POLICY ISSUE
NOTATION VOTE

January 26, 2004 SECY-04-0008

FOR: The Commissioners

FROM: William D. Travers
Executive Director for Operations

SUBJECT: PROPOSED AMENDMENT TO AGREEMENT BETWEEN THE STATE OF UTAH AND THE COMMISSION PURSUANT TO SECTION 274 OF THE ATOMIC ENERGY ACT OF 1954, AS AMENDED

PURPOSE:

Request Commission approval to publish the proposed amendment to the Agreement with the State of Utah in the Federal Register (FR) for public comment.

BACKGROUND:

Section 274b of the Act authorizes the Commission to enter into an agreement with the Governor of a State providing for the discontinuance of the regulatory authority of the Commission with respect to certain materials. In 1981, the Commission adopted the revised policy statement entitled, "Criteria for Guidance of States and Nuclear Regulatory Commission (NRC) in Discontinuance of NRC Regulatory Authority and Assumption Thereof by States Through Agreement" (46 FR 7540; January 23, 1981), as amended by statements published on July 16, 1981, (46 FR 36969), and on July 21, 1983, (48 FR 33376), referred to hereafter as the "policy statement." Subsequently, staff adopted an internal procedure for applying the policy statement to the processing of a new agreement. The criteria and approaches in these documents form the basis for the staff's evaluation of the Utah request.

DISCUSSION:

By letter dated January 2, 2003, Governor Michael O. Leavitt requested that the Commission enter into an amendment to the Agreement with the State of Utah, as amended, (the Agreement) under Section 274b of the Atomic Energy Act of 1954, as amended (Act). The amendment would add authority to regulate 11e.(2) byproduct material and the facilities that

CONTACT: Dennis M. Sollenberger, STP
301-415-2819

generate such material (uranium mill tailings and uranium mills). Governor Leavitt certified that Utah has a program for the control of radiation hazards that is adequate to protect public health and safety within the State with respect to the materials covered by the proposed amendment. The Governor further certified that the State wishes to assume the regulatory responsibility for those materials. Copies of Governor Leavitt's letter and Chairman Meserve's response are attached (Attachments 1 and 2, respectively).

The Governor requested that the Commission discontinue its regulatory authority for 11e.(2) byproduct material and allow Utah to assume regulatory authority for such material under an amendment to the Agreement. The effective date of the amendment to the Agreement proposed by Utah was October 1, 2003. However, the current schedule is for the amended Agreement to become effective March 31, 2004. The NRC staff sent comments to Utah on its final amendment application by letter dated June 27, 2003 (ML031810623). By letter dated July 18, 2003 (ML032060090), Utah responded to the NRC comments and submitted revised sections of its amendment application. By letter dated December 23, 2003, Utah also provided additional information concerning staffing and training (Attachment 3). The text of the proposed amendment to the Agreement is included in the proposed FR Notice in Attachment 4. The Act requires the proposed amendment to the Agreement to be published in the FR once a week for four consecutive weeks.

Utah modified the Utah Radiation Control Act to implement an amended Agreement for 11e.(2) byproduct material (uranium milling). Utah amended the Utah Administrative Code to adopt compatible regulations for uranium milling and 11e.(2) byproduct material management. The last of these regulatory changes became effective October 7, 2002. The NRC staff reviewed and forwarded comments on these regulations to the Utah staff by letter dated June 28, 2002 (ML021790511). The NRC staff review of Utah's final regulations verified that Utah resolved these comments and that Utah's rules contain all of the provisions, with the one caveat for their groundwater provisions discussed below, that are necessary in order for Utah's regulations to be compatible with the regulations of the NRC on the effective date of the amended Agreement between the State and the Commission (ML023290240). The NRC staff also verified that Utah will not attempt to enforce regulatory matters reserved to the Commission.

Utah regulations differ from NRC regulations with respect to the groundwater protection requirements for 11e.(2) byproduct material. Utah has proposed to use its existing groundwater regulations in lieu of the groundwater protection requirements in Appendix A to 10 CFR Part 40. The staff considers this approach an alternative standard and has addressed this issue in a separate Commission paper (SECY-03-0025, ML030210558). By staff requirements memorandum dated April 21, 2003 (ML031110278), the Commission approved the staff approach of proceeding with the alternative standard evaluation process in parallel with the evaluation of the amended Agreement application. The alternative standard process must be completed prior to the staff making a final recommendation to the Commission on the amendment proposal. The NRC staff is evaluating the comments received on Utah's proposal to use alternative groundwater standards and plans to present its recommendation on the alternative standards to the Commission, along with its final recommendation on the amendment to the Agreement.

NRC staff determined that the Utah position descriptions for technical staff specify educational requirements consistent with the educational requirements for equivalent NRC staff. Utah also has a formal plan for the training and qualification of technical staff that provides assurance of staff competence equivalent to the assurance provided by NRC Inspection Manual, Chapter 1246. However, Utah does not plan to hire the three new staff to implement the amended Agreement (two professional/technical and one administrative) until within three months of the effective date of the Agreement. Utah has qualified staff to implement the amended Agreement in the current program and has committed to using these staff members for the amended Agreement activities until the new staff are fully trained. The Division of Radiation Control believes that radiation control program work in the other program areas will be only minimally impacted due to the increased responsibilities of these staff during the transition period. (See December 23, 2003 Letter in Attachment 3.)

The NRC staff believes that the Utah request for an amended Agreement meets the criteria set forth in Section 274 of the Act and in the policy statement. This conclusion is based on the NRC staff's draft assessment (Attachment 5) of the proposed program against the seven criteria (Criteria 29 through 36) specific to 11e.(2) byproduct material Agreements contained in the policy statement.

As required by Section 274e of the Act, the proposed FR Notice that includes a summary of the staff's draft assessment of the proposed Utah regulatory program for regulation of 11e.(2) byproduct material and the text of the proposed amendment to the Agreement (Attachment 4) will be published for four consecutive weeks in the FR. The staff plans to receive and address public comments and, when successfully resolved, propose Commission acceptance of the amendment to the Agreement. This plan allows the Commission to satisfy the requirements of the Act.

The staff plans to follow the same process for Utah as it did for Wisconsin and Oklahoma. For the Wisconsin and Oklahoma Agreements, staff published the proposed Agreements in the FR for public comment, in parallel with the Commission's review of the staff's draft assessment. The staff will include an analysis of the public comments in a final paper to the Commission recommending a decision on the amendment to Utah's Agreement.

COORDINATION:

This paper has been coordinated with the Office of the General Counsel, which has no legal objection. The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objections.

RECOMMENDATIONS:

That the Commission:

1. Approve:

   Publication of the FR Notice (Attachment 4) for four consecutive weeks.

2. Review:

The proposed Agreement between the State of Utah and the NRC pursuant to Section 274 of the Act (Attachment 4), and the draft of the NRC staff assessment of the Utah regulatory program for 11e.(2) byproduct material (Attachment 5), in parallel with the publication of the proposed Agreement in the FR.

3. Note:

a. The staff will place a copy of the NRC Staff Draft Assessment (summarized in the FR Notice) in the NRC's Public Electronic Reading Room on the Internet at http://www.nrc.gov/NRC/ADAMS/index.html, and into ADAMS (Attachment 5).

b. The Office of Congressional Affairs will dispatch a letter to the cognizant Congressional Committees informing them that the Commission is considering entering into an amended Agreement with the State.

c. The Office of Public Affairs will issue a press release.

/RA Samuel J. Collins Acting For/

William D. Travers
Executive Director
for Operations

Attachments:
1. Letter from Governor Leavitt to Chairman Meserve (ML030280380)
2. Acknowledgment Letter from Chairman Meserve to Governor Leavitt (ML030280380)
3. Utah's December 23, 2003 Letter (ML033640565)
4. Draft Federal Register Notice, including the Proposed Amendment to the Agreement (ML)
5. NRC Staff Draft Assessment of the Proposed Utah 11e.(2) Byproduct Materials Program (ML)

EDO Principal Correspondence Control

FROM: Governor Michael O. Leavitt
State of Utah

DUE: 01/21/03

EDO CONTROL: G20030005
DOC DT: 01/02/03
FINAL REPLY:

TO:

Chairman Meserve

FOR SIGNATURE OF : ** PRI **

CRC NO: 03-0011

Chairman Meserve

DESC:

Request for an Amended Agreement Between NRC and the State of Utah

ROUTING:

Travers
Paperiello
Kane
Norry
Craig
Burns/Cyr
Merschoff, RIV
Virgilio, NMSS

DATE: 01/09/03

ASSIGNED TO: CONTACT:

STP Lohaus

SPECIAL INSTRUCTIONS OR REMARKS:

Template: SECY-017

E-RIDS: SECY-01

OFFICE OF THE SECRETARY
CORRESPONDENCE CONTROL TICKET

Date Printed: Jan 08, 2003 15:08

PAPER NUMBER:	LTR-03-0011	**LOGGING DATE:**	01/08/2003
ACTION OFFICE:	EDO		
AUTHOR:	Gov. Michael Leavitt		
AFFILIATION:	UT-GOV		
ADDRESSEE:	Chairman Meserve		
SUBJECT:	Request amended agreement between the NRC and the State of Utah..whereas the Commission will discontinue and the State of Utah will assume certain regulatory authority for by-product materials as defined in Section 11e of the AEA, etc;		
ACTION:	Signature of Chairman		
DISTRIBUTION:	RF..Encls to: EDO		
LETTER DATE:	01/02/2003		
ACKNOWLEDGED	No		
SPECIAL HANDLING:			
NOTES:	Commission Correspondence		
FILE LOCATION:	Adams		
DATE DUE:	01/23/2003	**DATE SIGNED:**	

MICHAEL O LEAVITT
GOVERNOR

STATE OF UTAH
OFFICE OF THE GOVERNOR
SALT LAKE CITY
84114-0601

OLENE S WALKER
LIEUTENANT GOVERNOR

January 2, 2003

The Honorable Richard A. Meserve
Chairman
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Meserve:

The purpose of this letter is to formally request an amended agreement between the U.S. Nuclear Regulatory Commission (NRC) and the State of Utah, as authorized under Section 274b of the Atomic Energy Act of 1954, as amended and Utah Code Annotated 19-3-104 under which the Commission will discontinue and the State of Utah will assume certain regulatory authority for by-product material as defined in Section 11e.(2) of the Atomic Energy Act, as amended (uranium mills and tailings) now under federal jurisdiction.

I certify that the State of Utah desires to assume regulatory responsibility for uranium mills and tailings and has a program for the control of radiation hazards adequate to protect the public health and safety with respect to materials within the State covered by this proposed agreement. In support of this proposal, I am submitting information describing the State's radiation control program and regulatory capabilities and a copy of the applicable State of Utah radiation control statute and rules. As part of the request, Utah is proposing to apply existing Utah groundwater protection standards in lieu of the NRC groundwater requirements in Appendix A to 10 CFR Part 40.

I would like the amended Agreement to become effective October 1, 2003. There will not be a formal signing ceremony.

I look forward to this amended Agreement and the transfer of regulatory authority over uranium mills and tailings to the State of Utah. Thank you for the support of NRC staff as the State has developed its program.

Sincerely,

Michael O. Leavitt
Governor

Enclosures: Final Application, Amended Agreement for Uranium Recovery Regulation, Division of Radiation Control, Utah Department of Environmental Quality, January 2003

MOL:DRN:dco/fs

FINAL APPLICATION
VOLUME 1
AMENDED AGREEMENT FOR URANIUM RECOVERY REGULATION

STATE OF UTAH

DIVISION OF RADIATION CONTROL
UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

JANUARY 2003

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UTAH FINAL APPLICATION
FOR
URANIUM MILLS AND MILL TAILINGS

Introduction (Criterion 29*)

Section 274 of the Atomic Energy Act of 1954, as amended, authorizes the U.S. Nuclear Regulatory Commission (NRC) to enter into agreements, whereby states assume certain regulatory functions that would otherwise be the responsibility of the NRC. Utah Code Annotated (UCA) 19-3-113 authorizes the Governor of Utah to enter into such an agreement. On April 1, 1984, Utah became an Agreement State with regulatory authority over 11e.(1) byproduct material, source material, and special nuclear material in quantities not sufficient to form a critical mass. On May 9, 1990, the agreement was amended to include the regulatory authority for land disposal within the State of source, byproduct, and special nuclear material received from other persons. At this time, the State of Utah wishes to amend its agreement to assume regulatory authority over byproduct material as defined in Section 11.e.(2) of the Atomic Energy Act for uranium mills and mill tailings.

The Utah Department of Environmental Quality (DEQ), Division of Radiation Control (DRC), will be the designated agency for carrying out these responsibilities. William J. Sinclair, Director of the Division of Radiation Control, will be the contact.

*1981/1983 Policy Statement "Criteria for Guidance of States and NRC in Discontinuance of NRC Regulatory Authority and Assumption Thereof by States Through Agreement"

Policy Statement (Criteria 29 and 35)

The following policy statement for assuming regulatory authority over byproduct material as defined in Section 11.e.(2) of the Atomic Energy Act for uranium mills and mill tailings has evolved through a discussion process involving scoping and task force meetings. During October and November 1999, the Division of Radiation Control conducted a series of stakeholder meetings with potential licensees and a series of public scoping meetings that were held in Salt Lake City, Tooele, Ticaboo, Blanding, and Moab, Utah. At the public scoping meetings, the Division requested comments on the following proposal: "The State of Utah will amend its current agreement with the Nuclear Regulatory Commission to regulate uranium mills and tailings." Thirty-nine persons offered oral comments during the public scoping meetings and approximately 150 persons attended the five scoping meetings. In addition, 8 written comments were received during a public comment period that ran from October 28, 1999 through December 6, 1999.

During the 2000 Utah legislative session, it was determined that it would be beneficial to form an Agreement State/Groundwater Authority task force to examine several issues relating to Agreement State status. The task force was initiated by the Utah Department of Environmental Quality in April 2000. Interested stakeholders that were invited to participate on the task force included licensee representatives, local community representatives, representatives of the Utah Radiation and Water Quality Boards, and a representative of the Utah Mining Association. The task force was jointly sponsored by the Department of Environmental Quality, Divisions of Water Quality and Radiation Control. After several meetings, the task force formulated a paper entitled: "Elements of a Utah Agreement State Program for Uranium Mill Regulation." In July

2000, the task force unanimously supported the Division of Radiation Control in pursuing Agreement State status as established in the "Elements" paper. The "Elements" paper described several aspects of a Utah Agreement State program including the following policy statement:

"The State of Utah recognizes the importance of and supports the uranium mining and milling industry. The State recognizes that to remain viable at this time, uranium mills must be able to engage in activities other than milling conventional mined uranium ores such as processing alternate feed materials for the recovery of uranium alone or together with other minerals. The State also recognizes its responsibility to ensure that all such activities are accomplished in a manner that is protective of human health and the environment. It has been a long-standing policy for the State to seek primacy for environmental programs. In this regard, the State believes that a cooperative uranium mills and tailings regulatory program will be of benefit to both the regulated community and Utah citizens. The advantages that the State can offer over the current Nuclear Regulatory Commission program include better communication with and participation of the public in uranium recovery issues, elimination of duplicative regulatory responsibilities, providing a more cost effective program for the regulated community, and establishing control of materials not currently being regulated (e.g. pre-1978 uranium mill tailings) while maintaining a regulatory program that is adequate and compatible with existing and future NRC regulations and policy. The elements within this application provide the framework for how the State of Utah would regulate uranium mills and tailings as an Agreement State."

Information on the task force, including minutes of each meeting can be found on the Division of Radiation Control website at http://www.deq.state.ut.us/EQRAD/MILLS/ATLAS/Deq_task.htm. Announcement of formation of the task force as well as periodic updates of the task force work were provided to the Utah Radiation Control Board.

The State of Utah also wishes to emphasize that this application does not include the former Atlas site in Moab, Utah, now known as the Moab Millsite. In accordance with the Defense Reauthorization Act, this property was transferred to the Department of Energy. The Moab Millsite has converted back to a Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I site with cleanup responsibility delegated to the Department of Energy.

Description of Organization (Criteria: 29, 33, and 35)

[See Appendix A for Organizational Charts]

The Department of Environmental Quality was created within state government on July 1, 1991 with the mission of safeguarding human health and quality of life through the protection and enhancement of the environment. The Governor with the advice and consent of the Senate appoints an Executive Director to administer the Department. The Department is made of six divisions: Division of Air Quality, Division of Drinking Water, Division of Environmental Response and Remediation (Superfund, Underground Storage Tanks, and Emergency Response), Division of Radiation Control, Division of Solid and Hazardous Waste, and the Division of Water Quality. Each Division is under immediate direction and control of a Division Director appointed by the Executive Director. There are five policymaking boards created within the department: the Air Quality Board, Radiation Control Board, the Drinking Water Board, the

Water Quality Board, and the Solid and Hazardous Waste Control Board. Division Directors are also appointed as an Executive Secretary to the appropriate Board.

The Utah Division of Radiation Control promotes a mission that protects Utah citizens and the environment from sources of radiation that constitute a significant health hazard. The Division is divided into two sections, Radioactive Materials and X-ray Section and Low-Level Waste and Environmental Monitoring Section. The Sections are supervised by two managers who are under the direction of the Division Director. Upon assumption of the program, the Low-Level Waste and Environmental Monitoring Section will be renamed the Environmental Monitoring, Uranium Recovery, and Waste Management Section. The staff is divided among the following: Radioactive Materials, X-ray, Indoor Radon, Envirocare, Waste Isolation Pilot Plant Transportation Project, and the Generator Site Access permit program. A seventh program, Uranium Mills, will be added. Division staff carry out the Division's mission and assist customers in complying with the rules.

The Radioactive Material and X-ray Section is responsible for coordinating and managing the use of radiation sources in hospital, clinical, medical, research, academic, and industrial facilities. This section performs the regulatory functions of licensing and inspecting facilities using radioactive material; registering and inspecting medical, academic, research, and industrial radiation producing equipment; and responding to radiation incidents.

The Low-Level Waste and Environmental Monitoring Section is responsible for licensing and inspecting the Envirocare low level waste facility; studying indoor radon concentrations and

disseminating information to the public relevant to health risks; directing and overseeing on-site stabilization or relocation of abandonment of uranium mill tailings; and maintaining the integrity and usefulness of radiation survey instruments.

The Radiation Control Board is appointed by the Governor with the consent of the Utah Senate and guides development of state radiation control policy and rules in the state. The board is made up of 13 members, one of whom is the Department of Environmental Quality Executive Director or designee, and are appointed by the Governor with the advice and consent of the Senate. The Department and Division staff submit recommendations for Board members to the Governor for consideration. The appointed members are to be knowledgeable about radiation protection and represent the following interests in the community: a physician; a dentist; a health physicist or other professional employed in the field of radiation safety; three representatives of the regulated community, at least one whom represents the radioactive waste management industry and one who represents the uranium milling industry; a registrant or licensee representative from academia; one representative of a local health department; one elected county official; and three members of the general public, at least one of whom represents organized environmental interests. The board is required to meet at least quarterly to carry out the duties described in section 19-3-103.5 of the Utah Code Annotated. The Board typically meets on a monthly basis except February and July. The Board also travels, as resources allow, to southeastern Utah and Tooele County for one of the monthly meetings during the year. It may be necessary to consider an increase in the number of times that the Board meets in southeastern Utah as a result of uranium recovery regulation. Board members are subject to the Utah Public Officers' and

Employees' Ethics Act. Information regarding disclosure and conflict of interest for Board members are found in Appendix A.

The State of Utah rules were amended to include an environmental report prepared by the licensee that will be reviewed by the Division of Radiation Control.

Outside consultants will not be used but the Division has the ability to contract with outside consultants through its fee schedule with mutual consent of the licensee.

The medical consultant with expertise in emergency medicine that would be used by the Division is the Radiation Emergency Assistance Center/Training Site in Oak Ridge, Tennessee. The Department of Energy Idaho National Engineering and Environmental Laboratory would also be used as a resource.

Legal support is through the Attorney General's Office. The Utah Attorney General's Office provides legal consultation services on all environmental issues that the Division may need to address. The Attorney General's office can provide criminal investigative assistance and prosecution.

Groundwater Authority (Criteria 29, 33, and 35)

The Division of Radiation Control administers both groundwater permitting and radioactive material licensing for disposal facilities and uranium mills. This process has been made more effective by utilizing existing provisions of the Utah Water Quality Act which allows the Water

Quality Board and Executive Director to designate the Director of the Division of Radiation Control as a Co-Executive Secretary to administer provisions of the Water Quality Act for the identified facilities [see Utah Code Annotated (UCA) 19-5-106 and 19-5-104 (1),(k)]. The DRC Director has been designated as a Co-Executive Secretary of the Water Quality Board and given legal authority to issue, administer, and enforce specific groundwater permits under the Utah Water Quality Rule UCA R317-6 as applied to the following facilities: Envirocare, Rio Algom, International Uranium Corporation, and Plateau Resources Limited, and as allowed under the provisions of UCA 19-5-104(1)(k). No separate involvement of the Division of Water Quality staff is required although they are available to consult with the DRC Director regarding interpretation of rules and other technical or procedural matters relating to groundwater protection. Appeals of enforcement proceedings and permit issues relating to groundwater would be through the Utah Water Quality Board. The Division has substituted the Administrative Rules for Ground Water Quality Protection, R317-6 for groundwater standards provided in Appendix A, 10 CFR Part 40 (EPA Rules 40 CFR Part 192). Enclosed in Appendix G is a packet of information previously submitted including:

(1) A cover letter of October 23, 2002 requesting review of information to justify an "alternate standard" under the Uranium Mill Tailings Radiation Control Act (UMTRCA);

(2) Summary of the process used to determine how to best regulate groundwater at Utah uranium mill facilities;

(3) Executive Summary - Comparison of NRC Groundwater Protection Criteria in 10 CFR Part 40, Appendix A with Utah Ground Water Quality Protection Rules (UAC R313-6)

(4) Detailed Comparison of NRC Groundwater Protection Criteria in 10 CFR Part 40, Appendix A with Utah Ground Water Quality Protection Rules (UAC R313-6)

Staffing (Criteria 29, 34, and 35)

(See also Appendix B)

Up to three new positions will be created within the Division for the Uranium Mill Program that will be combined with an existing groundwater hydrologist position within the Division that already coordinates the uranium mill issues. Eventually, this groundwater hydrogeologist will be responsible for the inspection and licensing of groundwater monitoring for the Uranium Mill Program. A health physicist will be responsible for radiation safety license reviews and inspections of mills as well as inspection of all radioactive material licensees in southern Utah (some 28 licensees). An engineer will be responsible for the inspection and licensing of new facilities, upgrading existing facilities, and closing facilities. An Office Technician II will be responsible for administrative support for the program. Staff currently utilized for licensing and oversight of Envirocare will also assist with the regulation of the Uranium Mill Program.

Management of the Uranium Mill Program will be under the direction of the Low-Level Waste and Environmental Monitoring Section Manager. The 28 radioactive material licensees that the health physicist inspects will be under the direction of the Radioactive Material and X-ray Section Manager.

The Division will staff the program by submitting a request, once it is known when the amended Agreement is to be signed, to the Department of Environmental Quality Human Resource

Management Office to recruit the three positions. The positions have already been authorized and established in the Department FY 2003/2004 budgets. It is anticipated that recruitment may commence as early as July 1, 2003 depending on the status of the amended Agreement. This would be in anticipation of an amended Agreement being signed on or before October 1, 2003. Three months of fees collected during January - March 2002 will fund new staff and have them in place prior to signing of the amended Agreement. The new staff will be mentored by existing staff that have been qualified in key areas prior to the new staff being hired. By July 1, 2003, the following existing Division of Radiation Control staff will be qualified in the uranium mill program area:

Specialty Area	Staff Members to be Qualified
Health physics	Gwyn Galloway, John Hultquist, Boyd Imai
Engineering	Steve Palmer, Woody Campbell
Groundwater	Loren Morton, Rob Herbert, Brian Hamos

The qualification process will consist of completion of NRC "core" courses (many of the above staff have accomplished this) in each specialty areas. Training will also be provided through accompaniment of NRC inspectors from NRC Region IV during routine mill inspections of the International Uranium White Mesa Mill, the Rio Algom facility, and the Plateau Resources Shootaring Canyon Mill. Opportunity will also be taken for inspection training during Region IV inspection of the Envirocare facility 11e.(2) operations. In addition, arrangements have been made with the Colorado Department of Public Health and Environment Radiation Services Division to accompany state of Colorado inspectors on a training/tour/routine inspection of the Cotter Corporation Mill in Canon City, Colorado. As the above staff members are qualified as

mentors, they will be available to work with newly hired staff prior to the signed amended Agreement to the point in which newly hired staff achieve uranium mill competency. Once newly hired staff are competent to work independently, the mentors provide adequate backup in this specialty area as needed.

The new staff will also go through program orientation and receive the opportunity to participate in Nuclear Regulatory Commission or equivalent, State, Federal Emergency Management Agency, Department of Energy, and other job related courses. The engineer, health physicist, and hydrogeologist will have the opportunity to take the following NRC or equivalent courses as needed: Inspection Procedures, Introduction to Licensing Practices and Procedures, Introduction to Health Physics, Nuclear Transportation Course, Radiation Protection Engineering, Radiological Emergency Response Operations Training, and available courses related to uranium mill and mill tailings. They will also review the Radiation Control Rules and become familiar with Regulatory Guides and reference materials. The NRC Training guidance documents (NRC Inspection Manual Reports 1246A-12 and A-13, Section XIII: "Training Requirements for Uranium Recovery Project Manager/ Technical Reviewer" and Section XII "Uranium Recovery Inspector NRC Inspector Qualification Journal") will be utilized by the Division as references for training inspectors and license reviewers for uranium mills. The office technician will be given the opportunity to take State training programs as they become available.

In order to ensure that an adequate number of staff were to be hired to fulfill the requirements of the uranium mill and tailings regulatory program, an evaluation was conducted. As mentioned previously, the staff to be hired are 1 health physicist, 1 engineer, and 1 office technician. The

groundwater hydrologist position that was anticipated will be filled by an existing position who has been coordinating uranium mill issues for the Division. It was determined that the professional staff (engineer, health physicist, groundwater hydrologist) would be available for 260 work days (52 weeks/year X 5 days/week). Factors of vacation (10 days assumed), paid holidays (11 days), and sick leave used (5 days) reduced the availability of 1 staff person to 243 days per year. Professional staff consisting of three persons would provide the Division with the availability of 702 staff days. Office technician administrative functions were not factored into the available staff days. This includes such administrative functions as filing, correspondence, GRAMA (similar to FOIA) requests, equipment and supplies, and travel arrangements.

To evaluate the staff availability, inspection and licensing activities were estimated on a yearly basis.

INSPECTION WORKLOAD/YEAR

Average Inspections per year	# of staff involved	Staff days per inspection	Enforcement factor [1]	Inspection days per year [2]
Envirocare - 2	3	5	10	50
Rio Algom - 2	2	3	0	12
IUC - 2	3	5	5	40
Plateau - 2	2	3	0	12
Totals				114 days

[1] Enforcement factor may include Notice of Violation/Order preparation, evaluation of responses regarding corrective actions, final settlement or administrative hearing.

[2] Does not include travel time to and from Southeastern Utah estimated to be 6 hours/each way. Rio Algom and White Mesa trips to be combined, Plateau trips will be single trip.

LICENSING WORKLOAD/YEAR

Licensee	Significant licensing actions/year	Public participation factor [1]	# of staff involved	Staff days per action	Licensing staff days
Envirocare	4	48	3	10	168
Rio Algom	1	12	2	5	72
IUC	4	48	3	10	168
Plateau	1	12	2	5	72
Totals					480 days

[1] Public participation factor: public hearing (1 day), evaluate comments (5 days), final decision (2 days), administrative hearings (4 days) = 12 days

To determine staff availability for a year, the inspection days workload (114 days) was added to the licensing days workload (480 days) for a total of 594 days. A 15% contingency factor (89 days) was also included which would include training and other non-direct activities.

In conclusion, staffing appears adequate:

> 594 days (inspection/licensing workload) + 89 days (15 % contingency) = 683 days
> 702 staff availability days estimated = + 19 staff availability days (not including the administrative services provided by the office technician)

Funding (Criteria 29 and 35)

The DRC will use a combination of annual operating fees and hourly review fees. The operating fees were initially established in the Radiation Control Act as a result of the passage of 1 substitute SB96 during the 2002 General Session of the Utah Legislature. The fees, beginning in FY2004 will be established and transferred to the DEQ annual fees document. A copy of the FY2004 proposed fee schedule is included in Appendix H. This fee schedule will be offered for approval during the 2003 General Session of the Utah Legislature. An hourly review fee was established in the DEQ annual fees document during the 2002 legislative session that will be effective upon program transfer. Annual operating fees will differentiate between closed,

standby, and operating facilities. Review of NRC generated data regarding review fees and operating fees suggested that there will be sufficient revenue generated to fully fund the state program.

Statutory Changes (Criteria 29 and 35)
(See also Appendix C)

The Radiation Control Act was amended during the 2002 General Session of the Utah Legislature by 1 substitute Senate Bill 96 (enrolled copy provided in Appendix I) to allow the Radiation Control Board to establish rules for licensing, operation, decontamination, decommissioning, including financial assurance, and reclamation of sites, structures, and equipment used in conjunction with possession, use, transfer, or delivery of source and byproduct material and the disposal of byproduct material (uranium or thorium mill tailings and related wastes). The Radiation Control Act was also amended to add a representative of the uranium milling industry and another member of the public to the Radiation Control Board. Governor Leavitt signed the bill on March 26, 2002. On November 22, 2002, following confirmation by the Utah Senate, Royal I. Hansen (general public) and Robert Pattison (uranium milling industry) were appointed by Governor Leavitt to the two new Board positions established by changes to the Act.

The following statutory changes to the Utah Radiation Control Act to implement an amended Agreement for uranium recovery regulation were accomplished during the 2002 General Session of the Utah Legislature:

19-3-103(3)(d) was modified to include three representatives of the regulated industry, at least one representing the radioactive waste management industry and at least one representing the uranium mill industry; and to modify (h) to include three members of the general public, at least one whom represents organized environmental interests. This change will expand the Board to 13 members. This is to ensure that the Board remains an odd-numbered membership as required by state policy.

19-3-104(d)(i) (ii) was added to give the Radiation Control Board the authority to make rules as necessary regarding the possession, use, transfer, or delivery of source and byproduct material and the disposal of byproduct material to establish requirements, for the licensing, operation, decontamination, decommissioning, including financial assurance and the reclamation of sites, structures, and equipment used in conjunction with such activities.

19-3-105(a) was added to establish fees under 19-3-105(b)(i)(ii),(c),(d)(i)(ii),(e),(f), and (6)(a)(b) for the regulation of source and byproduct material at uranium mills or commercial waste facilities. From January 1, 2003 through March 30, 2002, fees for uranium mills or commercial sites disposing of or reprocessing byproduct material were established at $6,667 per month and $4,167 per month for uranium mills determined to be on standby status. On or after March 31, 2003, the same fees apply, but only if the NRC has granted an amended Agreement to Utah on or before March 31, 2003. After March 31, 2003, fees are to be paid (same schedule) either beginning October 1, 2003 (if amended Agreement has been achieved), or the beginning the date in which NRC grants the amended Agreement. For payment periods after July 1, 2003, the fees are established under the authority of the Department of Environmental Quality fee schedule

approved by the Utah Legislature. Annual fees are deposited in the Environmental Quality Restricted Account.

In addition to the changes described above, administrative changes were made to:

19-1-108(2)(a) which adds the fees collected as described above to the Department of Environmental Quality Restricted Account

19-3-104(1)(a)(b) was added to indicate decommissioning includes financial assurance and source and byproduct material have the same definition as described in the Atomic Energy Act. This resulted in renumbering of subsequent paragraphs - (2)(3)(4).

19-3-104(11)(b) was added to clarify that only commercial low-level waste facilities are subject to siting criteria rules (already established under Utah Radiation Control Rules R313-25-3).

There were other administrative changes that resulted in some renumbering of portions of 19-3. These are best detailed in the enrolled copy of 1 substitute SB96 found in Appendix I in which the changes to the Radiation Control Act, 19-3 are underlined and striken as appropriate.

Reservation of Authority to the United States

(Criterion 30)

State rules will be modified to reserve the authority to the United States in UMTRCA as stated in 10 CFR 150.15a as follows: establishment of minimum standards for reclamation, long-term surveillance or maintenance, and ownership of byproduct material; prior to license termination, determine that licensee has complied with decontamination, decommissioning, reclamation standards, and ownership standards; prior to license termination, the take title provision will be invoked at option of the State; authority to require monitoring, maintenance and emergency measures after license termination; authority to permit use of surface or subsurface estate, or both of the land transferred per UMTRCA; and authority to exempt land ownership transfer requirement of Section 83(b)(1)(A).

Rulemaking (Criteria 29 and 35)

(See also Appendix J)

The Division of Radiation Control has adopted applicable parts of 10 CFR 40 by reference (disclaiming any intent to regulate materials or activities over which the NRC retains jurisdiction) with necessary changes to reflect primacy of the Utah program (e.g., recognition of the Executive Secretary, etc.). With the adoption by reference of the NRC regulatory program, it is recognized that guidance has been published that is intended to provide clarification to the various regulatory elements. The Division will follow the published NRC guidance documents unless doing so will compromise protection of human health and the environment.

The DRC recognizes that it cannot make a fundamental change to an Atomic Energy Act provision (e.g., the definition of byproduct material). The DRC further recognizes that pursuant to provisions of the Radiation Control Act [19-3-104 (6) and (7)], it can adopt rules more stringent than federal law only after a public hearing and a written finding based on evidence in the record that the federal regulations are not adequate to protect public health and the environment.

Statutory authority to make rules was granted to the Board during the 2002 Utah legislative session per 19-3-104(4)(d) of the Radiation Control Act. A determination was made that the following rules would need to be modified or proposed to ensure compatibility with the requirements of 10 CFR Part 40:

R313-22-33(1)(e), "General Requirements for the Issuance of Specific Licenses" [modified]

R313-70-7(2)(b)(c)(d), "License Categories and Types of Fees for Radioactive Material Licensees" [modified]

R313-17-2(1)(a), "Administrative Procedures" [modified]

R313-15-1001, "Waste Disposal - General Requirements"

R313-19-2, "Requirements of General Applicability to Licensing of Radioactive Material" [modified]

R313-22-39, "Executive Secretary Action on Applications to Renew or Amend" [modified]

R313-24, "Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements" [new section incorporating 10 CFR Part 40 by reference with exception of groundwater requirements]

The rulemaking process involves approval by the Radiation Control Board of each proposed rule for filing with the State Division of Administrative Rules. All State Agencies use the rulemaking procedures of the State Division of Administrative Rules and are bound by such procedures. Proposed rules or changes to proposed rules are published in the Utah Bulletin for public comment on the first or fifteenth of each month. The rulemaking process requires a 30-day public comment period. Announcement of the public comment period is made in the two major daily Salt Lake newspapers as well as newspapers in the impacted communities such as Moab and Blanding. Following the comment period, an assessment of needed changes is made. If no comments are received or the changes are non-substantive, the rules are submitted to the Radiation Control Board for final approval at the next Board meeting, and an effective date is established. The effective date is usually set for one week after the approval date to allow for the filing of the paperwork with the Division of Administrative Rules. Rulemaking has to be completed within 120 days of the initial filing date or the process must commence again. During this rulemaking process, comments were received from stakeholders regarding several of the rules (see Table A). As a result, it was determined that the comments required substantive changes to the initial proposed rule. For those rules, the comments were evaluated and a determination made if changes were needed (summarized in a response document). The rules requiring substantive changes then were re-drafted with the needed changes as a "change to a proposed rule". These modified rules were approved for filing by the Radiation Control Board

and submitted to the Division of Administration Rules. The rules were subject to another 30-day public comment period. Table A provides a summary of the rulemaking steps followed for each of the seven rules including when the rules were made effective.

Table A
Summary of Uranium Mills/Tailings Rulemakings
Division of Radiation Control - 2002

Rule	Approved by RCB for pc Published in State Bulletin	Commence Public Comment Period	Public comment period extension	Written comments/ Response to comments	Final approval by RCB Effective Date
R313-22-33(1)(e)	4/5/2002 5/1/2002	5/1/2002	6/5/2002	No	6/7/2002 6/14/2002
R313-70-7(2)(b)(c)(d)	4/5/2002 5/1/2002	5/1/2002	6/5/2002	Yes 6/4/2002	
R313-17-2(1)(a)	4/5/2002 5/1/2002	5/1/2002	6/5/2002	Yes 6/4/2002	
R313-15-1001	4/23/2002 5/15/2002	5/15/2002	6/28/2002	No	7/22/2002 7/22/2002
R313-19-2	4/23/2002 5/15/2002	5/15/2002	6/28/2002	Yes 7/12/2002	
R313-22-39	4/5/2002 5/15/2002	5/15/2002	6/28/2002	No	7/22/2002 7/22/2002
R313-24	4/5/2002 5/1/2002	5/1/2002	6/28/2002	Yes 7/12/2002	

Table A
Summary of Uranium Mills/Tailings Rulemakings
Division of Radiation Control - 2002

Rule	Approval by RCB Re-published in State Bulletin	Commence Public Comment Period	Public comment period ends	Written comments/ Response to comments	Final approval by RCB Effective Date
R313-22-33(1)(e)	N/A	N/A	N/A	N/A	N/A
R313-70-7(2)(b)(c)(d)	6/7/2002 7/1/2002	7/1/2002	7/31/2002	No	9/6/2002 9/10/2002
R313-17-2(1)(a)	6/7/2002 7/1/2002	7/1/2002	7/31/2002	No	9/6/2002 9/10/2002
R313-15-1001	N/A	N/A	N/A	N/A	N/A
R313-19-2	7/22/2002 8/15/2002	8/15/2002	9/16/2002	No	10/4/02 10/7/02
R313-22-39	N/A	N/A	N/A	N/A	N/A
R313-24	7/22/2002 8/15/2002	8/15/2002	9/16/2002	Yes 9/20/2002	10/4/02 10/7/02

Appendix J provides a copy of the rulemaking packet submitted to the NRC on October 9, 2002 which included each of the approved rules in "final" form as filed with the Division of Administrative Rules. Administrative rules adjudicative proceedings are found in R15-5, the entire text of Administrative Rules Procedures (R15) is provided in Appendix J as well. Also provided in Appendix J are copies of the Division response documents to stakeholder comments.

In addition, the NRC suggested in the letter confirming compatibility of the Utah rules of November 22, 2002 (see Appendix J) that a change be made to R313-24-1 by inserting "source material in" following the words "possession and use of" in the first line. This change has been accomplished by filing a non-substantive rule change (see Appendix J) with the Division of Administrative Rules on December 19, 2002. If accepted as a non-substantive change, it may be effective as early as January 1, 2003. If Administrative Rules rejects the non-substantive change explanation, the Division will proceed with normal rulemaking at either the January or March 2003 Radiation Control Board meeting.

The Utah Radiation Control rules were modified to include consideration of environmental impacts (see discussion below under **Suggested State Legislation-Model State Act)** (Criterion 31). This was accomplished in R313-24-3.

Suggested State Legislation-Model State Act (Criterion 31)

The Utah Radiation Control Rules will be modified to include consideration of environmental impacts (including radiological or non-radiological impacts, surface and groundwater impacts, consideration of alternatives to the licensed activities, and long-term impacts of licensed activities) for new licenses and major license amendments. The analysis will be included in the safety evaluation report for new licenses and in a statement of basis for major license amendments. New licenses and major license amendments will be available for public comment at least 30 days following the publication of notice. R313-17-2, 3, and 4 of the Utah Radiation Control Rules provides an opportunity for written comment, as well as a public hearing prior to

the issuance, or amendment of a license. Once the Executive Secretary of the Utah Radiation Control Board reaches a final decision on a new license or amendment to a license, parties or individuals may appeal such decisions to the Utah Radiation Control Board. The Board acts as a judge in such matters in accordance with Utah administrative procedures such as determining standing, taking testimony, and rendering a decision to either modify, set aside, or support the final decision of the Executive Secretary.

Licensing Program (Criteria 29 and 35)

The licensing process will follow the elements of the current radioactive materials program which is subject to periodic program review by the NRC. License renewal, amendments, reclamation plans or revisions to reclamation plans or new licenses may be subject to public comment and/or public hearing. Criteria of R313-17-1 through 4 of the Utah Radiation Control Rules would apply. Rule R313-17 will be modified to add the uranium recovery facility category designation as a category that public comment is applicable. The Division would follow current policy as to the differentiation between minor and major amendments and the need for public comment. This policy established in 1993 applies the following criteria:

> Minor amendments to a license do not require public comment. These amendments do not substantially alter the license conditions or reduce the capability of the licensee to protect human health and the environment.
>
> Major amendments to a license require public notice. These amendments are necessary to enable the licensee to respond in a timely manner to common variations in the types

and quantities of the materials, technological advancements, changes necessary to comply with new rules, and changes that substantially alter the facility or its operations.

Upon application for a license amendment, a determination of major or minor amendments will need to be made.

Existing NRC licenses will be transferred to the State upon program relinquishment by the NRC and will be converted into a "state license" which will include appropriate Utah regulatory citations in lieu of "Part 40" language and will incorporate the Utah administrative process (e.g., Executive Secretary) where necessary. The license conditions will remain unchanged except for the above until a license amendment request or license renewal. The current expiration date of the license will remain the same.

The Division of Radiation Control Technical Procedures for License Review will be followed during the review process (see Appendix E). The NRC Standard Review Plan for Uranium Mills and Mill Tailings as well as the checksheet will be used as guidance documents during the license review process. Licensing evaluations or analyses will include radiological safety aspects in occupational or restricted areas and environmental impacts to population or restricted areas surrounding facilities. As necessary, evaluations will include pre-licensing visits to obtain relevant information. Items which will be evaluated include, but are not limited to, the following: general statement of proposed activities; scope of proposed action; specific activities to be conducted; administrative procedures; facility organization and radiological safety responsibilities, authorities, and personnel qualifications; licensee audits and inspections;

radiation safety program, control and monitoring; radiation safety training programs for workers; restricted area markings and access controls; review of monitoring data, exposure records, license audit and inspection records as well as other records for existing mills; environmental monitoring; radiological emergency procedures; product transportation; tailing management facilities and procedures; site and physical plant decommissioning procedures, other than tailings; and employee exposure data and bioassay programs.

The environmental analysis will be part of the license review process and will consist of a detailed and documented evaluation of the following items: topography; geology and seismology; hydrology and water quality; meteorology; background radiation, tailings retention systems; interim stabilization, reclamation, and site decommissioning programs; radiological dose assessments (source terms; exposures pathways; dose commitment to individuals; dose commitment to populations; evaluation of radiological impacts to the public to include determination of compliance with State rules and Federal regulations and comparison with background values; occupational dose; radiological impact to biota other than man; and radiological monitoring programs, pre-operational and operational); impacts to quality and quantity of surface and groundwater; environmental effects of accidents; and evaluation of tailings management alternatives in terms of regulations. The staff will also review the following during preparation of the environmental analyses for a new uranium recovery facility: ecology; environmental effects of site preparation and facility construction on environment and biota; environmental effects of use and discharge of chemicals and fuels; and economic and social effects.

The Division will use the following NRC publications as guidance documents (when applicable) during the license review process: Regulatory Guide 3.11, "Design, Construction, and Inspection of Embankment Retention Systems for Uranium Mills"; 3.111, "Operational Inspection and Surveillance of Embankment Retention Systems for Uranium Mill Tailings"; 3.51, "Calculational Models for Estimating Radiation Doses to Man from Airborne Radioactive Materials Resulting from Uranium Milling Operations"; 3.56, "General Guidance for Designing, Testing, Operating, and Maintaining, Emission Control Devices at Uranium Mills"; 4.14, Radiological Effluent and Environmental Monitoring at Uranium Mills"; 8.22, "Bioassays at Uranium Mills"; 8.25 "Air Sampling in the Workplace"; 8.30, "Health Physics Surveys in Uranium Mills"; 8.31, "Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills will be As Low As is Reasonably Achievable". Other guidance documents that may also be use as resources are I.C.R.P. Report 29: "Radionuclide Release into the Environment: Assessment of Doses to Man" as well as N.C.R.P. Report 76, "Radiological Assessment: Predicting the Transport, Bioaccumulation and Utake by Man of Radionuclides Released to the Environment".

The Division's health physicist and hydrogeologist will perform operation data reviews and required the licensee to submit semi-annual radioactive material effluent release reports as well as semi-annual environmental monitoring reports. The written reports will be required to be submitted within 60 days after January and July 1 of each year. The licensee will be required to specify the quantity of each of the principle radionuclides released to unrestricted areas in liquid and gaseous effluents during the pervious six

months of operation. The data for the effluent release will be required in a manner that will permit the physicist and hydrogeologist to confirm the potential annual radiation doses to the public and confirm the dose to receptors.

The State will recognize already established performance-based license conditions for uranium mills and tailings. The State is willing to consider future performance-based license conditions on a case by case basis with each licensee. An issue that will need to be addressed is the appropriate method for substantive involvement of the public while still achieving the operational objectives of performance based licensing.

Inspection Program (Criteria 29 and 35)

There will be at least four facilities that will require inspection: Lisbon (Rio Algom), White Mesa (International Uranium), Shootaring Canyon (Plateau Resources), and Clive (Envirocare of Utah). Currently, Envirocare of Utah in Tooele County is subject to quarterly inspections by the NRC using staff from offices in Arlington, Texas sometimes supplemented by NRC headquarters staff from Rockville, Maryland. Envirocare inspections would be assigned to the "Envirocare team" and incorporated into the overall oversight and inspection schedule now in use for low-level radioactive waste.

A health physicist will be hired to inspect each of the mills at least on a quarterly basis. The mill inspection frequency schedule will be reviewed regularly and adjusted as needed for different circumstances (e.g., good compliance, standby not operating, etc.). The health physicist will be housed in the DRC office in Salt Lake City but will travel to

southern Utah at least one week per month to accomplish both regular (quarterly) and oversight inspections. This health physicist will also be responsible for the inspection of 28 other radioactive material licensees in southeast and southwest Utah. The engineer and groundwater hydrogeologist will provide inspection support as needed to the health physicist in such areas as groundwater sampling evaluations, split groundwater sampling, oversight of new engineering construction or oversight of closing facilities.

he State inspection program will incorporate all the elements of the current radioactive materials inspection program (see Appendix D for Inspection and Enforcement procedures) relevant to Part 40 uranium recovery facilities which is subject to periodic program review by the NRC. Items that will be examined during inspections will be consistent with items evaluated during licensing. The Division inspectors will perform independent surveys and sampling in addition to examining aspects of license performance as follows: administration; milling processes, including any additions, deletions or operational changes; accident and incidents; notices, instructions, and reports to workers in accordance with R313-18 rules; action taken on previous findings; physical plant facilities of the mill tour to determine compliance with regulations and license conditions; tailings waste management to determine compliance with rules and license conditions (NRC Regulatory Guide 3.11.1 see Appendix E); records; respiratory protection and bioassays to determine compliance with license conditions and R313-15 rule; effluent and environmental monitoring; training programs; and transportation and shipping.

A complete inspection will be performed at least annually and will include independent surveys and sampling. The NRC inspection form for Uranium Mills as well as the NRC Inspection Manual, Chapter 2801, "Uranium Mill and 11e.(2) Byproduct Material Disposal Site and Facility Inspection Program" will be utilized as guidance documents by the State inspectors during an inspection. Enforcement actions will be in accordance with the Utah Radiation Control Rules and existing enforcement guidance (used for the radioactive materials and low-level waste program, see Appendix D for Inspection Procedures). All enforcement actions can be appealed through the Utah Radiation Control Board and thereafter, to the appropriate court. The DRC will also conduct periodic split sampling with facilities regarding waste materials or groundwater samples.

Rules Equivalent to NRC Regulations (Criterion 32)

In addition to future adoption of applicable parts of 10 CFR 40 by reference (disclaiming any intent to regulate materials or activities over which NRC retains jurisdiction), pending the legislative process, the DRC has the following Utah Administrative Code (UAC) rules equivalent to NRC Regulations:

R313-15, "Standards for Protection Against Radiation"

R313-18, "Notices, Instructions and Reports to Workers by Licensees or Registrants-- Inspections;

R313-19, "Requirements of General Applicability of Licensing of Radioactive Material

(Packing and Transportation of Radioactive Material is in this section.)

Part of the regulation for certain portions of 10 CFR 150, "Exemptions and Continued Regulatory Authority in Agreement States and in Offshore Waters under 10 CFR 50.31(b)" is met through the Radiation Control Act, Utah Annotated Code 19-3, and will be met through the adoption of applicable parts of 10 CFR 40 by reference (disclaiming any intent to regulate materials or activities over which the NRC retains jurisdiction). The Utah Radiation Control rules will be modified to include a written environmental impact analysis process.

Pending the adoption of 10 CFR 40 and modifications of the rules, the DRC has rules that are up to-date and compatible with the NRC rules (see Appendix C, State Regulation Status form).

Instrumentation (Criterion 36) and **Laboratory Support** (Criterion 34)

The State has sufficient field and laboratory instruments to ensure licensee's control on materials and validate licensee's measurements. Appendix F has a list of the State's instruments and Instrument Calibration Procedures. Instruments are calibrated as necessary but not less than annually except for those used by the Radioactive Material Section which are calibrated semi-annually.

Laboratory instruments are available through the Division of Radiation Control as well as through the State Health Laboratory which have the capabilities for quantitative and qualitative analysis of radionuclides associated with natural uranium and its decay chain, primarily, U-238, Ra-266, Th-320, Pb-210, and Rn-222 in a variety of sample media. If the State Health Laboratory does not have the analytical capabilities needed, the Division may contract with a commercial laboratory to perform quantitative or qualitative analysis.

The State Health Laboratory has established acceptable criteria for quality assurance and participates in the National Environmental Laboratory Accreditation Program. The Environmental Protection Agency's program for laboratory performance is no longer available. The State Health Laboratory can provide the Division staff analytical reports within approximately 30 days. Arrangements can be made for the State Health Laboratory to handle a large number of samples from a major accident in a timely manner. However, the State Laboratory is limited to the number of samples it is capable of running and may have to contract a commercial laboratory for a timely turn around.

The Division has gamma spectroscopy capabilities in-house and a portable spectroscopy unit for field measurements, both qualitative and quantitative. In-house gamma spectroscopy capabilities include the following media: soil, water, and air (filters). The EG&G Ortec gamma spectroscopy unit is a germanium detector connected to a desk top computer with EG&G gamma vision software. The portable unit is a Berkley Nucleonics Corporation Smart Area Monitor. Employees in the environmental section have extensive

experience in dealing with the collection and analysis of naturally occurring radioactive material contaminants in soil, water, and air samples.

Arrangements for Discontinuing NRC Jurisdiction

As stated in the licensing program section of this application, existing NRC licenses will be transferred to the State upon program relinquishment by the NRC and will be converted into a "state license" which will include appropriate Utah regulatory citations in lieu of "Part 40" language and will incorporate the Utah administrative process where necessary. The license conditions will remain unchanged except for the above until a license amendment request or license renewal. The current expiration date of the license will remain the same. The license transfer will not give rise to a requirement to make any changes to existing facilities.

There will be a transition phase for staffing as described in the "staffing" section. Three months prior to signature of the Governor and Chairman of the amendment to the Agreement, recruitment will begin for staff as previously discussed in the staffing section. While staff are being recruited and hired, existing staff as described in the "staffing section" will conduct necessary activities relating to the uranium mill program. Existing Envirocare staff will assume the duties relating to the licensing and inspection of the Envirocare 11e.(2) facility immediately

It is anticipated that the majority of the workload will involve Envirocare and International Uranium White Mesa Mill of which existing staff have good familiarity. On the job training (mentoring) will be provided by existing staff to new staff and it is

anticipated that the new staff will be fully functional and independent within the shortest time possible. Core training will be provided as previously discussed to the new staff.

The NRC will transfer the inspection and licensing files of the four facilities to the DRC during the transition period. Any licensing or inspection actions underway or in transition at the time of program transfer will be provided to the DRC. The DRC recommends that the NRC Headquarters and Region IV representatives schedule (as an amendment Agreement appears imminent) a meeting to discuss the transition tasks that will be needed. The NRC is encouraged to complete Utah work prior to the transfer. Discussion of tasks to be deferred to the DRC should be discussed as part of the transition meeting and scheduling process. The DRC recommends that the NRC archive the license and inspection documents in accordance with federal record management prior to the transfer of site files.

DRC has provided in Appendix K copies of the original Agreement of 1984, the amended Agreement for low-level waste authority in 1990, and a draft amended Agreement for uranium mills and tailings authority for 2003.

Summary

The State of Utah is committed to administering a high quality Agreement State Program that will protect public health, public safety, and the environment. The Division has been granted statutory authority and has undertaken activities in preparation for regulating uranium mills and mill tailings. The Division has trained professional staff and will be

hiring new personnel in areas of administration, technology, and operational support. It is obtaining necessary statutory authority to assume Agreement State responsibilities regarding the regulation of uranium mills and mill tailings and has proposed adoption of regulation compatible, pending the State legislative process, with those developed and adopted by the NRC. Sufficient instrumentation to detect and measure radiation is available within the Division as well as other State agencies. Emergency response capabilities have been demonstrated and exercised. The Division has obtained necessary fiscal support to fund the Agreement State Program, including the regulation of uranium mills and mill tailings. The State is committed to full administrative support to the Agreement State program and has demonstrated its competency in control of radiation as evidenced by the adequate and compatible rating achieved during the last Integrated Material Performance Evaluation Program review.

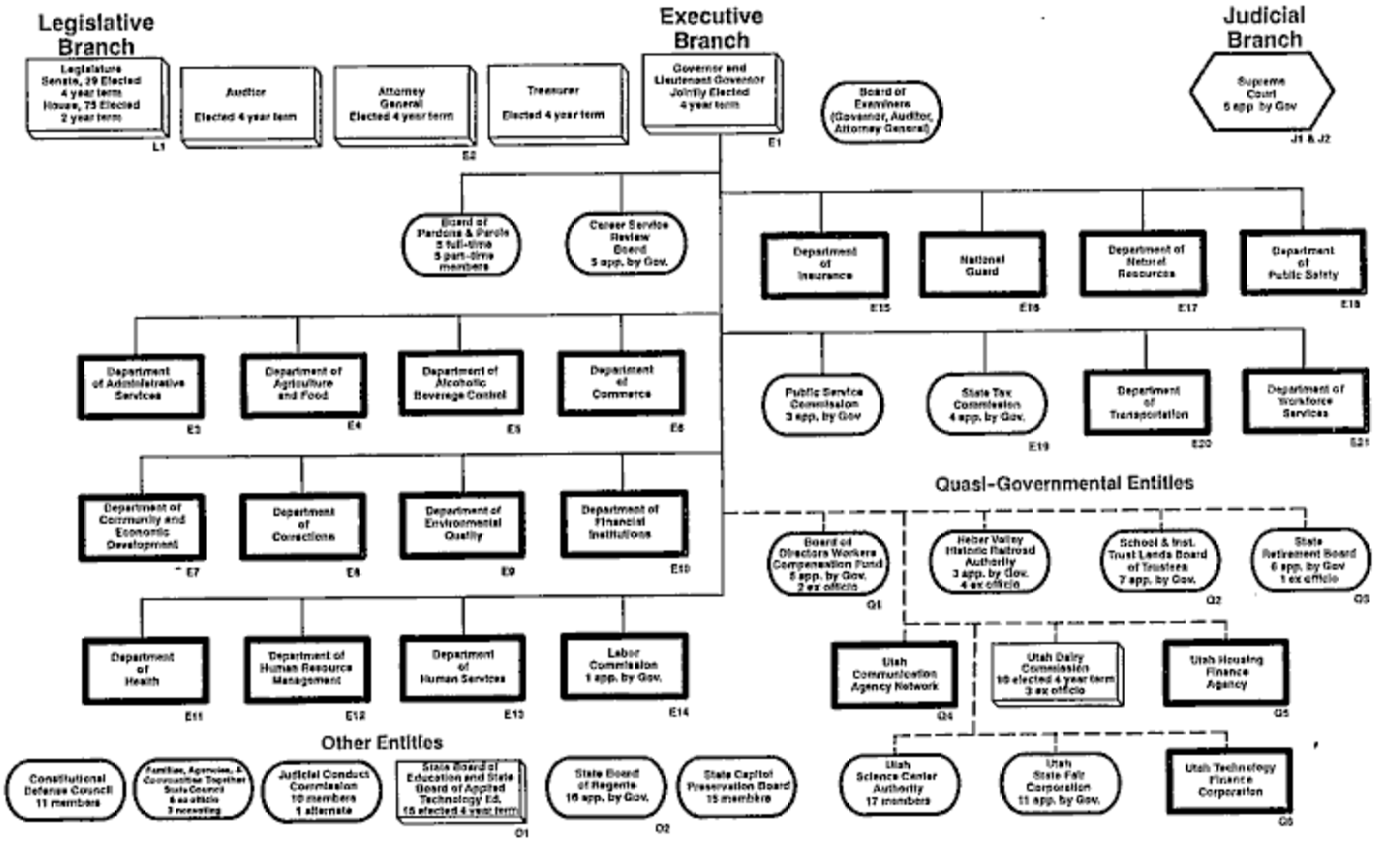
The Department of Environmental Quality remains committed to its mission of safeguarding human health and quality of life through the protection and enhancement of the environment. The Utah Division of Radiation Control will continue to protect Utah citizens and the environment from sources of radiation that constitute a significant health hazard through its radiation control programs. The State of Utah is prepared and qualifies to assume the responsibilities that would be transferred to the State upon amendment of Section 274 Agreement to include regulation of byproduct material as defined in Section 11e(2) of the Atomic Act.

Appendix A

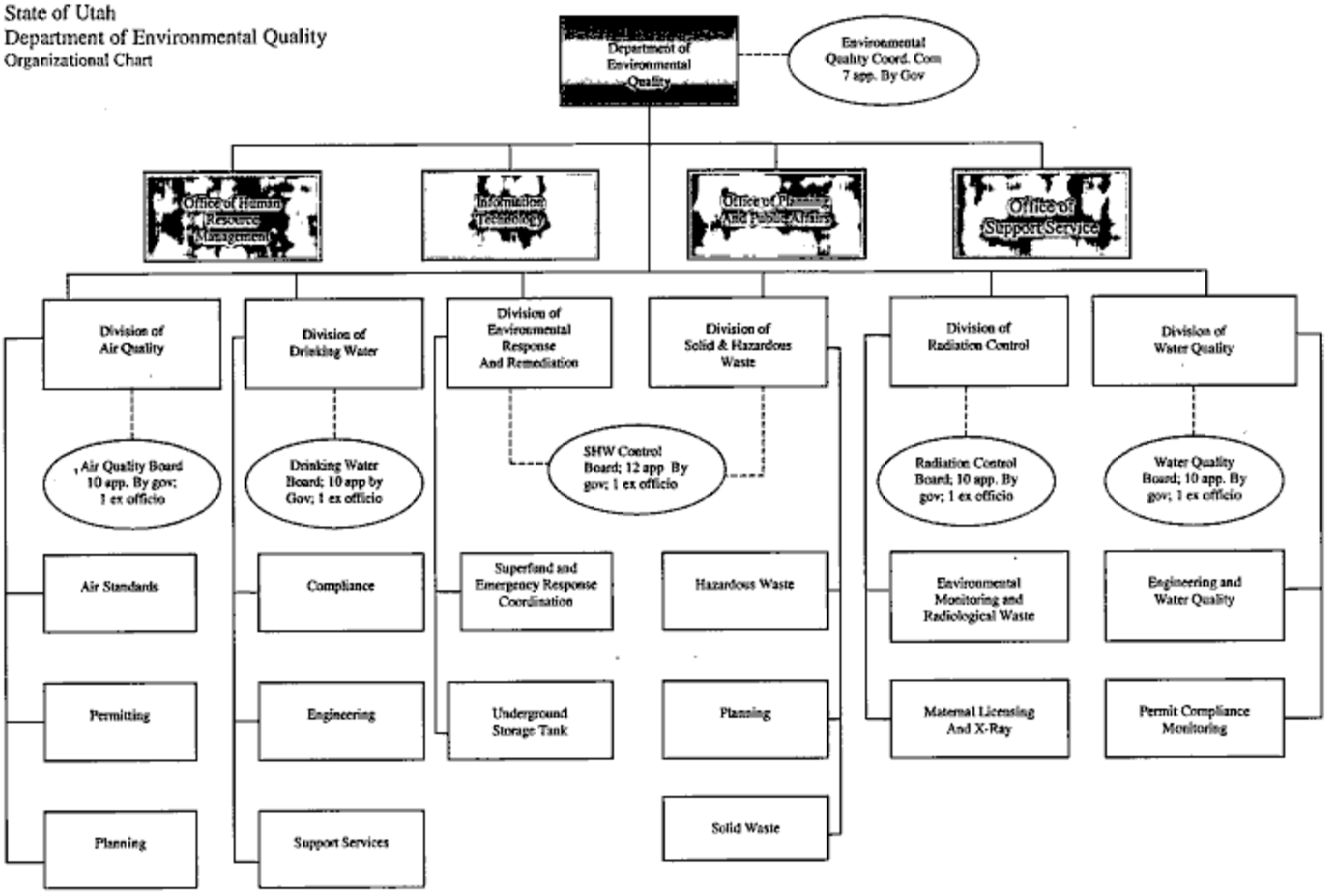
uly 2000
...nmary Chart

UTAH STATE GOVERNMENT

Prepared by
OFFICE OF LEGISLATIVE RESEARCH AND GENERAL COUNSEL
July 2000
Population 2,158,000 (estimated); Counties 29; Municipalities 236; Independent Special Service Districts 328; School Districts 40



State of Utah
Department of Environmental Quality
Organizational Chart



UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

"QUALITY PEOPLE FOR A QUALITY ENVIRONMENT"

MISSION

The mission of the Department of Environmental Quality is to safeguard human health and quality of life by protecting and enhancing the environment.

VISION

A quality environment will be achieved through:

**** careful, open, and fair consideration of the concerns of all Utahns;***
**** excellence in science, communications and operations;***
**** timely, effective, and consistent response to all customers; and***
**** actively promoting pollution prevention.***

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

"QUALITY PEOPLE FOR A QUALITY ENVIRONMENT"

VALUES

QUALITY OF LIFE

We believe clean air, water and land are valuable resources and essential to Utah's quality of life and economy.

INTEGRITY

We will have the courage to do what is right in all circumstances and to treat everyone fairly and consistently.

COMMITMENT TO PEOPLE

Each and every individual inside and outside of the organization will be treated as a valued and important person. Individual growth and esteem is of vital importance. People will be recognized for their contributions and value.

LEADERSHIP

We will promote excellence in all that we do. Creative and innovative "win-win" solutions to problems and issues will be encouraged. Risk taking and change will be strongly promoted as the "norm."

TEAMWORK

We will consider every person within the Department to be part of our team. One person's success will be everyone's. Each person's responsibilities are recognized as a critical part of the overall efforts of the Department.

SERVICE

We will provide quality service to all of our customers both internal and external. We will treat everyone courteously and responsively. Creativity and innovation will be fostered in serving our customers and responding to all concerns and requests.

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

OPERATING PRINCIPLES

* *Recognize issues and conflicts as opportunities to build relationships.*

* *Focus on results instead of on a "set" process.*

* *Know and respect your audience. Keep the message SIMPLE.*

* *Recognize and understand the strengths and limits, the abilities And resources of the people with whom we work.*

* *EMPATHIZE. Seek to understand before you are understood.*

* *LISTEN, LEARN, ASK. What would you have us do?*

* *Be creative in finding cost-effective, timely, workable solutions.*

* *Fix the problem, not the blame.*

* *Involve others to solve problems.*

* *Partners share information, support, and accountability*

* *FOLLOW UP! FOLLOW THROUGH!*

* *Recognize the needs of the people and the environment of Utah.*

Department of Environmental Quality

EXECUTIVE DIRECTOR'S OFFICE

Dianne R. Nielson,Executive Director
(801)536-4404
E-mail:
drnielso@deq.state.ut.us

Debbie Oberndorfer,
Administrative Assistant
(801)536-4402
E-mail:
doberndo@deq state.ut.us

office location:
168 North 1950 West
P.O. Box 144810
Salt Lake City, UT
84114-4810
(801) 536-4402
Fax: (801) 536-0061
TDD Number: (801) 536-4414
Internet Address:
http://www.deq.state.ut.us

Brent C. Bradford, Deputy Director
801/536-4405
E-mail:
bbradfor@deq.state.ut.us

Beverly Rasmussen,
Administrative Assistant
(801) 536-4405
E-mail:
brasmuss@deq state.ut.us

The Executive Director's Office provides leadership to the entire department.
Included in its functions are the following:

- Direct planning and policy development within the Department.
- Support implementation of State and Federal environmental laws, rules and regulations.
- Maintaining State primacy for implementing Federal programs.
- Implement community affairs and outreach programs.
- Provide technical and policy recommendations to the Governor and Legislature.
- Coordinate Department programs with Local Health Departments.
- Provide general services and program support.
- Coordinate public affairs.
- Coordinate budget and financial accounting.
- Provide human resource management services.

Utah Department of Environmental Quality

HOW WE DO BUSINESS

Division of Radiation Control

Assure Utah's citizens the lowest possible exposure to any form of radiation.

Bill Sinclair, Director
Phone: (801) 536-4250
E-mail:
bsinclai@deq.state.ut.us

Office Location:
168 North 1950 West
P.O. Box 144850
Salt Lake City, UT
84114-4850

Yoli Shropshire
Executive Secretary
Phone: (801) 536-0066
E-mail: yshropsh@deq.state.ut.us

Phone: (801) 536-4250
FAX: (801) 536-4097

Radon Hotline: 1-800-458-0145

Authorities:

- State Radiation Control Act
- Federal Atomic Energy Act

Program Contacts:

Craig Jones, Manager
Radioactive Material Licensing and X-ray Registration
Phone: (801) 536-4264
E-mail: cjones@deq.state.ut.us

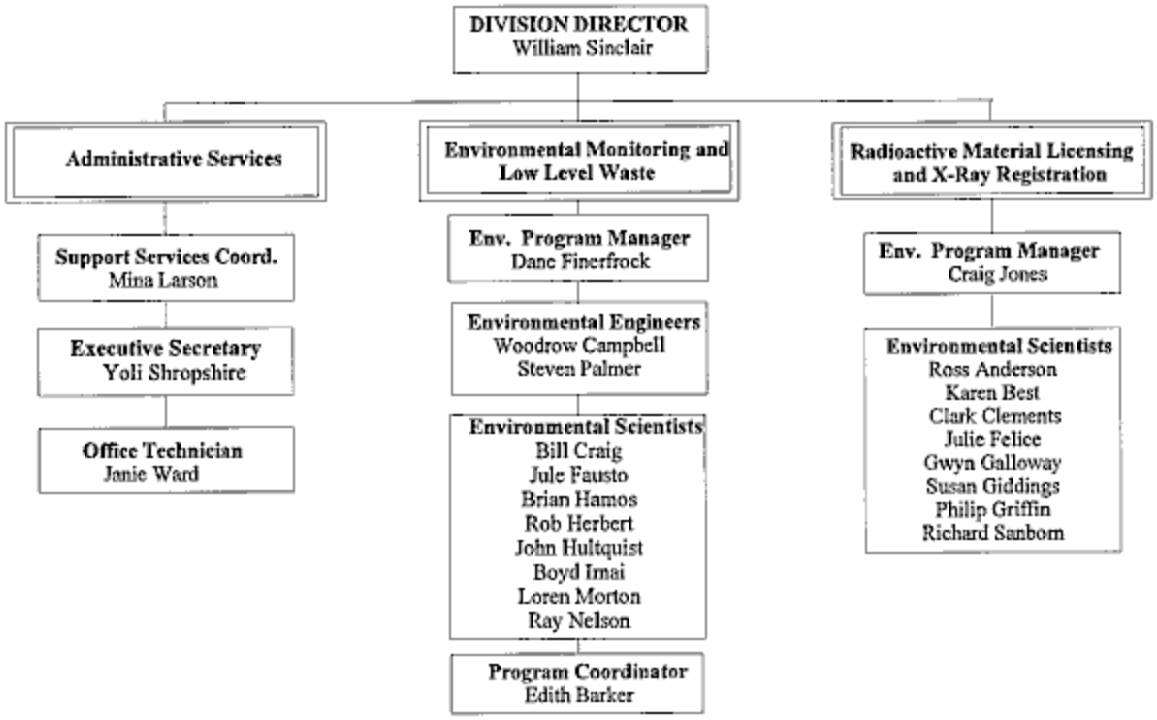
Richard Sanborn
X-Ray Registration/Mammography/Inspections
Phone: (801) 536-4268
E-mail: rsanborn@deq.state.ut.us

Dane Finerfrock, Manager
Radon and Radioactivity Monitoring, Safe Handling and Disposal of Radioactive Waste, Cleanup of Abandoned Uranium Mill Tailings, Transportation of Radioactive Materials.
Phone: (801) 536-4257
E-mail: dfinerfr@deq.state.ut.us

Gwyn Galloway
Radioactive Material Licensing/Inspections/Mammography
Phone: (801) 536-4258
E-mail. ggallowa@deq.state.ut.us

DIVISION OF RADIATION CONTROL

ORGANIZATIONAL CHART



DIVISION OF RADIATION CONTR0L

ADMINISTRATION

William J. Sinclair; Director, (536-4255)
Mina Larson; Support Services Coordinator (536-4254)
Yolanda Shropshire; Executive Secretary, (536-4250)
Janie Ward; Office Technician, (536-4184)
Office Technician, Uranium Mills

RADIOACTIVE MATERIALS & X-RAY SECTION

Craig Jones, Manager
(536-4264)

RADIOACTIVE MATERIALS

Clark Clements, Health Physicist
(536-4265)
Julie Felice, Health Physicist
(536-4256)
Gwyn Galloway, Health Physicist
(536-4258)
Phillip Griffin, Health Physicist
(536-4261)

X-RAY

Ross Anderson, Health Physicist
(536-4267)
Karen Best, Health Physicist
(536-4469)
Susan Giddings, Health Physicist
(536-4259)
Richard Sanborn, Health Physicist
(536-4268)

ENVIRONMENTAL MONITORING, URANIUM RECOVERY, & WASTE MANAGEMENT SECTION

Dane Finerfrock, Manager
(536-4257)

INDOOR RADON

John Hultquist, Health Physicist
(536-4263)

ENVIROCARE

Woodrow Campbell, Engineer
(536-4253)
Stephen Palmer, Engineer
(536-0079)

Brian Hamos, Hydrogeologist
(536-4234)
Rob Herbert, Hydrogeologist
(536-0046)
Loren Morton, Hydrogeologist
(536-4262)

John Hultquist, Health Physicist
(536-4266)
Boyd Imai, Health Physicist
(536-0038)
Ray Nelson, Health Physicist
(536-4266)

WIPP TRANSPORTATION PROJECT

William Craig, Health Physicist
(536-4271)

URANIUM MILLS

Engineer
Hydrogeologist
Health Physicist

GENERATOR SITE ACCESS

Jule Fausto, Health Physicist,
(536-0073)
Edith Barker, Program Coordinator
(536-0077)

DEPARTMENT OF ENVIRONMENTAL QUALITY
RADIATION CONTROL BOARD
Statute Citation: Utah Code Annotated §19-3-103

Name	Pol. Party	Representation	* Term Expires	Phone Numbers
Stephen T. Nelson, Ph.D., Chair Assist. Professor BYU Department of Geology S-389ESC Provo, UT 84602	R	Registrant or licensee representative from academia *First appointed 7/1/98*	07/01/04	801-378-8688 (work) 801-277-0937 (home) 801-378-8143 (fax)
Gary L. Edwards, Vice-Chair 455 East Valley View Circle PO Box 1176 Parowan, UT 84761	R	Local Health Department *First appointed 1996*	07/01/04	435-586-2437 (work) 435-586-4851 (fax)
Kent J. Bradford Westinghouse Electric Co. Nuclear Fuel 10000 West 900 South Ogden, UT 84404-9760	NP	Regulated industry, representing radioactive waste management industry *First appointed 10/2001*	07/01/04	801-732-2205 (work) 801-731-2338 (fax)
Robert S. Pattison 490 E. Nichols Lane Moab, UT 84532	NP	Regulated Industry *First appointed 11/22/02*	07/01/04	435-259-5287 (home)
Dr. Gregory G. Oman 1480 South Orchard Drive Bountiful, UT 84106	R	Dentist, knowledgeable about radiation; not connected with industry. *First appointed 7/2000*	07/01/04	801-298-9441 (work)
Karen S. Langley 7263 S Walnut Way SLC UT 84121	NP	Health physicist or other professional, employed in the field of radiation safety *First appointed 1998*	07/01/06	801-585-3999 (work) 801-944-1891 (home) 801-581-5807 (fax)
Tom Chism, Kennecott Kennecott Copper 5924 South 1475 West Taylorsville, UT 84118	NP	Regulated industry *First appointed7/2000*	07/01/04	801-569-7924
Gene D. White Tooele County Commissioner 47 South Main Tooele, UT 84074	D	County Government	11/22/02	435-843-3150 (work) 435-843-3400 (fax)
Linda M. Kruse 175 South West Temple, Suite 650 SLC UT 884101	D	Public	07/1/06	801-364-9300 (work) 801-364-9301 fax)
Rod O. Julander, Ph.D. Weber State Univeristy 1203 University Circle Ogden, Ut 84408	D	General public, representing organized environmental interests *First appointed 1998*	07/01/06	801-626-6697 (work) 801-363-0868 (home) 801-626-7994 (fax)
Royal Hansen 2026 East Herbert Avenue Salt Lake City, UT 84108	R	General public *First appointed 11/22/02*	07/06/06	801-521-0250 (work) 801-582-1342 (home) 801-521-9015 (fax)
Dianne R. Nielson Executive Director Department of Environmental Quality	NP	Department of Environmental Quality *Appointed 1/4/93*	N/A	801-536-4404 (work) 801-536-0061 (fax)
John W. Thomson, M.D. LDS Hospital Eight Avenue & C Street Salt Lake City, UT 84143	NP	Physician *First appointed 7/2002*	07/01/06	801-408-1146 (work)

* Board member may serve for 90 days beyond term expiration date.

Revised 11/2002

Organization:
Staff directory
Northwest Compact
Radiation Control Board

Programs:
X-Ray
Indoor Radon
Uranium Mills
Transportation
Low Level Waste
Radioactive Materials
Non-Ionizing Radiation
Generator Site Access

Information:
Public Notice
Rules
Forms
Calendar
Other Sites
Fallout Effects
High Level Waste

Contact Us At:
erbarker@utah.gov
Updated December 20, 2002

Board

The Radiation Control Board is appointed by the Utah governor with the consent c Senate and guides development of Radiation Control policy and rules in the state. Radiation Control Board holds open meetings ten times per year at locations throu

Contact
Bill Sinclair, Executive Secretary, at (801) 536-4250 or by E-mail regarding agenda items.

- Member List
- Calendar
- Policies & Position Statements
  - Policy - Broad Scope Licenses - adopted May 21, 1993
  - Position statement - Health Effects from Extremely Low Frequency E Fields (ELF-EMF) - adopted December 10, 1993
  - Policy - Board members conflict of interest - adopted March 3, 1995
  - Policy - Requests by the public to be placed on the Board agenda- a August 8, 1997
  - Position statement - The White Mesa Uranium Mill - April 9, 1999
  - Position statement - Processing and Disposal of Alternate Feed Mat Uranium Mills - April 9, 1999
  - Position statement - Support of the State of Utah in amending the cu with the Nuclear Regulatory Commission to include uranium recover September 7, 2001
  - Position Statement - Qualified Experts in the X-ray Inspection Progr October 5, 2001
  - Position Statement - Citizen's State Initiative Number 1 - adopted Oc
  - Position Statement - Computerized Tomography Scanning of Health Discouraged - adopted December 6, 2002
- Agenda
- Minutes
  - December 6, 2002
  - October 24, 2002
  - October 4, 2002
  - September 2002
  - July 22, 2002
  - July 12, 2002

- June 7, 2002
- No board meeting in May 2002
- April 23, 2002
- April 5, 2002
- March 2002
- No board meeting in February 2002
- January 2002
- December 2001
- November 2001
- October 2001
- September 2001
- August 2001
- June 2001
- May 2001
- April 2001
- March 2001
- No board meeting in February 2001
- January 2001
- December 2000
- November 2000
- October 2000
- September 2000
- August 2000
- No board meeting in July 2000
- June 2000
- May 2000
- April 2000
- March 2000
- No board meeting in February 2000
- January 2000

OFFICE OF THE ATTORNEY GENERAL
MEMORANDUM

TO: Utah Air Quality Board
Utah Water Quality Board
Utah Drinking Water Board
Utah Solid and Hazardous Waste Control Board
Utah Radiation Control Board

FROM: Fred Nelson
Assistant Attorney General

DATE: May 10, 2001

RE: **Ethics Act and Conflicts of Interest**

This memo is to provide information on ethics requirements and potential or actual conflicts of interest of members of the Board.

As you are aware, pursuant to Utah Code Annotated (UCA), Title 19, the Boards are comprised of members who by statute are representatives of various interests and groups. These statutorily-established criteria for membership on the Boards make conflicts of interest inevitable.

Applicable Law

By amendments in 1989 to the Utah Public Officers' and Employees' Ethics Act (Ethics Act) (copy attached), Board members are now covered by its various provisions. The definition of "public officer" means "all elected or appointed officers of the state . . . who occupy policy-making posts." Board members are appointed and determine state policy under their respective statutory powers. Prior to 1989, Board members were considered specifically by statute as "special employees" who were excluded from the requirements of the Ethics Act. The 1989 amendments deleted the exclusion.

In addition to the generally applicable Ethics Act, for members of the Air Quality Board, there is a specific statutory provision (UCA § 19-2-103) which requires that "(a)ny potential conflict of interest of any member or the executive secretary, relevant to the interests of the Board, shall be adequately disclosed."

In 1998 the Legislature amended the Ethics Act by clarifying that the offenses covered by this Act do not encompass actions taken under circumstances amounting to a violation of UCA § 63-56-72 or § 76-8-105. UCA § 63-56-72 (copy attached) makes it a felony for any person who in any official capacity participates in the procurement of any supplies, services,

construction, real property, or insurance for the state of Utah or any subdivision thereof if that person asks, receives, or offers to receive, from any person interested in the sale of these items or services, any emolument, gratuity, contribution, loan, reward, or any promise thereof, either for himself or for another person or organization.

In the 2000 General Session, the Legislature added provisions making it an offense to donate or to demand donations of property, money or services on a condition of granting a permit, approval, or other authorization. UCA § 67-16-5.3 and 5.6.

Under UCA § 76-8-105, a public servant is guilty of receiving or soliciting a bribe if that person asks for, solicits, accepts, or receives, directly or indirectly, any benefit with the understanding that the purpose is to influence an action, decision, opinion, recommendation, judgment, vote, nomination, or exercise of discretion. It is not a defense that the public servant was not qualified to act in the desired way, did not act in the desired way, or the benefit is not asked for, conferred, solicited, or accepted until after the public servant has performed the desired action or ceases to be a public servant.

Requirements of the Ethics Act

A. Disclosure

Under § 67-16-7 of the Ethics Act, every public officer who is an officer, director, agent, employee, or the owner of a substantial interest in any business entity which is subject to the regulation of the agency is required to disclose:

1. the position held; and

2. the precise nature and value of interest. (Does not apply where total value does not exceed $2,000. Life insurance policies and annuities are not considered in determining value.)

If the position changes or value is significantly increased, it must be reported.

Under § 67-16-6, a public officer may not receive or agree to receive compensation for assisting any person or business in any transaction involving any agency unless the public officer discloses the name and address of the public officer and the agencies involved, and provides a brief description of the transaction.

Under § 67-16-8, a public officer may not participate or receive compensation in respect to any transaction between the state and any business entity to which the public officer is also an

officer, director or employee or owns a substantial interest, unless disclosure is made as indicated below.

B. Method of Disclosure

A sworn, written statement by the public officer giving the information listed above is to be filed with the head of the agencies involved and the Utah Attorney General's Office (see attached form/outline).

C. Prohibitions

Restrictions outlined in the Ethics Act include:

No public officer shall:

1. accept employment or engage in any business or professional activity that he may reasonably expect would require or induce him to improperly disclose controlled information;

2. improperly disclose or use controlled, private or protected information acquired by reason of his position or in the course of official duties to further substantially his personal economic interest or obtain special privileges or exemptions for himself or others;

3. use or attempt to use his position to further substantially his personal economic interest or to secure special privileges or exemptions for himself or others;

4. accept employment that would impair his independence of judgment or interfere with the ethical performance of his public duties;

5. receive, take, seek, or solicit, directly or indirectly, for himself or another a gift of substantial value or a substantial economic benefit tantamount to a gift,[1]

[1] "Economic benefit tantamount to a gift" includes:
(1) a loan at an interest rate that is substantially lower than the commercial rate for similar loans; and
(2) substantially higher compensation received for private services than the fair market value of those services.

a. that would tend to improperly influence him in the discharge of his duties,

b. that the person knows or a reasonable person in that position should know under the circumstances is primarily to reward the person for official action taken,

c. if he recently has been or is or will be involved in a government action affecting the donor or lender unless a disclosure of the gift, compensation, or loan has been made in the manner described above; or

6. have personal investments in any business entity which will create a substantial conflict between his private interests and his public duties.

7. donate or to demand donations of property, money or services on a condition of granting a permit, approval or other authorization.

Conflicts of Interest

A. Discussion - Procedure

In the past, different approaches have been taken by various members of the environmental boards when they have had conflicts of interest. These approaches have included:

1. oral disclosure of the conflict before discussion and then participating in the discussion but not the vote;

2. oral disclosure of the conflict at the beginning of the discussion with no participation in discussion or the vote; or

3. oral disclosure of the conflict and physically withdrawing from the meeting when an action is being discussed and voted upon.

The approach taken by the Board member with a conflict of interest is an individual decision. While no specific law exists mandating how conflicts of interest should be resolved, the Board could establish a policy recommending how conflicts of interest should be handled.

Excluded from this definition is an occasional nonpecuniary gift of a value less than $50.00, an award publicly presented in recognition of public service, any bona fide loan made in the ordinary course of business, or a political campaign contribution.

While that policy may not be binding on a Board member, it would reflect the Board's attitude as to the best way to handle action items where there is a potential conflict of interest. Some Boards have established policies on handling conflicts of interest.

B. What is a conflict of interest?

One question which often arises is what constitutes a potential conflict of interest. It is generally considered that a potential conflict of interest is any direct and immediate interest or relationship, including financial interest, with persons or businesses regulated by or directly affected by decisions of the Board, or persons or organizations which may present requests or issues before the Board. The interest of a spouse or other members of the immediate family/household or the interest of any other person which is constructively controlled by the member is included.

It is recognized that some relationships and interests have more "potential" for being a conflict of interest than others. There are some interests and relationships which because of their nature are so "de minimus" as to be insignificant. The financial interest may be so small or the relationship so remote that it does not present an actual conflict.

Types of interests to be considered as potential conflicts of interest include relationships or interests with persons, business enterprises, or nonprofit, professional, charitable, religious, social, educational, recreational, environmental, public service, or civic organizations,

1. with which you are connected as a member, employee, officer, owner, director, trustee, partner, advisor, or consultant;

2. in which you have any continuing financial interest as a creditor or through ownership of stocks, bonds, or other securities, ownership of real property or rights in lands, or through a pension or retirement plan, shared income or otherwise; or

3. to which you are indebted financially.

DISCLOSURE STATEMENT

DEPARTMENT OF ENVIRONMENTAL QUALITY

Pursuant to Utah Public Officers' and Employees' Ethics Act,
Utah Code Ann. §§ 67-16-1 through -14.

I, _____, being first sworn, hereby disclose as follows:

1. I reside at _____

_____.

2. I was appointed as a member of the _____

Board on _____.

3. I am an officer, director, agent, employee, or owner of a substantial interest in the following business entities which are subject to regulation by the Board or the Department of Environmental Quality ("Department"):

   a. Name of business entity:_____

   b. Position held:_____

   c. Nature and value of interest: _____

_____

_____.

NOTE: This disclosure requirement does not apply to instances where the total value of the interest does not exceed $2,000. Life insurance policies and annuities shall not be considered in determining the value of any such interest. This statement is to be filed on first becoming a public officer, and again if the position or value of interest in the business entity significantly changes. It is filed with the head of the agency with which the officer is affiliated and with the Attorney General.

4. I have solicited, received or have agreed to receive, for myself or another, compensation, loans or gifts, directly or indirectly, from the following persons or business entities who, in the recent past, now or in the near future, may be subject to Board or Department action:

a. Name of person or business entity providing compensation, loans, or gifts:

_____

b. Brief description of gift, loan, or compensation transaction and the action by the Board that may affect the person or business entity_____

_____

_____

NOTE: This disclosure requirement does not apply to an occasional nonpecuniary gift of a value less than $50.00, a public award of recognition for public service, bona fide loans from commercial lenders, or political contributions.

5. I have participated in or received or have agreed to receive compensation 1) in respect to a transaction between state agencies and a business entity as to which I am an officer, director, or employee, or own a substantial interest, or 2) for assisting persons or business entities in transactions involving state agencies, as follows:

a. Name of Agency:_____

_____

b. Name of person or business entity involved:_____

_____

c. Brief description of the transaction and nature of service performed or to be performed: _____

_____

NOTE: This disclosure statement is required to be filed for each transaction or continuing transactions with an agency. It should be filed with the head of the agency with which the transaction is being conducted and with the Attorney General, within ten days after the date of any agreement or receipt of compensation, whichever is first.

DATED this _____ day of _____, 199_____.

_____
Signature

SUBSCRIBED and SWORN to before me this ____ day of _____, 199____.

_____
Notary Public

Residing at:_____

My Commission Expires:

_____

UTAH PUBLIC OFFICERS' AND EMPLOYEES' ETHICS ACT·

Current through the 2000 General Session

67-16-1 Short title.
This chapter is known as the "Utah Public Officers' and Employees' Ethics Act."

67-16-2 Purpose of chapter.
The purpose of this chapter is to set forth standards of conduct for officers and employees of the state of Utah and its political subdivisions in areas where there are actual or potential conflicts of interest between their public duties and their private interests. In this manner the Legislature intends to promote the public interest and strengthen the faith and confidence of the people of Utah in the integrity of their government. It does not intend to deny any public officer or employee the opportunities available to all other citizens of the state to acquire private economic or other interests so long as this does not interfere with his full and faithful discharge of his public duties.

67-16-3 Definitions.
As used in this chapter:
(1) "Agency" means any department, division, agency, commission, board, council, committee, authority, or any other institution of the state or any of its political subdivisions.
(2) "Agency head" means the chief executive or administrative officer of any agency.
(3) "Assist" means to act, or offer or agree to act, in such a way as to help, represent, aid, advise, furnish information to, or otherwise provide assistance to a person or business entity, believing that such action is of help, aid, advice, or assistance to such person or business entity and with the intent to assist such person or business entity.
(4) "Business entity" means a sole proprietorship, partnership, association, joint venture, corporation, firm, trust, foundation, or other organization or entity used in carrying on a business.
(5) "Compensation" means anything of economic value, however designated, which is paid, loaned, granted, given, donated, or transferred to any person or business entity by anyone other than the governmental employer for or in consideration of personal services, materials, property, or any other thing whatsoever.
(6) "Controlled, private, or protected information" means information classified as controlled, private, or protected in Title 63, Chapter 2, Government Records Access and Management Act, or other applicable provision of law.
(7) "Governmental action" means any action on the part of the state, a political subdivision, or an agency, including:
(a) any decision, determination, finding, ruling, or order; and
(b) any grant, payment, award, license, contract, subcontract, transaction, decision, sanction, or approval, or the denial thereof, or the failure to act in respect to.
(8) "Improper disclosure" means disclosure of controlled, private, or protected information to any person who does not have the right to receive the information.

(9) "Legislative employee" means any officer or employee of the Legislature, or any committee of the Legislature, who is appointed or employed to serve, either with or without compensation, for an aggregate of less than 800 hours during any period of 365 days. "Legislative employee" does not include legislators.
(10) "Legislator" means a member or member-elect of either house of the Legislature of the state of Utah.
(11) "Political subdivision" means a district, county, school district, or any other political subdivision of the state that is not an agency, but does not include municipalities.
(12) "Public employee" means a person who is not a public officer who is employed on a full-time, part-time, or contract basis by the state or any of its political subdivisions. "Public employee" does not include legislators or legislative employees.
(13) "Public officer" means all elected or appointed officers of the state or any of its political subdivisions who occupy policymaking posts. "Public officer" does not include legislators or legislative employees.
(14) "State" means the state of Utah.
(15) "Substantial interest" means the ownership, either legally or equitably, by an individual, his spouse, or his minor children, of at least 10% of the outstanding capital stock of a corporation or a 10% interest in any other business entity.

67-16-4 Improperly disclosing or using private, controlled, or protected information -- Using position to secure privileges or exemptions -- Accepting employment which would impair independence of judgment or ethical performance.
(1) It is an offense for a public officer, public employee, or legislator, under circumstances not amounting to a violation of Section 63-56-72 or 76-8-105, to:
(a) accept employment or engage in any business or professional activity that he might reasonably expect would require or induce him to improperly disclose controlled information that he has gained by reason of his official position;
(b) disclose or improperly use controlled, private, or protected information acquired by reason of his official position or in the course of official duties in order to further substantially the officer's or employee's personal economic interest or to secure special privileges or exemptions for himself or others;
(c) use or attempt to use his official position to:
(i) further substantially the officer's or employee's personal economic interest; or
(ii) secure special privileges or exemptions for himself or others;
(d) accept other employment that he might expect would impair his independence of judgment in the performance of his public duties; or
(e) accept other employment that he might expect would interfere with the ethical performance of his public duties.
(2)(a) Subsection (1) does not apply to the provision of education-related services to public school students by public education employees acting outside their regular employment,
(b) The conduct referred to in Subsection (2)(a) is subject to Section 53A-1-402.5.

Amended by Chapter 276, § 2, 2000 General Session

67-16-5 Accepting gift, compensation, or loan -- When prohibited.
(1) As used in this section, "economic benefit tantamount to a gift" includes:
(a) a loan at an interest rate that is substantially lower than the commercial rate then currently prevalent for similar loans; and
(b) compensation received for private services rendered at a rate substantially exceeding the fair market value of the services.
(2) It is an offense for a public officer, public employee, or legislator, under circumstances not amounting to a violation of Section 63-56-72 or 76-8-105, to knowingly receive, accept, take, seek, or solicit, directly or indirectly for himself or another a gift of substantial value or a substantial economic benefit tantamount to a gift:
(a) that would tend improperly to influence a reasonable person in the person's position to depart from the faithful and impartial discharge of the person's public duties;
(b) that the person knows or that a reasonable person in that position should know under the circumstances is primarily for the purpose of rewarding the person for official action taken; or
(c) if he recently has been, is now, or in the near future may be involved in any governmental action directly affecting the donor or lender, unless a disclosure of the gift, compensation, or loan and other relevant information has been made in the manner provided in Section 67-16-6.
(3) Subsection (2) does not apply to:
(a) an occasional nonpecuniary gift, having a value of not in excess of $50;
(b) an award publicly presented in recognition of public services;
(c) any bona fide loan made in the ordinary course of business; or
(d) a political campaign contribution.

67-16-5.3. Requiring donation, payment, or service to government agency in exchange for approval -- When prohibited.
(1) It is an offense for a public officer, public employee, or legislator, under circumstances not amounting to a violation of Section 63-56-72 or 76-8-105, to demand from any person as a condition of granting any application or request for a permit, approval, or other authorization, that the person donate personal property, money, or services to any

agency.
(2)(a) Subsection (1) does not apply to any donation of property, funds, or services to an agency that is:
(i) expressly required by statute, ordinance, or agency rule;
(ii) mutually agreed to between the applicant and the entity issuing the permit, approval, or other authorization;
(iii) made voluntarily by the applicant; or
(iv) a condition of a consent decree, settlement agreement, or other binding instrument entered into to resolve, in whole or in part, an actual or threatened agency enforcement action.
(b) If a person donates property, funds, or services to an agency, the agency shall, as part of the permit or other written authorization:
(i) identify that a donation has been made;
(ii) describe the donation;
(iii) certify, in writing, that the donation was voluntary; and
(iv) place that information in its files.

Enacted by ch 108, § 1, 2000 General Session

67-16-5.6. Offering donation, payment, or service to government agency in exchange for approval -- When prohibited.
(1) It is an offense for any person, under circumstances not amounting to a violation of Section 76-8-103, to donate or offer to donate personal property, money, or services to any agency on the condition that the agency or any other agency approve any application or request for a permit, approval, or other authorization.
(2)(a) Subsection (1) does not apply to any donation of property, funds, or services to an agency that is:
(i) otherwise expressly required by statute, ordinance, or agency rule;
(ii) mutually agreed to between the applicant and the entity issuing the permit, approval, or other authorization;
(iii) a condition of a consent decree, settlement agreement, or other binding instrument entered into to resolve, in whole or in part, an actual or threatened agency enforcement action; or
(iv) made without condition.
(b) The person making the donation of property, funds, or services shall include with the donation a signed written statement certifying that the donation is made without condition.
(c) The agency receiving the donation shall place the signed written statement in its files

Enacted by ch 108, § 2, 2000 General Session

67-16-6 Receiving compensation for assistance in transaction involving an agency -- Filing sworn statement.
(1) It is an offense for a public officer or public employee, under circumstances not amounting to a violation of Section 63-56-72 or 76-8-105, to receive or agree to receive compensation for assisting any person or business entity in any transaction involving an agency unless the public officer or public employee files a sworn, written statement containing the information required by Subsection (2) with:
(a) the head of his own agency;
(b) the agency head of the agency with which the transaction is being conducted; and
(c) the state attorney general.
(2) The statement shall contain:
(a) the name and address of the public officer or public employee involved;
(b) the name of the public officer's or public employee's agency;
(c) the name and address of the person or business entity being or to be assisted; and
(d) a brief description of:
(i) the transaction as to which service is rendered or is to be rendered; and
(ii) the nature of the service performed or to be performed.
(3) The statement required to be filed under Subsection (1) shall be filed within ten days after the date of any agreement between the public officer or public employee and the person or business entity being assisted or the receipt of compensation, whichever is earlier.
(4) The statement is public information and shall be available for examination by the public.

67-16-7 Disclosure of substantial interest in regulated business.
(1) Every public officer or public employee who is an officer, director, agent, employee, or the owner of a substantial interest in any business entity which is subject to the regulation of the agency by which the officer or employee is employed, shall disclose any such position held and the precise nature and value of the public officer's or public employee's interest upon first becoming a public officer or public employee, and again whenever the public officer's or public employee's position in the business entity changes significantly or if the value of his interest in the entity is significantly increased.
(2) The disclosure required under Subsection (1) shall be made in a sworn statement filed with:
(a) the state attorney general in the case of public officers and public employees of the state;
(b) the chief governing body of the political subdivision in the case of public officers and public employees of a political subdivision;
(c) the head of the agency with which the public officer or public employee is affiliated; and
(d) in the case of a public employee, with the immediate supervisor of the public employee.
(3) This section does not apply to instances where the total value of the interest does not exceed $2,000.

Life insurance policies and annuities shall not be considered in determining the value of any such interest.
(4) Disclosures made under this section are public information and shall be available for examination by the public.

67-16-8 Participation in transaction involving business as to which public officer or employee has interest -- Exceptions.
(1) No public officer or public employee shall participate in his official capacity or receive compensation in respect to any transaction between the state or any of its agencies and any business entity as to which such public officer or public employee is also an officer, director, or employee or owns a substantial interest, unless disclosure has been made as provided under Section 67-16-7.
(2) A concession contract between an agency, political subdivision, or the state and a certified professional golf association member who is a public employee or officer does not violate the provisions of Subsection (1) or Title 10, Chapter 3, Part 13.

67-16-9 Conflict of interests prohibited.
No public officer or public employee shall have personal investments in any business entity which will create a substantial conflict between his private interests and his public duties.

67-16-10 Inducing others to violate chapter.
No person shall induce or seek to induce any public officer or public employee to violate any of the provisions of this chapter.

67-16-11 Applicability of provisions.
The provisions of this chapter apply to all public officers and public employees.

67-16-12 Penalties for violation -- Removal from office or dismissal from employment.
In addition to any penalty contained in any other provision of law:
(1) any public officer or public employee who knowingly and intentionally violates this chapter, with the exception of Sections 67-16-6 and 67-16-7, shall be dismissed from employment or removed from office as provided by law, rule, or policy within the agency; and
(2) any public officer, public employee, or person who knowingly and intentionally violates this chapter, with the exception of Sections 67-16-6 and 16-6-7, shall be punished as follows:
(a) as a felony of the second degree if the total value of the compensation, conflict of interest, or assistance exceeds $1,000;
(b) as a felony of the third degree if:
(i) the total value of the compensation, conflict of interest, or assistance is more than $250 but not more than $1,000; or
(ii) the public officer or public employee has been twice before convicted of violation of this chapter and the value of the conflict of interest, compensation, or assistance was $250 or less;
(c) as a class A misdemeanor if the value of the compensation or assistance was more than $100 but does not exceed $250; or
(d) as a class B misdemeanor if the value of the compensation or assistance was $100 or less.

Amended by ch. 108, § 3, 2000 General Session

67-16-14 Unethical transactions -- Duty to dismiss officer or employee -- Right to rescind or void contract.
If any transaction is entered into in violation of Section 67-16-6, 67-16-7, or 67-16-8, the state, political subdivision, or agency involved:
(1) shall dismiss the public officer or public employee who knowingly and intentionally violates this chapter from employment or office as provided by law; and
(2) may rescind or void any contract or subcontract entered into in respect to such transaction without returning any part of the consideration that the state, political subdivision, or agency has received.

Emergency Response Phone List

Utah Department of Environmental Quality

Department of Environmental Quality Emergency Response	(24-hr)	(801)536-4123
Division of Radiation Control Office	(8am-5pm M-F)	(801)536-4250
	(FAX)	(801)533-4097
Division of Radiation Control Staff		
Bill Sinclair, Director	(Home)	(801)546-4132
Craig Jones, Section Chief, X-ray & Licensing	(Home)	(801)273-7080
Dane Finerfrock, Section Chief, Low Level Waste	(Home)	(801)485-8744
Ray Nelson, Health Physicist	(Home)	(801)266-2502
John Hultquist, Health Physicist	(Home)	(801)484-7602
Gwyn Galloway, Health Physicist	(Home)	(801)964-2035
Julie Felice, Health Physicist	(Home)	(801)966-6628

Utah Department of Public Safety

Utah Highway Patrol, Hazmat Section		
Salt Lake Dispatch	(24 Hr)	(801)887-3800
Sgt. Mark Millet	(Cellular)	(801)560-7039
	(Pager)	(801)249-8233
Division of Comprehensive Emergency Management (CEM)		
CEM Office	(24-Hr)	(801)538-3400

Federal Government

Nuclear Regulatory Commission (NRC) Operations Center	(24-Hr)	(301)816-5100
	(FAX)	(301)816-5151
Department of Energy, Region VI, Radiological Assistance Program (RAP), Idaho Falls, Idaho	(24-Hr)	(208)526-1515
Radiation Emergency Assistance Center/Training Site	(Day)	(865)576-3131
(REAC/TS) Oak Ridge, Tennessee	(24-Hr)	(865)576-1005
Environmental Protection Agency, Region 8 Denver Colorado	(24-Hr)	(303)293-1788

Approved _____ Date 8/27/2001

Bill S.

DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF THE EXECUTIVE DIRECTOR

Michael O. Leavitt
Governor
R. Nielson, Ph.D.
Executive Director
Brent C. Bradford
Deputy Director

MEMORANDUM

TO: Water Quality Board

FROM: Dianne R. Nielson, Ph.D.
Executive Director

DATE: July 27, 2001

SUBJECT: Designation of Bill Sinclair as Co-Executive Secretary of the Utah Water Quality Board for Designated Radioactive Material Management Facilities

It has been the policy of the Executive Branch of Utah State Government to seek primacy of Federal environmental programs when it will benefit the State. In this regard, through the Division of Radiation Control, the State has undertaken a process to assume the responsibility for administering the program regulating uranium mills and tailings currently being administered by the Nuclear Regulatory Commission(NRC). However, since this program only regulates radionuclide contaminants, other non-radionuclide parameters have been addressed through provisions of the Utah Water Quality Act and programs promulgated under its authority. As a consequence of this regulatory arrangement, there currently exists overlapping administrative authority in the area of ground water quality protection. This overlapping issue is further compounded with the fact that the Division of Radiation Control administers certain Federal programs dealing with the commercial waste disposal of low level radioactive waste. However, that program does not impose water quality standards and protection programs comparable to that under the Water Quality Act. This results in the Division of Radiation Control oversiting the operation of such a facility for radiation hazards, while the Division of Water Quality administers the ground water protection and ground water discharge permit program. This also involves two statutory boards.

In the interest of providing a more streamlined and coordinated regulatory setting for the regulated facilities, the Divisions of Water Quality and Radiation Control have implemented administrative processes to allow more of a "one-stop shopping" when it comes to securing operational authorizations for these kind of facilities. Because the primary source of technical expertise for these facilities resides within the Division of Radiation Control, memoranda of agreement have been developed, allowing them to be the lead agency and primary contact when radioactive materials are involved. While the staff in the Division of Radiation Control may use the statutory authority of the Water Quality Act, doing so requires an active involvement by the staff in the Division of Water Quality and the Executive Secretary of the Water Quality Board. Although there were attempts to implement a similar coordination process for uranium mill facilities that are regulated by the Nuclear Regulatory Commission, the NRC rejected the concept. Continuing in its attempt to streamline the

process, the Department of Environmental Quality created a task force to formulate recommendations in this regard.

The recommendation of the task force is primarily to change the Radiation Control Act thus allowing Utah to pursue agreement state status for administering the NRC regulatory program. In addition, the task force recommends that the Division of Radiation Control continue to administer both the radioactive materials licensing and ground water discharge permits for radioactive material disposal facilities and for uranium mills. In order to do this more effectively, provision UCA19-5-104(1)(k) of the Water Quality Act allows the Water Quality Board to delegate to the Department duties, as appropriate, to improve administrative efficiency. This provision is interpreted to allow designation of the Director of Division of Radiation Control as an Executive Secretary to the Water Quality Board with the powers and duties of those stated in the Water Quality Act over a specified universe of facilities. In consultation with the Attorney General's Office, it is his opinion that, although the Board could not transfer responsibility or authority without a statutory change, it is within its powers to direct where the responsibilities are carried out.

In arriving at this option to appoint the Director of the Division of Radiation Control as an Executive Secretary, the task force felt there were a number of advantages over the other options. First, there would be no need for a statutory change to allow the ground water program for the designated facilities to be administered in the Division of Radiation Control. The DRC Director as an appointed Executive Secretary would have the legal authority to issue, administer, and enforce specific ground water permits under the authority of the Water Quality Act. This would free up the current direct oversight responsibility activities by staff in the Division of Water Quality and shift these responsibilities to the staff and an Executive Secretary in the Division of Radiation Control that have direct involvement and expertise to deal with radiologic materials. Second, the current rules which were promulgated under the Water Quality Act could continue to be used without change. Third, there would be a clear direction to the regulated facilities on which State agency would regulate them by eliminating duplicate state agency involvement. Finally, appeals of permit conditions or enforcement actions would be conducted in accordance with the Water Quality Act as has been done in the past, thus consistency with the radioactive materials facilities would be insured. Also, fragmentation of the state ground water program would be prevented by continuing to keep the policy and planning aspects of this program under purview of the Board.

RECOMMENDED BOARD MOTION: It is recommended that (1) Bill Sinclair, Director of the Division of Radiation Control, as appointed by the Executive Director, be approved as an Executive Secretary to the Water Quality Board to exercise the powers prescribed under the provisions of UCA 19-5-106 to administer the requirements of UAC R317-6 as applied to the following facilities: Envirocare, Rio Algom, International Uranium Corporation, and Plateau Resources Limited, and (2) as allowed under the provisions of UCA19-5-104(1)(k), the responsibility for administering the Ground Water Protection Rules as derived from the authority of the Water Quality Act for the referenced facilities would be within the Division of Radiation Control.

MICHAEL O. LEAVITT
GOVERNOR

STATE OF UTAH
OFFICE OF THE GOVERNOR
SALT LAKE CITY
84114-0601

OLENE S. WALKER
LIEUTENANT GOVERNOR

June 26, 2001

Richard A. Meserve, Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Meserve:

This letter is to inform you that I have directed the Utah Department of Environmental Quality, Division of Radiation Control to submit an application to amend the current agreement between the State of Utah and the Nuclear Regulatory Commission to include regulation of uranium mills and tailings. It is understood that NRC will review pertinent rules, enabling legislation, staffing and resources, and any appropriate aspects of the current Division of Radiation Control program.

In response to the needed changes to the current Agreement State program, the State of Utah is requesting that NRC allow the review of a draft application to commence without having the necessary rulemaking and legislation in place. It is the intent of the Division to pursue necessary legislative changes in the upcoming 2002 Utah legislative session (tentative schedule: January 21-February 8; February 25-March 6, 2002) with the intent of establishing the necessary legislation to enable rules to be written and staff to be hired. Since the legislative window in Utah is limited, allowing the Division to initiate the amendment process as soon as possible would expedite the amendment process. Our final application for an amended agreement would be submitted following enactment of needed legislation and adoption of rules. We would appreciate your consideration of this matter so as to facilitate the transfer of regulation of uranium mills and tailings to the Utah Division of Radiation Control in a timely and orderly fashion.

William J. Sinclair, Director of the Division of Radiation Control, Utah Department of Environmental Quality will be the direct contact for the state of Utah with the Nuclear Regulatory Commission. Please contact him at 801-536-4255 regarding any questions. Thank you for your attention to this matter.

Sincerely,

Michael O. Leavitt
Governor

MOL:DRN:dco

AGREEMENT
BETWEEN THE
UNITED STATES NUCLEAR REGULATORY COMMISSION
AND THE
STATE OF UTAH
FOR
DISCONTINUANCE OF CERTAIN COMMISSION REGULATORY AUTHORITY
AND
RESPONSIBILITY WITHIN THE STATE PURSUANT TO
SECTION 274 OF THE ATOMIC ENERGY ACT OF 1954, AS AMENDED

WHEREAS, The United States Nuclear Regulatory Commission (hereinafter referred to as the Commission) is authorized under section 274 of the Atomic Energy Act of 1954, as amended (hereinafter referred to as the Act), to enter into agreements with the Governor of any State providing for discontinuance of the regulatory authority of the Commission within the State under Chapters 6, 7, and 8, and section 161 of the Act with respect to byproduct materials as defined in sections 11e.(1) and (2) of the Act, source materials, and special nuclear materials in quantities not sufficient to form a critical mass; and

WHEREAS, The Governor of the State of Utah is authorized under Utah Code Annotated 26-1-29 to enter into this Agreement with the Commission; and

WHEREAS, The Governor of the State of Utah certified on November 14, 1983, that the State of Utah (hereinafter referred to as the State) has a program for the control of radiation hazards adequate to protect the public health and safety with respect to the materials within the State covered by this Agreement, and that the State desires to assume regulatory responsibility for such materials; and

WHEREAS, The Commission found on March 12, 1984, that the program of the State for the regulation of the materials covered by this Agreement

is compatible with the Commission's program for the regulation of such materials and is adequate to protect the public health and safety; and

WHEREAS, The State and the Commission recognize the desirability and importance of cooperation between the Commission and the State in the formulation of standards for protection against hazards of radiation and in assuring that State and Commission programs for protection against hazards of radiation will be coordinated and compatible; and

WHEREAS, The Commission and the State recognize the desirability of reciprocal recognition of licenses and exemptions from licensing of those materials subject to this Agreement; and

WHEREAS, This Agreement is entered into pursuant to the provisions of the Atomic Energy Act of 1954, as amended;

NOW, THEREFORE, It is hereby agreed between the Commission and the Governor of the State, acting in behalf of the State, as follows:

ARTICLE I

Subject to the exceptions provided in Articles II, IV, and V, the Commission shall discontinue, as of the effective date of this Agreement, the regulatory authority of the Commission in the State under Chapters 6, 7, and 8, and section 161 of the Act with respect to the following materials:

A. Byproduct materials as defined in section 11e.(1) of the Act;

B. Source materials; and

C. Special nuclear materials in quantities not sufficient to form a critical mass.

ARTICLE II

This Agreement does not provide for discontinuance of any authority and the Commission shall retain authority and responsibility with respect to regulation of:

A. The construction and operation of any production or utilization facility;

B. The export from or import into the United States of byproduct, source, or special nuclear material, or of any production or utilization facility;

C. The disposal into the ocean or sea of byproduct, source, or special nuclear waste materials as defined in regulations or orders of the Commission;

D. The disposal of such other byproduct, source, or special nuclear material as the Commission from time to time determines by regulation or order should, because of the hazards or potential hazards thereof, not be so disposed of without a license from the Commission;

E. The land disposal of source, byproduct and special nuclear material received from other persons; and

F. The extraction or concentration of source material from source material ore and the management and disposal of the resulting byproduct material.

ARTICLE III

This Agreement may be amended, upon application by the State and approval by the Commission, to include the additional area(s) specified in Article II, paragraph E or F, whereby the State can exert regulatory control over the materials stated therein.

ARTICLE IV

Notwithstanding this Agreement, the Commission may from time to time by rule, regulation, or order, require that the manufacturer, processor, or producer of any equipment, device, commodity, or other product containing source, byproduct, or special nuclear material shall not transfer possession or control of such product except pursuant to a license or an exemption from licensing issued by the Commission.

ARTICLE V

This Agreement shall not affect the authority of the Commission under subsection 161 b. or i. of the Act to issue rules, regulations, or orders to protect the common defense and security, to protect restricted data or to guard against the loss or diversion of special nuclear material.

ARTICLE VI

The Commission will use its best efforts to cooperate with the State and other Agreement States in the formulation of standards and regulatory programs of the State and the Commission for protection against hazards of radiation and to assure that State and Commission programs for protection against hazards of radiation will be coordinated and compatible. The State will use its best efforts to cooperate with the

Commission and other Agreement States in the formulation of standards and regulatory programs of the State and the Commission for protection against hazards of radiation and to assure that the State's program will continue to be compatible with the program of the Commission for the regulation of like materials. The State and the Commission will use their best efforts to keep each other informed of proposed changes in their respective rules and regulations and licensing, inspection and enforcement policies and criteria, and to obtain the comments and assistance of the other party thereon.

ARTICLE VII

The Commission and the State agree that it is desirable to provide reciprocal recognition of licenses for the materials listed in Article I licensed by the other party or by any Agreement State. Accordingly, the Commission and the State agree to use their best efforts to develop appropriate rules, regulations, and procedures by which such reciprocity will be accorded.

ARTICLE VIII

The Commission, upon its own initiative after reasonable notice and opportunity for hearing to the State, or upon request of the Governor of the State, may terminate or suspend all or part of this Agreement and reassert the licensing and regulatory authority vested in it under the Act if the Commission finds that (1) such termination or suspension is required to protect the public health and safety, or (2) the State has not complied with one or more of the requirements of section 274 of the Act. The Commission may also, pursuant to section 274j. of the Act, temporarily suspend all or part of this Agreement if, in the judgment of the Commission, an emergency situation exists requiring immediate action to protect public health and safety and the State has failed to take

necessary steps. The Commission shall periodically review this Agreement and actions taken by the State under this Agreement to ensure compliance with section 274 of the Act.

ARTICLE IX

This Agreement shall become effective on April 1, 1984, and shall remain in effect unless and until such time as it is terminated pursuant to Article VIII.

Done at Salt Lake City, Utah, in triplicate, this 29th day of March, 1984.

FOR THE UNITED STATES
NUCLEAR REGULATORY COMMISSION

Nunzio J. Palladino, Chairman

FOR THE STATE OF UTAH

Scott M. Matheson, Governor

Amendment to Agreement
Between the United States Nuclear Regulatory Commission
and the State of Utah
for
Discontinuance of Certain Commission Regulatory Authority
and
Responsibility Within the State Pursuant to
Section 274 of the Atomic Energy Act of 1954, as amended.

WHEREAS, the United States Nuclear Regulatory Commission (hereinafter referred to as the Commission) entered into an Agreement (hereinafter referred to as the Agreement of March 29, 1984) with the State of Utah under Section 274 of the Atomic Energy Act of 1954, as amended (hereinafter referred to as the Act), which Agreement became effective on April 1, 1984, and provided for discontinuance of the regulatory authority of the Commission within the State under Chapters 6, 7, and 8 and Section 161 of the Act with respect to byproduct materials as defined in Section 11e.(1) of the Act, source materials, and special nuclear materials in quantities not sufficient to form a critical mass; and

WHEREAS, the Governor of the State of Utah is authorized under Utah Code Annotated 26-1-29 to enter into this amendment to the Agreement of March 29, 1984, between the Commission and the State of Utah; and

WHEREAS, the Governor of the State of Utah has requested this amendment in accordance with Section 274 of the Act by certifying on July 17, 1989 that the State of Utah has a program for the control of radiation hazards adequate to protect the public health and safety with respect to the land disposal within the State of source, byproduct and special nuclear material received from other persons and that the State desires to assume regulatory responsibility for such materials; and

WHEREAS, the Commission found on April 30, 1990 that the program of the State for the regulation of materials covered by this amendment is in accordance with the requirements of the Act and in all other respects compatible with the Commission's program for the regulation of such materials and is adequate to protect the public health and safety; and

WHEREAS, the State and the Commission recognize the desirability and importance of cooperation between the Commission and the State in the formulation of standards for protection against hazards of radiation and in assuring that the State and Commission programs for protection against hazards of radiation will be coordinated and compatible; and

WHEREAS, this amendment to the Agreement of March 29, 1984, is entered into pursuant to the provisions of the Atomic Energy Act of 1954, as amended.

NOW, THEREFORE, it is hereby agreed between the Commission and the Governor of the State, acting on behalf of the State, as follows:

Section 1. Article I of the Agreement of March 29, 1984, is amended by deleting "and" at the end of paragraph B., by adding ";and," after the words "critical mass" in paragraph C., and inserting the following new paragraph immediately after paragraph C.:

D. The land disposal of source, byproduct and special nuclear material received from other persons.

Section 2. Article II of the Agreement of March 29, 1984, is amended by deleting paragraph E. and by redesignating paragraph F. as paragraph E.

This amendment shall become effective on May 9, 1990, and shall remain in effect unless and until such time as it is terminated pursuant to Article VIII of the Agreement of March 29, 1984.

Done at Salt Lake City, Utah, in triplicate, this 8th day of May, 1990.

FOR THE UNITED STATES NUCLEAR REGULATORY COMMISSION

Kenneth M. Carr,
Chairman

FOR THE STATE OF UTAH

Norman H. Bangerter,
Governor

"*Elements of a Utah Agreement State Program for Uranium Mills Regulation*",
Divisions of Radiation Control and Water Quality
Utah Department of Environmental Quality

August 26, 2000

Policy Statement

The State of Utah recognizes the importance of and supports the uranium mining and milling industry. The State recognizes that to remain viable at this time, uranium mills must be able to engage in activities other than milling conventional mined uranium ores, such as processing alternate feed materials for the recovery of uranium alone or together with other minerals. The State also recognizes its responsibility to ensure that all such activities are accomplished in a manner that is protective of human health and the environment. It has been a long-standing policy for the State to seek primacy for environmental programs. In this regard, the State believes that a cooperative uranium mills and tailings regulatory program will be of benefit to both the regulated community and Utah citizens. The advantages that the State can offer over the current Nuclear Regulatory Commission program include better communication with and participation of the public in uranium recovery issues, elimination of duplicative regulatory responsibilities, providing a more cost effective program for the regulated community, and establishing control of materials not currently being regulated (e.g. Pre-1978 uranium mill tailings), while maintaining a regulatory program that is adequate and compatible with existing and future NRC regulations and policy. The elements within this discussion paper provide the framework for how the State of Utah would regulate uranium mills and tailings as an Agreement State.

Statutory Changes

The Radiation Control Act would be amended to allow the Radiation Control Board to establish rules for the licensing, operation, decontamination, decommissioning, and reclamation of sites, structures, and equipment used in conjunction with possession, use, transfer, or delivery of source and byproduct material and the disposal of byproduct material(uranium or thorium mill tailings and related wastes).

The Radiation Control Act would be amended to add a representative of the uranium milling industry to the Radiation Control Board.

Rulemaking

The Division of Radiation Control (DRC) will adopt 10 CFR Part 40 and new Part 41, if and when promulgated, by reference with necessary changes to reflect primacy of the Utah program (e.g., recognition of the Executive Secretary, etc.). With the adoption by reference of the NRC regulatory program, it is recognized that guidance has been published that is intended to provide

clarification to the various regulatory elements. The Division will follow the published NRC guidance unless doing so will compromise protection of human health and the environment.

DRC recognizes that it cannot make a fundamental change to an Atomic Energy Act provision (e.g., the definition of byproduct material). DRC further recognizes that pursuant to provisions of the Radiation Control Act (19-3-104 (6) and (7)), it can adopt rules more stringent than federal law only after a public hearing and a written finding based on evidence in the record that the federal regulations are not adequate to protect public health and the environment.

DRC will reach agreement with impacted mills, outside of rulemaking, desiring to process alternate feed on an acceptable uranium content level. Productive discussions in this regard are underway. Any agreement would be "approved" by the Utah Radiation Control Board, enforced by incorporation into a license condition.

The State of Utah will clarify during rulemaking that there is no distinction between pre and post-1978 uranium and thorium tailings and wastes that would otherwise satisfy the definition of 11e.(2) byproduct material.

Funding

DRC will use a combination of annual operating fees and review fees. There will be no "inspection fees" as part of the review fees. The Division or Department will not seek a change to "radioactive waste disposal fees" either in the Radiation Control Act or in the Department of Environmental Quality fees schedule to fund the program. The costs of developing the State programs and developing guidance and regulations from time to time will not be passed on to the licensees as part of the annual operating fees or review fees or otherwise.

Staffing

Staffing will consist of the establishment of four new positions within the Division. Staffing utilized for the licensing and oversight of the Envirocare site will be drawn from existing oversight staff for that facility. A health physicist position will be established with the responsibility for radiation safety inspections of the mills and inspection of all radioactive material licensees in Southern Utah (some 28 licensees). An engineer position will be established to assist in the inspection and licensing of new facilities, upgrade of existing facilities, and closing facilities. A groundwater hydrologist position will be established to provide for inspection and licensing review relating to groundwater monitoring and corrective actions for the mills. Administrative support to the section will be provided by an Office Technician III. Management of the mill team will be under the responsibility of the Environmental Monitoring and Low-Level Waste Section. The Section name will be changed to Environmental Monitoring, Uranium Recovery, and Waste Management Section.

Inspection program

There will be at least four facilities that will require inspection: Lisbon (Rio Algom), White Mesa (International Uranium), Shootaring Canyon (Plateau Resources), and Clive (Envirocare of Utah). There will also be the possibility of inspection responsibilities for the Moab Mill Reclamation Site if cleanup responsibility has not yet been transferred to the Department of Energy. Currently, Envirocare of Utah in Tooele County is subject to quarterly inspections by the NRC using staff from offices in Arlington, Texas sometimes supplemented by NRC Headquarters staff from Rockville, Maryland. Envirocare inspections would be assigned to the "Envirocare team" and incorporated into the overall oversight and inspection schedule now in use for low-level radioactive waste.

A health physicist will be hired to inspect each of the mills at least on a quarterly basis. The mill inspection frequency schedule will be reviewed regularly and adjusted as needed for different circumstances (e.g., good compliance, standby not operating, etc.) The health physicist will be housed in the DRC offices in Salt Lake City but will travel to Southern Utah at least one week per month to accomplish both regular (quarterly) and oversight inspections. This health physicist will also be responsible for the inspection of 28 other radioactive material licensees in Southeast and Southwest Utah. The engineer and groundwater hydrologist will provide inspection support as needed to the health physicist in such areas as groundwater sampling evaluations, split groundwater sampling, oversight of new engineering construction, or oversight of closing facilities.

The State inspection program would incorporate all the elements of the current radioactive materials inspection program relevant to Part 40 uranium recovery facilities which is subject to periodic program review by the NRC. Enforcement actions will be in accordance with the Utah Radiation Control Rules and existing enforcement guidance (used for the radioactive materials and low-level waste program). All enforcement actions can be appealed to the Utah Radiation Control Board and thereafter to the appropriate court.

Licensing program

The licensing process would follow the elements of the current radioactive materials program which is subject to periodic program review by the NRC. License renewal, amendments, reclamation plans or revisions to reclamation plans or new licenses may be subject to public comment and/or public hearing. Criteria of R313-17-1 through 4 would apply. DRC would follow current policy as to the differentiation between minor and major amendments and the need for public comment.

Existing NRC licenses will be transferred to the State upon program relinquishment by the NRC and they will be converted into a "state license" which will include appropriate Utah regulatory citations in lieu of "Part 40" language and will incorporate the Utah administrative process (e.g., Executive Secretary) where necessary. The license conditions will remain unchanged except for the above until a license amendment request or license renewal. The current expiration date of the license will remain the same. The license transfer will not give rise to a requirement to make

any changes to existing facilities.

The State will recognize already established performance-based license conditions for uranium mills and tailings. The State is willing to consider future performance-based license conditions on a case by case basis with each licensee. An issue that will need to be addressed is the appropriate method for substantive involvement of the public while still achieving the operational objectives of performance based licensing.

Groundwater Authority

The Division of Radiation Control should continue to administer both groundwater permitting and radioactive materials licensing for disposal facilities and uranium mills. This process can be streamlined and made more effective by utilizing existing provisions of the Utah Water Quality Act which we believe would allow the Water Quality Board and Executive Director to designate the Director of the Division of Radiation Control as an Executive Secretary to administer provisions of this Act for the identified facilities (see UCA 19-5-106 and 19-5-104 (1),(k). This option offers several advantages including no statutory changes to the Radiation Control Act would be required, the DRC Director would be designated as an Executive Secretary of the Water Quality Board and given legal authority to issue, administer and enforce specific groundwater permits under the Utah Water Quality Act, and no separate involvement of the Division of Water Quality staff would be required although they would remain available to consult with the DRC Director regarding interpretation of rules and any other technical or procedural matters.

Additional advantages include that it would be more clear to the regulatory community regarding which agency and individuals they must deal with, thus eliminating dual involvement, permits would be issued under the current groundwater rules and policies adopted by the Water Quality Board to insure consistency with other entities regulated for the protection of groundwater by the Board, and the Division of Radiation Control would not need to undertake a separate rule making to define a groundwater protection program for these specific facilities.

Finally, appeals of permit or enforcement decisions will be conducted in accordance with the Water Quality Act through the Water Quality Board or the Executive Director of DEQ as specified in the Statute. This will insure consistency with other facilities and groundwater protection actions. Mining representation and expertise is already established in statute for the Board. This approach insures consistency with the radioactive materials licensing because the same staff will be doing both. The DRC Director will need to be careful to insure that the proper signature authority is used for the various actions that might be taken. This approach prevents fragmentation of the state groundwater protection program and maintains consistency.

Task Force Recommendation to the Department of Environmental Quality

The following motion, proposed by Bill Sinclair, was moved for a vote by David Bird, seconded by George Hellstrom.

We, the members of the Department of Environmental Quality Groundwater Authority Agreement State task force support the State of Utah in pursuing Agreement State status for uranium recovery regulation on the terms established in the revised "Elements of a Utah Agreement State Program for Uranium Mills Regulation, Divisions of Radiation Control and Water Quality, agreed to at the July 26, 2000 meeting of the task force.

Unanimously supported by task force members:
Paul Goranson, Rio Algom
Fred Craft, Plateau Resources
George Hellstrom, Envirocare of Utah, Inc.
David Bird, Utah Mining Association
David Frydenlund, International Uranium
Harvey Merrell, Grand County Council
Teryl Hunsaker, Tooele County Commission
Stephen Nelson, Utah Radiation Control Board
William J. Sinclair, Division of Radiation Control, UDEQ
Don Ostler, Division of Water Quality, UDEQ

WOODROW W. CAMPBELL, P.E.
1418 East 275 North
Layton, UT 84040
(801) 547-5006

OBJECTIVES

As an engineer, I am interested in improving our quality of life. This includes helping people through the bureaucratic red tape. This includes Water Right and Environmental Regulations.

EDUCATION/TRAINING

P.E. Professional Engineer, State of Utah Number 174790.

BSGE Bachelor of Science Degree, Geological Engineering (Geotechnical Option), University of Utah, December 1984.

EXPERIENCE

OWNER/PARTNER, HydroDynamics, Water Right Consulting (Formerly Bureaucratic Systems) July 1990 to Present.

Water consulting specifically Proof of Appropriations (Proofs) This work involves a field survey, preparation of a drawing (usually using a CAD program) and completion of the necessary documents. These documents are then submitted to the Division of Water Rights (Division) and after being reviewed and Certificate of Beneficial Use is issued I follow through until that Certificate is completed. More than 250 Proofs have been completed in many different counties throughout Utah. I have also consulted concerning water right title, buying and selling water rights, and filing various applications with the Division

ENVIRONMENTAL ENGINEER III, State of Utah, Department of Environmental Quality, Division of Radiation Control. March 1995 to Present

As an Engineer, my main duty is verifying that Licensees (including radioactive waste disposal facilities) of the Division of Radiation Control (DRC) are constructing and monitoring their facilities in accordance with standard engineering procedures, regulatory standards, and specific conditions established in their individual license. These conditions include construction quality assurance/quality control (CQA/QC), groundwater monitoring, construction design, etc. The primary responsibility is to protect human health and the environment.

Training

- Completion of 5 week course in Health Physics

ENVIRONMENTAL ENGINEER, Growth Environmental Services, Inc., (Formerly Certified Environmental Consulting) November 1992 to March 1995.

As a project manager I was able to supervise various environmental projects including the following:

- Underground storage tank (UST) removals and tightness testing;
- emergency response of oil contaminated water and wetlands; and
- remediation of contaminated sites.

Training

- Completion of an EPA approved 8 hour refresher course as a Hazardous Waste Site Worker.
- Certified Groundwater and Soil Sampler.

ENVIRONMENTAL ENGINEER, Andrulis Research Corp., May 1991 to March 1992.

I helped prepare various required environmental documents for U.S. Army Dugway Proving Ground. These included an Installation Environmental Assessment (EA), an EA for the Waste Characterization BangBox Facility, an analysis of various disposal methods for the waste stream effluent from the Optical Data Branch, and an update of the Hazardous Waste Standing Operating Procedures and Filter Management Plan for the Chemical Laboratory.

Training

- Completion of an EPA approved 8 hour refresher course as a Hazardous Waste Site Worker.

ENVIRONMENTAL ENGINEER II, State of Utah, Department of Environmental Quality, Division of Solid and Hazardous Waste. June 1990 to May 1991.

This position is similar to the position listed above at the Division of Radiation Control I was in the compliance and enforcement section in the RCRA program

Training

- Completion of an EPA approved 40 hour Personnel Protection and Safety Course.
- RCRA Orientation Course
- Inspector Training Course

ENGINEER II, State of Utah, Department of Natural Resources, Division of Water Rights. October 1987 to June 1990.

As the Assistant Area Engineer in the Weber Area Office my main responsibilities were administering water rights in accordance with the established regulations and the Divisions rules and policies. Various projects included the following:

- Field checking Elections, updating title and issuing Water Users Claims;
- Verifying individual files in the main data base;
- Helping the public file various applications; and
- issuing various approvals including memorandum decisions.

CIVIL ENGINEERING TECHNICIAN, U.S. Army Corp of Engineers, Salt Lake City Regulatory Office. August 1986 to October 1987.

Under Section 404 of the Clean Water Act, I helped regulate the deposition of fill material into a water of the United States including Wetlands This work included stream and lake alterations below the ordinary high water mark and the mapping of wetland areas

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Name: Woody Campbell Date of Hire: February 27, 1995

Training Areas	Date Completed	Management Initials/Signature	Comments
BASIC TRAINING			
College/University Degree	12/84		Geological Engineering, University of Utah
Program Orientation	3/95		
Review of the UDRC Rules	3/95		
Review of the Location of the Regulatory Guides and Reference Materials	3/95		
Essentials of Inspection			
Essentials of Licensing			
SPECIALIZED TRAINING			
Elements of Health Physics (5 wk)	3/8/96		
Elements of Nuclear Medicine			
Elements of Medical Therapy			
Elements of Industrial Radiography			
Elements of Transportation	7/2001	DF	
Elements of Well Logging			
Elements of Pool Irradiators			
Elements of Environmental Monitoring			
Radiological Emergency Response Operations (RERO)			
ADVANCED TRAINING			
Advanced Health Physics			
Elements of Investigations			
OTHER TRAINING			
Personnel Protection and Safety	8/17/90		
8 hr. SARA/OSHA Supervisor	11/12/93		
Groundwater & Soil Sampler Cert.	1/29/94		

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Training Areas	Date Completed	Management Initials/Signature	Comments
OTHER TRAINING (cont'd)			
8 hr. OSHA CFR-29 1910.120	12/1/94		
Hydrologic Evaluation of Landfill Performance Modeling Workshop	8/11/95		
Mitigation Rad. Transp. Emerg.	9/19/95		
Clay Liners and Covers for Waste Disposal Facilities	5/17/96		
Intro. to Groundwater Invest.	6/27/96		
Gen. HP Pract. for Uran. Recovery	2/6/97		
Radon Measurement Operator	2/21/97		

Clark T. Clements
460 East Blaine Avenue
Salt Lake City, UT 84115

(801) 536-4265 (work)
(801) 933-4886 (home)

OBJECTIVE

To obtain a professional position in the field of Environmental Science where my 12 years of direct experience, skills, and knowledge of radiation protection can be utilized in order to promote both regulatory compliance and safety. I view the Environmental Scientist position as a challenging opportunity to further my professional growth, as well as creating the opportunity for me to assist in protecting both the environment and the public.

QUALIFICATIONS

Qualifications: As a professional radiation safety analyst I have experience performing the following functions: 1) Conducting compliance surveys of facilities where licensed radioactive materials are used. 2) Preparing written summaries of observations to document regulatory compliance. 3) Reviewing radiation safety plans and Radiation Protection Procedures. 4) Participated in Emergency response training involving both hazardous chemicals and radioactive material. 5) Assisted in collecting and analyzing environmental samples. 6) Analyzing samples to quantitatively measure levels of radioactivity for bioassays and surface contamination. 7) Evaluating dosimetry requirements for both personnel and laboratory facilities. 8) Evaluating dosimetry reports and performing appropriate verifications and investigations. Providing technical radiation safety input for development of computer database support for radiation protection program. 9) Calibrated survey instruments and conducted performance testing of Fume hoods. 10) Received and surveyed radioactive shipments. 11) Prepared excepted package limited quantity shipments. 12) Provided in-service training to radiation workers.

As a consultant Radiation Safety Officer (RSO) I have performed the following Radiation Safety Officer functions: 1) Completed application for a radioactive materials license. 2) Implemented the radiation safety program in accordance with the Utah Radiation Control Rules and license conditions. 3) Applied for amendments to my client's Radioactive Materials License. 4) Developed the radiation protection and chemical hygiene program 5) Conducted detailed audits of both the radiation safety and chemical hygiene programs providing written summaries and recommendations for program improvements. Interfaced with management representative to implement correct actions. 6) Developed and conducted laboratory safety training pursuant to compliance with 29 CFR 1910.1450 and commitments made in the radioactive materials license application. Applied for hazardous material permits, EPA site license permits, and assisted in hazardous material and radioactive waste shipments. 7) Developed exposure control plan, emergency evacuation plan, blood borne pathogen plan. 8) Evaluated personnel for dosimetry.

EMPLOYMENT

ENVIRONMENTAL SCIENTIST III — YEARS EMPLOYED (JUNE 2001 - PRESENT)

Department of Environmental Quality
Division of Radiation Control
Salt lake City, Utah

Responsibilities:

- Reviews, evaluates, and assesses applicant's submissions of limited scope licensing actions
- Considers and confirms proper application of health physics principles related to radioactive material licensing actions
- Maintains record of decisions for public inspections
- Prepares formal licensing document for issuance by Executive Secretary
- Evaluates adequacy of licensee's radiation protection program, instruments and equipment, exposure controls, and surveys and surveys by interviewing personnel, reviewing records or reports, and making personal observations
- Documents observations, finds and impressions
- Summarizes preliminary findings with the licensee management personnel at close out meeting
- Violations are categorized with an appropriate Severity Level, and escalated as necessary
- Ensure that licensees have established and are adhering to their ALARA program

RADIATION ANALYST
University of Utah
Radiological Health Department
Salt lake city, UT. 84112

YEARS EMPLOYED (1989 -2001)

Responsibilities:

- Perform routine audits of research laboratories
- Perform start up and close out surveys
- Provide initial practical radiation safety training to radioactive material users
- Provide refresher in-service training to radioisotope users
- Evaluate personnel dosimetry requirements
- Evaluate radiation protection program(s)
- Prepare detailed survey reports and summaries
- Perform Fume Hood performance test
- Calibrate survey instruments
- Survey packages for radioactive shipments
- Ensure that ALARA is implemented in University of Utah radiological safety operations

Accomplishments:

- Assisted the Director of radiological health in updating the University of Utah Radiation Safety Manual
- Helped structure and define the Radiation safety data base
- Developed laboratory safety program for student labs
- Restructured the safety program for the Hazardous Waste Facility
- Provided safety training for the Minorities Program in the School of Medicine
- Developed comprehensive chemical safety, fire safety, electrical safety, and bio-hazard training presentation(s) in accordance with OSHA's Laboratory Standard

ENVIRONMENTAL CHEMIST
ARSARCO, INC.
t Lake City, UT

YEARS EMPLOYED (1988 - 89)

Responsibilities:

- Performed analysis for trace metal and heavy metal analysis
- Monitored company employees for occupational exposures to toxic metal
- Assisted management in making determinations about personnel reassignments to duties in low exposure areas
- Performed analysis on EPA samples using graphite furnace spectrophotometry
- Trained and supervised employees on the night shift
- Maintained QA program for Spectrometry Section

RESEARCH SPECIALIST AND QA MANAGER FOR DATABASE
Associated Regional and University Pathologist
Salt Lake City, UT

YEARS EMPLOYED (1984 -1988)

Responsibilities:.

- Ensured correct entering of patient data for lab test to be performed
- Worked with computer manager to update database
- Performed Competitive Binding assays for various clinical test
- Radiation Safety Officer for RIA lab
- Performed general lab surveys to ensure contamination control
- QA Manager for Radioimmunoassay) lab
- Calibrated Gamma well counter

complishment:

- Authored the Editor's Guide for QA of patient data entry and lab test request

PHYSICAL THERAPY ASSISTANT — YEARS EMPLOYED (1981 - 1984)
Veterans Administration Medical Cente
Salt Lake City, UT

Responsibilities:

- Scheduling of hydrotherapy patients
- Provided patient hydrotherapy
- Applied post hydrotherapy standard dressing to patient wounds
- Patient treatment with various modalities, i.e., Ultrasound, Traction, Diathermy, Therapeutic Massage
- Assisted patients in Range of Motion exercises and therapy
- Maintained sterile environment in the in hydrotherapy section
- Provided patient education with respect to treatment regimen and exercises

Accomplishments:

- Upgraded patient care by improving cross contamination control and Bio-safety
- Applied environmental aesthetics concepts to improve patient environment

LAB TECHNICIAN — YEARS EMPLOYED (1977 - 1981)
Veterans Administration Medical Center
Salt Lake City, UT

Responsibilities:

- Performed DNA extractions and sized DNA for tissue culture transfections
- Cultured and harvested Rous Sarcoma virus
- Performed protein sequencing
- Performed UV spectrophotometer analysis of DNA and proteins
- Made stock solutions and maintained reagents for biochemistry section
- Maintained incubator and hatching schedule for avian experimental population
- Performed animal injections
- Performed animal surgery to remove tumors and identify metastatsis
- Drew blood on research animals for analysis
- Reviewed scientific papers for

Accomplishments:

- Authored paper on Critique Virogene Hypothesis and the Asian Origin of Man

EDUCATION

B.S. PHYSICAL ANTHROPOLOGY — YEARS ATTENDED (1977 - 80)
University of Utah
Salt lake City, Utah

Accomplishments :

Scholastic Achievement Award 1979

M.S. BIOLOGICAL ANTHROPOLOGY/GENETICS (PENDING) — YEARS ATTENDED (1981 - 83)
University of Utah
Salt lake City, Utah

Accomplishment:

- Introduced Molecular Biology concepts and techniques to University of Utah Anthropology Department

ADDITIONAL TRAINING

- Army Reserve Nuclear Biological Chemical (NBC) training
- University of Utah Radiation Safety Training
- Operation of J. L. Shepard & Associates Model Mark I-30 Irradiator
- Hazardous Material Transportation
- Hazardous Material Waste Management
- Advanced Hazardous Material Waste Management
- Core Concepts In Industrial Hygiene
- Chemical Safety I
- Chemical Safety II
- Personal Protective Equipment
- OSHA Specific Chemicals Standards
- Respiratory Protection
- Medical Management for Radiological Emergencies
- Electrical Safety
- Bio-safety Blood Borne Pathogens
- Fire Safety
- USNRC Introductory Health Physics
- USNRC Licensing Course
- NTS Nuclear Testing Services Training Course

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Name: Clark T. Clements Date of Hire: June 25, 2001

Training Areas	Date Completed	Management Initials/Signature	Comments
BASIC TRAINING			
College/University Degree	1980	CW Jones	
Program Orientation	7-3-01	CW Jones	
Review of the UDRC Rules	6-27-01	CW Jones	
Review of the Location of the Regulatory Guides and Reference Materials	6-27-01	CW Jones	
Essentials of Inspection			Sep 01 course cancelled
Essentials of Licensing	9-14-01	CW Jones	
SPECIALIZED TRAINING			
Introductory Health Physics (1 wk)	7-20-01	CW Jones	H-117
Elements of Nuclear Medicine			
Elements of Medical Therapy			
Elements of Industrial Radiography			
Elements of Transportation			
Elements of Well Logging			
Elements of Pool Irradiators			
Elements of Environmental Monitoring			
Radiological Emergency Response Operations (RERO)			
ADVANCED TRAINING			
Advanced Health Physics			
Elements of Investigations			
OTHER TRAINING			

Julie Rupp Felice

EDUCATION:

B.S. Utah State University, Logan, Utah (June, 1977)

CERTIFICATION:

Supervisory Certificate (June, 1996)
Issued by the Utah Department of Human Resource Management in conjunction with The University of Utah Center for Public Policy and Administration.

Manager Certificate (January, 1997)
Issued by the Utah Department of Human Resource Management in conjunction with The Utah System of Higher Education.

Certified Public Manager (July, 1997)
Issued by the Governor's Office of the State of Utah and the Utah Department of Resource Management in conjunction with the Utah System of Higher Education

ASNT IRRSP Senior Proctor (March, 1999)
Successful completion of The American Society for Nondestructive Testing, Inc. (ASNT) IRRSP Senior Proctor Training Program

PROFESSIONAL TRAINING:

U.S. Nuclear Regulatory Commission Sponsored Training Courses:

Introduction to Licensing Practices and Procedures (09/25/89 to 09/29/89)
Teleconference, "Overview of Revisions to 10 CFR 20: Standards for Protection Against Ionizing Radiation" (09/29/89)
Safety Aspects of Industrial Radiography (09/24/90 to 09/28/90)
Gas & Oil Well Logging for Regulatory Personnel (11/05/90 to 11/09/90)
Sealed Sources and Device Workshop (09/24/91 to 09/27/91)
Inspection Procedures Course (07/27/92 to 07/31/92)
Transportation of Radioactive Materials (09/27/93 to 10/1/93)
Two Week Health Physics Technology Course (03/12/95 to 03/24/95)

Oak Ridge Associated Universities:

Medical Uses of Radionuclides (08/13/90 to 08/17/90)
Five Week Health Physics & Radiation Protection Course (07/08/91 to 08/09/91)
One Week Radiation Protection Engineering Course (12/09/91 to 12/13/91)

The Advanced Health Education Center
(H-313) Teletherapy and Brachytherapy Course (03/13/00 to 03/17/00)

Conger & Elsea, Inc.
(G-205) Root Cause/Incident Investigation Workshop (07/31/00 to 08/04/00)

U.S. Nuclear Regulatory Commission Sponsored Workshops:

Environmental Issues Workshop (09/28/92 to 09/30/92)
Site Decommissioning Management Plan Workshop (03/23/94)
Workshop on the Nuclear Material Event Database (05/11/94)
Events Reporting Workshop (02/8/95 to 02/9/95)
Sealed Source and Device Evaluation Workshop (09/12/95 to 09/15/95)
(HP-401) Health Physics Topical Review,
"New Modalities in Teletherapy and Brachytherapy" (01/22/96 to 01/23/96)

U.S. Nuclear Regulatory Commission and Conference of Radiation Control Program Directors, Inc. (CRCPD) Sponsored Training:

Nuclear Materials Events Database Software and Management of Unwanted Radioactive Material (08/15/01 through 08/16/01)

U.S. Department of Energy Sponsored Training:

First Responders Radiological Transportation Emergencies Course (08/29/89)
Medical Management in Radiation Accidents (05/14/92)
Emergency Response Orientation Training (08/23/94)
Mitigation Radiological Transportation Emergencies Course (09/19/95)

Columbia University, Center for Risk Communication:
Environmental Communication Workshop (03/30/92 to 04/03/92)

U.S. Department of Energy and U.S. Environmental Protection Agency Sponsored Training:

(EVN351) Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) Training (07/28/98 to 07/30/98)

U.S. Federal Emergency Management Agency, Emergency Management Institute:

First Response to Transportation Emergencies Involving Radioactive Materials (07/12/89 to 07/13/89)
Radiological Emergency Response Study Course [IS-301] (11/05/93)
Radiological Emergency Response Operations Course (12/05/93 to 12/11/93)

Idaho National Engineering and Environmental Laboratory in conjunction with the Eastern Idaho Technical College and the State of Utah:

Radioactive Material Transportation Course (04/28/97)

State of Utah Sponsored Training:

DEQ Emergency Response Plan Refresher Training (06/07/00)

Other Training:

University of Utah, Radiological Health Department:
Radiation Safety Training Course (04/29/83)

Troxler Electronic Laboratories:
Training Course for the Use of Nuclear Testing Equipment (06/01/90)
Troxler Radiation Safety Officer Course (10/14/94)

Patterson Dental:
Quality Assurance Compliance Testing Seminar (12/04/95)

RadCal Corporation:
Training on Model 9010 Radiation Monitor Controller (07/2/96, 07/11/96)

Certified Public Manager Program
Leaders' and Teams' Reaction Course (06/23/97)

Salt Lake County Fire Department
"Community Emergency Response Team" (CERT) Disaster Preparedness Program
(09/99 through 11/99)

PROFESSIONAL EXPERIENCE:

Health Physicist (1989-Present)
Utah Department of Environmental Quality
Division of Radiation Control
Salt Lake City, Utah

Radiation Analyst (1984-1989)
University of Utah
Radiological Health Department
Salt Lake City, Utah

Radiation Safety Dosimetrist (1980-1984)
University of Utah
Radiological Health Department
Salt Lake City, Utah

MEMBERSHIPS:

Health Physics Society (HPS)
Plenary member since 1987

Great Salt Lake Chapter of HPS
Member since 1985
Local Arrangement Committee for 1987 HPS Annual Meeting
Secretary Treasurer (1987-1991)
President Elect (1991-1992)
President (1992-1993)
Chairperson, Science Teacher Workshops (1994-1995)

Conference of Radiation Control Program Directors, Inc. (CRCPD)
Associate member since 1990
Assisted with CRCPD Conference held in Salt Lake City, Utah (1990)

Utah Society of Certified Public Managers (USCPM)
CPM member since 1997
Director at Large, Board of Directors (1998)
Utah Delegate to AACPM Educational Symposium, Biloxi, Mississippi (1998)
Director at Large, Board of Directors (1999)
Utah Delegate to AACPM Educational Symposium, Baton Rouge, Louisiana (1999)
President-Elect (2000)
Utah Delegate to AACPM Educational Symposium, St. Pete Beach, Florida (2000)
President (2001)
Co-Chair, 3rd Annual Managers Conference (2001)
Chair, Strategic Planning Committee (2001)
Utah Delegate to AACPM Educational Symposium, Scottsdale, Arizona (2001)

American Academy of Certified Public Managers
CPM member since 1997
Member, Bylaws and Ethics Committee (1999, 2000)
Member, Board of Elections Committee (1999)
Member, Henning Award Committee (2000)
Chair, International Outreach Committee (2000, 2001)
Member, Orientation Program for New Societies Committee (2001)

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Name: Julie Felice Date of Hire: May 5, 1989

Training Areas	Date Completed	Management Initials/Signature	Comments
BASIC TRAINING			
College/University Degree	6/77	CW Jones	B.S., Education, USU
Program Orientation	5/89	CW Jones	
Review of the UDRC Rules	5/89	CW Jones	
Review of the Location of the Regulatory Guides and Reference Materials	5/89	CW Jones	
Essentials of Inspection	7/31/92	CW Jones	
Essentials of Licensing	9/29/89	CW Jones	
SPECIALIZED TRAINING			
Elements of Health Physics (5 wk)	8/9/91	CW Jones	
Elements of Nuclear Medicine	8/17/90	CW Jones	
Elements of Medical Therapy			
Elements of Industrial Radiography	9/28/90	CW Jones	
Elements of Transportation	10/1/93	CW Jones	
Elements of Well Logging	11/9/90	CW Jones	
Elements of Pool Irradiators			
Elements of Environmental Monitoring	12/13/91	CW Jones	engineering
Radiological Emergency Response Operations (RERO)	12/11/93	CW Jones	
ADVANCED TRAINING			
Advanced Health Physics	3/24/95	CW Jones	no cert.
Elements of Investigations			
OTHER TRAINING			
Radiation Safety Training	4/29/83	CW Jones	
1st Respondrs Rad. Transp. Emerg.	8/29/89	CW Jones	
Troxler Rad. Safety & Gauge Ops.	6/1/90	CW Jones	

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Training Areas	Date Completed	Management Initials/Signature	Comments
OTHER TRAINING (cont'd)			
NTS Rad. Safety & Gauge Ops.	3/14/90	CW Jones	
Sealed Sources & Devices Wkshp	9/27/91	CW Jones	
Environmental Communications	5/1/92	CW Jones	
Environmental Issues Workshop	9/30/92	CW Jones	no cert.
ISO-301 Rad. Emergncy Response	11/5/93	CW Jones	
Site Decommissioning Management Plan Workshop	3/23/94	CW Jones	no cert.
Workshop on the Nuclear Material Event Database	5/11/94	CW Jones	no cert.
Rad. Material Transportation Emergency Response Orientaion	8/23/94	CW Jones	
Troxler Radiation Safety Officer	10/14/94	CW Jones	
Events Reporting Workshop	2/9/95	CW Jones	
Sealed Source & Device Evaluation Workshop	9/15/95	CW Jones	
Mitigation Rad. Transp. Emerg.	9/19/95	CW Jones	
Health Physics Topical Review	1/23/96	CW Jones	
Multi-Agency Radiation Survey & Site Investigation Manual	7/30/98	CW Jones	
Teletherapy and Brachytherapy Course (H-313)	3-17-00	CW Jones	
Root Cause/Incident Investigation Workshop (G-205)	8-4-00	CW Jones	
NMED Training Session	8-16-01	CW Jones	no cert.

RESUME

DANE L. FINERFROCK
1732 East 1700 South
Salt Lake City, Utah 84108

EDUCATION

B.S. in Meteorology 1970
University of Utah
Salt Lake City, Utah

B.S. in Biology 1974
University of Utah
Salt Lake City, Utah

EXPERIENCE

Environmental Health Manager
Utah Department of Health, Bureau of Radiation Control
(April 1988 - Current)

Administrative responsibilities for four health physicist. Duties include determining staff assignments, performance evaluations, project budgeting and progress evaluations. Prepare and review staff reports.

Technical duties include Radon-in-Residences monitoring program, statewide environmental radiation monitoring program, licensing and inspection of low-level radioactive waste disposal facility, and inactive uranium mill tailings remedial action program.

Health Physicist
Utah Department of Health, Bureau of Radiation Control
(May 1984 to April 1988)

Duties included development and implementation of a statewide radon-in-residences monitoring program. Quality assurance and quality control audits of the health physics and radiation safety program for the Salt Lake City uranium mill tailings remedial action project. By-product material license application review, licensing and compliance inspections of various users of radioactive materials throughout Utah as an Agreement State.

Preparation and implementation of the health physics and radiation safety plan for uranium mill tailings remedial action project in Utah.

Determination of what type, how and where, soil, water, vegetation, air and food samples need to be collected for appropriate analysis. Once analysis is completed, interpretation and documentation of results, and where necessary, recommendations for appropriate actions.

Section Leader/Health Physicist
Ford, Bacon and Davis, Salt Lake City, Utah
(October 1981 - April 1984)

Administrative responsibility for the technical management of three scientists and four technicians in support of State and Federal government and industry contracts.

Prepare proposals, market hazardous waste, health physics and nuclear group services, direct projects in accordance with contract requirements, determine staff assignments, monitor project work, prepare and review staff reports, responsible for NRC by-product licenses.

Responsible for all health physics activities including instrumentation, personnel dosimetry, environmental monitoring and sampling, sample analysis, dose assessment and risk analysis.

Developed a radiological control plan and health physics and safety plan for uranium mill tailings remedial action contract and instrumentation use and calibration protocols. Other contract work has included permitting for a Federal Energy Regulatory Commission project, instrumentation for low-level radioactive waste test facility at the NTS, hazardous waste assessments.

As a meteorologist, I prepared climatologic and meteorologic sections for environmental assessments and acted as a project liaison with consultants for other proposals and contracts.

Health Physicist
Utah Department of Health, Bureau of Radiation and Occupational Health
(September 1979 - September 1981)

Staff responsibility for the development, implementation and operation of the radiation control program of the State of Utah. Within this context, several functions were performed:

Project coordination for Uranium Mill Tailings Remedial Action Program - Responsibilities included: assessment and evaluation of radiation exposure due to mill tailings; maintain liaison and coordinate Federal, State and local government activities; conduct and assess environmental surveys of tailings locations; interface with the public to secure their willing participation in the mill tailings remedial action program. Serve as technical staff to a Task Force of local businessmen, government and concerned citizens for the Mill Tailings Program.

Environmental Monitoring - determine requirements for and maintain air, water and soil monitoring programs. Collect, analyze, document and interpret results, and prepare recommendations for appropriate policy decisions.

Promulgation, inspection and enforcement of regulations where State jurisdiction allows; perform inspections and enforce State-imposed standards.

Radiation Emergency Response Team Member

Radiation Analyst
University of Utah, Radiological Health Department
Salt Lake City, Utah
(1977 - September 1979)

Radiation surveys of laboratories throughout the University; performed analytical tests on personnel dosimeters; maintenance and calibration of instrumentation; assist in the assessment of radiation doses received by personnel; advise laboratories on proper radiation safety. Other responsibilities included liquid scintillation counting, and air sampling and analysis. Also, radiation safety assessments and quality control analysis of diagnostic radiology equipment; radiation safety assessment of x-ray defraction units, commercial and research microwave units.

Responsible for the University's low-level radioactive waste disposal program, including collection, classification, packaging and shipment of wastes. supervisor of two employees.

ADDITIONAL EXPERIENCE

Research Technician
University of Utah, Department of Anatomy
Internal Irradiation Research Project
(1976 - 1977)

United States Army
2nd Lt. Fort Jackson, South Carolina
1st Lt. U.S. Army Viet Nam
(August 1970 - February 1972)

Meteorologist
Stone and Webster Engineering Co.
Boston, Massachusetts
(Summer 1969)

ADDITIONAL TRAINING

Oak Ridge Associated Universities (February - April 1981) "Health Physics and Radiation Protection" - Professional Training Programs, Manpower, Education, Research, and Training Division.

U.S. Nuclear Regulatory Commission, Radiological Emergency Response Operations. Approximate 64 hour course ending August 8, 1980.

U.S. Nuclear Regulatory Commission, Safety Aspects of Industrial Radiography. Approximate 40 hour course ending August 17, 1980.

Western Interstate Energy Board, "Workshop on Low-Level Radioactive Waste". Approximate 16 hour workshop on low-level waste and appropriate regulations ending July 16, 1980.

Bureau of Radiological Health, U.S. Department of Health, Education and Welfare, Basic Course for Investigators: Diagnostic X-Ray Surveillance. Approximate 80 hour training course ending March 14, 1980.

U.S. Nuclear Regulatory Commission, Transportation of Radioactive Materials. Approximate 40 hour training ending November 16, 1984.

U.S. Nuclear Regulatory Commission, License Inspection Procedures. Approximate 40 hour training course ending June 18, 1985.

AFFILIATIONS

Member, Health Physics Society
Member, American Meteorology Society
Member, Great Salt Lake Chapter, Health Physics Society
Associate Member, Conference of Radiation Control Program Directors, Inc.

CERTIFICATES

National Registry of Radiation Protection Technologists
Part I Completion of Certification for Certified Health Physicist

PERSONAL

Born, July 15, 1947, Reading, Pennsylvania
6'4", 250 lbs., good health
Married, two children

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Name: Dane L. Finerfrock Date of Hire: March 5, 1984

Training Areas	Date Completed	Management Initials/Signature	Comments
BASIC TRAINING			
College/University Degree	10/74		B.S., Meteorology & Biology, U of U
Program Orientation	5/84		
Review of the UDRC Rules	5/84		
Review of the Location of the Regulatory Guides and Reference Materials	5/84		
Essentials of Inspection	6/28/85		
Essentials of Licensing	/79		no cert.
SPECIALIZED TRAINING			
Elements of Health Physics (10 wk)	4/16/81		
Elements of Nuclear Medicine			
Elements of Medical Therapy			
Elements of Industrial Radiography	/79		no cert.
Elements of Transportation	11/16/84		
Elements of Well Logging			
Elements of Pool Irradiators			
Elements of Environmental Monitoring			
Radiological Emergency Response Operations (RERO)	8/8/80		
ADVANCED TRAINING			
Advanced Health Physics			
Elements of Investigations			
OTHER TRAINING			
X-Ray Compliance	/78		no cert.
Basic Radon Control/Nonionizing/X-Ray Fees	9/18/86		
Mitigation Rad. Transp. Emerg.	4/12/88		

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Training Areas	Date Completed	Management Initials/Signature	Comments
OTHER TRAINING (cont'd)			
Reducing Radon in Structures	3/10/89		

GWYN E. GALLOWAY
UTAH DIVISION OF RADIATION CONTROL
168 NORTH 1950 WEST
SALT LAKE CITY, UTAH 84116
(801) 536-4250

EMPLOYMENT

Utah Department of Environmental Quality, Division of Radiation Control
Environmental Scientist, November 1988 - Present

Inspect X-Ray facilities, inspect radioactive material licensees, and inspect mammography facilities under the old HCFA contract and the present FDA MQSA contract. Review license requests and issue licenses for radioactive materials use and possession. Initiate enforcement actions when a violation is observed or identified. Manage the Division's licensing and x-ray databases. Research, develop, and evaluate changes to the Utah Radiation Control Rules. Evaluate process controls and radiation levels or concentrations in restricted and unrestricted areas.

Utah Department of Health, Bureau of Water Pollution Control
Environmental Scientist, May 1986 - November 1988

Gathered routine and compliance water samples from municipal, industrial, as well as natural water sources such as lakes ans streams. Performed biological and lake samples and surveys. Maintained ans serviced variety of sampling equipment. Prepared reports and letters of results to Bureau personnel, managers, clients, and EPA. Performed various computer skills such as data entry and retreival of information.

Utah Department of Health, Bureau of Radiation Control
Environmental Scientist, April 1985 - May 1986

Established and performed air monitoring for the Uranium Mill Tailings Remedial Action Project at the VITRO site. Gathered air samples using Hoffman's, Hi-Q's, and Personnel Pumps. Analyzed filters for radiological content and compared findings to BRC standards. Monitored personnel and equipment entering and exiting site for radium contamination. Participated in Department of Energy audits of the site. Mapped out area and collected soil samples to be evaluated for radiolaogical content and compared to DOE standards. Maintained various generators and air monitoring equipment. Interacted and instructed Bureau personnel, DOE personnel and various contractors of onsite industrial hygiene and radiological health practices. Informed personnel of violations and enforced compliance with rules.

EDUCATION

BACHELOR OF SCIENCE, University of Georgia,
Forest Resources/Wildlife Biology, 1981

TRAINING

Basic Course for Investigators: Diagnostic X-Ray System: US Food & Drug Administration 1990
Inspection Procedures Course: US Nuclear Regulatory Commission 1990
Five Week Health Physics & Radiation Protection Course: ORNL 1991
Medical Uses of Radionuclides: ORNL 1991
Radiological Emergency Response Operations (RERO): 1991
Screening Mammography Training Course: US Health Care Financing Administration 1992
Industrial Radiography: US Nuclear Regulatory Commission 1992
Special Topics in Health Physics: US Nuclear Regulatory Commission 1993
Exemption Test MQSA Inspection Procedures Course I: US Food & Drug Administration 1994
Transportation of Radioactive Materials: US Nuclear Regulatory Commission 1994
Licensing Practices & Procedures: US Nuclear Regulatory Commission 1995
Mitigation Radiological Transportation Emergencies Course: Westinghouse Electric Corporation, Waste Isolation Division, Waste Isolation Pilot Plant 1995
Lasers in Medicine: Conference of Radiation Control Program Directors, Inc. 1995
MQSA Inspection Procedures Course II: US Food & Drug Adminstration 1995
Health Physics Technology: US Nuclear Regulatory Commission 1996
MQSA Inspection Procedures Course III: US Food & Drug Adminstration 1996
Accelerator Radiation Therapy: Conference of Radiation Control Program Directors, Inc. 1995
MQSA Continuing Education (10 hours): Conference of Radiation Control Program Directors 1996
Safety Aspects of Well Logging. US Nuclear Regulatory Commission 1997
MQSA Continuing Education (12 hours): Conference of Radiation Control Program Directors 1998
MQSA Course IV, Final Regulations (15 hours): US Food & Drug Adminstration 1999
Teletherapy and Brachytherapy Course: US Nuclear Regulatory Commission 1999
MQSA Continuing Education (12.5 hours): Conference of Radiation Control Program Directors 2000
Inspecting for Performance: US Nuclear Regulatory Commission 2000

CERTIFICATION

Certified MQSA Mammography Inspector: US Food & Drug Administration 02/1999 - 02/2002

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Name: Gywn Galloway Date of Hire: August 3, 1986

Training Areas	Date Completed	Management Initials/Signature	Comments
BASIC TRAINING			
College/University Degree	3/81	CW Jones	
Program Orientation	8/86	CW Jones	
Review of the UDRC Rules	8/86	CW Jones	
Review of the Location of the Regulatory Guides and Reference Materials	8/86	CW Jones	
Essentials of Inspection	9/14/90	CW Jones	
Essentials of Licensing	2/14/95	CW Jones	
SPECIALIZED TRAINING			
Elements of Health Physics (5 wk)	8/9/91	CW Jones	
Elements of Nuclear Medicine	8/16/91	CW Jones	
Elements of Medical Therapy	8/20/99	CW Jones	H-313
Elements of Industrial Radiography	4/92	CW Jones	
Elements of Transportation	12/5/94	CW Jones	
Elements of Well Logging	11/97	CW Jones	no cert.
Elements of Pool Irradiators			
Elements of Environmental Monitoring	12/93	CW Jones	Special Topics Course
Radiological Emergency Response Operations (RERO)	10/91	CW Jones	
ADVANCED TRAINING			
Advanced Health Physics	4/4/96	CW Jones	
Elements of Investigations			
OTHER TRAINING			
Mitigation Rad. Transp. Emerg.	9/19/95	CW Jones	
NRC Teletherapy / Brachytherapy	8-20-99	CW Jones	Taken as per 1998 IMPEP review comment
Inspecting for Performance	12-7-00	CW Jones	G-304

H-313

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Training Areas	Date Completed	Management Initials/Signature	Comments
OTHER TRAINING (cont'd)			

RESUME

Susan Giddings

Employment History:

Date	Title	Description of Duties
1968-1972	Research Assistant	Biological research using P-32 as a biological tracer in field and laboratory research University of Utah
1980-1982	Diagnostic Radiologic Technologist	Studied and worked with patients clinically: certified, 1982 University of Utah Medical Center
1982-1983	Radiation Therapist	Studied and worked with patients clinically: certified, 1983 University of Utah Medical Center
1984-1985	Radiological Science Instructor	Taught radiobiology, radiotherapeutic biology, radiation protection, anatomy/physiology, directed readings, x-ray laboratories, and radiographic positioning Weber State University
1988-1997	Health Physicist	Radioactive material licensing, and compliance Environmental monitoring and compliance IMPEP team member State of Utah, Department of Environmental Quality, Division of Radiation Control

1997-present	Health Physicist	Inspection of x-ray facilities, facility radiation barrier evaluation, compliance, database tracking of x-ray registrants, research, develop, and evaluate rule change (radioactive materials and x-ray), respond to radiological emergencies as a team member, review and comment on FDA, CRCPD policy and procedural documents or statements of proposed rule making, prepare routine correspondence and special requests for information or resolution of complaints, and speak on subject of ionizing radiation State of Utah, Department of Environmental Quality, Division of Radiation Control

NRC, DOE, FEMA, STATE COURSES AND OTHER TRAINING

Introduction to Licensing Practices and Procedures
Inspection Procedures
Medical Uses of Radionuclides Course
WIPP - Radiological Emergency Response Trainer's Course
Fundamental Course for Radiological Monitors
Fundamental Course for Radiological Response Teams
Radiological instructor Course
Five-Week Health Physics and Radiation Protection Course
Use of Nuclear Testing Equipment (Troxler)
Safety Aspects of Industrial Radiography
Nuclear Transportation Course
Radiological Emergency Response Operations Training for State and Local Government Preparedness Personnel
Gas and Oil Well Logging for Regulatory Personnel
NRC Medical Workshop
Troxler Radiation Safety Officer Course
Mitigation Radiological Transportation Emergencies Course
Integrated Materials Performance Evaluation ProgramTraining
Radiation Therapy Training: basic physics of radiation therapy, clinical oncology, dosimetry, radiotherapeutic biology, radiation protection, medical terminology, math, anatomy, physiology, nursing care and the cancer patient, death and dying, and human diseases
Diagnostic Radiological training: anatomy/physiology, medical terminology, radiobiology, radiographic positioning, fundamentals of x-ray and radium physics, math, radiation protection, radiographic imaging, patient care, and contrast media

Quality Advantage training
The Grammar Game
S.A.F.E. Plus Driver Safety Course
Preventing Sexual Harassment in Utah Sate Government

Education:

1964	Bachelor of Science, University of Oregon, Secondary Education: Biology	
1967	Masters of Science, University of Oregon, Interdisciplinary: Biology and Speech Science	
1976	University of Utah: 40 hours of non-matriculated courses: biology, computer science, math, and Spanish	
1982	University of Utah	Certified Diagnostic Radiological Technologist
1983	University of Utah	Certified Radiation Therapist
1987-1988	University of Utah	Independent Study: Human genetics, Human Ecology, Microcomputers in the Classroom, Introduction to Microcomputers, Lotus 1,2,3, Graphic/Business Forecasting, Word Processing and Database Management
1988-present	State of Utah	NRC, DOE, FEMA, State, and other training courses (see above list)

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Name: Susan Giddings Date of Hire: August 15, 1988

Training Areas	Date Completed	Management Initials/Signature	Comments
BASIC TRAINING			
College/University Degree	/67	CW Jones	M.S., Biology & Speech Science, U of Or.
Program Orientation	8/88	CW Jones	
Review of the UDRC Rules	8/88	CW Jones	
Review of the Location of the Regulatory Guides and Reference Materials	8/88	CW Jones	
Essentials of Inspection	7/14/89	CW Jones	
Essentials of Licensing	12/30/88	CW Jones	
SPECIALIZED TRAINING			
Elements of Health Physics (5 wk)	3/9/90	CW Jones	
Elements of Nuclear Medicine	9/1/89	CW Jones	
Elements of Medical Therapy	1983	Equivalent learning Certified Practicum Practicum	Practicum: University of Utah medical School Dept Radiation Oncology
Elements of Industrial Radiography	9/21/90	CW Jones	
Elements of Transportation	8/30/91	CW Jones	
Elements of Well Logging	11/8/91	CW Jones	
Elements of Pool Irradiators			
Elements of Environmental Monitoring			
Radiological Emergency Response Operations (RERO)	10/25/91	CW Jones	
ADVANCED TRAINING			
Advanced Health Physics			
Elements of Investigations			
OTHER TRAINING			
Fund. Course for Rad. Monitors	1/28/89	CW Jones	
Fundamental Course for Radiological Response Teams	4/19/89	CW Jones	

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Training Areas	Date Completed	Management Initials/Signature	Comments
OTHER TRAINING (cont'd)			
Radiological Instructor Course	4/21/89	CW Jones	
WIPP - Radiological Emergency Response Trainers Course	9/6/89	CW Jones	
Troxler Nuclear Testing Equipment	6/1/90	CW Jones	
Troxler Radiation Safety Officer	10/14/94	CW Jones	
Mitigation Rad. Transp. Emerg.	9/19/95	CW Jones	
IMPEP Inspection	/95	CW Jones	no cert.

Philip G. Griffin

3712 South 8370 West, Magna, Utah 84044 (801) 250-0274

Objective

Employment in Technical Analysis and Operations

Work Experience

Health Physicist, Utah Division of Radiation Control
Salt Lake City, Utah June 1990 to present

- Perform compliance inspections of x-ray equipment and radioactive materials use in medical, dental, veterinary, educational, and industrial facilities
- Evaluate x-ray machine performance, radioactive materials use, and facility compliance with State regulations
- Assist in the registration of facilities using x-ray equipment
- Review radioactive materials license applications and amendments for adequacy and completeness
- Prepare correspondence with x-ray facilities, radioactive materials users, regulated public, machine assemblers, and general public
- Review and critique the inspection results and correspondence other health physicists
- Coordinate activities regarding sources of non-ionizing radiation

Technician - temporary, Hercules Aerospace (SOS Temporary Services)
Magna, Utah November 1989 to June 1990

- Assist engineers and technicians implement aging and testing of rocket propellant
- Write technical procedures and instructions for Aging group
- Assist with inventory of hazardous materials in plant facilities

Physics Grader, Brigham Young University
Provo, Utah September 1987 to December 1987

- Evaluate exams and quizzes in electromagnetism/electronics
- Assist professor in assigning grades

Other employment includes: security guard, physics tutor, custodian, construction worker, package assembler, dormitory assistant, and bindery worker

Education

Bachelor of Science - Physics, Brigham Young University
Provo, Utah April 1988

Courses Emphasized

- Electronics
- Optics
- Mechanics
- Solid state physics
- Thermodynamics
- Electromagnetism

Technical & Other Skills

- **Computer Languages:** BASIC and PASCAL
- **Computer Aided Design:** AutoCAD
- **Microcomputers:** Macintosh, PC, and Wang with experience in WordPerfect, MS Word, Excel, and database operations

- **Language**: Read, write, and speak fluent Spanish

Training Received

- First Responders Radiological Transportation Emergencies Course, Ogden, UT, May 29, 1991
- National Training Institute's tanning training program, Reno NV, July 1, 1993
- Five-Week Health Physics and Radiation Protection Course, ORAU, Oak Ridge, TN, July 17 - August 20, 1993
- Radiological Emergency Response Operations Course, Mercury, NV, January 30 - February 5, 1994
- IS-301 Radiological Emergency Response, Emergency Management Institute, FEMA, January 7, 1994
- Committee on Nationwide Evaluation of X-Ray Trends 1994 Chest Study Training, Las Vegas, NV, February 23-24, 1994
- Medical Uses of Radionuclide Course, ORAU, Oak Ridge, TN, March 13 - 17, 1995
- Mitigation Radiological Transportation Emergencies Course, WIPP, Salt Lake City, UT, September 19, 1995
- Inspection Procedures Course, NRC, Chattanooga, TN, September 25 - 29, 1995
- Safety Aspects of Well Logging, Schlumberger Wireline Training Center, Houston, TX, October 30 - November 3, 1995
- Transportation of Radioactive Materials Course, Chem Nuclear Systems Inc., Columbia, SC, April 29 - May 3, 1996
- Licensing Practices and Procedures Course, NRC, Chattanooga, TN, June 3 - 7, 1996
- Integrated Emergency Management Course: Hazardous Materials, Emergency Management Institute, FEMA, Emmitsburg, MD, August 12 - 16, 1996
- ANSI-N322A Calibration Workshop for Portable Survey Instruments, The Calibration Metrology Group, Boulder, CO, August 10 - 14, 1998
- Safety Aspects of Industrial Radiography, NRC, Chattanooga, TN, May 12, 2000 (challenged course by proctored examination in Salt Lake City, UT)
- Training Course for the Use of Nuclear Testing Equipment, Nuclear Testing Services, Salt Lake City, UT, August 23, 2001

Achievements and Interests

- Health Physics Society, plenary member
- National Honor Society, chapter vice president
- Presidential scholarship to Brigham Young University
- Acting and vocal performance, solos and choral music
- Member of the Salt Lake Mormon Tabernacle Choir

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Name: Philip G. Griffin Date of Hire: June 25, 1990

Training Areas	Date Completed	Management Initials/Signature	Comments
BASIC TRAINING			
College/University Degree	4/88	CW Jones	B.S, Physics, BYU
Program Orientation	6/90	CW Jones	
Review of the UDRC Rules	7/90	CW Jones	
Review of the Location of the Regulatory Guides and Reference Materials	7/90	CW Jones	
Essentials of Inspection	~~9/29/95~~ 11-15-95	CW Jones	
Essentials of Licensing	6/7/96	CW Jones	
SPECIALIZED TRAINING			
Elements of Health Physics (5 wk)	8/20/93	CW Jones	
Elements of Nuclear Medicine	~~2/17/95~~ 5-26-95	CW Jones	
Elements of Medical Therapy			
Elements of Industrial Radiography	5-12-00	CW Jones	challenged exam
Elements of Transportation	~~5/3/96~~ 6-10-96	CW Jones	
Elements of Well Logging	11~~/7~~/95 20	CW Jones	
Elements of Pool Irradiators			
Elements of Environmental Monitoring			
Radiological Emergency Response Operations (RERO)	2/5/94	CW Jones	
ADVANCED TRAINING			
Advanced Health Physics			
Elements of an Inspection			
OTHER TRAINING			
1st Respondrs Rad. Transp. Emerg.	5/29/91	CW Jones	
Tanning Training	7/1/93	CW Jones	
ISO-301 Rad. Emergncy Response	1/7/94	CW Jones	

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Training Areas	Date Completed	Management Initials/Signature	Comments
OTHER TRAINING (cont'd)			
NEXT 1994 Chest	2/24/94	CW Jones	No cert.
Mitigation Rad. Transp. Emerg.	9/19/95	CW Jones	
Integrated Emergency Management: Haz. Mat.	8/16/96	CW Jones	
Calibration Workshop for Portable Survey Instruments	8/14/98	CW Jones	
Nuclear Testing Services Training Course (Portable Gauges)	8/23/01	CW Jones	

BRIAN HAMOS

EDUCATION

B.S., Geology, University of Iowa, 1985
Minor-Mathematics

COURSEWORK

Engineering Calculus, Physical Geography, Physical Geology, Structural Geology, Mineralogy, Principles of Groundwater Hydrology, Petrology, Paleontology, Remote Sensing, Statistics, Chemistry, and Physics

SKILL AND EXPERIENCE SUMMARY

Eleven years of experience in the investigation, remediation, and regulatory oversight of hazardous waste sites. Experienced in all aspects of environmental projects. Management experience includes cost proposal preparation, contract negotiation, budget management, project scheduling, subcontractor selection and management, subcontract preparation, and developing and maintaining positive client relationships. Technical experience includes designing and conducting contaminated soil and groundwater investigations; soil and groundwater sampling; groundwater monitoring well design, placement, and installation; supervision of drilling programs; construction management of remediation projects; and technical report preparation. Supervisory experience includes performing personnel performance reviews, interviewing prospective employees, and coordinating support staff during the production of technical documents. Regulatory oversight experience includes evaluating the impact site operations have on the hydrogeologic conditions at a low level radioactive waste disposal facility. Site experience includes radioactive waste disposal facilities, petroleum storage facilities, chemical manufacturing facilities, landfills, and chemical and explosive warfare materiel contaminated sites.

WORK HISTORY

Hydrogeologist. State of Utah Department of Environmental Quality, Division of Radiation Control. Salt Lake City, UT. November 1999 – Present.

Responsible for evaluating hydrologic aspects of disposal of radioactive wastes in a low level radioactive waste disposal facility. Regulate activities performed under Groundwater Quality Discharge Permits, perform routine inspections of facilities impacting ground water issues, interpret water quality data, review engineering plans for appropriateness and safety in satisfying ground water protection standards and rules, and evaluate license applications. Provide hydrologic technical support to Division staff, government agencies, the public and regulated industry. Conduct radioactive material licensing and compliance activities according to the Utah Radiation Control Rules, EPA and State Ground Water Regulations.

Hydrogeologist. Montgomery Watson Consulting Engineers. Des Moines, IA/Salt Lake City, UT. September 1991 – October 1999.

Project Manager

Directed the characterization of an 850-acre site contaminated with unexploded ordnance at a former military firing range. Responsible for preparing the project cost proposal, negotiating the contract, and managing project costs. Coordinated approximately 20 geophysical subcontractor technical staff during site characterization under an accelerated regulatory schedule. Supervised the successful development of a custom software program designed to identify ordnance within geophysical data. Managed database personnel in the collection and storage of all data in a geographical information system (GIS). Ongoing activities include coordinating with an explosives remediation contractor during the removal of ordnance identified during geophysical mapping of the site.

Maintained overall responsibility for the characterization and remediation of a site contaminated with petroleum hydrocarbons from leaking underground storage tanks. Responsible for preparing the project cost proposal, negotiating the contract, managing the budget, staffing project activities, and responding to regulatory comments. Conducted meetings, maintained regular client contact, prepared monthly financial reports to track project costs, scheduled subcontractors, and coordinated engineering support for the remedial design. Project activities included site records research, tank tightness testing, work plan preparation, contaminated soil and groundwater investigation, and report preparation. Successful site characterization led to remedial design phase, which employed a combination of soil vapor extraction and enhanced bioremediation to achieve regulatory cleanup levels in soil and groundwater. Successfully met regulatory deadlines and satisfied regulatory requirements.

Construction Manager

Performed construction management services during the remediation of several burial pits where chemical warfare materiel had been disposed. Remediation consisted of excavation, recovery, and removal of intact and residual chemical warfare agents by the U.S. Army Technical Escort Unit. Responsible for maintaining the project schedule, ensuring project work plans were followed by U.S. Army personnel, directing U.S. Army soil sampling activities, documenting project activities in daily quality control reports, tracking the construction budget, and preparing the project close-out report. Satisfied regulatory oversight provided by government agencies including the U.S. Army Corps of Engineers, Utah Department of Environmental Quality, and the Environmental Protection Agency (EPA).

Project Hydrogeologist

Responsible for designing and directing field investigations, preparing work plans, supervising field activities, and preparing site characterization reports in support of the characterization and

remediation of a variety of sites under the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Duties included overseeing health and safety procedures, interpreting laboratory analytical data, evaluating water quality, coordinating regulatory agency review of documents, determining proper characterization and disposal of wastes generated during field activities, and interpreting and satisfying state and federal rules and regulations.

Projects have included the investigation of soil and groundwater contamination resulting from operations at military installations, industrial manufacturing facilities, fuel storage and distribution facilities, transformer storage yards, agricultural chemical sites, Formerly Used Defense Sites (FUDS), and landfills. Contaminants of concern have included petroleum hydrocarbons, pesticides, metals, PCBs, solvents, and chemical warfare agents.

Environmental Scientist

Performed office and field tasks in support of numerous environmental investigation and remediation projects. Field tasks consisted of defining soil and groundwater contaminant plumes using various subsurface investigation techniques including hollow-stem auger drilling, dual-wall reverse circulation drilling, cone penetrometer and geoprobe sampling techniques, and geophysical surveys. Responsible for collecting soil and groundwater samples, geologic logging of drill cuttings and soil samples, sediment and surface water sampling of streams and wetlands, groundwater monitoring well installation and development, and aquifer testing. Office responsibilities included summarizing and interpreting soil and groundwater analytical results; assessing ground water quality, preparing data tables, site maps, and geologic cross sections; and writing field sampling plans, quality assurance/quality control plans, site investigation work plans, and site investigation reports.

Staff Geologist. Enecotech, Inc. Denver, CO. September 1990 - September 1991.

Participated in all aspects of Phase I (Property Audit) and Phase II (Hydrogeological) environmental assessments. Responsibilities included the assessment and characterization of petroleum contamination from underground storage facilities. Activities included placement and installation of boreholes and monitoring wells, operation of field sampling equipment and air monitoring instruments, soil and groundwater sample collection, UST removal oversight, conducting soil vapor surveys, performing record searches, and technical report preparation.

Engineering Aide. City of Arvada. Arvada, CO. November 1985 - September 1990.

Member of survey crew on public works improvement projects. Responsibilities included gathering field data utilizing a variety of survey instruments, note keeping, interpreting construction plans, drawings and specifications, performing mathematical calculations, field layout of project for subcontractors, and project inspection during the construction phase. Developed the skills to communicate effectively both orally and in writing. Interacted with the

public and local government officials during construction projects.

TRAINING/CERTIFICATIONS

State of Utah Groundwater and Soil Sampler Certificate #GS0602
OSHA 40 Hour Hazardous Waste Site Health and Safety Training
First Aid/CPR Certified
Proficient in the use of personal computers, including database, spreadsheet, and word processing software

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Name: Brian Hamos Date of Hire: November1, 1999

Training Areas	Date Completed	Management Initials/Signature	Comments
BASIC TRAINING			
College/University Degree	1985		Univ. of Iowa, B.S. Geology
Program Orientation	11-99		
Review of the UDRC Rules	11-99		
Review of the Location of the Regulatory Guides and Reference Materials	11-99		
Essentials of Inspection			
Essentials of Licensing			
SPECIALIZED TRAINING			
Elements of Health Physics (1 wk)	7/2001	DF	
Elements of Nuclear Medicine			
Elements of Medical Therapy			
Elements of Industrial Radiography			
Elements of Transportation	7/2001	DF	
Elements of Well Logging			
Elements of Pool Irradiators			
Elements of Environmental Monitoring			
Radiological Emergency Response Operations (RERO)			
ADVANCED TRAINING			
Advanced Health Physics			
Elements of Investigations			
OTHER TRAINING			
Intro. to GW Modeling	2-2000		
Fundamentals of GW Geochemistry	10-2000		
Geochem. of Metals NGWA	3-2001		

ROBERT F. HERBERT
Hydrogeologist
3068 East 3960 South
Salt Lake City, Utah 84124
801-278-5314

EXPERIENCE

7/97-Present **UTAH DEQ - DIVISION OF RADIATION CONTROL** - Salt Lake City, UT
Hydrogeologist (Environmental Scientist III)

As Project Manager, provides State oversight for Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I and Title II sites, naturally-occurring radioactive materials (NORM) tailings waste sites, and low-level radioactive disposal (LLRD) sites in Utah. Reviews and evaluates hydrologic related issues including groundwater well monitoring, saturated and unsaturated flow modeling, radioactive contaminant transport modeling, and infiltration modeling. Reviews technical information submitted to the DRC for new or existing potential sources of radioactive contamination in the surface and ground waters of the State and prepare appropriate responses to the submission. Recommends, develops, and implements the adoption of rules, standards, or criteria as appropriate, related to the protection of the public health and the environment from the effects of radioactivity in surface and ground water from licensed or un-licensed activities using Titles 10 and 40 CFR and State Groundwater Regulations. Coordinates the DRCs activities relating to surface and ground water protection with other local, state, or federal agencies having similar responsibilities. Review engineering plans for radioactive waste disposal facilities and radioactive waste/spills remediation projects as to their appropriateness and safey in meeting groundwater protection criteria and rules. Review and evaluate ground water quality and other compliance monitoring data from licensees to determine technical adequacy, completeness, and compliance with Division/Department standards or requirements. Participates in public and professional meetings, seminars, training, and workshops. Conducts studies, prepares technical reports, and reviews technical publications.

3/97-7/97 **UTAH DEQ - DIVISION OF ENVIRONMENTAL RESPONSE AND REMEDIATION - CERCLA Site Assessment** - Salt Lake City, UT
Environmental Scientist I

Project Manager for Preliminary Assessment (PA) work and assistant on Site Inspection projects for the Utah Superfund program. Coordinated project activities by setting goals, objectives, and schedules with relevant parties including EPA and in-house staff to elucidate project objectives. Prepared for and attended necessary meetings to keep managment apprised of project activities and provided recommendations, as necessary. Conducted PA site visits, file reviews, and summarized geologic, hydrogeologic, climatologic, and soil conditions relavent to PA sites prior to preparing PA Reports. Actively assisted in identifying and developing information for the Site Discovery Program and submitting that information to EPA for placement on the CERCLIS List. Provided assistance to other staff members in researching information on sites which may pose risks to human health and the environment. Coordinated facility needs and local participant enrollment in CERCLA-related training.

5/95-3/97 **IHI ENVI[redacted]NMENTAL** - Salt Lake City, UT
Senior Hydrogeologist/Project Manager

Office duties include: preparing proposals and cost estimates for CERCLA, RCRA, UST, and LUST investigations and remediations; evaluating remedial alternatives and implementing the most technically efficient and cost-effective remedial actions such as free-product recovery, in-situ bioventing, soil vapor extraction, and associated groundwater and soil-gas monitoring; reviewing subsurface investigation reports and remedial action plans for technical content and potential client liability associated with property transfers/development; preparing subcontract agreements for environmental investigations; preparing work plans, subsurface investigation reports, corrective action plans, monitoring reports, and closure reports for CERCLA, RCRA, and LUST investigations and remediations; conducting qualitative risk assessments and preparing risk assessment reports; managing staff geologists and technicians; tracking and managing project budgets; interacting with clients and preparing project invoices. **Field duties include:** delineating the nature and extent of soil and groundwater contamination at CERCLA, RCRA, and LUST sites; conducting shut-down tests for in-situ bioventing and soil vapor extraction remedial systems to evaluate the progress of remediation; guiding mine tailings removal actions by XRF soil screening and collecting confirmatory samples prior to reclamation activities; providing third party technical oversight during subsurface investigations and remediations.

1/92-5/95 **MONTGOMERY WATSON** - Industrial/Hazardous Waste Services
New Orleans, LA and Salt Lake City, UT
Hydrogeologist/UST Project Manager.

Office duties included: preparing and negotiating proposals for Installation Restoration Program UST and LUST investigations and corrective actions; preparing work plans, subsurface investigation reports, corrective action plans, decision documents, and monitoring reports for LUST sites; preparing CERCLA preliminary assessment work plans and reports; conducting SESOIL modeling at LUST sites to estimate the impact of BTEXN to groundwater; conducting FLOWPATH groundwater modeling to optimize the number, position, and pumping rates of extraction wells for groundwater remediations; interacting with DOD clients and preparing monthly delivery order invoices and reports. **Field duties included:** supervising drilling operations, soil sampling, and monitoring well installations for LUST subsurface investigations, RCRA facility investigations, and CERCLA remedial investigations; installing soil-gas probes, air injection wells, and vapor extraction wells for in-situ remediation of petroleum hydrocarbon-contaminated soils; conducting soil respiration tests, radius of influence tests, and pilot bioventing tests to assess the feasibility of in-situ bioventing at petroleum-contaminated sites.

8/91-12/91 **UNIVERSITY OF NEW ORLEANS** - Department of Geology and Geophysics
Masters Candidate - Graduate Thesis Research in Environmental Geology
Thesis: Geostatistical Analysis of Percent-Sand Data to Estimate Vertical Permeability for a Hazardous Waste Deep-Well Injection Confining Zone

1/91-8/91 **LOUISIA● GEOLOGICAL SURVEY** - Water ●ources Section, Baton Rouge, LA
Research Geologist III
Conducted geological review of Class I underground injection wells for the Louisiana Department of Environmental Quality (DEQ). Examined structural and stratigraphic relationships between subsurface waste disposal zones and Underground Sources of Drinking Water to determine the geologic suitability of injection sites. Prepared detailed reports for DEQ describing and illustrating site-specific subsurface geology, hydrogeology, and migration potential of injected wastes.

8/90-1/91 **UNIVERSITY OF NEW ORLEANS** - Department of Geology and Geophysics
Graduate Teaching Assistant - Historical Geology and Invertebrate Paleontology
Provided laboratory lectures about the evolutionary history of the earth including physical changes and an introduction to the fossil record of life through time. Provided laboratory instruction to apply the principles and methods of interpreting earth history including geologic maps and cross sections.

1/85-8/90 **CONSOLIDATED NATURAL GAS PRODUCING COMPANY**- New Orleans, LA
Exploration Geologist
Conducted petroleum exploration and prospect generation by correlating well logs and interpreting geophysical record sections; preparing structure contour, net sand, and paleobathymetric maps; constructing geologic cross sections; delineating field production; calculating reserves; and conducting lease histories of prospective acreage.

Set up a Paradox database for all productive fields in offshore Louisiana for calling up specific elements of interest on any block, field, area, or trend for exploration purposes. Elements included cumulative production, biostratigraphic pay zones, perforated intervals by true vertical depth, seismic characteristics, trapping mechanisms, key wells, key seismic lines, composite type logs, depositional environments, formation temperatures, mudweights, dates of first production, discovery dates, field position within regional trends, and references. Generated a regional working production map showing all fields with production summaries.

2/84-1/85 **DATA LOG, INC.** - Reserve, LA
Well-Site Geologist
Continuously monitored and analyzed formation cuttings and drilling fluid to detect the presence of hydrocarbons during petroleum exploration well drilling. Constructed a stratigraphic profiles from geologic interpretation of the drilled section by analysis of drilling parameters including penetration rate, porosity, lithology, shale density, and hydrocarbon detection.

EDUCATION

University of New Orleans - New Orleans, LA
M.S. - Geology/Hydrogeology, December 1991

Louisiana State University - Baton Rouge, LA
B.S. - Professional Geology, May 1983

COMPUTER SKILLS

Paradox, Microsoft Word and Excel; Wordperfect; Lotus; SESOIL; HELP; FLOWPATH.

REGISTRATIONS/CERTIFICATIONS/MEMBERSHIPS

Registered Professional Geologist in the State of Tennessee
40-Hour Hazardous Waste Operations and Emergency Response Training
Certified UST Consultant in the State of Utah
Certified Groundwater and Soil Sampler in the State of Utah
National Ground Water Association

SHORT COURSES

Understanding the Migration, Assessment, and Remediation of Non-Aqueous Phase Liquids; LNAPLs and DNAPLs (NGWA)
Treatment Technology for Contaminated Soils and Groundwater (NGWA)
Environmental Fate of Hydrocarbons in Soils and Groundwater (AEHS)
Risk-Based Corrective Action Workshop (AEHS)
Introductory Preliminary Assessment Training (EPA Superfund)
Introductory Site Inspection Training (EPA Superfund)
Treatment Technologies for Superfund (EPA Superfund)

AWARDS/BONUSES

1996 IHI Environmental Performance Bonus
1994 Montgomery Watson Outstanding Performance Award
1992, 1993, and 1994 Montgomery Watson Performance Bonuses
1991 University of New Orleans Graduate Teaching Assistantship

KEY PROJECTS

Offshore Louisiana Production Synopsis Project
Set up a Paradox database for all productive fields in offshore Louisiana for calling up specific elements of interest on any block, field, area, or trend for exploration purposes. Elements included cumulative production, biostratigraphic pay zones, perforated intervals by true vertical depth, seismic characteristics, trapping mechanisms, key wells, key seismic lines, composite type logs, depositional environments, formation temperatures, mudweights, dates of first production, discovery dates, field position within regional trends, and references. Generated a regional working production map showing all fields with production summaries.

Hill Air Force Base UST Investigations and Corrective Actions
Project hydrogeologist for a 25-site UST subsurface investigation and corrective action project. Identified 12 LUST sites, characterized the horizontal and vertical extent of contamination, prepared subsurface investigation reports and corrective action plans, and implemented remedial action after receiving regulatory approval. Corrective actions included conducting in-situ bioventing treatability studies at eleven hydrocarbon-contaminated sites and soil vapor extraction at one Stoddard solvent site. Initial soil respiration and radius of influence tests were conducted to evaluate bioventing feasibility and six-month shut-down respiration tests were conducted to monitor the progress of biodegradation.

Hill Air Force Base Light Non-Aqueous Phase Liquid Site Investigation and Remediation
As Project Manager and Hydrogeologist, identified and delineated an LNAPL plume floating on the water table at 110 feet below ground surface by installing eleven 4-inch diameter product recovery/groundwater monitoring wells. After preparing a subsurface investigation report, evaluated the effectiveness of using skimmer pumps for LNAPL recovery. Approximately 15,000 gallons of LNAPL were removed from the water table in 15 months. Based on the project success, the skimmer pump system was upgraded for a full-scale long-term recovery operation.

Tooele Army Depot RCRA Facility Investigation
Hydrogeologist for a 12-week field investigation for the Phase I RCRA Facility Investigation (RFI). This RFI involved collecting approximately 800 soil, sediment, and groundwater samples at 17 Solid Waste Management Units. Duties included sampling surface soils and surface waters, sampling deep soil borings and groundwater monitoring wells. To characterize the open burning and open detonation (OB/OD) areas of the Depot, over 100 test pits were excavated, logged, and surveyed.

Hill Air Force Base North Area Preliminary Assessment
Primary investigator and author of a CERCLA Preliminary Assessment (PA) Report for the North Area of Hill Air Force Base which comprises approximately 4,400 acres or two-thirds of the Base's total area. The objective of the PA was to identify buildings, facilities, or areas that may have had releases of hazardous substances to the environment. After preparing the PA work plan, conducted personal interviews and extensive records searches of Base files, assimilated all information, and prepared the PA report. Out of approximately 700 facilities in the North Area, 167 were recommended for site inspections to determine if additional investigations and sampling were warranted. The North Area PA study area has become CERCLA Operable Unit 9 of Hill Air Force Base.

Utah Transit Authority LUST Investigation and Remediation
Project manager for the UTA Meadowbrook South Tank Farm. After preparing the proposal and cost estimate, delineated the nature and extent of contamination, prepared a Corrective Action Plan that was approved by DERR, and implemented free-product recovery from the water table and in-situ bioventing of petroleum contaminated unsaturated soils. Monitoring activities include semi-annual groundwater sampling to monitor the progress of intrinsic bioremediation of contaminated groundwater and semi-annual bioventing shut-down respiration tests to monitor the progress of biodegradation of contaminated soils.

Hill Air Force Base Operable Unit 3 Remedial Investigation
Hydrogeologist for the Berman Pond site characterization for the Operable Unit 3 RI. Berman Pond was a waste disposal pond used to dump spent solvents, fuels, and metal plating wastes until the late 1970s when it was backfilled and covered. Duties included drilling and continuously sampling soil borings to the sludge base of the pond, installing conductor casing to seal off the pond bottom, and drilling and sampling from below the pond bottom to groundwater to assess the extent of contaminant leaching from the pond. Installed two soil vapor extraction wells, five groundwater monitoring wells, and seven piezometers to monitor hydrogeologic parameters during groundwater pumping and recovery tests of the water table.

Hill Air Force Base Operable Units 1 and 7 Remedial Investigations
Hydrogeologist for the site characterizations for OUs 1 and 7. For OU 1, installed eleven groundwater monitoring wells in the shallow on-Base and off-Base aquifers, collected soil samples for chemical analyses, and performed field grain size analyses to select the proper filter sand pack and screen size for each well completion. At OU 7, sampled soil borings, and installed a 130-foot groundwater monitoring well inside an aircraft maintenance hanger to delineate the vertical extent of heavy metals and PCBs.

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Name: Robert F. Herbert Date of Hire: March 3, 1997

Training Areas	Date Completed	Management Initials/Signature	Comments
BASIC TRAINING			
College/University Degree	12/91		M.S., Geology/ Hydrogeology, U of N.O.
Program Orientation	7/97		
Review of the UDRC Rules	7/97		
Review of the Location of the Regulatory Guides and Reference Materials	7/97		
Essentials of Inspection			
Essentials of Licensing			
SPECIALIZED TRAINING			
Elements of Health Physics (5 wk)			
Elements of Nuclear Medicine			
Elements of Medical Therapy			
Elements of Industrial Radiography			
Elements of Transportation			
Elements of Well Logging	7/2001	DF	
Elements of Pool Irradiators			
Elements of Environmental Monitoring			
Radiological Emergency Response Operations (RERO)			
ADVANCED TRAINING			
Advanced Health Physics			
Elements of Investigations			
OTHER TRAINING			
Introductory Site Inspection	5/9/97		
Treatment Techn. for Superfund	6/13/97		
Radiation Safety at Superfund Sites	2/6/98		

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Training Areas	Date Completed	Management Initials/Signature	Comments
OTHER TRAINING (cont'd)			
Preliminary Assessment	5/7/97		
Geochemistry of Metals NGWA	5-2001		

JOHN DOUGLAS HULTQUIST

Personal Information

Address: 2505 East 2860 South
Salt Lake City, Utah 84109
Birth Date: 12/31/59

Employment History

April 1985 - Present
Utah Department of Health
Division of Environmental Health
Bureau of Radiation Control
288 N. 1460 W./P.O. Box 16690
Salt Lake City, Utah 84116-0690
(801) 538-6734

Coordinate and implement the health, safety and monitoring program during remedial action at the Vitro UMTRA site in Salt Lake City from April 1985 to August 1988, which included routine data collection, inspections, evaluating data against standards, care and maintenance of sampling equipment, correspondence, and enforcement of regulations applicable to the UMTRA Project.

From August 1988 to present my responsibilities are license compliance inspections of a low level waste disposal site, material license audit team, environmental monitoring program, instrumentation calibration, and a member of the Bureau's emergency response program.

May 1981 - August 1983
U.S. Army Corps of Engineers
1160 Lake Mendocino Drive
Ukiah, California 95482
(707) 462-7581

Seasonal employment during the summers of 1981, 1982, and 1983 as Park Technician. Duties consisted of maintaining daily camp register, supervision of co-workers, provided information to travelers and assisted the Park Ranger as needed.

Education

1980-1984
University of Tennessee at Chattanooga
Bachelor of Science
Environmental Science/Biology

Training

Environmental Protection Agency's 2 day course in Basic Risks Assessment and Decision Making.

References as Requested.

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Name: John D. Hultquist Date of Hire: August 8, 1988

Training Areas	Date Completed	Management Initials/Signature	Comments
BASIC TRAINING			
College/University Degree	/84		B.S , Environmental Science/Biology, UTC
Program Orientation	8/88		
Review of the UDRC Rules	8/88		
Review of the Location of the Regulatory Guides and Reference Materials	8/88		
Essentials of Inspection	8/3/90		
Essentials of Licensing	6/18/93		
SPECIALIZED TRAINING			
Elements of Health Physics (5 wk)	8/11/89		
Elements of Nuclear Medicine			
Elements of Medical Therapy			
Elements of Industrial Radiography			
Elements of Transportation	3/92		no cert.
Elements of Well Logging			
Elements of Pool Irradiators			
Elements of Environmental Monitoring	6/19/95		
Radiological Emergency Response Operations (RERO)	10/91		no cert.
ADVANCED TRAINING			
Advanced Health Physics			
Elements of Investigations			
OTHER TRAINING			
Radon Mitigation (3 day)	6/89		no cert.
1st Responders Rad. Trans. Emerg.	8/29/89		
Radiation Protection Engineering	2/1/91		

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Training Areas	Date Completed	Management Initials/Signature	Comments
OTHER TRAINING (cont'd)			
Radon Mitigation (5 day)	11/92		no cert.
Mitigation Rad. Transp. Emerg.	9/19/95		
Multi-Agency Radiation Survey and Site Investigation Manual	7/28/98		
Resp Protection Training Plan (Train the Trainer)	7-31-01	DF	North Salt Lake, SLC,

BOYD M. IMAI

443 East Vine Street
Murray, Utah 84107

Telephone: (801) 270-5370 (home)
(801) 356-0038 (work)

E-mail: Tritiumx@msn.com (home)
bimai@deq.state.ut.us (work)

EMPLOYMENT EXPERIENCE

August 2001- Present — STATE OF UTAH
Department of Environmental Quality, Division of Radiation Control
168 North 1950 West
Salt Lake City, Utah 84114-4850

As an Environmental Scientist, write radioactive materials licenses by analyzing the applicants submissions and comparing them with rules, standards, and other regulatory criteria; conduct radioactive material license inspections at a low-level radioactive waste disposal facility; compose inspection reports; and prepare enforcement actions.

August 2000 - July 2001 — INTERNATIONAL TECHNOLOGY, CORP.
Las Vegas, Nevada

As a Waste Management Lead and the Nevada Test Site Waste Acceptance Criteria (NTSWAC) Coordinator, managed and direct low-level radioactive and mixed waste activities. Responsibilities include characterizing, packaging, and transporting waste for disposal; developing, implementing, and maintaining operating procedures; assuring compliance with waste certification and acceptance criteria; supporting project operations generating radioactive wastes. Security Clearance: Q

Jan. 1996 - August 2000 — BECHTEL NEVADA
Las Vegas, NV

As a Scientist, served as the company Waste Generator Program task leader with a $750,000 operating budget and as the Transuranic Waste Transportation Certification Official; prepared low-level radioactive and mixed wastes for disposal; and supported Department of Energy Nevada Operations, Waste Generator Program.

Sept. 1982 - Dec. 1995 — REYNOLDS ELECTRICAL & ENGINEERING CO., INC. (REECo)
Las Vegas, NV

- Radioactive Waste Management Specialist III & IV — June 1993 - Dec. 1995
- Health Physicist II — Sept. 1989 - June 1993
- Radiation Safety Monitor — Sept. 1982 - Sept. 1989

July 1979 - April 1982 — VALLEY HOSPITAL MEDICAL CENTER, Las Vegas, Nevada

- Administrative Assistant — Aug. 1980 - Apr. 1982
- Administrative Resident — July 1979 - July 1980

?. 1977 - y 1979	ARIZONA STATE UNIVERSITY, Tempe, Arizona Department of Quantitative Systems -Graduate Assistant
June 1977 - Aug. 1977	BUREAU OF LAND MANAGEMENT & COLLEGE OF E. UTAH, Price, Utah Youth Conservation Corps -Group Leader/Counselor
Sept. 1975 - June 1977	COLLEGE OF EASTERN UTAH, Price, Utah Learning Resource Center -Tutor Coordinator
Sept. 1972 - March 1974	UNIVERSITY OF UTAH, Salt Lake City, Utah Department of Physics -Physics Intern

EDUCATION

Arizona State University, Tempe, Arizona
- Master of Health Services Administration - 1980
- Graduate Program in Business Admin. - 1977-1978

University of Utah, Salt Lake City, Utah
- Graduate Program in Education - 1974-1975
- Bachelor of Science in Mathematics - 1974

College of Eastern Utah, Price, Utah
- Associate Degree - 1971

Carbon High School, Price, Utah
- Graduate - 1969

MEMBERSHIPS

Health Physics Society
National Registry of Radiation Protection Technologists

RELEVANT TRAINING

Department of Transportation Hazardous Materials Transportation
Resource Conservation and Recovery Act Hazardous Wastes
Occupational Safety and Health Administration Hazardous Waste Site Worker
Radiation Worker

CURRICULUM VITAE

Craig W. Jones

Education

University of Utah, Salt Lake City, Utah: B.S., Biology, 1976, Cum Laude.
University of Utah, Salt Lake City, Utah: M.S.P.H., Industrial Hygiene, 1987

Certification

Radiation Protection Technologist, 1979

Experience

April 1988 to Present - Division of Radiation Control, Utah Department of Environmental Quality, Environmental Manager I. I have administrative responsibilities for eight Health Physicists. My duties include determining staff assignments, conducting performance evaluations, interviewing and hiring, project budgeting, and progress evaluations. I also prepare and review a variety of technical reports. Technical duties include directing an Agreement State program for licensing and inspection of various users of radioactive material, directing statewide registration and inspection of x-ray machines, and participating on the agency's radiological emergency response team.

September 1984 to April 1988 - Bureau of Radiation Control, Division of Environmental Health, Utah Department of Health, Environmental Health Scientist III (Health Physicist). I provided technical support for the control of radioactive materials in an Agreement State program. Specific duties and responsibilities included reviewing and preparing a license authorizing the possession and use of radioactive material, examination or observation of a licensee to determine compliance with the appropriate regulations, and enforcement of regulations to protect the public and the environment from hazards associated with radiation. I also served as a team member for radiological emergency response.

January 1983 to September 1984 - Department of Pharmacology, Radiobiology Division, University of Utah, Senior Research Specialist. I conceived, designed and conducted experiments to evaluate decorporation therapy for actinide and heavy metals poisoning in animal models and to test the application of radioactive tracers in biology and medicine. I supervised the work of an animal husbandry technician and several medical students conducting research projects. My experience also included the interviewing and hiring of technical support staff. I was assistant Radiation Safety Officer for the Radiobiology Division and was designated as the Department of Energy, Chicago Operations Office, contact for management of the radioactive materials inventories and waste disposal.

August 1977 to January 1983 - Department of Anatomy, Radiobiology Laboratory, University of Utah, Research Specialist. I was actively involved in radiobiological research work. The primary aim of this research was to study the distribution and toxicity of alpha-emitting, bone-seeking, internally deposited radionuclides in suitable animal models. I participated in the design of specific experiments, collected and analyzed data, and prepared reports for principal investigators. My technical experience also included the operation of a total-body counter for gamma-ray spectrometric analysis of humans, research animals, and various samples.

May 1975 to August 1977 - Radiological Health Department, University of Utah, Radioactive Waste Disposal Technician. It was my duty to manage all aspects of the University of Utah low-level radioactive waste disposal program that included collection, packaging and shipment of radioactive waste to an appropriate disposal facility. It was also my duty to survey laboratories for radiation protection. If there were a radiation accident, they called upon me to advise and aid in decontamination procedures.

Activities

Trained member of the Utah radiological emergency response team. Secretary for the Great Salt Lake Chapter of the Health Physics Society, 1982 to 1984; Executive Council member 1070 through 1081.

Invited speaker at the Utah Conference on Safety & Industrial Hygiene, October 4-5, 2000. Guest lecturer for the University of Utah Department of Family and Preventive Medicine since 1988. Guest lecturer for the University of Utah Department of Health Promotion and Education since 1993.

Membership in Societies

Health Physics Society, Plenary Member since 1978.
Radiation Research Society, Member, 1983 to 1988.
American Conference of Governmental Industrial Hygienists, Member, 1987 to 1991.
Great Salt Lake Chapter of the Health Physics Society, member since 1978.

Publications

Articles - 19, Abstracts - 7, Technical Reports -14, Available upon request.

LOREN B. MORTON

4156 Charles Drive
West Valley City, Utah 84120
(801) 969-8647 (home)

CAREER OBJECTIVE — A project hydrogeologist in environmental protection/restoration and resource conservation, utilizing a strong background in hydrogeology and regulatory application.

EXPERIENCE

1994 to present — **UTAH DIVISION OF RADIATION CONTROL**, Salt Lake City, Utah

Senior Hydrogeologist (September, 1994 to present)
Report to Environmental Monitoring and Waste Disposal Manager. Evaluate hydrogeologic reports, engineering plans and specifications, ground water monitoring plans, and other technical reports. Review, evaluate, and conduct infiltration, groundwater flow and contaminant transport models. In-house consulting for other staff. Draft ground water discharge permits, evaluate groundwater quality and compliance monitoring data, conduct inspections and enforcement. Major Projects: low-level radioactive waste (LLRW) landfills, uranium mill tailings, and naturally occurring radioactive materials disposal. Major Accomplishments: licensing renewal of LLRW landfill.

1984 to 1994 — **UTAH DIVISION OF WATER QUALITY**, Salt Lake City, Utah

Environmental Scientist (Hydrogeologist) (January, 1989 to September, 1994)
Report to Ground Water Section Manager. Evaluate hydrogeologic reports, engineering plans and specifications, ground water monitoring plans, closure plans, and other technical reports. Draft ground water discharge permits, evaluate ground water quality and compliance monitoring data, conduct inspections and enforcement. Review and evaluate infiltration, ground water flow and contaminant transport modeling. Coordinate permits with RCRA, CERCLA, and State Radiation Control programs. *Major Projects*: LLRW landfill, mine water disposal, mine tailings ponds, cyanide dump leach operations, and aerospace wastewater disposal. *Major Accomplishments*: develop permit for Utah's first LLRW landfill in coordination with the NRC and state RCRA and Radiation Control requirements.

Underground Injection Control Geologist (September, 1984 to January, 1989)
Report to Permits & Compliance Section Manager. Administer EPA delegated program, coordinate with EPA and two other state agencies, oversee administrative agreements and contracts, prepare EPA program grants and reports. Evaluate hydrogeologic reports and engineering plans, draft UIC and construction permits, witness mechanical integrity tests, evaluate ground water compliance monitoring data, conduct inspections and enforcement action. *Major projects*: Complex Class III solution mine permit, Class V well inventory and assessment, leaky UST cleanups, mine backfill injection, oil-field produced water disposal. *Major Accomplishments*: turn around UIC program by completing overdue EPA projects (left by predecessor) in a short time period, developed Bureau compliance criteria for leaky UST cleanups.

1984 — **U.S. BUREAU OF RECLAMATION**, Provo, Utah

Engineering Geologist (April to September, 1984)
Report to Branch Geologist, develop geologic map of Monks Hollow Dam site, subdivide local stratigraphy, measure stratigraphic sections, supervise one exploratory drilling crew, log core, design piezometers.

Loren B. Morton

EDUCATION

M.S., Brigham Young University, April, 1984
Major: Geology GPA: 3.76/4.00

B.S., Brigham Young University, December, 1981
Major: Geology, Minor: Physics, GPA: 3.35/4.00, Secondary Education Certificate

PROFESSIONAL AFFILIATION

Association of Ground Water Scientists and Engineers
Utah Geological Association, 1989 Assistant Guidebook Editor

PERSONAL

U.S. Citizen Excellent Health
Second Language: Spanish Married, two children
Computer Literate: Word Perfect, Excel, Dataease, Surfer, EPA HELP and Pathrae Models, and other ground water related programs.

REFERENCES

Excellent references available upon request

CONTINUED EDUCATION

Ground Water Hydrology, Dr. Chris Duffy, Utah State University, SLC, UT, CEE 643, 3 credit hours (3.33/4.0), Fall Qtr., 1984.

RCRA Ground Water Monitoring, EPA, SLC, UT, January and March, 1985, 26 class hours.

Fundamentals of Ground Water Contamination, Geraghty & Miller, Inc., Denver, CO, August, 1985, 12 class hours.

Fluvial Mechanics, Dr. Don Reichmuth, Geomax, Inc., SLC, UT, Jan. 1986, 15 class hours.

Refractory Organic Chemicals & Biodegradation, Dr. Ron Oakey, University of Utah, SLC, UT, August, 1986, 4 class hours.

Soil Classification, Bill Lund, Utah Geologic & Mineral Survey, SLC, UT, December, 1986, 10 class hours.

Ground Water Concepts, Drs. Herb Buxton, Keith Prince, Tom Reilly, USGS-WRD, Denver, CO, February - March, 1987, 72 class hours.

Transport & Fate of Contaminants in the Subsurface, Drs. Carl Palmer, Rick Johnson, Joseph Suflita, & Joesph Keely, EPA, Denver, CO, Oct. 1987, 16 class hours.

Environmental Risk Assessment & Management, EPA, SLC, UT, November, 1987, 14 class hours.

Environmental Geophysics-Electrical Methods, Dr. Stan Ward, University of Utah, GG-592R, SLC, UT, October, 1988, 10 class hours.

Introduction to Ground Water Geochemistry, Dr. Alan Mayo, Brigham Young University, SLC, UT, February, 1989, 15 class hours.

Contaminant Fate & Transport Modeling, Drs. Atul Salhotra & Jim Hendry,

National Water Well Association, SLC, UT, September, 1989, 26 class hours.

Environmental Site Assessments, National Water Well Association, SLC, UT, September, 1989, 8 class hours.

Introduction to Ground Water Modeling, Dr. Craig Forester, University of Utah, GG-592-R30, SLC, UT, January - March, 1990, 28 class hours.

Introduction to Solute Transport and Contaminant Migration, Dr. Craig Forester, University of Utah, GG-97-R2, SLC, UT, January - March, 1991, 1.5 CEU.

Bioremediation of Contaminated Soils, Utah State University Summer Seminar, Drs. Bill Doucette, Ryan Dupont, Ron Sims, Darwin Sorensen, Dave Stevens, Department of Civil and Environmental Engineering, Logan, UT, August, 1991, 38 class hours.

Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Dr. David Mason, University of Utah, SLC, UT, February-March, 1993, 14 class hours.

HELP Modeling Workshop for Landfill Design & Evaluation, Drs. Lee Peyton & Paul Schroeder, University of Wisconsin, College of Engineering & Applied Science, Milwaukee, Wisconsin, August, 1993, 20 class hours.

Grammer Training, CareerTrack, SLC, UT, October 13, 1995, 6 class hours.

Fundamentals of Groundwater Geochemistry, Dr. Pat Longmire and Bill Deutsch, National Ground Water Association, Denver, CO, February, 3-4, 1997, 16 class hours.

Practical Applications of Groundwater Geochemistry, Dr. Pat Longmire and Bill Deutsch, National Ground Water Association, Denver, CO, February, 5-7, 1997, 22 class hours.

Radiation Safety at Superfund Sites, Mssrs. Jim Stokes, Guy Cooley, and Jerry Gels, Halliburton NUS Corporation and U.S. EPA, Salt Lake City, UT, March 17-21, 1997, 2.95 CEU.

Techniques of Geostatistical Estimation and Simulation Applied to Environmental Geology, Dr. Chris Rautman and Sean McKenna, Geological Society of America, Salt Lake City, UT, October 18-19, 1997, 1.6 CEU.

Unsaturated Zone Monitoring Workshop, Drs. Peter Wierenga, Art Warrick, Mike Young, University of Arizona Dept. of Soil, Water, and Environmental Science, and U.S. Nuclear Regulatory Commission, Maricopa, AZ, February 11-12, 1998, 15 class hours.

Unsaturated Zone Monitoring Strategies Workshop, Drs. Peter Wierenga, Art Warrick, Mike Young, University of Arizona Dept. of Soil, Water, and Environmental Science, and U.S. Nuclear Regulatory Commission, Rockville, MD, July 9, 1998, 6 class hours.

PUBLICATIONS

Bedrock Neutralization Capacity and its Role in Predicting Sensitive Watersheds in Utah, in Acid Deposition in Utah, Utah Acid Deposition Technical Advisory Committee, Utah Department of Health, Carol Revelt, ed., April, 1990, pp 15-30.

Class V Well Inventory and Report for the Underground Injection Control Program, with James Martin, Utah Division of Environmental Health, November, 1987, 74 pp.

Ground Water Contamination Potential of Drainage Wells in Utah in Proceedings of International Symposium on Class V Injection Well Technology, Underground Injection Practices Council, September, 1987, pp.87-119.

Provisional Geologic and Coal Resources Map of the Mt. Ellen Quadrangle, Garfield County, Utah, Utah Geological & Mineral Survey Map 90, 1986, 15 pp. & 3 Plates.

Geology of the Mt. Ellen 3 SE Quadrangle, Henry Mountains, Garfield County, Utah, Brigham Young University Geology Studies, Vol. 31, Part 1, Dec. 1984, pp. 67-96.

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Name: Loren Morton Date of Hire: September 10, 1984

Training Areas	Date Completed	Management Initials/Signature	Comments
BASIC TRAINING			
College/University Degree	4/84		M.S., Geology, BYU
Program Orientation	9/94		
Review of the UDRC Rules	9/94		
Review of the Location of the Regulatory Guides and Reference Materials	9/94		
Essentials of Inspection			
Essentials of Licensing			
SPECIALIZED TRAINING			
Elements of Health Physics (1 wk) USNRC	7/17 - 7/21 2100		
Elements of Nuclear Medicine			
Elements of Medical Therapy			
Elements of Industrial Radiography			
Elements of Transportation			
Elements of Well Logging			
Elements of Pool Irradiators			
Elements of Environmental Monitoring			
Radiological Emergency Response Operations (RERO)			
ADVANCED TRAINING			
Advanced Health Physics			
Elements of Investigations			
OTHER TRAINING			
Groundwater Hydrology	2/85		
Underground Injection Control, Regulation and Technology	4/4/85		

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Training Areas	Date Completed	Management Initials/Signature	Comments
OTHER TRAINING (cont'd)			
Environ. Geophys. Electrical Meth.	10/88		
Principles of Subsurface Contam. Fate & Transport Modeling	9/21/89		
Legal Implications of Environmental Site Assessments	9/22/89		
Intro. to Ground Water Modeling	3/90		
Introduction to Solute Transport and Contaminant Migration	3/91		
HELP Modeling Workshop for Landfill Design & Evaluation	8/11/93		
Fundamentals of Ground Water Geochemistry	2/4/97		
Practical Applications of Ground Water Geochemistry	2/7/97		
Radiation Safety at Superfund Sites	3/21/97		
Techniques of Geostatistical Estimation and Simulation Applied to Environmental Geology	10/19/97		
Geochem of Metals UGWA	3/2001		

RESUME

RAYMOND G. NELSON
5958 Suwannee Circle
Murray, Utah 84123
(801) 266-2502

EDUCATION

1988 TO 1993	University of Utah, Geophysics and Geology Major Overall GPA 2.78, GPA in Majors 3.62
1971 to 1973	Utah Technical College, Electronics Technology
1968 to 1970	LDS Business College, Management and Marketing
1962 to 1965	Skyline High School in Salt Lake County

MEMBERSHIPS

Health Physics Society
Wasatch Gem Society
Rocky Mountain Mineralogical Society

EXPERIENCE

August 1988 to Present
Utah Department of Environmental Quality
Division of Radiation Control (DRC)
Lead Inspector for the DRC for oversight of the Envirocare Radioactive Waste disposal facility at Clive, Utah. Responsible for the radiological portion of the final report to the U.S. Department of Energy on the Vitro UMTRA Project. Responsibilities included environmental monitoring and maintenance , calibration and control all radiological instrumentation for the DRC.

May 1985 to August 1988
Utah Department of Health
Bureau of Radiation Control
UMTRA site coodinator for radiation safety. Supervised nine Bureau technical staff and various contractor personnel to insure that radiological health risks to personnel and the environment were kept to a minimum. Trained Bureau field staff in monitoring procedures, use of radiological test instrumentation and safe work ethics. Oversite to insure that Health Physics staff were present al all times when contractor was working on the site.

March 1984 to May 1985
Chem Nuclear/Morrison Knudsen
Remedial Action Contractor for the U.S. Department of Energy
Supervised fourteen Health Physics Technicians in the process of cleaning up vicinity properties under the Vitro UMTRA project, Salt Lake City, Utah. Oversite of contractor and environmental safety and training of technical staff and contractor staff in radiological safety.

November 1982 to March 1984
Nuclear, Environmental and Geotechnical Group
Ford, Bacon and Davis of Utah
Design, fabrication and installation of electronic control panels. Calibrated, maintained and repaired radiological instrumentation. Worked as field technician on various vicinity properties under the Vitro UMTRA Project, Salt Lake City, Utah. Site assessment as a radiological surveyor and a land surveyor on all but three of the UMTRA Mill sites in the United States.

June 1981 to 1992
Applied Research and Technology of Utah
Field instrumentation and shop supervisor for building electronic control panels. Including panels at the National Reactor Site Fast Gas Processing Facility, Arco, Idaho. Design and fabrication of control panels for Natural Bridges National Monument Photo Voltaic power System, the largest stand alone solar power generating system in the United States.

December 1976 to November 1982
Ford Bacon and Davis of Utah
Field Technician for electronic instrumentation and design area. Designed and built control systems for water treatment plants, water distribution systems, power generation control systems, nuclear waste processing and effluent monitoring systems. The following are some of the systems worked on:

Reno Sparks Waste Water Treatment Facility, Reno, Nevada
East Bay MUDD Water Treatment Facility, Oakland, California
Stockton Waste Water Treatment Facility, Stockton, California
Burley Idaho Water Distribution System
Houston Power and Light Power Distribution System

August 1973 to November 1976
Wiscomb Company of Salt Lake City, Utah
Assembled control panels for waste water treatment plants. Also worked as field installation technician during construction and start up of the various systems.

REFERENCES

Dane Finerfrock, Section Manager
Environmental Monitoring & Uranium Mill Tailings
Utah, Department of Environmental Quality
Division of Radiation Control
(801) 536-4266

Craig W. Jones, Section Manager
Radioactive Material Licensing & X-Ray Registration
Utah, Department of Environmental Quality
Division of Radiation Control
(801) 536-4266

Dr. Emerson Cannon
CEO Micro Core Inc.
Salt Lake City, Utah
(801) 484-8682

Ernie Couch
Chem Nuclear Systems, Inc.
(505) 327-5721

Richard Richie
U.S. Department of Energy
Albuquerque Operations Office
(505) 846-1210

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Name: Raymond G. Nelson Date of Hire: August 8, 1988

Training Areas	Date Completed	Management Initials/Signature	Comments
BASIC TRAINING			
College/University Degree	5/93		B S , Geophysics & Geology, U of U
Program Orientation	8/88		
Review of the UDRC Rules	8/88		
Review of the Location of the Regulatory Guides and Reference Materials	8/88		
Essentials of Inspection	6/23/89		
Essentials of Licensing	4/26/91		
SPECIALIZED TRAINING			
Elements of Health Physics (5 wk)	8/10/90		
Elements of Nuclear Medicine			
Elements of Medical Therapy			
Elements of Industrial Radiography	12/5/94		
Elements of Transportation	8/18/89		
Elements of Well Logging	11/5/93		
Elements of Pool Irradiators			
Elements of Environmental Monitoring			
Radiological Emergency Response Operations (RERO)	10/91		
ADVANCED TRAINING			
Advanced Health Physics			
Elements of Investigations			
OTHER TRAINING			
NTS Rad. Safety & Gauge Ops.	5/27/82		
Basic Risk & Decision Making	9/29/88		
Fund. Course for Rad. Monitors	1/28/89		

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Training Areas	Date Completed	Management Initials/Signature	Comments
OTHER TRAINING (cont'd)			
Reducing Radon in Structures	3/10/89		
TRANSCOM	5/12/89		
1st Respondrs Rad. Transp. Emerg.	8/29/89		
Haz. Mat. Response for 1st Resp.	9/15/89		
Fundamental Course for Radiological Response Teams	4/19/91		
Radiological Instructor	4/21/91		
Mitigation Rad. Transp. Emerg.	9/19/95		
RCRA Ground Water Monitoring	97		
RCRA Closure & Post-Closure Care Cost Estimating Software	3/26/98		
MEANS Cost Estimating For Construction	11/2000	DF	
Resp ~~Training~~ Protection Training Prog (TRAIN the TRAINER)	7-31-2001	DF	

STEPHEN R. PALMER, P.E.

EDUCATION

M.S. in Environmental Engineering, August 1990, Brigham Young University, Provo, Utah.
B.S. in Civil Engineering, April 1989, Brigham Young University, Provo, Utah.

EXPERIENCE RECORD

8/01 - Present **Utah Division of Radiation Control**, Salt Lake City, Utah.
Environmental Engineer

- Inspected and reviewed waste placement test pads.
- Revised engineering inspection modules for Envirocare facility.
- Inspected and reviewed portion of radon barrier.

11/00 - 8/01 **Ward Engineering Group**, Salt Lake City, Utah.
Project Manager

- Prepared a preliminary engineering report evaluating wastewater treatment alternatives for Lake Point Improvement District using State standards.
- Managed construction contract administration for a water treatment plant, two lift stations, and a concrete water storage tank.
- Prepared sewer master plan, including computer modeling, for Utah Industrial Depot.

7/98 - 7/00 **Hansen, Allen & Luce (On-Site Environmental)**, Salt Lake City, Utah.
Project Engineer

- Provided plan reviews specifically associated with storm drainage and storm water quality issues.
- Prepared storm drain master plans, including computer modeling using GIS based software interfacing with the HEC-1 model, for both the City of Tooele and the City of South Salt Lake.
- Designed and provided construction oversight of embankment protection for portion of Missouri River in Great Falls, Montana.

4/96 - 7/98 **Brown & Gay Engineers**, Houston, Texas.
Project Engineer.

- Managed construction contract administration for water and wastewater treatment plants, lift stations, water, sanitary sewer and storm sewer utilities. This included reviewing shop drawings and pay estimates, and negotiating change orders.
- Designed a water plant, lift station and activated sludge wastewater treatment plant for Fort Bend County Municipal Utility District No. 1. This included sizing tanks and pumps, designing access roads and site plans, coordinating design work of electrical and structural engineers, preparing design drawings, bid documents and specifications.
- Prepared a preliminary engineering report evaluating rehabilitation of an existing lift station versus construction of a new submersible or wet pit/dry pit lift station, and also

alternative routes for force main construction. This included giving an oral presentation of the report recommendations to officials at the City of Houston.

12/92 - 2/96 **Parsons Engineering Science**, Houston, Texas and Richland, Washington.
Project Engineer.

- Conducted an environmental compliance audit for the Port of Kennewick, which included USTs, based on RCRA/CERCLA/SARA and other federal, state, and local regulations.
- Performed groundwater fate and transport modeling for jet fuel spill at Eielson Air Force Base as part of remedial investigation using the MEPAS computer model.
- Prepared an O&M manual for groundwater pump and treat system and soil vapor extraction system for TCE leak in landfill at Fairchild Air Force Base.
- Prepared remedial investigation/feasibility studies for both Eilson Air Force Base and the Hanford nuclear site.
- Designed a RCRA pond liner system for Gulf Coast Waste Disposal Authority's Bayport Facility plant upgrade.
- Performed groundwater sampling and bioventing pilot tests at Fairchild Air Force Base.
- Performed air dispersion modeling calculations for tank emission control system at Hanford's 200-BP-1 nuclear waste storage tank farm using AIRDOS-PC computer model.

7/90 - 9/92 **John Carollo Engineers**, San Bernardino, California.
Project Engineer.

- Designed several miles of relief trunk sewer for the County Sanitation Districts of Los Angeles in the City of Industry, and in the City of Torrance.
- Prepared a preliminary engineering report evaluating design alternatives for a chlorine contact basin for Carson City, Nevada's Wastewater Treatment Plant.
- Planned nitrification improvements for Chino Basin Municipal Water District's Regional Plant No. 1 using BNR process.
- Developed local limits for industrial dischargers who use the San Clemente Water Reclamation Plant and the City of Santa Maria's Wastewater Treatment Plant, including sampling program.

PROFESSIONAL AFFILIATIONS

U.S. Naval Reserve (Civil Engineering Corps Officer-in-Charge of NMCB 1417)
Naval Reserve Officer of the Year - 2000 (Salt Lake Area Chamber of Commerce)
Society of American Military Engineers
P.E. (Utah, Washington and Texas)

SPECIAL TRAINING

Annual Supervisory Training and 8 hour OSHA Refresher, 1998
First Aid/CPR Certification, 1998
Project Management Training, 1995
OSHA 40 hour Health and Safety, 1993

DIVISION OF RADIATION CONTROL

FY 04

PCN	ORG NAME	5100 General	5160 Exp Rev	5210 Enviro	5250 Uran Mill	5300 X-R/Lic	5500 Radon	5600 FDA/M	5700 WIPP	5800 DOH/XR	5900 Vitro	5950 Gr River	DRC TOTAL
HD7N	ANDERSON, R.					100%							100%
ID61	BARKER, E.			100%									100%
HK9Z	BEST, K.					100%							100%
HU9U	CAMPBELL, W.			100%									100%
HD89	CLEMENTS, C.					100%							100%
IC95	CRAIG, B.								100%				100%
ID60	FAUSTO, J.			100%									100%
HC7P	FELICE, J.		2%			98%							100%
HB09	FINERFROCK, D.	5%		90%			5%						100%
HG9J	GALLOWAY, G.		2%			85%		13%					100%
HC9N	GIDDINGS, S.					98%				2%			100%
HN9B	GRIFFIN, P.		1%			99%							100%
IA99	HAMOS, B.			100%									100%
HK9H	HERBERT, ROB			90%							2%	8%	100%
HP9T	HULTQUIST, J.			50%			50%						100%
ID58	IMAI, B.			100%									100%
HB1O	JONES, C.	5%				94%		1%					100%
HH3F	LARSON, M.	20%		25%		49%	3%		2%			1%	100%
IC24	MORTON, L.	10%		90%									100%
HD5Q	NELSON, R.			100%									100%
HD7P	SANBORN, R.					82%		18%					100%
HR17	SHROPSHIRE, Y.	20%		27%		50%	3%						100%
HA71	SINCLAIR, W.	25%		42%		25%	2%		5%			1%	100%
HS6B	WARD, J.	20%		26%		51%			2%			1%	100%
ID59	PALMER, STEVEN			100%									100%
9999	ENGINEER III				100%								100%
9999	ENV HEALTH SCI III				100%								100%
9999	ENV HEALTH SCI III				100%								100%
9999	OFFICE TECH II				100%								100%
	TOTAL BY ORG	1.05	0.05	11.40	4.00	10.31	0.63	0.32	1.09	0.02	0.02	0.11	29.00

FTE ALLOCATIONS
(to be added)

ORG	5400
NAME	U-Mills
Engineer	100%
Office Tech	100%
Health Physicist	100%

Date Printed: 9/13/2001

STATE OF UTAH
DEPARTMENT OF HUMAN RESOURCE MANAGEMENT
JOB DESCRIPTION

TITLE: ENVIRONMENTAL ENGINEER III

JOB ID: 37505 **STATUS:** 1st Level Approved **EFFECTIVE DATE:** 8/4/2001

Agency Representative: Charlene Lamph

DHRM Representative:

BENCHMARKED TO: ENGINEER III

SAFETY SENSITIVE [None]

SUPERVISORY LEVEL: [None]

STEP RANGE: 59 - 76 **PAY RANGE:** $22.48 - $35.65 **FLSA EXEMPT:** Yes

CAREER SERVICE PROBATIONARY PERIOD: 12 months **EEO DESIGNATION:** Professionals

WORKING CONDITIONS: Everyday Risks **PHYSICAL REQUIREMENTS:** Sedentary

PURPOSE AND DISTINGUISHING CHARACTERISTICS

(Description of the job which distinguishes it from other job(s) in a series or family)

Incumbents in this job are fully competent engineers and utilize advanced training, experience and independent judgement to perform a wide range of technically complex environmental engineering/permitting assignments and/or major multifaceted environmental projects with minimal supervision. Depth of experience allows incumbents to organize, administer and resolve engineering problems and regulation conflicts. Incumbents in the Division of Water Quality, Drinking Water and Radiation Control are required to be valid Utah Licensed Professional Engineers; incumbents in all other divisions within the Department of Environmental Quality need to successfully pass the Fundamentals of Engineering Exam and have a degree in a related engineering discipline. Plans, develops and coordinates major engineering projects requiring the application of advanced engineering skills. Acts as a project lead engineer providing technical direction to less senior engineers in a team environment. Performs research projects to evaluate new environmental engineering technologies, procedures and policy/rules. Assesses feasibility of proposed complex permit engineering plans, projects, systems or equipment for compliance to state and federal environmental rules and regulations. Maintains liaison with project sponsors/commercial entities and coordinates the environmental rules and regulations. Conducts compliance evaluation, investigations, case preparation, and participates in enforcement actions and follow through.

EXAMPLES OF TASKS

(More specific information about the job can be found in the Purpose and Distinguishing characteristics. This list contains tasks that are typically associated with the job. It is not all-inclusive and may vary from position to position. Hiring agencies may, depending on the specific nature of the position, modify these tasks and/or identify additional tasks, based on a current position analysis.).

- Plans, develops and coordinates one or more large, complex projects.
- Participates in a variety of activities including feasibility, materials, research, design, concept and scoping, environmental, safety, specifications, schedules, revisions in the process of designing and developing engineering projects.
- Schedules and conducts inspections and/or investigations.
- Maintains detailed inspection or investigation records, prepares reports, and attends to other related administrative requirements.
- Develops, evaluates, or reviews plans and criteria for a variety of projects and activities; assesses feasibility of proposals.
- Interprets, clarifies, explains and applies agency policy and procedures, business practices, federal or state laws and regulations, etc.
- Discuss, review and interpret plans and specifications.
- Coordinates and/or acts as a liaison between agency or work unit and other agencies, work units, organizations, suppliers, etc.
- Writes or drafts correspondence, reports, documents and/or other written materials.
- Ensures compliance with applicable federal and/or state laws, regulations, and/or agency rules, standards and guidelines, etc.
- Conducts, or represents agency at, formal or informal hearings.
- Other tasks as assigned.

STATE OF UTAH

Job Analysis Questionnaire

DHRM Representative

Agency Representative Charlene Lamph

Agency 480 - Dep Environmental Quality

Agency Approval Lamph, Charlene **Date** 2/21/2001

Level 1 Approval Judy Price **Date** 8/2/2001

Level 2 Approval **Date**

Status 1st Level Approved

Requested Effective Date 9/16/2000

Effective Date 8/4/2001

End Date

Benchmarked To

ID 43005

Title ENGINEER III

Pay Range

Type 1 - On Step **Steps** 59 - 76

FLSA Exempt Yes **Pay Rate** $22.48 - $35.65

Supervisory Level [None]

Working Level Senior

EEO Designation 2 - Professionals

Probation Period 12 months

Working Conditions Everyday Risks

Physical Requirements Sedentary

Safety Sensitive [None]

Purpose And Distinguishing Characteristics

Incumbents in this job are fully competent engineers and utilize advanced training, experience and independent judgement to perform a wide range of technically complex environmental engineering/permitting assignments and/or major multifaceted environmental projects with minimal supervision. Depth of experience allows incumbents to organize, administer and resolve engineering problems and regulation conflicts. Incumbents in the Division of Water Quality, Drinking Water and Radiation Control are required to be valid Utah Licensed Professional Engineers; incumbents in all other divisions within the Department of Environmental Quality need to successfully pass the Fundamentals of Engineering Exam and have a degree in a related engineering discipline. Plans, develops and coordinates major engineering projects requiring the application of advanced engineering skills. Acts as a project lead engineer providing technical direction to less senior engineers in a team environment. Performs research projects to evaluate new environmental engineering technologies, procedures and policy/rules.
Assesses feasibility of proposed complex permit engineering plans, projects, systems or equipment for compliance to state and federal environmental rules and regulations. Maintains liaison with project sponsors/commercial entities and coordinates the environmental rules and regulations. Conducts compliance evaluation, investigations, case preparation, and participates in enforcement actions and follow through.

Comments / Justification

This administrative action creates a new version of this job in connection with the implementation of the new integrated Utah Job Match system.

Senior level is assigned because incumbent is an expert in the field with substantial work experience performing the essential functions of the Job.

KNOWLEDGE, SKILLS, AND ABILITIES

(This list contains KSAs that are typically associated with the job. It is not all-inclusive and may vary from position to position. Hiring agencies may, depending on the specific nature of the position, modify these KSAs and/or identify additional KSAs, based on a current position analysis.)

KNOWLEDGE OF THE FOLLOWING THEORY, PRINCIPLES, PRACTICES AND / OR CONTENT:

- principles and practices of construction
- principles, theories, and practices of engineering
- agency, professional and/or industry standards and practices
- applicable laws, rules, regulations and/or policies and procedures
- specific speciality area of assignment
- agency objectives, organization, structure and mission
- field or agency specific terminology
- negotiation techniques and methods
- agency and/or organizational program(s)
- grammar, spelling and punctuation

SKILLS / ABILITY TO:

- deal with people in a manner which shows sensitivity, tact, and professionalism
- evaluate information against a set of standards
- speak clearly, concisely and effectively; listen to, and understand, information and ideas as presented verbally
- read, interpret and apply laws, rules, regulations, policies and/or procedures
- work independently with little or no supervision
- review and/or edit documents for accuracy and completeness
- compose and produce reports, documents and related material
- communicate information and ideas clearly, and concisely, in writing; read and understand information presented in writing
- weigh the relative costs and benefits of a potential action
- read and interpret maps, plats, charts, plans, blueprints and/or electrical schematics
- perform scientific and/or technical research
- conduct a methodical examination
- plan, organize and prioritize time and workload in order to accomplish tasks and meet deadlines
- monitor or track information or data
- develop approaches for implementation of an idea, program or change in operations
- lead the work of others by monitoring, reviewing, training co-workers and/or delegating work
- work with or contribute to a work group or team to complete assigned task(s)
- assess risk and impose appropriate restrictions

OTHER REQUIREMENTS

REQUIRED CERTIFICATES

- Engineer -In-Training (EIT) or the Fundamentals of Engineering Exam (FE).

REQUIRED LICENSES

- Must be registered as a professional engineer.

Task Number	Task	Knowledge, Skill, or Ability
1	Plans, develops and coordinates one or more large, complex projects.	K: principles, theories, and practices of engineering
		K: principles and practices of construction
		S/A: weigh the relative costs and benefits of a potential action
		S/A: develop approaches for implementation of an idea, program or change in operations
		K: agency, professional and/or industry standards and practices
		S/A: read and interpret maps, plats, charts, plans, blueprints and/or electrical schematics
		K: applicable laws, rules, regulations and/or policies and procedures
		S/A: lead the work of others by monitoring, reviewing, training co-workers and/or delegating work
		K: negotiation techniques and methods
		S/A: speak clearly, concisely and effectively; listen to, and understand, information and ideas as presented verbally
		S/A: plan, organize and prioritize time and workload in order to accomplish tasks and meet deadlines
		S/A: read, interpret and apply laws, rules, regulations, policies and/or procedures
		S/A: work with or contribute to a work group or team to complete assigned task(s)

Task Number	Task	Knowledge, Skill, or Ability
1	Plans, develops and coordinates one or more large, complex projects.	S/A: communicate information and ideas clearly, and concisely, in writing; read and understand information presented in writing
		K: agency and/or organizational program(s)
		K: field or agency specific terminology
		K: agency objectives, organization, structure and mission
2	Participates in a variety of activities including feasibility, materials, research, design, concept and scoping, environmental, safety, specifications, schedules, revisions in the process of designing and developing engineering projects.	K: principles, theories, and practices of engineering
		K: principles and practices of construction
		S/A: weigh the relative costs and benefits of a potential action
		S/A: evaluate information against a set of standards
		K: agency, professional and/or industry standards and practices

Task Number	Task	Knowledge, Skill, or Ability
2	Participates in a variety of activities including feasibility, materials, research, design, concept and scoping, environmental, safety, specifications, schedules, revisions in the process of designing and developing engineering projects.	S/A: read and interpret maps, plats, charts, plans, blueprints and/or electrical schematics
		K: applicable laws, rules, regulations and/or policies and procedures
		S/A: read, interpret and apply laws, rules, regulations, policies and/or procedures
		S/A: review and/or edit documents for accuracy and completeness
		S/A: perform scientific and/or technical research
		K: field or agency specific terminology
		K: agency objectives, organization, structure and mission

Task Number	Task	Knowledge, Skill, or Ability
2	Participates in a variety of activities including feasibility, materials, research, design, concept and scoping, environmental, safety, specifications, schedules, revisions in the process of designing and developing engineering projects.	K: specific speciality area of assignment
3	Schedules and conducts inspections and/or investigations.	K: principles, theories, and practices of engineering
		S/A: conduct a methodical examination
		K: principles and practices of construction
		S/A: deal with people in a manner which shows sensitivity, tact, and professionalism
		S/A: evaluate information against a set of standards
		K: agency, professional and/or industry standards and practices
		S/A: read and interpret maps, plats, charts, plans, blueprints and/or electrical schematics
		K: applicable laws, rules, regulations and/or policies and procedures
		S/A: plan, organize and prioritize time and workload in order to accomplish tasks and meet deadlines
		S/A: read, interpret and apply laws, rules, regulations, policies and/or procedures
		S/A: monitor or track information or data
		K: field or agency specific terminology
		K: specific speciality area of assignment
4	Maintains detailed inspection or investigation records, prepares reports, and attends to other related administrative requirements.	K: principles, theories, and practices of engineering

Task Number	Task	Knowledge, Skill, or Ability
4	Maintains detailed inspection or investigation records, prepares reports, and attends to other related administrative requirements.	S/A: conduct a methodical examination
		K: principles and practices of construction
		S/A: deal with people in a manner which shows sensitivity, tact, and professionalism
		S/A: evaluate information against a set of standards
		K: agency, professional and/or industry standards and practices
		S/A: compose and produce reports, documents and related material
		S/A: communicate information and ideas clearly, and concisely, in writing; read and understand information presented in writing
		K: grammar, spelling and punctuation
5	Develops, evaluates, or reviews plans and criteria for a variety of projects and activities; assesses feasibility of proposals.	K: principles, theories, and practices of engineering
		S/A: conduct a methodical examination
		K: principles and practices of construction
		S/A: weigh the relative costs and benefits of a potential action
		S/A: assess risk and impose appropriate restrictions

Task Number	Task	Knowledge, Skill, or Ability
5	Develops, evaluates, or reviews plans and criteria for a variety of projects and activities; assesses feasibility of proposals.	S/A: evaluate information against a set of standards
		K: agency, professional and/or industry standards and practices
		S/A: read and interpret maps, plats, charts, plans, blueprints and/or electrical schematics
		S/A: review and/or edit documents for accuracy and completeness
		K: agency and/or organizational program(s)
		K: field or agency specific terminology
		S/A: work independently with little or no supervision
		K: specific speciality area of assignment
6	Interprets, clarifies, explains and applies agency policy and procedures, business practices, federal or state laws and regulations, etc.	K: principles, theories, and practices of engineering
		S/A: deal with people in a manner which shows sensitivity, tact, and professionalism
		K: applicable laws, rules, regulations and/or policies and procedures
		S/A: speak clearly, concisely and effectively; listen to, and understand, information and ideas as presented verbally

Task Number	Task	Knowledge, Skill, or Ability
6	Interprets, clarifies, explains and applies agency policy and procedures, business practices, federal or state laws and regulations, etc.	S/A: read, interpret and apply laws, rules, regulations, policies and/or procedures
		S/A: communicate information and ideas clearly, and concisely, in writing; read and understand information presented in writing
		K: agency and/or organizational program(s)
		K: agency objectives, organization, structure and mission
		K: specific speciality area of assignment
7	Discuss, review and interpret plans and specifications.	K: principles, theories, and practices of engineering
		S/A: conduct a methodical examination
		K: principles and practices of construction
		K: agency, professional and/or industry standards and practices
		S/A: read and interpret maps, plats, charts, plans, blueprints and/or electrical schematics
		K: applicable laws, rules, regulations and/or policies and procedures
		S/A: speak clearly, concisely and effectively; listen to, and understand, information and ideas as presented verbally
		S/A: read, interpret and apply laws, rules, regulations, policies and/or procedures

Task Number	Task	Knowledge, Skill, or Ability
7	Discuss, review and interpret plans and specifications.	S/A: review and/or edit documents for accuracy and completeness
		S/A: communicate information and ideas clearly, and concisely, in writing; read and understand information presented in writing
		K: field or agency specific terminology
		K: agency objectives, organization, structure and mission
		K: specific speciality area of assignment
8	Coordinates and/or acts as a liaison between agency or work unit and other agencies, work units, organizations, suppliers, etc.	K: principles, theories, and practices of engineering
		S/A: deal with people in a manner which shows sensitivity, tact, and professionalism
		K: agency, professional and/or industry standards and practices
		K: applicable laws, rules, regulations and/or policies and procedures
		K: negotiation techniques and methods
		S/A: speak clearly, concisely and effectively; listen to, and understand, information and ideas as presented verbally
		S/A: communicate information and ideas clearly, and concisely, in writing; read and understand information presented in writing
		K: agency objectives, organization, structure and mission
		K: specific speciality area of assignment

Task Number	Task	Knowledge, Skill, or Ability
9	Writes or drafts correspondence, reports, documents and/or other written materials.	K: principles, theories, and practices of engineering
		K: agency, professional and/or industry standards and practices
		S/A: read, interpret and apply laws, rules, regulations, policies and/or procedures
		S/A: review and/or edit documents for accuracy and completeness
		S/A: compose and produce reports, documents and related material
		S/A: communicate information and ideas clearly, and concisely, in writing; read and understand information presented in writing
		K: agency and/or organizational program(s)
		K: field or agency specific terminology
		K: grammar, spelling and punctuation
		K: specific speciality area of assignment.
10	Ensures compliance with applicable federal and/or state laws, regulations, and/or agency rules, standards and guidelines, etc.	S/A: deal with people in a manner which shows sensitivity, tact, and professionalism
		K: applicable laws, rules, regulations and/or policies and procedures
		K: negotiation techniques and methods

Task Number	Task	Knowledge, Skill, or Ability
10	Ensures compliance with applicable federal and/or state laws, regulations, and/or agency rules, standards and guidelines, etc.	S/A: speak clearly, concisely and effectively; listen to, and understand, information and ideas as presented verbally
		S/A: read, interpret and apply laws, rules, regulations, policies and/or procedures
		S/A: work independently with little or no supervision
		K: agency objectives, organization, structure and mission
11	Conducts, or represents agency at, formal or informal hearings.	K: principles, theories, and practices of engineering
		K: principles and practices of construction
		S/A: deal with people in a manner which shows sensitivity, tact, and professionalism
		S/A: evaluate information against a set of standards
		K: agency, professional and/or industry standards and practices
		K: applicable laws, rules, regulations and/or policies and procedures
		S/A: speak clearly, concisely and effectively; listen to, and understand, information and ideas as presented verbally
		S/A: read, interpret and apply laws, rules, regulations, policies and/or procedures
		K: field or agency specific terminology
		K: agency objectives, organization, structure and mission
		K: specific speciality area of assignment

Required Certificates

Engineer -In-Training (EIT) or the Fundamentals of Engineering Exam (FE).

Comments

Agency Policy.

Required Licenses

Must be registered as a professional engineer.

Comments

Utah Code Annotated 58-22

Date Printed: 9/13/2001

STATE OF UTAH
DEPARTMENT OF HUMAN RESOURCE MANAGEMENT
JOB DESCRIPTION

TITLE: ENVIRONMENTAL SCIENTIST III Health Physicist Hydrogeologist

JOB ID: 37255 **STATUS:** 1st Level Approved **EFFECTIVE DATE:** 8/4/2001

Agency Representative: Charlene Lamph

DHRM Representative:

BENCHMARKED TO: Local Benchmark

SAFETY SENSITIVE [None]

SUPERVISORY LEVEL: [None]

STEP RANGE: 60 - 75 **PAY RANGE:** $23.09 - $34.69 **FLSA EXEMPT:** Yes

CAREER SERVICE PROBATIONARY PERIOD: 12 months **EEO DESIGNATION:** Professionals

WORKING CONDITIONS: Special Risks **PHYSICAL REQUIREMENTS:** Moderate

PURPOSE AND DISTINGUISHING CHARACTERISTICS

(Description of the job which distinguishes it from other job(s) in a series or family)

Incumbents perform a wide range of environmental scientific/administrative tasks requiring the application of an extensive and broad base of environmental quality experience. Depth of experience allows incumbent to organize, administer and resolve problems and rule/regulation conflict for permitting and other regulatory applications and compliance enforcement activities which apply a broad range of the latest emission/discharge control technology and rare polluting elements. Incumbents lead and coordinate large multifaceted pollution emitting/discharging project/facilities. Reviews complex permit/license applications for compliance with state and federal environmental rules and regulations. Drafts permit approvals. Prepares documentation to support negotiated resolution of non-complaint issues. Monitors the follow through on corrective actions. Coordinates permitting activities with other agencies. Evaluates and interprets data and prepares written technical reports and impact statements. Develops discharge factors. Reviews technical plans and reports concerned with public environmental issues. Develops and recommends environmental rules and proposals in area of specialization. Performs project lead and coordinating tasks from planning to site remediation. Writes program management and project plans. Develops, writes and implements quality assurance and data collection and monitoring programs and procedures.

EXAMPLES OF TASKS

(More specific information about the job can be found in the Purpose and Distinguishing characteristics. This list contains tasks that are typically associated with the job. It is not all-inclusive and may vary from position to position. Hiring agencies may, depending on the specific nature of the position, modify these tasks and/or identify additional tasks, based on a current position analysis.).

- Reviews and/or inspects work for quality, accuracy, and completeness.
- Monitors and evaluates operations, programs, processes and/or practices for quality and effectiveness; makes recommendations for improvement.
- Analyzes, summarizes and/or reviews data; reports findings, interprets results and/or makes recommendations.
- Writes or drafts technical reports, articles or related material based on research, investigation or analysis.
- Reviews and edits technical writing.
- Plans and manages projects and/or programs. Writes (or discusses) project/program plan(s), recommendation(s) and/or finding(s).
- Develops environmental test methodology, determines placement of sampling equipment, maintains and calibrates equipment and evaluates instrumentation for effectiveness.

  Schedules and conducts inspections and/or investigations.

  Provides technical assistance and contract interpretation to contractors.
- Provides technical assistance on agency issues, services, program(s), and/or computer hardware and software, etc.
- Other tasks as assigned.

KNOWLEDGE, SKILLS, AND ABILITIES

(This list contains KSAs that are typically associated with the job. It is not all-inclusive and may vary from position to position. Hiring agencies may, depending on the specific nature of the position, modify these KSAs and/or identify additional KSAs, based on a current position analysis.)

KNOWLEDGE OF THE FOLLOWING THEORY, PRINCIPLES, PRACTICES AND / OR CONTENT:

- principles, theories, and practices of biological science
- principles, theories, and practices of environmental science
- principles, theories, and practices of the physical sciences
- machines and tools, including their designs, uses, benefits, repair, and maintenance
- principles, theories, and practices of quality management.
- procurement and/or administration of contracts, grants, loans, or similar agreements
- agency and/or organizational program(s)

SKILLS / ABILITY TO:

- use logic to analyze or identify underlying principles, reasons, or facts associated with information or data to draw conclusions
- principles, theories, and practices of environmental science
- agency and/or organizational program(s)
- ensure compliance with contract terms, policies and procedures, etc.
- develop approaches for implementation of an idea, program or change in operations
- communicate information and ideas clearly, and concisely, in writing; read and understand information presented in writing
- review and/or edit documents for accuracy and completeness
- principles, theories, and practices of environmental response and remediation

OTHER REQUIREMENTS

OTHER REQUIREMENTS AND CHARACTERISTICS (Not position specific)

- Risks which require the use of special safety precautions and/or equipment, e.g., working around operating machines, working with contagious diseases or hazardous chemicals, etc.
- The work requires some physical exertion such as long periods of standing; walking over rough terrain or rocky surfaces; recurring bending, crouching, stooping, stretching, reaching, or similar activities; recurring lifting of moderately heavy items such as typewriters and record boxes. The work may require specific but common physical characteristics and abilities such as lifting up to 50 pounds, above-average agility, and dexterity.

STATE OF UTAH

Job Analysis Questionnaire

Job 37255 - ENVIRONMENTAL SCIENTIST III

DHRM Representative

Agency Representative Charlene Lamph

Agency 480 - Dep Environmental Quality

Agency Approval Lamph, Charlene **Date** 2/21/2001

Level 1 Approval Judy Price **Date** 8/3/2001

Level 2 Approval **Date**

Status 1st Level Approved

Requested Effective Date

Effective Date 8/4/2001

End Date

Benchmarked To

Type Local

Pay Range

Type 1 - On Step **Steps** 60 - 75

FLSA Exempt Yes **Pay Rate** $23.09 - $34.69

Supervisory Level [None]

Working Level Senior

EEO Designation 2 - Professionals

Probation Period 12 months

Working Conditions Special Risks

Physical Requirements Moderate

Safety Sensitive [None]

Purpose And Distinguishing Characteristics

Incumbents perform a wide range of environmental scientific/administrative tasks requiring the application of an extensive and broad base of environmental quality experience. Depth of experience allows incumbent to organize, administer and resolve problems and rule/regulation conflict for permitting and other regulatory applications and compliance enforcement activities which apply a broad range of the latest emission/discharge control technology and rare polluting elements. Incumbents lead and coordinate large multifaceted pollution emitting/discharging project/facilities. Reviews complex permit/license applications for compliance with state and federal environmental rules and regulations. Drafts permit approvals. Prepares documentation to support negotiated resolution of non-complaint issues. Monitors the follow through on corrective actions. Coordinates permitting activities with other agencies. Evaluates and interprets data and prepares written technical reports and impact statements. Develops discharge factors. Reviews technical plans and reports concerned with public environmental issues. Develops and recommends environmental rules and proposals in area of specialization. Performs project lead and coordinating tasks from planning to site remediation. Writes program management and project plans. Develops, writes and implements quality assurance and data collection and monitoring programs and procedures.

Comments / Justification

This administrative action creates a new version of this job in connection with the implementation of the new integrated Utah Job Match system.

Senior level is assigned because incumbent is an expert in the field with substantial work experience performing the essential functions of the Job.

STATE OF UTAH

Job Analysis Questionnaire

Task Number	Task	Knowledge, Skill, or Ability
1	Reviews and/or inspects work for quality, accuracy, and completeness.	S/A: principles, theories, and practices of environmental science
		S/A: agency and/or organizational program(s)
		K: principles, theories, and practices of quality management.
		S/A: use logic to analyze or identify underlying principles, reasons, or facts associated with information or data to draw conclusions
2	Monitors and evaluates operations, programs, processes and/or practices for quality and effectiveness; makes recommendations for improvement.	S/A: develop approaches for implementation of an idea, program or change in operations
		K: principles, theories, and practices of quality management.
3	Analyzes, summarizes and/or reviews data; reports findings, interprets results and/or makes recommendations.	K: principles, theories, and practices of environmental science
		K: principles, theories, and practices of biological science
		K: principles, theories, and practices of the physical sciences
		S/A: use logic to analyze or identify underlying principles, reasons, or facts associated with information or data to draw conclusions
4	Writes or drafts technical reports, articles or related material based on research, investigation or analysis.	S/A: communicate information and ideas clearly, and concisely, in writing; read and understand information presented in writing
		K: principles, theories, and practices of biological science

STATE OF UTAH

Job Analysis Questionnaire

Task Number	Task	Knowledge, Skill, or Ability
4	Writes or drafts technical reports, articles or related material based on research, investigation or analysis.	K: principles, theories, and practices of the physical sciences
5	Reviews and edits technical writing.	S/A: review and/or edit documents for accuracy and completeness
6	Plans and manages projects and/or programs. Writes (or discusses) project/program plan(s), recommendation(s) and/or finding(s).	S/A: communicate information and ideas clearly, and concisely, in writing; read and understand information presented in writing
		K: agency and/or organizational program(s)
		S/A: develop approaches for implementation of an idea, program or change in operations
7	Develops environmental test methodology, determines placement of sampling equipment, maintains and calibrates equipment and evaluates instrumentation for effectiveness.	S/A: use logic to analyze or identify underlying principles, reasons, or facts associated with information or data to draw conclusions
		K: machines and tools, including their designs, uses, benefits, repair, and maintenance
8	Schedules and conducts inspections and/or investigations.	S/A: ensure compliance with contract terms, policies and procedures, etc.
9	Provides technical assistance and contract interpretation to contractors.	S/A: ensure compliance with contract terms, policies and procedures, etc.
		K: procurement and/or administration of contracts, grants, loans, or similar agreements
10	Provides technical assistance on agency issues, services, program(s), and/or computer hardware and software, etc.	S/A: principles, theories, and practices of environmental response and remediation
		S/A: principles, theories, and practices of environmental science
		S/A: agency and/or organizational program(s)

STATE OF UTAH

Job Analysis Questionnaire

Job 37255 - ENVIRONMENTAL SCIENTIST III

Task Number	Task	Knowledge, Skill, or Ability
10	Provides technical assistance on agency issues, services, program(s), and/or computer hardware and software, etc.	K: principles, theories, and practices of biological science K: principles, theories, and practices of the physical sciences

Other Requirements and Characteristics

Risks which require the use of special safety precautions and/or equipment, e.g., working around operating machines, working with contagious diseases or hazardous chemicals, etc.

The work requires some physical exertion such as long periods of standing; walking over rough terrain or rocky surfaces; recurring bending, crouching, stooping, stretching, reaching, or similar activities; recurring lifting of moderately heavy items such as typewriters and record boxes. The work may require specific but common physical characteristics and abilities such as lifting up to 50 pounds, above-average agility, and dexterity.

Comments

Date Printed: 9/13/2001

STATE OF UTAH
DEPARTMENT OF HUMAN RESOURCE MANAGEMENT
JOB DESCRIPTION

TITLE: OFFICE TECHNICIAN III

JOB ID: 11115 **STATUS:** 2nd Level Approved **EFFECTIVE DATE:** 7/7/2001

Agency Representative:

DHRM Representative: Judith Price

BENCHMARKED TO: SECRETARY

SAFETY SENSITIVE [None]

SUPERVISORY LEVEL: [None]

STEP RANGE: 24 - 41 **PAY RANGE:** $8.70 - $13.79 **FLSA EXEMPT:** No

CAREER SERVICE PROBATIONARY PERIOD: 6 months **EEO DESIGNATION:** Administrative Support

WORKING CONDITIONS: Everyday Risks **PHYSICAL REQUIREMENTS:** Sedentary

PURPOSE AND DISTINGUISHING CHARACTERISTICS

(Description of the job which distinguishes it from other job(s) in a series or family)

Incumbents in this job exercise independent judgment in office specialities and perform the most complex production tasks requiring advanced general office skills plus a comprehensive knowledge of pertinent rules, regulations, policies, and procedures. Incumbent will either perform functional supervisory/lead worker responsibilities or serve as the focal point for advanced agency-specific assignment(s). Incumbent may lead or supervise a small clerical unit by prioritizing work flow, authorizing selected clerical, procedures, ensuring quality control, and providing subordinates with on-the-job training. Incumbent process a variety of agency documents by reviewing for accuracy and completeness, updating information, evaluating against policy, comparing elements for consistency or logical relationship, and otherwise taking action where such procedures my require independen judgment in applying agency regulations, policies and procedures. Originates correspondence, documentation, and other written communication; assists the public and others to complete forms and applications; locates and assembles records and information which may be complex or difficult to identify, and which may require substantial research, judgment, and subject matter knowledge. Prepares and generates recurring reports involving automated processes and thorough subject matter understanding.

EXAMPLES OF TASKS

(More specific information about the job can be found in the Purpose and Distinguishing characteristics This list contains tasks that are typically associated with the job. It is not all-inclusive and may vary from position to position. Hiring agencies may, depending on the specific nature of the position, modify these tasks and/or identify additional tasks, based on a current position analysis.).

- Prepare and/or process documents; review for accuracy and completeness; update information and/or evaluate against policy; compare elements for consistency or logical relationships, etc.
- Edits written material for accuracy, format, and arrangement of material.
- Writes or drafts correspondence, reports, documents and/or other written materials.
- Types and prepares reports or other written materials from source documents, transcription, etc.
- Retrieves data found in databases to generate requested reports.
- Assists the public and others to locate, view, or assemble filmed, scanned, or archived documents and/or information.
- Records and/or transcribes minutes of meetings, hearings, dictation, dialogue, etc., and produces document in draft or final format.
- Acts as a resource to provide information or determine the most effective way of meeting the needs of management, staff, clients customers.

Other tasks as assigned.

KNOWLEDGE, SKILLS, AND ABILITIES

(This list contains KSAs that are typically associated with the job. It is not all-inclusive and may vary from position to position. Hiring agencies may, depending on the specific nature of the position, modify these KSAs and/or identify additional KSAs, based on a current position analysis.)

KNOWLEDGE OF THE FOLLOWING THEORY, PRINCIPLES, PRACTICES AND / OR CONTENT:

- grammar, spelling and punctuation
- research methods, techniques, and/or sources of information

SKILLS / ABILITY TO:

- use automated software applications
- communicate information and ideas clearly, and concisely, in writing; read and understand information presented in writing
- enter, transcribe, record, store, or maintain information in either written or electronic form.
- grammar, spelling and punctuation
- assemble, sort, and/or distribute documents, supplies, and/or materials/items
- compile, code, categorize, calculate, tabulate, audit, verify, or process information or data
- review and/or edit documents for accuracy and completeness
- organize information in a clear and concise manner
- find, gather and collect information or data
- deal with people in a manner which shows sensitivity, tact, and professionalism
- speak clearly, concisely and effectively; listen to, and understand, information and ideas as presented verbally

OTHER REQUIREMENTS

OTHER REQUIREMENTS AND CHARACTERISTICS (Not position specific)

- Risks found in the typical office setting, which is adequately lighted, heated and ventilated, e.g., safe use of office equipment, avoiding trips and falls, observing fire regulations, etc.
- Typically, the employee may sit comfortably to perform the work. However, there may be some walking; standing; bending; carrying of light items such as papers, books, small parts; driving an automobile, etc. No special physical demands are required to perform the work.

STATE OF UTAH

Job Analysis Questionnaire

Job 11115 - OFFICE TECHNICIAN III

DHRM Representative Judith Price
Agency Representative
Agency 000 - Cross Agency
Agency Approval Cass Opheikens **Date** 2/27/2001
Level 1 Approval Cass Opheikens **Date** 2/27/2001
Level 2 Approval Judy Price **Date** 7/17/2001

Status 2nd Level Approved
Requested Effective Date 3/31/2001
Effective Date 7/7/2001
End Date

Benchmarked To
ID 11001
Title SECRETARY

Pay Range
Type 1 - On Step **Steps** 24 - 41
FLSA Exempt No **Pay Rate** $8.70 - $13.79

Supervisory Level [None]
Working Level Senior
EEO Designation 6 - Administrative Support
Probation Period 6 months

Working Conditions Everyday Risks
Physical Requirements Sedentary
Safety Sensitive [None]

Purpose And Distinguishing Characteristics

Incumbents in this job exercise independent judgment in office specialities and perform the most complex production tasks requiring advanced general office skills plus a comprehensive knowledge of pertinent rules, regulations, policies, and procedures. Incumbent will either perform functional supervisory/lead worker responsibilities or serve as the focal point for advanced agency-specific assignment(s). Incumbent may lead or supervise a small clerical unit by prioritizing work flow, authorizing selected clerical, procedures, ensuring quality control, and providing subordinates with on-the-job training. Incumbent process a variety of agency documents by reviewing for accuracy and completeness, updating information, evaluating against policy, comparing elements for consistency or logical relationship, and otherwise taking action where such procedures my require independen judgment in applying agency regulations, policies and procedures. Originates correspondence, documentation, and other written communication; assists the public and others to complete forms and applications; locates and assembles records and information which may be complex or difficult to identify, and which may require substantial research, judgment, and subject matter knowledge. Prepares and generates recurring reports involving automated processes and thorough subject matter understanding.

Comments / Justification

This administrative action creates a new version of the job in connection with the implementation of the new integrated Utah Job Match System.

Senior level is assigned because incumbent is an expert in the field with substantial work experience performing the essential functions of the Job.

STATE OF UTAH

Job Analysis Questionnaire

Job 11115 - OFFICE TECHNICIAN III

Task Number	Task	Knowledge, Skill, or Ability
1	Prepare and/or process documents; review for accuracy and completeness; update information and/or evaluate against policy; compare elements for consistency or logical relationships, etc.	S/A: assemble, sort, and/or distribute documents, supplies, and/or materials/items
		S/A: compile, code, categorize, calculate, tabulate, audit, verify, or process information or data
		S/A: review and/or edit documents for accuracy and completeness
		S/A: communicate information and ideas clearly, and concisely, in writing; read and understand information presented in writing
		S/A: use automated software applications
		K: grammar, spelling and punctuation
2	Edits written material for accuracy, format, and arrangement of material.	S/A: review and/or edit documents for accuracy and completeness
		S/A: grammar, spelling and punctuation
3	Writes or drafts correspondence, reports, documents and/or other written materials.	S/A: communicate information and ideas clearly, and concisely, in writing; read and understand information presented in writing
		S/A: use automated software applications
		K: grammar, spelling and punctuation

STATE OF UTAH

Job Analysis Questionnaire

Job 11115 - OFFICE TECHNICIAN III

Task Number	Task	Knowledge, Skill, or Ability
4	Types and prepares reports or other written materials from source documents, transcription, etc.	S/A: assemble, sort, and/or distribute documents, supplies, and/or materials/items
		S/A: organize information in a clear and concise manner
		S/A: use automated software applications
		K: research methods, techniques, and/or sources of information
5	Retrieves data found in databases to generate requested reports.	S/A: organize information in a clear and concise manner
		S/A: use automated software applications
6	Assists the public and others to locate, view, or assemble filmed, scanned, or archived documents and/or information.	S/A: find, gather and collect information or data
		S/A: deal with people in a manner which shows sensitivity, tact, and professionalism
		S/A: speak clearly, concisely and effectively; listen to, and understand, information and ideas as presented verbally
		S/A: assemble, sort, and/or distribute documents, supplies, and/or materials/items
7	Records and/or transcribes minutes of meetings, hearings, dictation, dialogue, etc., and produces document in draft or final format.	S/A: enter, transcribe, record, store, or maintain information in either written or electronic form.
		S/A: assemble, sort, and/or distnbute documents, supplies, and/or materials/items
8	Acts as a resource to provide information or determine the most effective way of meeting the needs of management, staff, clients or customers.	S/A: find, gather and collect information or data

STATE OF UTAH

Job Analysis Questionnaire

Task Number	Task	Knowledge, Skill, or Ability
8	Acts as a resource to provide information or determine the most effective way of meeting the needs of management, staff, clients or customers.	S/A: deal with people in a manner which shows sensitivity, tact, and professionalism S/A: speak clearly, concisely and effectively; listen to, and understand, information and ideas as presented verbally

Other Requirements and Characteristics

Risks found in the typical office setting, which is adequately lighted, heated and ventilated, e.g., safe use of office equipment, avoiding trips and falls, observing fire regulations, etc.

Typically, the employee may sit comfortably to perform the work. However, there may be some walking; standing; bending; carrying of light items such as papers, books, small parts; driving an automobile, etc. No special physical demands are required to perform the work.

Comments

UTAH DIVISION OF RADIATION CONTROL
TRAINING POLICY STATEMENT

We will ensure that staff will be qualified to do regulatory and inspection functions for all types of facilities regulated by the Utah Radiation Control Board. We also recognize the need for continued staff development through cross-work training and training required by staff to maintain current qualifications.

An individual will not be a lead inspector at a regulated facility unless the individual has shown competency in the program training areas applicable to that type of facility. An individual will not be a senior license reviewer for a license unless the individual has shown competency in the program training areas applicable to that type of license.

The program training areas and essential elements to be covered in each program training area are stated on the Utah Radiation Control Training Qualification Form. When an individual has shown competency in a particular training area to management, the training qualification form for that individual will be completed by a member of management.

In-house training under the supervision of a mentor or personal study and exam proctoring may be used in lieu of more formal training when such training is impractical or unfeasible. When in-house training is provided to an individual, documentation demonstrating the successful completion of the training and management approval of the training will be maintained.

Refresher training will be provided, as needed. This additional training recognizes that staff training does not stop with initial qualification, but that training should be made available for experienced staff on the basis of need, special circumstances, and the necessity of keeping current with inspection and regulatory programs.

William J. Sinclair, Division Director

Date

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Name: _____ Date of Hire:

Training Areas	Date Completed	Management Initials/Signature	Comments
BASIC TRAINING			
College/University Degree			
Program Orientation			
Review of the UDRC Rules			
Review of the Location of the Regulatory Guides and Reference Materials			
Essentials of Inspection			
Essentials of Licensing			
SPECIALIZED TRAINING			
Elements of Health Physics (5 wk)			
Elements of Nuclear Medicine			
Elements of Medical Therapy			
Elements of Industrial Radiography			
Elements of Transportation			
Elements of Well Logging			
Elements of Pool Irradiators			
Elements of Environmental Monitoring			
Radiological Emergency Response Operations (RERO)			
ADVANCED TRAINING			
Advanced Health Physics			
Elements of Investigations			
OTHER TRAINING			

UTAH RADIATION CONTROL TRAINING QUALIFICATION FORM

Training Areas	Date Completed	Management Initials/Signature	Comments
OTHER TRAINING (cont'd)			

Issue Date: 01/05/01

Section XII: Uranium Recovery Inspector NRC Inspector Qualification Journal

Applicability

This NRC Inspector Qualification Journal implements NRC Manual Chapter 1246, Appendix A, Section XII, by establishing the minimum training requirements for personnel assigned to perform safety inspection activities at uranium recovery facilities. The Qualification Journal must provide traceable documentation to show that minimum requirements are met for each inspector.

The NRC Inspector Qualification Journal consists of a series of qualification guides and signature cards. Each signature card is used to document task completion, as indicated by the appropriate signature blocks. Each signature card has a corresponding qualification guide which establishes the minimum knowledge levels or areas of study that must be completed for each signature card.

Most of the qualification guides are divided into sections. The review sections of the qualification guides identify references with general application to the inspector's qualification. The inspector is expected to have a general familiarity with these references. Other sections of the qualification guides identify specific references that have direct application to an inspection discipline. The inspector is expected to demonstrate detailed knowledge of the inspection discipline specific references.

In order to support the review of upper tier documents, programs, and policies, the inspector's First Line Supervisor will assign one or more uranium recovery facilities as reference facilities. The selection of a reference facility is intended to provide the inspector's management with the ability to tailor the qualification process to the experience and training level of the inspector, and to meet the inspection needs of the NRC. The use of specific real world material will reinforce the qualification process.

INSPECTOR QUALIFICATION JOURNAL
Uranium Recovery Inspector

_____	_____	_____	_____
Name	Title	Branch	Section

To complete your qualification as a Uranium Recovery Inspector you are to complete the following signature cards. All signoffs shall include the signature of the responsible reviewer and the date. Maintain these cards in a notebook along with any background or written material required by the program. This notebook will comprise your NRC Inspector Qualification Journal.

	Signature When Complete	Date
1. NRC Orientation	_____ First Line Supervisor	_____
2. Code of Federal Regulations	_____ First Line Supervisor	_____
3. Office Instructions	_____ First Line Supervisor	_____

4. Regulatory Guidance	First Line Supervisor	
5. NRC Inspection Manual Chapters (MC)	First Line Supervisor	
6. Industry Codes and Standards	First Line Supervisor	
7. Inspection Accompaniments	First Line Supervisor	
8. NRC Management Directives	First Line Supervisor	
9. Review of Significant Events at Uranium Recovery Facilities and/ or Facilities for Disposal of Non-Atomic Energy Act of 1954, Section 11e.(2) Byproduct Material	First Line Supervisor	
10. Formal Training	First Line Supervisor	
Qualification Board Requirement Met	Second Level Supervisor or Board Chairman	
Recommended as a qualified inspector	Second Level Supervisor	
Certification Memo Issued	Second Level Supervisor	

Qualification Card 1
NRC Orientation

	Initials	Date
A. Site Orientation		
1. New employee processing package completed	Employee	
2. Facility tour and ntroduction	First Line Supervisor	
B. NRC Organization		

1. Review of NRC headquarters and NMSS organization _____ _____
Employee

2. Discussion of NRC organization _____ _____
First Line Supervisor

Qualification Card 2
Code of Federal Regulations (CFR)

	Initials	Date
A. Familiarization with selected CFR parts completed	_____ Employee	_____
B. Discussion completed on CFR parts related to Uranium Recovery program	_____ First Line Supervisor	_____

Qualification Card 3
Office Instructions

	Initials	Date
A. Familiarization with office policies and procedures	_____ Employee	_____
B. Discussion completed on office policies and procedures	_____ First Line Supervisor	_____

Qualification Card 4
Regulatory Guidance

	Initials	Date
A. Review of regulatory guidance		
1. Regulatory Guides	_____ Employee	_____

2. Information Notices /Bulletins	Employee	
3. NUREGs	Employee	
4. Generic Letters	Employee	
5. Federal Register Notices	Employee	
6. Policy and Guidance Directives	Employee	
7. NRC Branch Technical Positions	Employee	
8. SECY Papers	Employee	
B. Discussion of regulatory guidance with application to the Uranium Recovery program	First Line Supervisor	

Qualification Card 5
NRC Inspection Manual Chapters (MC)

	Initials	Date
A. Review of appropriate NRC MCs completed	Employee	
B. Discussion of NRC MCs and its relation to the Uranium Recovery inspection program	First Line Supervisor	

Qualification Card 6
Industry Codes and Standards

	Initials	Date
A. Review of selected codes and standards completed	Employee	
B. Discussion of the		

application of codes First Line Supervisor

and standards
related to the
Uranium Recovery
program

Qualification Card 7
Inspection Accompaniments

	Initials	Date
A. Inspections completed		
1. _____ Facility	_____ Employee	_____
2. _____ Facility	_____ Employee	_____
3. _____ Facility	_____ Employee	_____
4. _____ Facility	_____ Employee	_____
B. Discussion of inspection and employees's role		
1. _____ Facility	_____ First Line Supervisor	_____
2. _____ Facility	_____ First Line Supervisor	_____
3. _____ Facility	_____ First Line Supervisor	_____
4. _____ Facility	_____ First Line Supervisor	_____

Qualification Card 8
NRC Management Directives

	Initials	Date
A. Review of selected portions of the NRC Management Directives completed	_____ Employee	_____

B. Discussion of the application of the NRC Management Directives to the Uranium Recovery inspection program	First Line Supervisor	

Qualification Card 9
Review of Significant Uranium Recovery Events

	Initials	Date
A. Review of selected significant historical events	Employee	
B. Discussion of the importance of these events and lessons learned	First Line Supervisor	

Qualification Card 10
Formal Training

A. CORE TRAINING:	Initials	Date
1. Fundamentals of Inspection Course (G-101)	Training Coordinator	
2. Root Cause/Incident Investigation Workshop (G-205)	Training Coordinator	
3. Inspecting for Performance Course - Materials Version (G-304)	Training Coordinator	
4. Effective Communications for NRC Inspectors	Training Coordinator	
5. OSHA Indoctrination Course (G-111)	Training Coordinator	
6. NMSS Radiation Worker Training	Training Coordinator	

(H-102)

7. General Health Physics Practices for Uranium Recovery Course (F-104) or General Health Physics Practices for Fuel Cycle Facilities Directed Self-Study Course (F-102S)	Training Coordinator	
8. NRC Inspection Team Leader Workshop	Training Coordinator	

B. SPECIALIZED TRAINING

Other specialized training courses required for license reviewers performing licensing activities in specific areas:

Course Title	Course #	Initials	Initials	Date
		Supervisor	Training Coordinator	
		Supervisor	Training Coordinator	
		Supervisor	Training Coordinator	
		Supervisor	Training Coordinator	

Qualification Guide 1
NRC Orientation

A. Site Orientation

1. The qualifying individual should read and complete, as appropriate, the following forms for processing into the NRC:

a. Personnel information

b. Health insurance elections

c. Retirement plan elections

d. Savings elections (e.g. U.S. Savings Bonds, TSP, etc.)

e. Fitness for Duty requirements and physical examination

f. Any other forms which may be required by NRC Office of Human Resources

g. Forms for issuance of tagged, controlled NRC equipment

h. Payroll forms and time cards

i. Regulatory Information Tracking System (RITS)

2. The First Line Supervisor should orient the qualifying individual to the facility as follows:

a. Tour the facility and introduce the qualifying individual to the staff

b. Indicate to the qualifying individual the location of controlled documents, reference material, supplies, office equipment, classrooms, etc.

B. NRC Organization

1. The qualifying individual should review and become familiar with:

a. Organizational charts of division, NMSS, regions and headquarters and overall NRC organization (NUREG 0325)

b. Role of Headquarters in policy and interpretation of regulations

c. Role of NRC General Counsel

d. Role of NRC Inspector General

e. Role of NRC Public Affairs

f. Role of NRC Office of Investigations

g. Role of NRC Office of Enforcement

h. Physical location of NRC offices and regions

i. Role of NRC as a regulatory agency

(1) 10 CFR Part 1 (Organization)

(2) Atomic Energy Act of 1954, as amended

(3) Energy Reorganization Act of 1974, as amended

(4) NRC Enforcement Policy (NUREG 1600)

(5) Incident Response Plan (NUREGs 0728 and 0845)

(6) Energy Policy Act of 1992

2. The First Line Supervisor should discuss NRC organization and role with the qualifying individual to ensure the qualifying individual has a full understanding of NRC's organization and mission and the role of the license reviewer in that mission.

Qualification Guide 2
Code of Federal Regulations (CFR)

A. A selection of currently applicable CFR Parts should be made by the First Line Supervisor. The selection should include the references listed below and be documented. The qualifying individual should be expected to have a general knowledge of the topics addressed in the references. This review may be accomplished by self-study, study-quizzes, briefings, or discussions.

1. 10 CFR Part 1 Statement of organization and general information

2. 10 CFR Part 2 Rules of practice for domestic licensing proceedings and issuance of orders

3. 10 CFR Part 9 Public Records

4. 10 CFR Part 19 Notices, instructions and reports to workers; inspections

5. 10 CFR Part 20 Standards for protection against radiation (includes selected Questions and Answers, Q & As)

6. 10 CFR Part 21 Reporting of defects and noncompliance

11. 30 CFR Part 828 Special Permanent Program Performance Standards - In-Situ Processing

12. 40 CFR Part 141 National Primary Drinking Water Regulations

13. 40 CFR Part 192 Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings

B. Following completion of the qualifying individual's self study of the listed CFR Parts, a discussion will be held with the qualifying inspector by the First Line Supervisor to test the qualifying individual's knowledge of these Parts. To the extent possible, recent application of various sections, new regulatory initiatives, and current industry issues should be emphasized.Qualification Guide 3
Office Instructions

A. NMSS Office Policies and Procedures

1. Read the NMSS Policy and Procedures Letters (PPLs)

1-8 Differing Professional Views and Opinions

1-11 Communications with Licensees

1-19 Notification of Regional Administrators

1-22 Quality Assurance

1-23 Open Meetings

1-24 Office of Investigation and the release of information on investigations/inspections

1-27 Management of Allegations

1-40 Legislative and Regulatory Review Requirements for the Office of the Inspector General

1-42 Radiation Protection Procedures for NMSS Employees

2. The qualifying individual should review the NMSS policies and practices on:

a. Travel, including Management Directive 14.1 Official Temporary Duty Travel

b. Telephone use

c. Policies on use of annual leave and sick leave and excused leave, including Bulletin 4135, Leave Administration

d. Work schedule, including NRC Appendix 4136, Hours of work and Premium Pay

3. Use of government equipment, including computers (NUDOCS and ADAMS) and Management Directive 13.1, Property Management

f. Union activities, including Management Directive 10.102, Labor- Management Relations Program for Federal Employees

g. Communications outside NRC

h. Policies on outside employment and acceptance of gifts

i. Participation in political activities

j. Routing of mail and procedures for sending mail and materials (via U.S. Mail, Federal Express, etc.), including Management Directive 3.23, Mail Management

k. Ordering of documents (e.g NUREGs)

l. NMSS emergency and evacuation procedures

m. Employee appraisal system and Individual Development Plan (IDP)

(1) Employee trial period (Management Directive 10.14 Employment and Staffing)

(2) Employee appraisals (Management Directive 10.67 (Non-SES Performance Appraisal System)

n. Differing Professional Views or Opinions (Management Directive 10.159, General Personnel Management Provisions)

o. NMSS Delegation of Authority (September 18, 1995)

B. The First Line Supervisor should discuss these policies and practices with the qualifying individual to ensure that the qualifying individual has a full and complete understanding.

Qualification Guide 4
Regulatory Guidance

A. A selection of currently applicable regulatory guidance should be identified by the First Line Supervisor. These references should include those listed below and should be documented. The qualifying individual should be expected to have a general knowledge of the topics addressed in the references. The review may be accomplished by self-study, study-quizzes, briefings, or discussions. Note that many Regulatory Guides reference or endorse industry codes and standards listed in Qualification Guide 6. Study of corresponding and subtier codes and standards is recommended.

1. Regulatory Guides (use latest revision)

3.11 Design, Construction, and Inspection of Embankment Retention Systems for Uranium Mills

3.56 General Guidance for Designing, Testing, Operating and Maintaining Emission Control Devices at Uranium Mills

3.59 Methods for Estimating Radioactive and Toxic Airborne Source Terms for Uranium Milling Operations

3.63 Onsite Meteorological Measurement Program for Uranium Recovery Facilities-Data Acquisition and Reporting

3.64 Calculation of Radon Flux Attenuation by Earthen Uranium Mill Tailings Covers

4.14 Radiological Effluent and Environmental Monitoring at Uranium Mills

4.15 Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment

8.2 Guide for Administrative Practices in Radiation Monitoring

8.7 Instructions for Recording and Reporting Occupational Radiation Exposure Data

8.9 Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program

8.10 Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable

8.11 Applications of Bioassay for Uranium

8.13 Instruction Concerning Prenatal Radiation Exposure

8.15 Acceptable Programs for Respiratory Protection

8.22 Bioassay at Uranium Mills

8.25 Air Sampling in the Workplace

8.29 Instruction Concerning Risks from Occupational Radiation Exposure

8.30 Health Physics Surveys in Uranium Mills

8.31 Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills Will Be As Low As Reasonably Achievable

8.34 Monitoring Criteria and Methods to Calculate Occupational Radiation Doses

8.36 Radiation Dose to the Embryo/fetus

8.37 ALARA Levels for Effluents from Material Facilities

10.1 Compilation of Reporting Requirements for Persons Subject to NRC Regulations

ES 114-4 Guidelines for Groundwater Monitoring at In-Situ Uranium Solution Mines

Others as selected by the First Line Supervisor

2. Information Notices (IN) and Bulletins (BL)

IN 93-60 Reporting Fuel Cycle and Materials Events to the NRC Operations Center, Supplement 1

IN 94-023 Guidance to Hazardous, Radioactive and Mixed Waste Generators on Elements of Waste Minimization

IN 95-055 Handling Uncontaminated Yellowcakes Outside of Facility Processing Circuit

IN 96-047 Record Keeping, Decommissioning Notifications for Disposals of Radwaste by Land Burial

IN 97-050 Contaminated Lead Products

IN 97-055 Calculation of Surface Activity for Contaminated Equipment & Materials

IN 97-057 Leak Testing of Packaging used in Transport of Radioactive Material

IN 97-058 Mechanical Integrity of In-Situ Leach Injection Wells & Piping

Others as selected by the First Line Supervisor

3. NUREGs (latest revision, where applicable)

NUREG 0325 NRC Functional Organization Chart

NUREG 1569 Draft Standard Review Plan (SRP) for In Situ Leach Uranium Extraction License Applications

NUREG-1600 General Statement of Policy and Procedures for NRC Enforcement Actions

NUREG 1621 Final SRP for the Review of Remedial Action of Inactive Mill Tailings Sites under Title I of the UMTRCA

NUREG/CR-4884 Interpretation of Bioassay Measurements

NUREG/CR-5849 Manual for Conducting Radiological Surveys in Support of License Termination

NUREG/CR-6232 Assessing the Environmental Availability of Uranium in Soils and Sediments

Others as selected by the First Line Supervisor

4. Generic Letters (GL)

97-03 Annual Financial Surety Update Requirements for Uranium Recovery Licensees

Others as selected by the First Line Supervisor.

5. Federal Register Notices

60 FR 49296 Final Revised Guidance on Disposal of Non-Atomic Energy Act of 1954, Section 11e.(2) Byproduct Material in Tailings Impoundments (September 22, 1995)

Others as selected by the First Line Supervisor.

6. Policy and Guidance Directives (PGD)

PGD 8-01 Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Byproduct, Source, and Special Nuclear Material Licensees, November 1983

UR 90-03 Memorandum of Understanding Between the U.S. Department of Energy and the NRC, November 1990

UR 91-01 Costs for Fencing Reclaimed Title II Sites, Letter from R.L. Bangart to A.B. Beach, February 1991

UR 91-02 Standard Format for Completion Review Report (CRR), LLUR, June 1991

UR 91-03 Position on Disposal Of In-Situ Wastes, LLWM, September 1991

UR 93-02 Standard Review Plan for the Review of Remedial Action of Inactive Mill Tailings Sites Under Title I of the Uranium Mill Tailings Radiation Control Act, Rev. 1, June 1993

Others as selected by the First Line Supervisor

7. Branch Technical Position

Alternate Concentration Limits for Title II Uranium Mills (January 1996)

Design of Erosion Protection Covers for Stabilization of Uranium Mill Tailings Sites (August 1990)

Effluent Disposal at Licensed Uranium Recovery Facilities (April 1995)

Others As selected by the First Line Supervisor.

8. SECY Papers

97-110 Status Report on Implementation of Dam Safety Program (May 29, 1997)

95-155 Review of Previously Approved Reclamation Plans (June 14, 1995)

90-316 Decommissioning Records Plan, Records Management Guidelines (RMG)

Others as selected by the First Line Supervisor.

Qualification Guide 5
NRC Inspection Manual Chapters (MC)

A. A selection of currently applicable NRC MC and Inspection Procedure (IP) references with direct application to the Uranium Recovery inspection should be identified by the First Line Supervisor. The application of the specific references to the inspection program should be studied in detail by the qualifying individual.

1. REPORTS/COMMUNICATIONS/FOLLOW-UP

MC 0230 Morning Report
MC 0610 Inspection Reports
MC 0620 Inspection Documents and Records
MC 0720 NRC Bulletins and Information Notices
MC 0801 Inspector Feedback
MC 1120 Preliminary Notifications

IP 92701 Follow-up
IP 92703 Follow-up of Confirmatory Action Letters

2. INSPECTIONS

MC 0300 Announced and Unannounced Inspections
MC 1246 Formal Qualification Programs in Nuclear Material Safety and Safeguards Program Area

MC 2620 On-Site Construction Reviews of Remedial Actions at Inactive Uranium Mill Tailings Sites (Title I UMTRCA)
MC 2641 In-Situ Leach Facilities Inspection Program
MC 2801 Uranium Mill and 11e.(2) Byproduct Material Disposal Site and Facility Inspection Program

IP 37001 10 CFR 50.59 Safety Evaluation Program
IP 87654 Uranium Mill Site Decommissioning Inspection
IP 88001 On-site Construction
IP 89001 In-Situ Leach (ISL) Facilities

3. INTERACTIONS WITH OTHER FEDERAL AGENCIES

MC 1007 Interfacing Activities between Regional Offices of NRC and OSHA

IP 87102 Maintaining Effluents from Materials Facilities As Low As Is Reasonably Achievable (ALARA) [EPA][1]

4. RADIATION PROTECTION

MC 8300 Radiation Protection

IP 83726 Control of Radioactive Materials and Contamination, Surveys, and Monitoring
IP 83728 Maintaining Occupational Exposures ALARA
IP 83750 Occupational Radiation Exposure
IP 83822 Radiation Protection

5. TRANSPORTATION

MC 1330 Response to Transportation Accidents Involving Radioactive Materials

IP 86721 Transportation (Basic)
IP 86740 Inspection of Transportation Activities
IP 86750 Solid Radioactive Waste Management and Transportation of Radioactive Materials

6. OTHER

MC 1010 Independent Assessment and Analysis
MC 1100 Notification of Significant Meetings
MC 1201 Conduct of Employees
MC 2900 Performance Appraisal Program

B. The First Line Supervisor will hold discussions, interviews, or oral quizzes to test the qualifying individual's knowledge and understanding of the application of the selected references to the Uranium Recovery program.

Qualification Guide 6
Industry Codes and Standards

A. A selection of currently applicable industry codes and standards should be identified by the First Line Supervisor. The qualifying individual should be expected to have a general knowledge of the topics

addressed in the references. This review may be accomplished by self study, study quizzes, briefings, or discussions. Standards selected should be documented by the First Line Supervisor

B. The First Line Supervisor should test the qualifying individual's knowledge of application of these codes and standards to the Uranium Recovery program by discussions, interviews, or oral quizzes.

Qualification Guide 7
Inspection Accompaniments

A. Each inspector should accompany certified inspectors on at least four inspections. At least two of these inspections should be performed at a facility other than the designated lead facility.

B. The following is a guide for material that should be studied and discussed with the inspector in charge during these inspection accompaniments. The First Line Supervisor will discuss these items, as appropriate, following each inspection accompaniment.

1. The Inspection Program

MC 2620 On-Site Construction Reviews of Remedial Actions at Inactive Uranium Mill Tailings Sites (Title I UMTRCA)

MC 2641 In-Situ Leach Facilities Inspection Program

MC 2801 Uranium Mill and 11e.(2) Byproduct Material Disposal Site and Facility Inspection Program

2. Scheduling and Preparation for Inspections

MC 0300 Announced and Unannounced Inspections

3. Scope of Inspection

4. Entrance/Exit Interviews

5. Conduct of Inspection, Accumulation of Data

6. Post-inspection Activities of Inspectors

MC 0610 Inspection Reports

MC 0620 Inspection Documents and Records

MC 1100 Notification of Significant Meetings

7. Morning Reports

MC 0230 Morning Report

8. Non-routine Licensee Events

MC 1110 Potential Abnormal Occurrences

IP 90714 Nonroutine Reporting Program

Management Directive 8.3 NRC Incident Investigation Program

Management Directive 8.9 Accident Investigation

9. Preliminary Notification

MC 1120 Preliminary Notifications

10. Bulletins/Information Notices

MC 0720 NRC Bulletins and Information Notices

MC 0730 Generic Communications Regarding Materials and Fuel Cycle Issues

11. Use of Consultants of NRC

MC 1360 Use of Physician and Scientific Consultants in the Medical Consultant Program

Management Directive 10.6 Use of Consultants & Experts

12. Allegations and Investigations

Management Directive 8.8 Management of Allegations

13. Communication outside NRC

MC 1007 Interfacing Activities Between Regional Offices of NRC and OSHA

Management Directive 5.5 Public Affairs Program

Management Directive 3.6 Distribution of Unclassified NRC Staff/Contractor-Generated Reports

Qualification Guide 8
NRC Management Directives

A. A selection of currently applicable NRC Management Directive (MD) references should be identified by the First Line Supervisor. These references should include those listed below and be documented. The qualifying inspector should be expected to have a general knowledge of the topics addressed in the references. This review may be accomplished by self-study, study-quizzes, briefings, or discussions. The selection should include:

1. NRC MD 9.1 Organization Management

2. NRC MD 9.29 Organization and Function of Regional Offices

3. NRC MD 3.2 Privacy Act

4. NRC MD 3.1 Freedom of Information Act

5. NRC MD 10.130 Safety and Health Program Under the Occupational Safety and Health Act

6. NRC MD 10.131 Protection of NRC Employees Against Ionizing Radiation

7. NRC MD 14.1 Official Temporary Duty Travel

8. NRC MD 10.159 Differing Professional Views or Opinions

9. NRC MD 10.42 Hours of Work and Premium Pay

10. NRC MD 10.43 Time and Attendance Reporting

11. NRC MD 10.67 Non-SES Performance Appraisal System

12. NRC MD 10.101 Employee Grievances

13. NRC MD 8.3 NRC Incident Investigation Program

14. NRC MD 8.8 Management of Allegations

15. NRC MD 4.6 License Fee Management Program

16. NRC MD 5.1 Intergovernmental Consultation

17. NRC MD 5.2 Memorandum of Understanding With States

18. NRC MD 5.5 Public Affairs Program

19. NRC MD 8.11 Review Process for 10 CFR 2.206 Petitions

20. NRC MD 10.5 Oath of Office

21. NRC MD 10.160 Open Door Policy

B. Application of the selected NRC Management Directives to the Uranium Recovery program will be discussed with the qualifying individual by the First Line Supervisor to test the qualifying individual's knowledge.

Qualification Guide 9
Review of Significant Uranium Recovery Events

A. A selection of significant historical related events should be identified by the First Line Supervisor. These events should be documented and studied in detail by the qualifying individual.

B. The First Line Supervisor should discuss the selected events in detail with the qualifying individual and go over recommendations made, lessons learned, and changes identified to prevent recurrence. The relevance of the event to the Uranium Recovery program should be stressed.

Qualification Guide 10
Formal Training

The standards for each Training Course are provided in the NRC Technical Training Division Course Catalog and will not be duplicated in the Qualification Guide.

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1. Required for non-sealed source licensees

Issue Date: 01/05/01

Section XIII: Training Requirements For Uranium Recovery Project Manager/technical Reviewer

A. Applicability

The training described below is required for all uranium recovery project manager/technical reviewers assigned to perform project management and technical reviews of licensing actions on Source Material Licenses.

B. Training

1. Required Initial Training

a. Self Study and On-the-Job Training

(1) NRC Orientation

(2) Code of Federal Regulations

(3) Office Instructions

(4) Regulatory Guidance

(5) NRC Management Directives

(6) Directed Review of Selected Licensing Casework

(7) Formal Training (and Other Specialized Training and/or Courses)

b. Core Training. These courses establish minimum formal classroom training requirements. Refer to Section 1246-11 for exceptions to these requirements.

(1) Licensing Practices and Procedures (G-109)

(2) NMSS Radiation Worker Training (H-102)

(3) General Health Physics Practices for Uranium Recovery (F-104) or General Health Physics Practices for Fuel Cycle Facilities Directed Self-Study Course (F-102S)

(4) Environmental Impact Assessment (Form 368)

c. Specialized Training. Depending on the employee's previous work experience and planned activities, additional courses may be required in order to gain knowledge necessary for specialized licensing activities. Management will make this determination on an individual basis.

2. Supplemental Training. Additional training beyond that identified as Core Training. This training will be determined by the individual's supervisor and will depend on the individual's previous work experience and planned licensing activities in specific areas.

3. Refresher Training. Refresher training will be conducted every three years following initial certification. Refresher training will be determined by management on a case-by-case basis.

END

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Rule R313-12. General Provisions.

As in effect on September 1, 2002

Table of Contents

R313-12-1. Authority.

The rules set forth herein are adopted pursuant to the provisions of Subsections 19-3-104(3) and 19-3- 104(6) and Section 63-38-3.

R313-12-2. Purpose and Scope.

It is the purpose of these rules to state such requirements as shall be applied in the use of radiation, radiation machines, and radioactive materials to ensure the maximum protection of the public health and safety to all persons at, or in the vicinity of, the place of use, storage, or disposal. These rules are intended to be consistent with the proper use of radiation machines and radioactive materials. Except as otherwise specifically provided, these rules apply to all persons who receive, possess, use, transfer, own or acquire any source of radiation, provided, however, that nothing in these rules shall apply to any person to the extent such person is subject to regulation by the U.S. Nuclear Regulatory Commission. See also Section R313-12-55.

R313-12-3. Definitions.

As used in these rules, these terms shall have the definitions set forth below. Additional definitions used only in a certain rule will be found in that rule.

"A_1" means the maximum activity of special form radioactive material permitted in a Type A package.

"A_2" means the maximum activity of radioactive material, other than special form radioactive material, low specific activity, and surface contaminated object material permitted in a Type A package. These values are either listed in 10 CFR 71, Appendix A, which is incorporated by reference in Section R313-19-100 or may be derived in accordance with the procedures prescribed in 10 CFR 71, Appendix A, which is incorporated by reference in Section R313-19- 100.

"Absorbed dose" means the energy imparted by ionizing radiation per unit mass of irradiated material. The units of absorbed dose are the gray (Gy) and the rad.

"Accelerator produced material" means a material made radioactive by a particle accelerator.

"Act" means Utah Radiation Control Act, Title 19, Chapter 3.

"Activity" means the rate of disintegration or transformation or decay of radioactive material. The units of activity are the becquerel (Bq) and the curie (Ci).

"Adult" means an individual 18 or more years of age.

"Address of use" means the building that is identified on the license and where radioactive material may be received, used or stored.

"Agreement State" means a state with which the United States Nuclear Regulatory Commission has entered into an effective agreement under Section 274 b. of the Atomic Energy Act of 1954, as amended (73 Stat. 689).

"Airborne radioactive material" means a radioactive material dispersed in the air in the form of dusts, fumes, particulates, mists, vapors, or gases.

"Airborne radioactivity area" means: a room, enclosure, or area in which airborne radioactive material exists in concentrations:

(a) In excess of the derived air concentrations (DACs), specified in Rule R313-15, or

(b) To such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the annual limit on intake (ALI), or 12 DAC hours.

"As low as reasonably achievable" (ALARA) means making every reasonable effort to maintain exposures to radiation as far below the dose limits as is practical, consistent with the purpose for which the licensed or registered activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed or registered sources of radiation in the public interest.

"Area of use" means a portion of an address of use that has been set aside for the purpose of

receiving, using, or storing radioactive material.

"Background radiation" means radiation from cosmic sources; naturally occurring radioactive materials, including radon, except as a decay product of source or special nuclear material, and including global fallout as it exists in the environment from the testing of nuclear explosive devices or from past nuclear accidents such as Chernobyl that contribute to background radiation and are not under the control of the licensee. "Background radiation" does not include sources of radiation from radioactive materials regulated by the Department under the Radiation Control Act or Rules.

"Becquerel" (Bq) means the SI unit of activity. One becquerel is equal to one disintegration or transformation per second.

"Bioassay" means the determination of kinds, quantities or concentrations, and in some cases, the locations of radioactive material in the human body, whether by direct measurement, in vivo counting, or by analysis and evaluation of materials excreted or removed from the human body. For purposes of these rules, "radiobioassay" is an equivalent term.

"Board" means the Radiation Control Board created under Section 19-1-106.

"Byproduct material" means:

(a) a radioactive material, with the exception of special nuclear material, yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material; and

(b) the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content, including discrete surface wastes resulting from uranium or thorium solution extraction processes. Underground ore bodies depleted by these solution extraction operations do not constitute "byproduct material" within this definition.

"Calendar quarter" means not less than 12 consecutive weeks nor more than 14 consecutive weeks. The first calendar quarter of the year shall begin in January, and subsequent calendar quarters shall be arranged so that no day is included in more than one calendar quarter and no day in any one year is omitted from inclusion within a calendar quarter. The method observed by the licensee or registrant for determining calendar quarters shall only be changed at the beginning of a year.

"Calibration" means the determination of:

(a) the response or reading of an instrument relative to a series of known radiation values over the range of the instrument; or

(b) the strength of a source of radiation relative to a standard.

"CFR" means Code of Federal Regulations.

"Chelating agent" means a chemical ligand that can form coordination compounds in which the ligand occupies more than one coordination position. The agents include beta diketones, certain proteins, amine polycarboxylic acids, hydroxycarboxylic acids, gluconic acid, and polycarboxylic acids.

"Collective dose" means the sum of the individual doses received in a given period of time by a specified population from exposure to a specified source of radiation.

"Committed dose equivalent" ($H_{T,50}$), means the dose equivalent to organs or tissues of reference (T), that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.

"Committed effective dose equivalent" ($H_{E,50}$), is the sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to each of these organs or tissues.

"Controlled area" means an area, outside of a restricted area but inside the site boundary, access to which can be limited by the licensee or registrant for any reason.

"Critical group" means the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances.

"Curie" means a unit of measurement of activity. One curie (Ci) is that quantity of radioactive material which decays at the rate of 3.7×10^{10} disintegrations or transformations per second (dps or tps).

"Decommission" means to remove a facility or site safely from service and reduce residual radioactivity to a level that permits:

(a) release of property for unrestricted use and termination of the license; or

(b) release of the property under restricted conditions and termination of the license.

"Deep dose equivalent" (H_d), which applies to external whole body exposure, means the dose equivalent at a tissue depth of one centimeter (1000 mg/cm^2).

"Department" means the Utah State Department of Environmental Quality.

"Depleted uranium" means the source material uranium in which the isotope uranium-235 is less than 0.711 weight percent of the total uranium present. Depleted uranium does not include special nuclear material.

"Distinguishable from background" means that the detectable concentration of a radionuclide is statistically different from the background concentration of that radionuclide in the vicinity of the site or, in the case of structures, in similar materials using adequate measurement technology, survey, and statistical techniques.

"Dose" is a generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent. For purposes of these rules, "radiation dose" is an equivalent term.

"Dose equivalent" (H_T), means the product of the absorbed dose in tissue, quality factor, and other necessary modifying factors at the location of interest. The units of dose equivalent are the sievert (Sv) and rem.

"Dose limits" means the permissible upper bounds of radiation doses established in accordance

with these rules. For purpose of these rules, "limits" is an equivalent term.

"Effective dose equivalent" (H_E), means the sum of the products of the dose equivalent to each organ or tissue (H_T), and the weighting factor (w_T,) applicable to each of the body organs or tissues that are irradiated.

"Embryo/fetus" means the developing human organism from conception until the time of birth.

"Entrance or access point" means an opening through which an individual or extremity of an individual could gain access to radiation areas or to licensed or registered radioactive materials. This includes entry or exit portals of sufficient size to permit human entry, irrespective of their intended use.

"Executive Secretary" means the executive secretary of the board.

"Explosive material" means a chemical compound, mixture, or device which produces a substantial instantaneous release of gas and heat spontaneously or by contact with sparks or flame.

"EXPOSURE" when capitalized, means the quotient of dQ by dm where "dQ" is the absolute value of the total charge of the ions of one sign produced in air when all the electrons, both negatrons and positrons, liberated by photons in a volume element of air having a mass of "dm" are completely stopped in air. The special unit of EXPOSURE is the roentgen (R). See Section R313-12-20 Units of exposure and dose for the SI equivalent. For purposes of these rules, this term is used as a noun.

"Exposure" when not capitalized as the above term, means being exposed to ionizing radiation or to radioactive material. For purposes of these rules, this term is used as a verb.

"EXPOSURE rate" means the EXPOSURE per unit of time, such as roentgen per minute and milliroentgen per hour.

"External dose" means that portion of the dose equivalent received from a source of radiation outside the body.

"Extremity" means hand, elbow, arm below the elbow, foot, knee, and leg below the knee.

"Facility" means the location within one building, vehicle, or under one roof and under the same administrative control

(a) at which the use, processing or storage of radioactive material is or was authorized; or

(b) at which one or more radiation-producing machines or radioactivity-inducing machines are installed or located.

"Former United States Atomic Energy Commission (AEC) or United States Nuclear Regulatory Commission (NRC) licensed facilities" means nuclear reactors, nuclear fuel reprocessing plants, uranium enrichment plants, or critical mass experimental facilities where AEC or NRC licenses have been terminated.

"Generally applicable environmental radiation standards" means standards issued by the U.S. Environmental Protection Agency under the authority of the Atomic Energy Act of 1954, as

amended, that impose limits on radiation exposures or levels, or concentrations or quantities of radioactive material, in the general environment outside the boundaries of locations under the control of persons possessing or using radioactive material.

"Gray" (Gy) means the SI unit of absorbed dose. One gray is equal to an absorbed dose of one joule per kilogram.

"Hazardous waste" means those wastes designated as hazardous by the U.S. Environmental Protection Agency rules in 40 CFR Part 261.

"Healing arts" means the disciplines of medicine, dentistry, osteopathy, chiropractic, and podiatry.

"High radiation area" means an area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving a dose equivalent in excess of one mSv (0.1 rem), in one hour at 30 centimeters from the source of radiation or from a surface that the radiation penetrates. For purposes of these rules, rooms or areas in which diagnostic x-ray systems are used for healing arts purposes are not considered high radiation areas.

"Human use" means the intentional internal or external administration of radiation or radioactive material to human beings.

"Individual" means a human being.

"Individual monitoring" means the assessment of:

(a) dose equivalent, by the use of individual monitoring devices or, by the use of survey data; or

(b) committed effective dose equivalent by bioassay or by determination of the time weighted air concentrations to which an individual has been exposed, that is, DAC-hours.

"Individual monitoring devices" means devices designed to be worn by a single individual for the assessment of dose equivalent. For purposes of these rules, individual monitoring equipment and personnel monitoring equipment are equivalent terms. Examples of individual monitoring devices are film badges, thermoluminescence dosimeters (TLD's), pocket ionization chambers, and personal air sampling devices.

"Inspection" means an official examination or observation including, but not limited to, tests, surveys, and monitoring to determine compliance with rules, orders, requirements and conditions applicable to radiation sources.

"Interlock" means a device arranged or connected requiring the occurrence of an event or condition before a second condition can occur or continue to occur.

"Internal dose" means that portion of the dose equivalent received from radioactive material taken into the body.

"Lens dose equivalent" (LDE) applies to the external exposure of the lens of the eye and is taken as the dose equivalent at a tissue depth of 0.3 centimeter (300 mg/cm^2).

"License" means a license issued by the Executive Secretary in accordance with the rules adopted

by the Board.

"Licensee" means a person who is licensed by the Department in accordance with these rules and the Act.

"Licensed or registered material" means radioactive material, received, possessed, used or transferred or disposed of under a general or specific license issued by the Executive Secretary.

"Licensing state" means a state which has been provisionally or finally designated as such by the Conference of Radiation Control Program Directors, Inc., which reviews state regulations to establish equivalency with the Suggested State Regulations and ascertains whether a State has an effective program for control of natural occurring or accelerator produced radioactive material (NARM). The Conference will designate as Licensing States those states with regulations for control of radiation relating to, and an effective program for, the regulatory control of NARM.

"Limits". See "Dose limits".

"Lost or missing source of radiation" means licensed or registered sources of radiation whose location is unknown. This definition includes, but is not limited to, radioactive material that has been shipped but has not reached its planned destination and whose location cannot be readily traced in the transportation system.

"Major processor" means a user processing, handling, or manufacturing radioactive material exceeding Type A quantities as unsealed sources or material, or exceeding four times Type B quantities as sealed sources, but does not include nuclear medicine programs, universities, industrial radiographers, or small industrial programs. Type A and B quantities are defined in 10 CFR 71.4.

"Member of the public" means an individual except when that individual is receiving an occupational dose.

"Minor" means an individual less than 18 years of age.

"Monitoring" means the measurement of radiation, radioactive material concentrations, surface area activities or quantities of radioactive material, and the use of the results of these measurements to evaluate potential exposures and doses. For purposes of these rules, radiation monitoring and radiation protection monitoring are equivalent terms.

"NARM" means a naturally occurring or accelerator-produced radioactive material. It does not include byproduct, source or special nuclear material.

"NORM" means a naturally occurring radioactive material.

"Natural radioactivity" means radioactivity of naturally occurring nuclides.

"Nuclear Regulatory Commission" (NRC) means the U.S. Nuclear Regulatory Commission or its duly authorized representatives.

"Occupational dose" means the dose received by an individual in the course of employment in which the individual's assigned duties for the licensee or registrant involve exposure to sources of radiation, whether or not the sources of radiation are in the possession of the licensee, registrant, or other person. Occupational dose does not include doses received from background radiation, from any medical administration the individual has received, from exposure to individuals

administered radioactive material and released in accordance with Section R313-32-75, from voluntary participation in medical research programs, or as a member of the public.

"Package" means the packaging together with its radioactive contents as presented for transport.

"Particle accelerator" means a machine capable of accelerating electrons, protons, deuterons, or other charged particles in a vacuum and of discharging the resultant particulate or other radiation into a medium at energies usually in excess of one MeV.

"Permit" means a permit issued by the Executive Secretary in accordance with the rules adopted by the Board.

"Permitee" means a person who is permitted by the Department in accordance with these rules and the Act.

"Person" means an individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, agency, political subdivision of this state, or another state or political subdivision or agency thereof, and a legal successor, representative, agent or agency of the foregoing.

"Personnel monitoring equipment," see individual monitoring devices.

"Pharmacist" means an individual licensed by this state to practice pharmacy. See Sections 58-17a-101 through 58-17a-801.

"Physician" means an individual licensed by this state to practice medicine and surgery in all its branches. See Sections 58-67-101 through 58-67-803.

"Practitioner" means an individual licensed by this state in the practice of a healing art. Examples would be, physician, dentist, podiatrist, osteopath, and chiropractor.

"Protective apron" means an apron made of radiation-attenuating materials used to reduce exposure to radiation.

"Public dose" means the dose received by a member of the public from sources of radiation from licensed or registered operations. Public dose does not include occupational dose or doses received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released in accordance with Section R313-32-75, or from voluntary participation in medical research programs.

"Pyrophoric material" means any liquid that ignites spontaneously in dry or moist air at or below 130 degrees Fahrenheit (54.4 degrees Celsius) or any solid material, other than one classed as an explosive, which under normal conditions is liable to cause fires through friction, retained heat from manufacturing or processing, or which can be ignited and, when ignited, burns so vigorously and persistently as to create a serious transportation, handling, or disposal hazard. Included are spontaneously combustible and water-reactive materials.

"Quality factor" (Q) means the modifying factor, listed in Tables 1 and 2 of Section R313-12-20 that is used to derive dose equivalent from absorbed dose.

"Rad" means the special unit of absorbed dose. One rad is equal to an absorbed dose of 100 erg per gram or 0.01 joule per kilogram

"Radiation" means alpha particles, beta particles, gamma rays, x-rays, neutrons, high speed electrons, high speed protons, and other particles capable of producing ions. For purposes of these rules, ionizing radiation is an equivalent term. Radiation, as used in these rules, does not include non-ionizing radiation, like radiowaves or microwaves, visible, infrared, or ultraviolet light.

"Radiation area" means an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.05 mSv (0.005 rem), in one hour at 30 centimeters from the source of radiation or from a surface that the radiation penetrates.

"Radiation machine" means a device capable of producing radiation except those devices with radioactive material as the only source of radiation.

"Radiation safety officer" means an individual who has the knowledge and responsibility to apply appropriate radiation protection rules and has been assigned such responsibility by the licensee or registrant.

"Radiation source". See "Source of radiation."

"Radioactive material" means a solid, liquid, or gas which emits radiation spontaneously.

"Radioactivity" means the transformation of unstable atomic nuclei by the emission of radiation.

"Radiobioassay". See "Bioassay".

"Registrant" means any person who is registered with respect to radioactive materials or radiation machines with the Executive Secretary or is legally obligated to register with the Executive Secretary pursuant to these rules and the Act.

"Registration" means registration with the Department in accordance with the rules adopted by the Board.

"Regulations of the U.S. Department of Transportation" means 49 CFR 100 through 189.

"Rem" means the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rem is equal to the absorbed dose in rad multiplied by the quality factor. One rem equals 0.01 sievert (Sv).

"Research and development" means:

(a) theoretical analysis, exploration, or experimentation; or

(b) the extension of investigative findings and theories of a scientific or technical nature into practical application for experimental and demonstration purposes, including the experimental production and testing of models, devices, equipment, materials, and processes. Research and development does not include the internal or external administration of radiation or radioactive material to human beings.

"Residual radioactivity" means radioactivity in structures, materials, soils, groundwater, and other media at a site resulting from activities under the licensee's control. This includes radioactivity from all licensed and unlicensed sources used by the licensee, but excludes background radiation. It also includes radioactive materials remaining at the site as a result of routine or accidental releases of radioactive material at the site and previous burials at the site, even if those burials were made in accordance with the provisions of Rule R313-15.

"Restricted area" means an area, access to which is limited by the licensee or registrant for the purpose of protecting individuals against undue risks from exposure to sources of radiation. A "Restricted area" does not include areas used as residential quarters, but separate rooms in a residential building may be set apart as a restricted area.

"Roentgen" (R) means the special unit of EXPOSURE. One roentgen equals 2.58×10^{-4} coulombs per kilogram of air. See EXPOSURE.

"Sealed source" means radioactive material that is permanently bonded or fixed in a capsule or matrix designed to prevent release and dispersal of the radioactive material under the most severe conditions which are likely to be encountered in normal use and handling.

"Shallow dose equivalent" (H_s) which applies to the external exposure of the skin or an extremity, means the dose equivalent at a tissue depth of 0.007 centimeter (seven mg per cm^2), averaged over an area of one square centimeter.

"SI" means an abbreviation of the International System of Units.

"Sievert" (Sv) means the SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sievert is equal to the absorbed dose in gray multiplied by the quality factor. One Sv equals 100 rem.

"Site boundary" means that line beyond which the land or property is not owned, leased, or otherwise controlled by the licensee or registrant.

"Source container" means a device in which sealed sources are transported or stored.

"Source material" means:

(a) uranium or thorium, or any combination thereof, in any physical or chemical form, or

(b) ores that contain by weight one-twentieth of one percent (0.05 percent), or more of, uranium, thorium, or any combination of uranium and thorium. Source material does not include special nuclear material.

"Source material milling" means any activity that results in the production of byproduct material as defined by (b) of "byproduct material".

"Source of radiation" means any radioactive material, or a device or equipment emitting or capable of producing ionizing radiation.

"Special form radioactive material" means radioactive material which satisfies the following conditions:

(a) it is either a single solid piece or is contained in a sealed capsule that can be opened only by destroying the capsule;

(b) the piece or capsule has at least one dimension not less than five millimeters (0.197 inch); and

(c) it satisfies the test requirements specified by the U.S. Nuclear Regulatory Commission in 10 CFR 71.75. A special form encapsulation designed in accordance with the U.S. Nuclear Regulatory

Commission requirements in effect on June 30, 1983, and constructed prior to July 1, 1985, may continue to be used. A special form encapsulation designed in accordance with the requirements of Section 71.4 in effect on March 31, 1996, (see 10 CFR 71 revised January 1, 1983), and constructed before April 1, 1998, may continue to be used. Any other special form encapsulation must meet the specifications of this definition.

"Special nuclear material" means:

(a) plutonium, uranium-233, uranium enriched in the isotope 233 or in the isotope 235, and other material that the U.S. Nuclear Regulatory Commission, pursuant to the provisions of section 51 of the Atomic Energy Act of 1954, as amended, determines to be special nuclear material, but does not include source material; or

(b) any material artificially enriched by any of the foregoing but does not include source material.

"Special nuclear material in quantities not sufficient to form a critical mass" means uranium enriched in the isotope U-235 in quantities not exceeding 350 grams of contained U-235; uranium-233 in quantities not exceeding 200 grams; plutonium in quantities not exceeding 200 grams or a combination of them in accordance with the following formula: For each kind of special nuclear material, determine the ratio between the quantity of that special nuclear material and the quantity specified above for the same kind of special nuclear material. The sum of such ratios for all of the kinds of special nuclear material in combination shall not exceed one. For example, the following quantities in combination would not exceed the limitation and are within the formula:

((175(Grams contained U-235)/350) + (50(Grams U-233/200) + (50(Grams Pu)/200)) is equal to one.

"Survey" means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of sources of radiation. When appropriate, such evaluation includes, but is not limited to, tests, physical examinations and measurements of levels of radiation or concentrations of radioactive material present.

"Test" means the process of verifying compliance with an applicable rule.

"These rules" means "Utah Radiation Control Rules".

"Total effective dose equivalent" (TEDE) means the sum of the deep dose equivalent for external exposures and the committed effective dose equivalent for internal exposures.

"Total organ dose equivalent" (TODE) means the sum of the deep dose equivalent and the committed dose equivalent to the organ receiving the highest dose as described in Subsection R313-15-1107(1)(f).

"U.S. Department of Energy" means the Department of Energy established by Public Law 95-91, August 4, 1977, 91 Stat. 565, 42 U.S.C. 7101 et seq., to the extent that the Department exercises functions formerly vested in the U.S. Atomic Energy Commission, its Chairman, members, officers and components and transferred to the U.S. Energy Research and Development Administration and to the Administrator thereof pursuant to sections 104(b), (c), and (d) of Public Law 93- 438, October 11, 1974, 88 Stat. 1233 at 1237, effective January 19, 1975 known as the Energy Reorganization Act of 1974, and retransferred to the Secretary of Energy pursuant to section 301(a) of Public Law 95-91, August 14, 1977, 91 Stat. 565 at 577-578, 42 U.S.C. 7151, effective October 1, 1977 known as the Department of Energy Organization

Act.

"Unrefined and unprocessed ore" means ore in its natural form prior to processing, like grinding, roasting, beneficiating or refining.

"Unrestricted area" means an area, to which access is neither limited nor controlled by the licensee or registrant. For purposes of these rules, "uncontrolled area" is an equivalent term.

"Waste" means those low-level radioactive wastes that are acceptable for disposal in a land disposal facility. For the purposes of this definition, low-level waste has the same meaning as in the Low-Level Radioactive Waste Policy Act, P.L. 96-573, as amended by P.L. 99-240, effective January 15, 1986; that is, radioactive waste:

(a) not classified as high-level radioactive waste, spent nuclear fuel, or byproduct material as defined in Section 11e.(2) of the Atomic Energy Act (uranium or thorium tailings and waste) and

(b) classified by the U.S. Nuclear Regulatory Commission as low-level radioactive waste consistent with existing law and in accordance with (a) above.

"Waste collector licensees" means persons licensed to receive and store radioactive wastes prior to disposal or persons licensed to dispose of radioactive waste.

"Week" means seven consecutive days starting on Sunday.

"Whole body" means, for purposes of external exposure, head, trunk including male gonads, arms above the elbow, or legs above the knees.

"Worker" means an individual engaged in work under a license or registration issued by the Executive Secretary and controlled by a licensee or registrant, but does not include the licensee or registrant.

"Working level" (WL), means any combination of short-lived radon daughters in one liter of air that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha particle energy. The short-lived radon daughters are, for radon-222: polonium-218, lead-214, bismuth-214, and polonium-214; and for radon 220: polonium-216, lead-212, bismuth-212, and polonium-212.

"Working level month" (WLM), means an exposure to one working level for 170 hours. 2,000 working hours per year divided by 12 months per year is approximately equal to 170 hours per month.

"Year" means the period of time beginning in January used to determine compliance with the provisions of these rules. The licensee or registrant may change the starting date of the year used to determine compliance by the licensee or registrant provided that the decision to make the change is made not later than December 31 of the previous year. If a licensee or registrant changes in a year, the licensee or registrant shall assure that no day is omitted or duplicated in consecutive years.

R313-12-20. Units of Exposure and Dose.

(1) As used in these rules, the unit of EXPOSURE is the coulomb per kilogram (C per kg). One roentgen is equal to 2.58×10^{-4} coulomb per kilogram of air.

(2) As used in these rules, the units of dose are:

(a) Gray (Gy) is the SI unit of absorbed dose. One gray is equal to an absorbed dose of one joule per kilogram. One gray equals 100 rad.

(b) Rad is the special unit of absorbed dose. One rad is equal to an absorbed dose of 100 erg per gram or 0.01 joule per kilogram. One rad equals 0.01 Gy.

(c) Rem is the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rem is equal to the absorbed dose in rad multiplied by the quality factor. One rem equals 0.01 Sv.

(d) Sievert (Sv) is the SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sievert is equal to the absorbed dose in gray multiplied by the quality factor. One Sv equals 100 rem.

(3) As used in these rules, the quality factors for converting absorbed dose to dose equivalent are shown in Table 1.

TABLE 1

Quality Factors and Absorbed Dose Equivalencie

Type of Radiation	Quality Factor (Q)	Absorbed Dose Equal to a Unit Dose Equivalent
X, gamma, or beta radiation and high-speed electrons	1	1
Alpha particles, multiple-charged particles, fission fragments and heavy particles of unknown charge	20	0.05
Neutrons of unknown energy	10	0.1
High energy protons	10	0.1

For the column in Table 1 labeled "Absorbed Dose Equal to a Unit Dose Equivale to one rem or the absorbed dose in gray is equal to one Sv.

(4) If it is more convenient to measure the neutron fluence rate than to determine the neutron dose equivalent rate in sievert per hour or rem per hour, as provided in Subsection R313-12-20 (3), 0.01 Sv of neutron radiation of unknown energies may, for purposes of these rules, be assumed to result from a total fluence of 25 million neutrons per square centimeter incident upon the body. If sufficient information exists to estimate the approximate energy distribution of the neutrons, the licensee or registrant may use the fluence rate per unit dose equivalent or the appropriate Q value from Table 2 to convert a measured tissue dose in gray or rad to dose equivalent in sievert or rem.

TABLE 2

Mean Quality Factors, Q, and Fluence Per Unit Dc Equivalent for Monoenergetic Neutrons

Fluence per Unit Dose	Fluence per Unit Dose

	Neutron Energy Mev	Quality Factor Q	Equivalent neutrons cm^{-2} rem^{-1}	Equivalent neutrons cm^{-2} Sv^{-1}
thermal	2.5×10^{-8}	2	980×10^6	980×10^8
	1×10^{-7}	2	980×10^6	980×10^8
	1×10^{-6}	2	810×10^6	810×10^8
	1×10^{-5}	2	810×10^6	810×10^8
	1×10^{-4}	2	840×10^6	840×10^8
	1×10^{-3}	2	980×10^6	980×10^8
	1×10^{-2}	2.5	1010×10^6	1010×10^8
	1×10^{-1}	7.5	170×10^6	170×10^8
	5×10^{-1}	11	39×10^6	39×10^8
	1	11	27×10^6	27×10^8
	2.5	9	29×10^6	29×10^8
	5	8	23×10^6	23×10^8
	7	7	24×10^6	24×10^8
	10	6.5	24×10^6	24×10^8
	14	7.5	17×10^6	17×10^8
	20	8	16×10^6	16×10^8
	40	7	14×10^6	14×10^8
	60	5.5	16×10^6	16×10^8
	1×10^2	4	20×10^6	20×10^8
	2×10^2	3.5	19×10^6	19×10^8
	3×10^2	3.5	16×10^6	16×10^8
	4×10^2	3.5	14×10^6	14×10^8

For the column in Table 2 labeled "Quality Factor", the values of Q are at the maximum in a 30 cm diameter cylinder tissue-equivalent phantom.

For the columns in Table 2 labeled "Fluence per Unit Dose Equivalent", the val incident normally on a 30 cm diameter cylinder tissue equivalent phantom.

R313-12-40. Units of Radioactivity.

For purposes of these rules, activity is expressed in the SI unit of becquerel (Bq), or in the special unit of curie (Ci), or their multiples, or disintegrations or transformations per unit of time.

(1) One becquerel (Bq) equals one disintegration or transformation per second.

(2) One curie (Ci) equals 3.7×10^{10} disintegrations or transformations per second, which equals 3.7×10^{10} becquerel, which equals 2.22×10^{12} disintegrations or transformations per minute.

R313-12-51. Records.

(1) A licensee or registrant shall maintain records showing the receipt, transfer, and disposal of all sources of radiation.

(2) Prior to license termination, each licensee authorized to possess radioactive material with a half-life greater than 120 days, in an unsealed form, may forward the following records to the Executive Secretary:

(a) records of disposal of licensed material made under Sections R313-15-1002 (including burials

authorized before January 28, 1981), R313-15-1003, R313-15-1004, and R313-15-1005; and

(b) records required by Subsection R313-15-1103(2)(d).

NOTE: 10 CFR 20.304 permitted burial of small quantities of licensed materials in soil before January 28, 1981, without specific U.S. Nuclear Regulatory Commission authorization. See 20.304 contained in the 10 CFR, parts 0 to 199, edition revised as of January 1, 1981.

(3) If licensed activities are transferred or assigned in accordance with Subsection R313-19-34 (2), each licensee authorized to possess radioactive material, with a half-life greater than 120 days, in an unsealed form, shall transfer the following records to the new licensee and the new licensee will be responsible for maintaining these records until the license is terminated:

(a) records of disposal of licensed material made under Sections R313-15-1002 (including burials authorized before January 28, 1981), R313-15-1003, R313-15-1004, and R313-15-1005; and

(b) records required by Subsection R313-15-1103(2)(d).

(4) Prior to license termination, each licensee may forward the records required by Subsection R313- 22-35(7) to the Executive Secretary.

(5) Additional records requirements are specified elsewhere in these rules.

R313-12-52. Inspections.

(1) A licensee or registrant shall afford representatives of the Executive Secretary, at reasonable times, opportunity to inspect sources of radiation and the premises and facilities wherein those sources of radiation are used or stored.

(2) A licensee or registrant shall make available to representatives of the Executive Secretary for inspection, upon reasonable notice, records maintained pursuant to these rules.

R313-12-53. Tests.

(1) A licensee or registrant shall perform upon instructions from a representative of the Board or the Executive Secretary or shall permit the representative to perform reasonable tests as the representative deems appropriate or necessary including, but not limited to, tests of:

(a) sources of radiation;

(b) facilities wherein sources of radiation are used or stored;

(c) radiation detection and monitoring instruments; and

(d) other equipment and devices used in connection with utilization or storage of licensed or registered sources of radiation.

R313-12-54. Additional Requirements.

The Board may, by rule, or order, impose upon a licensee or registrant requirements in addition to those established in these rules that it deems appropriate or necessary to minimize any danger to public health and safety or the environment.

R313-12-55. Exemptions.

(1) The Board may, upon application or upon its own initiative, grant exemptions or exceptions from the requirements of these rules as it determines are authorized by law and will not result in undue hazard to public health and safety or the environment.

(2) U.S. Department of Energy contractors or subcontractors and U.S. Nuclear Regulatory Commission contractors or subcontractors operating within this state are exempt from these rules to the extent that the contractor or subcontractor under his contract receives, possesses, uses, transfers, or acquires sources of radiation. The following contractor categories are included:

(a) prime contractors performing work for the U.S. Department of Energy at U.S. Government-owned or controlled sites, including the transportation of sources of radiation to or from the sites and the performance of contract services during temporary interruptions of the transportation;

(b) prime contractors of the U.S. Department of Energy performing research in, or development, manufacture, storage, testing or transportation of, atomic weapons or components thereof;

(c) prime contractors of the U.S. Department of Energy using or operating nuclear reactors or other nuclear devices in a United States Government-owned vehicle or vessel; and

(d) any other prime contractor or subcontractor of the U.S. Department of Energy or of the U.S. Nuclear Regulatory Commission when the state and the U.S. Nuclear Regulatory Commission jointly determine (i) that the exemption of the prime contractor or subcontractor is authorized by law; and (ii) that under the terms of the contract or subcontract, there is adequate assurance that the work thereunder can be accomplished without undue risk to the public health and safety.

R313-12-70. Impounding.

Sources of radiation shall be subject to impounding pursuant to Section 19-3-111. Persons who have a source of radiation impounded are subject to fees established in accordance with the Legislative Appropriations Act for the actual cost of the management and oversight activities performed by representatives of the Executive Secretary.

R313-12-100. Prohibited Uses.

(1) A hand-held fluoroscopic screen using x-ray equipment shall not be used unless it has been listed in the Registry of Sealed Source and Devices or accepted for certification by the U.S. Food and Drug Administration, Center for Devices and Radiological Health.

(2) A shoe-fitting fluoroscopic device shall not be used.

R313-12-110. Communications.

All communications and reports concerning these rules, and applications filed thereunder, should be addressed to the Division of Radiation Control, P.O. Box 144850, 168 North 1950 West, Salt Lake City, Utah 84114-4850.

KEY

definitions, units, inspections, exemptions

Date of Enactment or Last Substantive Amendment

September 14, 2001

Notice of Continuation

July 23, 2001

Authorizing, Implemented, or Interpreted Law

19-3-104; 19-3-108

Rule converted into HTML by the Division of Administrative Rules.

For questions regarding the *content* or *application* of rules under Title R313, please contact the promulgating agency (Environmental Quality, Radiation Control). A list of agencies with links to their homepages is available at **http://www.utah.gov/government/agencylist.html.**

For questions about the *rulemaking process*, please contact **the Division of Administrative Rules.** *Please Note:* The Division of Administrative Rules is ***not able*** to answer questions about the content or application of these rules.

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Rule R313-14. Violations and Escalated Enforcement.

As in effect on September 1, 2002

Table of Contents

R313-14-1. Introduction and Purpose.

(1) The purpose of the radiation control inspection and compliance program is to assure the radiological safety of the public, radiation workers, and the environment by:

(a) ensuring compliance with Utah Radiation Control rules or license conditions;

(b) obtaining prompt correction of violations;

(c) deterring future violations; and

(d) encouraging improvement of licensee, permittee or registrant performance, including the prompt identification, reporting, and correction of potential safety problems.

(2) Consistent with the purpose of the radiation control inspection and compliance program, prompt and vigorous enforcement action shall be taken when dealing with licensees, permittees or registrants who fail to demonstrate adherence to these rules. Enforcement action is dependent on the circumstances of the case and may require that discretion be exercised after consideration of these standards. Sanctions have been designed to ensure that a licensee, permittee or registrant does not deliberately profit from violations of the Utah Radiation Control rules.

R313-14-2. Responsibilities.

(1) The Board has authorized the Executive Secretary to:

(a) enforce rules through the issuance of orders and assess penalties in accordance with Section 19- 3-109; and

(b) impound radioactive material in accordance with Section 19-3-111.

(2) The Executive Secretary is authorized to issue Notices of Violations.

R313-14-3. Definitions.

As used in R313-14, the following definitions apply:

(1) "Material False Statement" means a statement that is false by omission or commission and is relevant to the regulatory process.

(2) "Requirement" means a legally binding requirement such as a statute, rule, license condition, permit, registration, technical specification, or order.

(3) "Similar" means those violations which could have been reasonably expected to have been prevented by the licensee's, permittee's or registrant's corrective action for a previous violation.

(4) "Willfulness" means the deliberate intent to violate or falsify, and includes careless disregard for requirements. Acts which do not rise to the level of careless disregard are not included in this definition.

R313-14-10. Severity of Violations.

(1) Violations are placed in one of two major categories. These categories are:

(a) electronically produced radiation operations; or

(b) radioactive materials operations.

(2) Regulatory requirements vary in public health and environmental safety significance. Therefore, it is essential that the relative importance of violations be identified as the first step in the enforcement process. Based upon their relative hazard, violations are assigned to one of five levels of severity.

(3) Severity Level I is assigned to violations that are the most significant and Severity Level V violations are the least significant. In general, violations that are included in Severity Levels I and II involve actual or high potential impact on the public. Severity Level III violations are cause for significant concern. Severity Level IV violations are less serious but are of more than minor concern, however, if left uncorrected, they could lead to a more serious concern. Severity Level V violations are of minor safety or environmental concern.

(4) The severity of a violation shall be characterized at the level best suited to the significance of the particular violation. A severity level may be increased if the circumstances surrounding the violation involve careless disregard of requirements, deception, or other indications of willfulness. In determining the specific severity level of a violation involving willfulness, consideration will be given to factors like the position of the person involved in the violation, the significance of an underlying violation, the intent of the violator and the economic advantage gained by the

violation. The relative weight given to these factors in arriving at the appropriate severity level is dependent on the circumstances of the violation.

(5) The severity level assigned to material false statements may be Severity Level I, II or III, depending on the circumstances surrounding the statement. In determining the specific severity level of a violation involving material false statements or falsification of records, consideration is given to factors like the position of the person involved in the violation, for example, a first line supervisor as opposed to a senior manager, the significance of the information involved, and the intent of the violator. Negligence not amounting to careless disregard would be weighted differently than careless disregard or deliberateness. The relative weight given to these factors in arriving at the appropriate severity level is dependent on the circumstances of the violation.

R313-14-15. Enforcement Actions.

This Section describes the enforcement sanctions available to the Executive Secretary and specifies the conditions under which they are to be used.

(1) Notice of Violation

(a) A Notice of Violation is a written notice setting forth one or more violations of a legally binding requirement. The notice normally requires the licensee, permittee or registrant to provide a written statement describing:

(i) corrective steps which have been taken by the licensee, permittee or registrant and the results achieved;

(ii) corrective steps which shall be taken to prevent recurrence; and

(iii) the date when full compliance will be achieved.

(b) The Executive Secretary may require responses to Notices of Violation to be under oath. Normally, responses under oath may be required only in connection with civil penalties and orders.

(c) A Notice of Violation is used by the Executive Secretary as the method for formalizing the existence of a violation. The Notice may be the only enforcement action taken or it may be used as a basis for other enforcement actions. Licensee, permittee or registrant initiative for self-identification and correction of problems is encouraged. The Executive Secretary shall not generally issue Notices of Violation for a violation that meets the five following tests:

(i) it was identified by the licensee, permittee or registrant;

(ii) it fits in Severity Level IV or V;

(iii) it was reported, in writing, to the Executive Secretary;

(iv) it was or will be corrected, including measures to prevent recurrence, within a reasonable time; and

(v) it was not a violation that could reasonably be expected to have been prevented by the licensee's, permittee's or registrant's corrective action for a previous violation.

(d) Licensees, permittees or registrants are not ordinarily cited for violations resulting from matters outside of their control, like equipment failures that were not avoidable by reasonable quality assurance measures or management controls. Generally however, licensees, permittees and registrants are held responsible for the acts of their employees. Accordingly, the rules should not be construed to excuse personal errors.

(2) Civil Penalty.

(a) A civil penalty is a monetary penalty that may be imposed for violation of Utah Radiation Control Rules or lawful orders issued by the Executive Secretary. Civil penalties are designed to emphasize the need for lasting remedial action and to deter future violations. Generally, civil penalties are imposed for Severity Level I violations, are imposed for Severity Level II violations, in the absence of mitigating circumstances, are considered for Severity Level III violations, and may be imposed for Severity Level IV and V violations that are similar to previous violations for which the licensee, permittee or registrant failed to take effective corrective action.

(b) The level of a civil penalty is established so that a penalty does not exceed $5,000 per violation. Except as modified by provision of the next paragraphs, the base civil penalties are as follows:

TABLE

Severity Level I Violations	$5,000
Severity Level II Violations	$4,000
Severity Level III Violations	$2,500
Severity Level IV Violations	$ 750
Severity Level V Violations	$ 250

(i) Comprehensive licensee, permittee or registrant programs for detection, correction and reporting of problems that may constitute, or lead to, violation of regulatory requirements are important and consideration may be given for effective internal audit programs. When licensees, permittees or registrants find, report, and correct a violation expeditiously and effectively, the Executive Secretary may apply adjustment factors to reduce or eliminate a civil penalty.

(ii) Ineffective licensee, permittee or registrant programs for problem identification or correction are unacceptable. In cases involving willfulness, flagrant violations, repeated poor performance in an area of concern, or serious breakdown in management controls, the Executive Secretary may apply the full enforcement authority.

(iii) The Executive Secretary may review the proposed civil penalty case on its own merits and adjust the civil penalty upward or downward appropriately. After considering the relevant circumstances, adjustments to these values may be made for the factors identified below:

(A) Reduction of the civil penalty may be given when a licensee, permittee or registrant identifies the violation and promptly reports, in writing, the violation to the Executive Secretary. No consideration will be given to this factor if the licensee, permittee or registrant does not take immediate action to correct the problem upon discovery.

(B) Recognizing that corrective action is always required to meet regulatory requirements, the promptness and extent to which the licensee, permittee or registrant takes corrective action, including actions to prevent recurrence, may be considered in modifying the civil penalty to be assessed.

(C) Reduction of the civil penalty may be given for prior good performance in the general area of concern.

(D) The civil penalty may be increased as much as 50% for cases where the licensee, permittee or registrant had prior knowledge of a problem as a result of an internal audit, or specific Executive Secretary or industry notification, and had failed to take effective preventive steps.

(E) The civil penalty may be increased as much as 50% where multiple examples of a particular violation are identified during the inspection period.

(c) A violation of a continuing nature shall, for the purposes of calculating the proposed civil penalty, be considered a separate violation for each day of its continuance. A continuing violation is not considered a repeat violation. In the event a violation is repeated within five years, the scheduled amount of the civil penalty may be increased 25%; and for repeat violations of Severity Levels II and III, the penalty may not be avoided by compliance. Other rights and procedures are not affected by the repeat violation.

(d) Payment of civil penalties shall be made within 30 working days of receipt of a Notice of Violation and Notice of Proposed Imposition of a Civil Penalty. An extension may be given when extenuating circumstances are shown to exist. Payment shall be made by check, payable to the Division of Radiation Control and mailed to the Division at the address shown with the Notice of Violation.

(3) Orders.

(a) An Order is a written directive to modify, suspend, or revoke a license, permit or registration; to cease and desist from a given practice or activity; or to take other action that may be necessary.

(b) Modification Orders are issued when some change in licensee, permittee or registrant equipment, procedures or management control is necessary.

(c) Suspension Orders may be used:

(i) to remove a threat to the public health and safety or the environment;

(ii) when the licensee, permittee or registrant has not responded adequately to other enforcement action;

(iii) when the licensee, permittee or registrant interferes with the conduct of an inspection; or

(iv) for a reason not mentioned above for which license, permit or registration revocation is authorized.

(v) Suspensions may apply to all or part of the regulated activity. Ordinarily, an activity is not suspended, nor is a suspension prolonged for failure to comply with requirements when the failure is not willful or when adequate corrective actions have been taken.

(d) Revocation Orders may be used:

(i) when a licensee, permittee or registrant is unable or unwilling to comply with these rules;

(ii) when a licensee, permittee or registrant refuses to correct a violation;

(iii) when a licensee, permittee or registrant does not respond to a Notice of Violation;

(iv) when a licensee, permittee or registrant does not pay a fee required by the Department; or

(v) for any other reason for which revocation is authorized.

(e) Cease and Desist Orders are used to stop unauthorized activity that has continued despite notification by the Executive Secretary that the activity is unauthorized.

(f) Orders may be made effective immediately, without prior opportunity for hearing, whenever it is determined that the public health, interest, or safety so requires, or when the Order is responding to a violation involving willfulness. Otherwise, a prior opportunity for a hearing is afforded. For cases in which a basis could reasonably exist for not taking the action as proposed, the licensee, permittee or registrant shall be afforded an opportunity to show cause why the Order should not be issued in the proposed manner.

(4) Escalation of Enforcement Sanctions.

(a) In accordance with the provisions of Section 19-3-111 the radioactive material of a person may be impounded. Administrative procedures will be conducted as provided by R313-14-20, prior to disposal of impounded radioactive materials.

(b) Violations of Severity Levels I, II or III are considered to be very serious. If repetitive very serious violations occur, the Executive Secretary may issue Orders in conjunction with other enforcement actions to achieve immediate corrective actions and to deter their recurrence. In accordance with the criteria contained in this section, the Executive Secretary shall carefully consider the circumstances of cases when selecting and applying the appropriate sanctions.

(c) The progression of enforcement actions for repetitive violations may be based on violations under a single license, permit or registration. The actual progression to be used in a particular case may depend on the circumstances. When more than one facility is covered by a single license, permit or registration, the normal progression may be based on repetitive violations under the same license, permit or registration. It should be noted that under some circumstances, for example, where there is common control over some facet of facility operations, repetitive violations may be charged even though the second violation occurred at a different facility or under a different license, permit or registration.

(5) Related Administrative Actions.

(a) In addition to the formal enforcement mechanisms of Notices of Violation and Orders, the Executive Secretary may use administrative mechanisms, like enforcement conferences, bulletins, circulars, information notices, generic letters, and confirmatory action letters as part of the enforcement and regulatory program. Licensees, permittees and registrants are expected to adhere to obligations and commitments resulting from these processes and the Executive Secretary shall, if necessary, issue appropriate orders to make sure that expectation is realized.

(b) Enforcement Conferences are meetings held by the Executive Secretary with licensee, permittee or registrant management to discuss safety, public health, or environmental problems, compliance with regulatory requirements, proposed corrective measures, including schedules for implementation, and enforcement options available to the Executive Secretary.

(c) Bulletins, Circulars, Information Notices, and Generic Letters are written notifications to groups of licensees, permittees or registrants identifying specific problems and calling for or recommending specific actions on their part. Responses to these notifications may be required.

(d) Confirmatory Action Letters are letters confirming a licensee's, permittee's or registrant's agreement to take certain actions to remove significant concerns about health and safety, or the environment.

R313-14-25. Public Disclosure of Enforcement Actions.

Enforcement actions and responses are publicly available for inspection. In addition, press releases are generally issued for Notices of Proposed Imposition of a Civil Penalty and Orders. In the case of orders and civil penalties related to violations at Severity Level I, II or III, press releases may be issued at the time of the Order or the Notice of Proposed Imposition of the Civil Penalty. Press releases are not normally issued for Notices of Violation.

KEY

violations, penalties, enforcement

Date of Enactment or Last Substantive Amendment

June 8, 2001

Notice of Continuation

July 23, 2001

Authorizing, Implemented, or Interpreted Law

19-3-109; 19-3-111

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Rule R313-15. Standards for Protection Against Radiation.

As in effect on September 1, 2002

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R313-15-1. Purpose, Authority and Scope.

(1) Rule R313-15 establishes standards for protection against ionizing radiation resulting from activities conducted pursuant to licenses issued by the Executive Secretary. These rules are issued pursuant to Sections 19-3-104(3) and 19-3-104(6).

(2) The requirements of Rule R313-15 are designed to control the receipt, possession, use, transfer, and disposal of sources of radiation by any licensee or registrant so the total dose to an individual, including doses resulting from all sources of radiation other than background radiation, does not exceed the standards for protection against radiation prescribed in Rule R313-15. However, nothing in Rule R313-15 shall be construed as limiting actions that may be necessary to protect health and safety.

(3) Except as specifically provided in other sections of these rules, Rule R313-15 applies to persons licensed or registered by the Executive Secretary to receive, possess, use, transfer, or dispose of sources of radiation. The limits in Rule R313-15 do not apply to doses due to background radiation, to exposure of patients to radiation for the purpose of medical diagnosis or therapy, to exposure from individuals administered radioactive material and released in accordance with Section R313-32-75, or to exposure from voluntary participation in medical research programs.

R313-15-2. Definitions.

"Annual limit on intake" (ALI) means the derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide in a year by the reference man that would result in a committed effective dose equivalent of 0.05 Sv (5 rem) or a committed dose equivalent of 0.5 Sv (50 rem) to any individual organ or tissue. ALI values for intake by ingestion and by inhalation of selected radionuclides are given in Table I, Columns 1 and 2, of Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference.

"Air-purifying respirator" means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

"Assigned protection factor" (APF) means the expected workplace level of respiratory protection that would be provided by a properly functioning respirator or a class of respirators to properly fitted and trained users. Operationally, the inhaled concentration can be estimated by dividing the ambient airborne concentration by the APF.

"Atmosphere-supplying respirator" means a respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

"Class" means a classification scheme for inhaled material according to its rate of clearance from the pulmonary region of the lung. Materials are classified as D, W, or Y, which applies to a range of clearance half-times: for Class D, Days, of less than ten days, for Class W, Weeks, from ten to 100 days , and for Class Y, Years, of greater than 100 days. For purposes of these rules, "lung class" and "inhalation class" are equivalent terms.

"Constraint (dose constraint)" in accordance with 10 CFR 20.1003, 2001 ed., means a value above which specified licensee actions are required.

"Declared pregnant woman" means a woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception. The declaration remains in effect until the declared pregnant woman withdraws the declaration in writing or is no longer pregnant.

"Demand respirator" means an atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

"Derived air concentration" (DAC) means the concentration of a given radionuclide in air which, if breathed by the reference man for a working year of 2,000 hours under conditions of light work, results in an intake of one ALI. For purposes of these rules, the condition of light work is an inhalation rate of 1.2 cubic meters of air per hour for 2,000 hours in a year. DAC values are given in Table I, Column 3, of Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference.

"Derived air concentration-hour" (DAC-hour) means the product of the concentration of radioactive material in air, expressed as a fraction or multiple of the derived air concentration for each radionuclide, and the time of exposure to that radionuclide, in hours. A licensee or registrant may take 2,000 DAC-hours to represent one ALI, equivalent to a committed effective dose equivalent of 0.05 Sv (5 rem).

"Disposable respirator" means a respirator for which maintenance is not intended and that is designed to be discarded after excessive breathing resistance, sorbent exhaustion, physical damage, or end-of-service-life renders it unsuitable for use. Examples of this type of respirator are a disposable half-mask respirator or a disposable escape- only self-contained breathing apparatus (SCBA).

"Dosimetry processor" means an individual or an organization that processes and evaluates individual monitoring devices in order to determine the radiation dose delivered to the monitoring devices.

"Filtering facepiece" (dust mask) means a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium, not equipped with elastomeric sealing surfaces and adjustable straps.

"Fit factor" means a quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

"Fit test" means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual.

"Helmet" means a rigid respiratory inlet covering that also provides head protection against impact and penetration.

"Hood" means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

"Inhalation class", refer to "Class".

"Labeled package" means a package labeled with a Radioactive White I, Yellow II, or Yellow III label as specified in U.S. Department of Transportation regulations 49 CFR 172.403 and 49 CFR 172.436 through 440, 2000 ed. Labeling of packages containing radioactive materials is required by the U.S. Department of Transportation if the amount and type of radioactive material exceeds the limits for an excepted quantity or article as defined and limited by U.S. Department of Transportation regulations 49 CFR 173.403(m) and (w) and 49 CFR 173.421 through 424, 2000 ed.

"Loose-fitting facepiece" means a respiratory inlet covering that is designed to form a partial seal with the face.

"Lung class", refer to "Class".

"Negative pressure respirator" (tight fitting) means a respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

"Nonstochastic effect" means a health effect, the severity of which varies with the dose and for

which a threshold is believed to exist. Radiation-induced cataract formation is an example of a nonstochastic effect. For purposes of these rules, "deterministic effect" is an equivalent term.

"Planned special exposure" means an infrequent exposure to radiation, separate from and in addition to the annual occupational dose limits.

"Positive pressure respirator" means a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

"Powered air-purifying respirator" (PAPR) means an air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

"Pressure demand respirator" means a positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

"Qualitative fit test" (QLFT) means a pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

"Quantitative fit test" (QNFT) means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

"Quarter" means a period of time equal to one-fourth of the year observed by the licensee, approximately 13 consecutive weeks, providing that the beginning of the first quarter in a year coincides with the starting date of the year and that no day is omitted or duplicated in consecutive quarters.

"Reference Man" means a hypothetical aggregation of human physical and physiological characteristics determined by international consensus. These characteristics may be used by researchers and public health employees to standardize results of experiments and to relate biological insult to a common base. A description of the Reference Man is contained in the International Commission on Radiological Protection report, ICRP Publication 23, "Report of the Task Group on Reference Man."

"Respiratory protective equipment" means an apparatus, such as a respirator, used to reduce an individual's intake of airborne radioactive materials.

"Sanitary sewerage" means a system of public sewers for carrying off waste water and refuse, but excluding sewage treatment facilities, septic tanks, and leach fields owned or operated by the licensee or registrant.

"Self-contained breathing apparatus" (SCBA) means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

"Stochastic effect" means a health effect that occurs randomly and for which the probability of the effect occurring, rather than its severity, is assumed to be a linear function of dose without threshold. Hereditary effects and cancer incidence are examples of stochastic effects. For purposes of these rules, "probabilistic effect" is an equivalent term.

"Supplied-air respirator" (SAR) or airline respirator means an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

"Tight-fitting facepiece" means a respiratory inlet covering that forms a complete seal with the

face.

"User seal check" (fit check) means an action conducted by the respirator user to determine if the respirator is properly seated to the face. Examples include negative pressure check, positive pressure check, irritant smoke check, or isoamyl acetate check.

"Very high radiation area" means an area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving an absorbed dose in excess of five Gy (500 rad) in one hour at one meter from a radiation source or one meter from any surface that the radiation penetrates.

"Weighting factor" w_T for an organ or tissue (T) means the proportion of the risk of stochastic effects resulting from irradiation of that organ or tissue to the total risk of stochastic effects when the whole body is irradiated uniformly. For calculating the effective dose equivalent, the values of w_T are:

TABLE

ORGAN DOSE WEIGHTING FACTORS

Organ or Tissue	w_T
Gonads	0.25
Breast	0.15
Red bone marrow	0.12
Lung	0.12
Thyroid	0.03
Bone surfaces	0.03
Remainder	0.30(1)
Whole Body	1.00(2)

(1) 0.30 results from 0.06 for each of five "remainder" organs, excluding the skir the highest doses.
(2) For the purpose of weighting the external whole body dose, for adding it to th factor, w_T = 1.0, has been specified. The use of other weighting factors for exter on a case-by-case basis until such time as specific guidance is issued.

R313-15-3. Implementation.

(1) Any existing license or registration condition that is more restrictive than Rule R313-15 remains in force until there is an amendment or renewal of the license or registration.

(2) If a license or registration condition exempts a licensee or registrant from a provision of Rule R313-15 in effect on or before January 1, 1994, it also exempts the licensee or registrant from the corresponding provision of Rule R313-15.

(3) If a license or registration condition cites provisions of Rule R313-15 in effect prior to January 1, 1994, which do not correspond to any provisions of Rule R313-15, the license or registration condition remains in force until there is an amendment or renewal of the license or registration that modifies or removes this condition.

R313-15-101. Radiation Protection Programs.

(1) Each licensee or registrant shall develop, document, and implement a radiation protection

program sufficient to ensure compliance with the provisions of Rule R313-15. See Section R313-15-1102 for recordkeeping requirements relating to these programs.

(2) The licensee or registrant shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA).

(3) The licensee or registrant shall, at intervals not to exceed 12 months, review the radiation protection program content and implementation.

(4) To implement the ALARA requirements of Subsection R313-15-101(2), and notwithstanding the requirements in Section R313-15-301, a constraint on air emissions of radioactive material to the environment, excluding radon-222 and its decay products, shall be established by licensees or registrants such that the individual member of the public likely to receive the highest dose will not be expected to receive a total effective dose equivalent in excess of 0.1 mSv (0.01 rem) per year from these emissions. If a licensee or registrant subject to this requirement exceeds this dose constraint, the licensee or registrant shall report the exceedance as provided in Section R313-15-1203 and promptly take appropriate corrective action to ensure against recurrence.

R313-15-201. Occupational Dose Limits for Adults.

(1) The licensee or registrant shall control the occupational dose to individual adults, except for planned special exposures pursuant to Section R313-15-206, to the following dose limits:

(a) An annual limit, which is the more limiting of:

(i) The total effective dose equivalent being equal to 0.05 Sv (5 rem); or

(ii) The sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 0.50 Sv (50 rem).

(b) The annual limits to the lens of the eye, to the skin, and to the extremities which are:

(i) A lens dose equivalent of 0.15 Sv (15 rem), and

(ii) A shallow dose equivalent of 0.50 Sv (50 rem) to the skin or to any extremity.

(2) Doses received in excess of the annual limits, including doses received during accidents, emergencies, and planned special exposures, shall be subtracted from the limits for planned special exposures that the individual may receive during the current year and during the individual's lifetime. See Subsections R313-15-206(5)(a) and R313-15-206(5)(b).

(3) The assigned deep dose equivalent and shallow dose equivalent shall be for the part of the body receiving the highest exposure.

(a) The deep dose equivalent, lens dose equivalent and shallow dose equivalent may be assessed from surveys or other radiation measurements for the purpose of demonstrating compliance with the occupational dose limits, if the individual monitoring device was not in the region of highest potential exposure, or the results of individual monitoring are unavailable; or

(b) When a protective apron is worn while working with medical fluoroscopic equipment and monitoring is conducted as specified in Subsection R313-15-502(1)(d), the effective dose equivalent for external radiation shall be determined as follows:

(i) When only one individual monitoring device is used and it is located at the neck outside the protective apron, and the reported dose exceeds 25 percent of the limit specified in Subsection R313-15-201(1), the reported deep dose equivalent value multiplied by 0.3 shall be the effective dose equivalent for external radiation; or

(ii) When individual monitoring devices are worn, both under the protective apron at the waist and outside the protective apron at the neck, the effective dose equivalent for external radiation shall be assigned the value of the sum of the deep dose equivalent reported for the individual monitoring device located at the waist under the protective apron multiplied by 1.5 and the deep dose equivalent reported for the individual monitoring device located at the neck outside the protective apron multiplied by 0.04.

(4) Derived air concentration (DAC) and annual limit on intake (ALI) values are specified in Table I of Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference, and may be used to determine the individual's dose and to demonstrate compliance with the occupational dose limits. See Section R313-15-1107.

(5) Notwithstanding the annual dose limits, the licensee shall limit the soluble uranium intake by an individual to ten milligrams in a week in consideration of chemical toxicity. See footnote 3, of Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference.

(6) The licensee or registrant shall reduce the dose that an individual may be allowed to receive in the current year by the amount of occupational dose received while employed by any other person. See Subsection R313-15- 205(5).

R313-15-202. Compliance with Requirements for Summation of External and Internal Doses.

(1) If the licensee or registrant is required to monitor pursuant to both Subsections R313-15-502 (1) and R313-15-502(2), the licensee or registrant shall demonstrate compliance with the dose limits by summing external and internal doses. If the licensee or registrant is required to monitor only pursuant to Subsection R313-15-502(1) or only pursuant to Subsection R313-15-502(2), then summation is not required to demonstrate compliance with the dose limits. The licensee or registrant may demonstrate compliance with the requirements for summation of external and internal doses pursuant to Subsections R313-15-202(2), R313-15-202(3) and R313-15-202(4). The dose equivalents for the lens of the eye, the skin, and the extremities are not included in the summation, but are subject to separate limits.

(2) Intake by Inhalation. If the only intake of radionuclides is by inhalation, the total effective dose equivalent limit is not exceeded if the sum of the deep dose equivalent divided by the total effective dose equivalent limit, and one of the following, does not exceed unity:

(a) The sum of the fractions of the inhalation ALI for each radionuclide, or

(b) The total number of derived air concentration-hours (DAC-hours) for all radionuclides divided by 2,000, or

(c) The sum of the calculated committed effective dose equivalents to all significantly irradiated organs or tissues (T) calculated from bioassay data using appropriate biological models and expressed as a fraction of the annual limit. For purposes of this requirement, an organ or tissue is deemed to be significantly irradiated if, for that organ or tissue, the product of the weighting factors, w_T, and the committed dose equivalent, $H_{T,50}$, per unit intake is greater than ten percent of the maximum weighted value of $H_{T,50}$, that is, $w_T H_{T,50}$, per unit intake for any organ or tissue.

(3) Intake by Oral Ingestion. If the occupationally exposed individual receives an intake of radionuclides by oral ingestion greater than ten percent of the applicable oral ALI, the licensee or registrant shall account for this intake and include it in demonstrating compliance with the limits.

(4) Intake through Wounds or Absorption through Skin. The licensee or registrant shall evaluate and, to the extent practical, account for intakes through wounds or skin absorption. The intake through intact skin has been included in the calculation of DAC for hydrogen-3 and does not need to be evaluated or accounted for pursuant to Subsection R313-15-202(4).

R313-15-203. Determination of External Dose from Airborne Radioactive Material.

(1) Licensees or registrants shall, when determining the dose from airborne radioactive material, include the contribution to the deep dose equivalent, lens dose equivalent, and shallow dose equivalent from external exposure to the radioactive cloud. See footnotes 1 and 2 of Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference.

(2) Airborne radioactivity measurements and DAC values shall not be used as the primary means to assess the deep dose equivalent when the airborne radioactive material includes radionuclides other than noble gases or if the cloud of airborne radioactive material is not relatively uniform. The determination of the deep dose equivalent to an individual shall be based upon measurements using instruments or individual monitoring devices.

R313-15-204. Determination of Internal Exposure.

(1) For purposes of assessing dose used to determine compliance with occupational dose equivalent limits, the licensee or registrant shall, when required pursuant to Section R313-15-502, take suitable and timely measurements of:

(a) Concentrations of radioactive materials in air in work areas; or

(b) Quantities of radionuclides in the body; or

(c) Quantities of radionuclides excreted from the body; or

(d) Combinations of these measurements.

(2) Unless respiratory protective equipment is used, as provided in Section R313-15-703, or the assessment of intake is based on bioassays, the licensee or registrant shall assume that an individual inhales radioactive material at the airborne concentration in which the individual is present.

(3) When specific information on the physical and biochemical properties of the radionuclides taken into the body or the behavior of the material in an individual is known, the licensee or registrant may:

(a) Use that information to calculate the committed effective dose equivalent, and, if used, the licensee or registrant shall document that information in the individual's record; and

(b) Upon prior approval of the Executive Secretary, adjust the DAC or ALI values to reflect the actual physical and chemical characteristics of airborne radioactive material, for example, aerosol size distribution or density; and

(c) Separately assess the contribution of fractional intakes of Class D, W, or Y compounds of a

given radionuclide to the committed effective dose equivalent. See Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference.

(4) If the licensee or registrant chooses to assess intakes of Class Y material using the measurements given in Subsections R313-15-204(1)(b) or R313-15-204(1)(c), the licensee or registrant may delay the recording and reporting of the assessments for periods up to seven months, unless otherwise required by Section R313-15-1202 or Section R313-15-1203. This delay permits the licensee or registrant to make additional measurements basic to the assessments.

(5) If the identity and concentration of each radionuclide in a mixture are known, the fraction of the DAC applicable to the mixture for use in calculating DAC-hours shall be either:

(a) The sum of the ratios of the concentration to the appropriate DAC value, that is, D, W, or Y, from Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference, for each radionuclide in the mixture; or

(b) The ratio of the total concentration for all radionuclides in the mixture to the most restrictive DAC value for any radionuclide in the mixture.

(6) If the identity of each radionuclide in a mixture is known, but the concentration of one or more of the radionuclides in the mixture is not known, the DAC for the mixture shall be the most restrictive DAC of any radionuclide in the mixture.

(7) When a mixture of radionuclides in air exists, a licensee or registrant may disregard certain radionuclides in the mixture if:

(a) The licensee or registrant uses the total activity of the mixture in demonstrating compliance with the dose limits in Section R313-15-201 and in complying with the monitoring requirements in Subsection R313-15-502(2), and

(b) The concentration of any radionuclide disregarded is less than ten percent of its DAC, and

(c) The sum of these percentages for all of the radionuclides disregarded in the mixture does not exceed 30 percent.

(8) When determining the committed effective dose equivalent, the following information may be considered:

(a) In order to calculate the committed effective dose equivalent, the licensee or registrant may assume that the inhalation of one ALI, or an exposure of 2,000 DAC-hours, results in a committed effective dose equivalent of 0.05 Sv (5 rem) for radionuclides that have their ALIs or DACs based on the committed effective dose equivalent.

(b) For an ALI and the associated DAC determined by the nonstochastic organ dose limit of 0.50 Sv (50 rem), the intake of radionuclides that would result in a committed effective dose equivalent of 0.05 Sv (5 rem), that is, the stochastic ALI, is listed in parentheses in Table I of Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference. The licensee or registrant may, as a simplifying assumption, use the stochastic ALI to determine committed effective dose equivalent. However, if the licensee or registrant uses the stochastic ALI, the licensee or registrant shall also demonstrate that the limit in Subsection R313-15-201(1)(a)(ii) is met.

R313-15-205. Determination of Prior Occupational Dose.

(1) For each individual likely to receive, in a year, an occupational dose requiring monitoring pursuant to Section R313-15-502, the licensee or registrant shall:

(a) Determine the occupational radiation dose received during the current year; and

(b) Attempt to obtain the records of cumulative occupational radiation dose. A licensee or registrant may accept, as the record of cumulative radiation dose, an up-to-date form DRC-05 or equivalent, signed by the individual and countersigned by an appropriate official of the most recent employer for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee or registrant.

(2) Prior to permitting an individual to participate in a planned special exposure, the licensee or registrant shall determine:

(a) The internal and external doses from all previous planned special exposures; and

(b) All doses in excess of the limits, including doses received during accidents and emergencies, received during the lifetime of the individual.

(3) In complying with the requirements of Subsection R313-15-205(1), a licensee or registrant may:

(a) Accept, as a record of the occupational dose that the individual received during the current year, a written signed statement from the individual, or from the individual's most recent employer for work involving radiation exposure, that discloses the nature and the amount of any occupational dose that the individual received during the current year; and

(b) Obtain reports of the individual's dose equivalents from the most recent employer for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee or registrant, by telephone, telegram, facsimile, other electronic media or letter. The licensee or registrant shall request a written verification of the dose data if the authenticity of the transmitted report cannot be established.

(4) The licensee or registrant shall record the exposure history, as required by Subsection R313-15- 205(1), on form DRC-05, or other clear and legible record, of all the information required on that form.

(a) The form or record shall show each period in which the individual received occupational exposure to radiation or radioactive material and shall be signed by the individual who received the exposure. For each period for which the licensee or registrant obtains reports, the licensee or registrant shall use the dose shown in the report in preparing form DRC-05 or equivalent. For any period in which the licensee or registrant does not obtain a report, the licensee or registrant shall place a notation on form DRC-05 or equivalent indicating the periods of time for which data are not available.

(b) For the purpose of complying with this requirement, licensees or registrants are not required to reevaluate the separate external dose equivalents and internal committed dose equivalents or intakes of radionuclides assessed pursuant to the rules in Rule R313-15 in effect before January 1, 1994. Further, occupational exposure histories obtained and recorded on form DRC-05 or equivalent before January 1, 1994, would not have included effective dose equivalent, but may be used in the absence of specific information on the intake of radionuclides by the individual.

(5) If the licensee or registrant is unable to obtain a complete record of an individual's current and previously accumulated occupational dose, the licensee or registrant shall assume:

(a) In establishing administrative controls under Subsection R313-15-201(6) for the current year, that the allowable dose limit for the individual is reduced by 12.5 mSv (1.25 rem) for each quarter for which records were unavailable and the individual was engaged in activities that could have resulted in occupational radiation exposure; and

(b) That the individual is not available for planned special exposures.

(6) The licensee or registrant shall retain the records on form DRC-05 or equivalent until the Executive Secretary terminates each pertinent license or registration requiring this record. The licensee or registrant shall retain records used in preparing form DRC-05 or equivalent for three years after the record is made.

R313-15-206. Planned Special Exposures.

A licensee or registrant may authorize an adult worker to receive doses in addition to and accounted for separately from the doses received under the limits specified in Section R313-15-201 provided that each of the following conditions is satisfied:

(1) The licensee or registrant authorizes a planned special exposure only in an exceptional situation when alternatives that might avoid the dose estimated to result from the planned special exposure are unavailable or impractical.

(2) The licensee or registrant, and employer if the employer is not the licensee or registrant, specifically authorizes the planned special exposure, in writing, before the exposure occurs.

(3) Before a planned special exposure, the licensee or registrant ensures that each individual involved is:

(a) Informed of the purpose of the planned operation; and

(b) Informed of the estimated doses and associated potential risks and specific radiation levels or other conditions that might be involved in performing the task; and

(c) Instructed in the measures to be taken to keep the dose ALARA considering other risks that may be present.

(4) Prior to permitting an individual to participate in a planned special exposure, the licensee or registrant ascertains prior doses as required by Subsection R313-15-205(2) during the lifetime of the individual for each individual involved.

(5) Subject to Subsection R313-15-201(2), the licensee or registrant shall not authorize a planned special exposure that would cause an individual to receive a dose from all planned special exposures and all doses in excess of the limits to exceed:

(a) The numerical values of any of the dose limits in Subsection R313-15-201(1) in any year; and

(b) Five times the annual dose limits in Subsection R313-15-201(1) during the individual's lifetime.

(6) The licensee or registrant maintains records of the conduct of a planned special exposure in accordance with Section R313-15-1106 and submits a written report in accordance with Section R313-15-1204.

(7) The licensee or registrant records the best estimate of the dose resulting from the planned special exposure in the individual's record and informs the individual, in writing, of the dose within 30 days from the date of the planned special exposure. The dose from planned special exposures shall not be considered in controlling future occupational dose of the individual pursuant to Subsection R313-15-201(1) but shall be included in evaluations required by Subsections R313-15-206(4) and R313-15-206(5).

R313-15-207. Occupational Dose Limits for Minors.

The annual occupational dose limits for minors are ten percent of the annual occupational dose limits specified for adult workers in Section R313-15-201.

R313-15-208. Dose to an Embryo/Fetus.

(1) The licensee or registrant shall ensure that the dose equivalent to the embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed five mSv (0.5 rem). See Section R313-15-1107 for recordkeeping requirements.

(2) The licensee or registrant shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in Subsection R313-15-208(1).

(3) The dose equivalent to an embryo/fetus is the sum of:

(a) The dose equivalent to the embryo/fetus resulting from radionuclides in the embryo/fetus and radionuclides in the declared pregnant woman; and

(b) The dose equivalent that is most representative of the dose equivalent to the embryo/fetus from external radiation, that is, in the mother's lower torso region.

(i) If multiple measurements have not been made, assignment of the highest deep dose equivalent for the declared pregnant woman shall be the dose equivalent to the embryo/fetus, in accordance with Subsection R313-15-201(3); or

(ii) If multiple measurements have been made, assignment of the deep dose equivalent for the declared pregnant woman from the individual monitoring device which is most representative of the dose equivalent to the embryo/fetus shall be the dose equivalent to the embryo fetus. Assignment of the highest deep dose equivalent for the declared pregnant woman to the embryo/fetus is not required unless that dose equivalent is also the most representative deep dose equivalent for the region of the embryo/fetus.

(4) If the dose equivalent to the embryo/fetus is found to have exceeded five mSv (0.5 rem) or is within 0.5 mSv (0.05 rem) of this dose by the time the woman declares the pregnancy to the licensee or registrant, the licensee or registrant shall be deemed to be in compliance with Subsection R313-15-208(1) if the additional dose equivalent to the embryo/fetus does not exceed 0.50 mSv (0.05 rem) during the remainder of the pregnancy.

R313-15-301. Dose Limits for Individual Members of the Public.

(1) Each licensee or registrant shall conduct operations so that:

(a) Except as provided in Subsection R313-15-301(1)(c), the total effective dose equivalent to individual members of the public from the licensed or registered operation does not exceed one mSv (0.1 rem) in a year, exclusive of the dose contribution from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released in accordance with Section R313-32-75, from voluntary participation in medical research programs, and from the licensee's or registrant's disposal of radioactive material into sanitary sewerage in accordance with Section R313-15-1003; and

(b) The dose in any unrestricted area from external sources, exclusive of the dose contributions from patients administered radioactive material and released in accordance with Section R313-32-75, does not exceed 0.02 mSv (0.002 rem) in any one hour; and

(c) The total effective dose equivalent to individual members of the public from infrequent exposure to radiation from radiation machines does not exceed 5 mSv (0.5 rem) in a year.

(2) If the licensee or registrant permits members of the public to have access to controlled areas, the limits for members of the public continue to apply to those individuals.

(3) A licensee, registrant, or an applicant for a license or registration may apply for prior Executive Secretary authorization to operate up to an annual dose limit for an individual member of the public of five mSv (0.5 rem). This application shall include the following information:

(a) Demonstration of the need for and the expected duration of operations in excess of the limit in Subsection R313-15-301(1); and

(b) The licensee's or registrant's program to assess and control dose within the five mSv (0.5 rem) annual limit; and

(c) The procedures to be followed to maintain the dose ALARA.

(4) The Executive Secretary may impose additional restrictions on radiation levels in unrestricted areas and on the total quantity of radionuclides that a licensee or registrant may release in effluents in order to restrict the collective dose.

R313-15-302. Compliance with Dose Limits for Individual Members of the Public.

(1) The licensee or registrant shall make or cause to be made surveys of radiation levels in unrestricted and controlled areas and radioactive materials in effluents released to unrestricted and controlled areas to demonstrate compliance with the dose limits for individual members of the public in Section R313-15-301.

(2) A licensee or registrant shall show compliance with the annual dose limit in Section R313-15-301 by:

(a) Demonstrating by measurement or calculation that the total effective dose equivalent to the individual likely to receive the highest dose from the licensed or registered operation does not exceed the annual dose limit; or

(b) Demonstrating that:

(i) The annual average concentrations of radioactive material released in gaseous and liquid

effluents at the boundary of the unrestricted area do not exceed the values specified in Table II of Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference; and

(ii) If an individual were continuously present in an unrestricted area, the dose from external sources would not exceed 0.02 mSv (0.002 rem) in an hour and 0.50 mSv (0.05 rem) in a year.

(3) Upon approval from the Executive Secretary, the licensee or registrant may adjust the effluent concentration values in Appendix B, Table II of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference, for members of the public, to take into account the actual physical and chemical characteristics of the effluents, such as, aerosol size distribution, solubility, density, radioactive decay equilibrium, and chemical form.

R313-15-401. Radiological Criteria for License Termination - General Provisions.

(1) The criteria in Sections R313-15-401 through R313-15-406 apply to the decommissioning of facilities licensed under Rules R313-22 and R313-25, as well as other facilities subject to the Board's jurisdiction under the Act. For low-level waste disposal facilities (Rule R313-25), the criteria apply only to ancillary surface facilities that support radioactive waste disposal activities.

(2) The criteria in Sections R313-15-401 through R313-15-406 do not apply to sites which:

(a) Have been decommissioned prior to the effective date of the rule in accordance with criteria approved by the Executive Secretary;

(b) Have previously submitted and received Executive Secretary approval on a license termination plan or decommissioning plan; or

(c) Submit a sufficient license termination plan or decommissioning plan before the effective date of the rule with criteria approved by the Executive Secretary.

(3) After a site has been decommissioned and the license terminated in accordance with the criteria in Sections R313-15-401 through R313-15-406, the Executive Secretary will require additional cleanup only if, based on new information, the Executive Secretary determines that the criteria in Sections R313-15-401 through R313-15-406 was not met and residual radioactivity remaining at the site could result in significant threat to public health and safety.

(4) When calculating the total effective dose equivalent to the average member of the critical group, the licensee shall determine the peak annual total effective dose equivalent dose expected within the first 1000 years after decommissioning.

R313-15-402. Radiological Criteria for Unrestricted Use.

A site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a total effective dose equivalent to an average member of the critical group that does not exceed 0.25 mSv (0.025 rem) per year, including no greater than 0.04 mSv (0.004 rem) committed effective dose equivalent or total effective dose equivalent to an average member of the critical group from groundwater sources, and the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). Determination of the levels which are ALARA must take into account consideration of any detriments, such as deaths from transportation accidents, expected to potentially result from decontamination and waste disposal.

R313-15-403. Criteria for License Termination Under Restricted Conditions.

A site will be considered acceptable for license termination under restricted conditions if:

(1) The licensee can demonstrate that further reductions in residual radioactivity necessary to comply with the provisions of Section R313-15-402 would result in net public or environmental harm or were not being made because the residual levels associated with restricted conditions are ALARA. Determination of the levels which are ALARA must take into account consideration of any detriments, such as traffic accidents, expected to potentially result from decontamination and waste disposal; and

(2) The licensee has made provisions for legally enforceable institutional controls that provide reasonable assurance that the total effective dose equivalent from residual radioactivity distinguishable from background to the average member of the critical group will not exceed 0.25 mSv (0.025 rem)per year; and

(3) The licensee has provided sufficient financial assurance to enable an independent third party, including a governmental custodian of a site, to assume and carry out responsibilities for any necessary control and maintenance of the site. Acceptable financial assurance mechanisms are:

(a) Funds placed into an account segregated from the licensee's assets outside the licensee's administrative control as described in Subsection R313-22-35(6)(a);

(b) Surety method, insurance, or other guarantee method as described in Subsection R313-22-35(6)(b);

(c) A statement of intent in the case of Federal, State, or local Government licensees, as described in Subsection R313-22-35(6)(d); or

(d) When a governmental entity is assuming custody and ownership of a site, an arrangement that is deemed acceptable by such governmental entity; and

(4) The licensee has submitted a decommissioning plan or license termination plan to the Executive Secretary indicating the licensee's intent to decommission in accordance with Subsection R313-22-36(4) and specifying that the licensee intends to decommission by restricting use of the site. The licensee shall document in the license termination plan or decommissioning plan how the advice of individuals and institutions in the community who may be affected by the decommissioning has been sought and incorporated, as appropriate, following analysis of that advice;

(a) Licensees proposing to decommission by restricting use of the site shall seek advice from such affected parties regarding the following matters concerning the proposed decommissioning:

(i) Whether provisions for institutional controls proposed by the licensee;

(A) Will provide reasonable assurance that the total effective dose equivalent from residual radioactivity distinguishable from background to the average member of the critical group will not exceed 0.25 mSv (0.025 rem) total effective dose equivalent per year;

(B) Will be enforceable; and

(C) Will not impose undue burdens on the local community or other affected parties; and

(ii) Whether the licensee has provided sufficient financial assurance to enable an independent third party, including a governmental custodian of a site, to assume and carry out responsibilities

for any necessary control and maintenance of the site; and

(b) In seeking advice on the issues identified in Subsection R313-15-403(4)(a), the licensee shall provide for:

(i) Participation by representatives of a broad cross section of community interests who may be affected by the decommissioning;

(ii) An opportunity for a comprehensive, collective discussion on the issues by the participants represented; and

(iii) A publicly available summary of the results of all such discussions, including a description of the individual viewpoints of the participants on the issues and the extent of agreement and disagreement among the participants on the issues; and

(5) Residual radioactivity at the site has been reduced so that if the institutional controls were no longer in effect, there is reasonable assurance that the total effective dose equivalent from residual radioactivity distinguishable from background to the average member of the critical group is as low as reasonably achievable and would not exceed either:

(a) one mSv (0.1 rem) per year; or

(b) five mSv (0.5 rem) per year provided the licensee:

(i) Demonstrates that further reductions in residual radioactivity necessary to comply with the one mSv (0.1 rem) per year value of Subsection R313-15-403(5)(a) are not technically achievable, would be prohibitively expensive, or would result in net public or environmental harm;

(ii) Makes provisions for durable institutional controls; and

(iii) Provides sufficient financial assurance to enable a responsible government entity or independent third party, including a governmental custodian of a site, both to carry out periodic rechecks of the site no less frequently than every five years to assure that the institutional controls remain in place as necessary to meet the criteria of Subsection R313-15-403(2) and to assume and carry out responsibilities for any necessary control and maintenance of those controls. Acceptable financial assurance mechanisms are those in Subsection R313-15-403(3).

R313-15-404. Alternate Criteria for License Termination.

(1) The Executive Secretary may terminate a license using alternative criteria greater than the dose criterion of Section R313-15-402, and Subsections R313-15-403(2) and R313-15-403(4)(a)(i)(A), if the licensee:

(a) Provides assurance that public health and safety would continue to be protected, and that it is unlikely that the dose from all man-made sources combined, other than medical, would be more than the one mSv (0.1 rem) per year limit of Subsection R313-15-301(1)(a), by submitting an analysis of possible sources of exposure; and

(b) Has employed, to the extent practical, restrictions on site use according to the provisions of Section R313-15-403 in minimizing exposures at the site; and

(c) Reduces doses to ALARA levels, taking into consideration any detriments such as traffic

accidents expected to potentially result from decontamination and waste disposal; and

(d) Has submitted a decommissioning plan or license termination plan to the Executive Secretary indicating the licensee's intent to decommission in accordance with Subsection R313-22-36(4), and specifying that the licensee proposes to decommission by use of alternate criteria. The licensee shall document in the decommissioning plan or license termination plan how the advice of individuals and institutions in the community who may be affected by the decommissioning has been sought and addressed, as appropriate, following analysis of that advice. In seeking such advice, the licensee shall provide for:

(i) Participation by representatives of a broad cross section of community interests who may be affected by the decommissioning; and

(ii) An opportunity for a comprehensive, collective discussion on the issues by the participants represented; and

(iii) A publicly available summary of the results of all such discussions, including a description of the individual viewpoints of the participants on the issues and the extent of agreement and disagreement among the participants on the issues.

(2) The use of alternate criteria to terminate a license requires the approval of the Executive Secretary after consideration of recommendations from the Division's staff, comments provided by federal, state and local governments, and any public comments submitted pursuant to Section R313-15-405.

R313-15-405. Public Notification and Public Participation.

Upon the receipt of a license termination plan or decommissioning plan from the licensee, or a proposal by the licensee for release of a site pursuant to Sections R313-15-403 or R313-15-404, or whenever the Executive Secretary deems such notice to be in the public interest, the Executive Secretary shall:

(1) Notify and solicit comments from:

(a) Local and State governments in the vicinity of the site and any Indian Nation or other indigenous people that have treaty or statutory rights that could be affected by the decommissioning; and

(b) Federal, state and local governments for cases where the licensee proposes to release a site pursuant to Section R313-15-404.

(2) Publish a notice in a forum, such as local newspapers, letters to State or local organizations, or other appropriate forum, that is readily accessible to individuals in the vicinity of the site, and solicit comments from affected parties.

R313-15-406. Minimization of Contamination.

Applicants for licenses, other than renewals, shall describe in the application how facility design and procedures for operation will minimize, to the extent practicable, contamination of the facility and the environment, facilitate eventual decommissioning, and minimize, to the extent practicable, the generation of waste.

R313-15-501. Surveys and Monitoring - General.

(1) Each licensee or registrant shall make, or cause to be made, surveys that:

(a) Are necessary for the licensee or registrant to comply with Rule R313-15; and

(b) Are necessary under the circumstances to evaluate:

(i) The magnitude and the extent of radiation levels; and

(ii) Concentrations or quantities of radioactive material; and

(iii) The potential radiological hazards.

(2) The licensee or registrant shall ensure that instruments and equipment used for quantitative radiation measurements, for example, dose rate and effluent monitoring, are calibrated at intervals not to exceed 12 months for the radiation measured, except when a more frequent interval is specified in another applicable part of these rules or a license condition.

(3) All personnel dosimeters, except for direct and indirect reading pocket ionization chambers and those dosimeters used to measure the dose to any extremity, that require processing to determine the radiation dose and that are used by licensees and registrants to comply with Section R313-15-201, with other applicable provisions of these rules, or with conditions specified in a license or registration shall be processed and evaluated by a dosimetry processor:

(a) Holding current personnel dosimetry accreditation from the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology; and

(b) Approved in this accreditation process for the type of radiation or radiations included in the NVLAP program that most closely approximates the type of radiation or radiations for which the individual wearing the dosimeter is monitored.

(4) The licensee or registrant shall ensure that adequate precautions are taken to prevent a deceptive exposure of an individual monitoring device.

R313-15-502. Conditions Requiring Individual Monitoring of External and Internal Occupational Dose.

Each licensee or registrant shall monitor exposures from sources of radiation at levels sufficient to demonstrate compliance with the occupational dose limits of Rule R313-15. As a minimum:

(1) Each licensee or registrant shall monitor occupational exposure to radiation from licensed, unlicensed, and registered radiation sources under the control of the licensee and shall supply and require the use of individual monitoring devices by:

(a) Adults likely to receive, in one year from sources external to the body, a dose in excess of ten percent of the limits in Subsection R313-15-201(1); and

(b) Minors likely to receive, in one year, from radiation sources external to the body, a deep dose equivalent in excess of one mSv (0.1 rem), a lens dose equivalent in excess of 1.5 mSv (0.15 rem), or a shallow dose equivalent to the skin or to the extremities in excess of five mSv (0.5 rem); and

(c) Declared pregnant women likely to receive during the entire pregnancy, from radiation

sources external to the body, a deep dose equivalent in excess of one mSv (0.1 rem); and

(d) Individuals entering a high or very high radiation area; and

(e) Individuals working with medical fluoroscopic equipment.

(i) An individual monitoring device used for the dose to an embryo/fetus of a declared pregnant woman, pursuant to Subsection R313-15-208(1), shall be located under the protective apron at the waist.

(A) If an individual monitoring device worn by a declared pregnant woman has a monthly reported dose equivalent value in excess of 0.5 mSv (50 mrem), the value to be used for determining the dose to the embryo/fetus, pursuant to Subsection R313-15-208(3)(a) for radiation from medical fluoroscopy, may be the value reported by the individual monitoring device worn at the waist underneath the protective apron which has been corrected for the potential overestimation of dose recorded by the monitoring device because of the overlying tissue of the pregnant individual. This correction shall be performed by a radiation safety officer of an institutional radiation safety committee, a qualified expert approved by the Board, or a representative of the Executive Secretary.

(ii) An individual monitoring device used for lens dose equivalent shall be located at the neck, or an unshielded location closer to the eye, outside the protective apron.

(iii) When only one individual monitoring device is used to determine the effective dose equivalent for external radiation pursuant to Subsection R313-15-201(3)(b), it shall be located at the neck outside the protective apron. When a second individual monitoring device is used, for the same purpose, it shall be located under the protective apron at the waist. Note: The second individual monitoring device is required for a declared pregnant woman.

(iv) A registrant is not required to supply and require the use of individual monitoring devices provided the registrant has conducted a survey, pursuant to Section R313-15-501, that demonstrates that the working environment the individual encounters will not likely result in a dose in excess of ten percent of the limits in Subsection R313-15-201(1), and that the individual is neither a minor nor a declared pregnant woman.

(2) Each licensee or registrant shall monitor, to determine compliance with Section R313-15-204, the occupational intake of radioactive material by and assess the committed effective dose equivalent to:

(a) Adults likely to receive, in one year, an intake in excess of ten percent of the applicable ALI(s) in Table I, Columns 1 and 2, of Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference; and

(b) Minors likely to receive, in one year, a committed effective dose equivalent in excess of one mSv (0.1 rem); and

(c) Declared pregnant women likely to receive, during the entire pregnancy, a committed effective dose equivalent in excess of one mSv (0.1 rem).

Note: All of the occupational doses in Section R313-15-201 continue to be applicable to the declared pregnant worker as long as the embryo/fetus dose limit is not exceeded.

R313-15-503. Location of Individual Monitoring Devices.

Each licensee or registrant shall ensure that individuals who are required to monitor occupational doses in accordance with Subsection R313-15-502(1) wear individual monitoring devices as follows:

(1) An individual monitoring device used for monitoring the dose to the whole body shall be worn at the unshielded location of the whole body likely to receive the highest exposure. When a protective apron is worn, the location of the individual monitoring device is typically at the neck (collar).

(2) An individual monitoring device used for monitoring the dose to an embryo/fetus of a declared pregnant woman, pursuant to Subsection R313-15-208(1), shall be located at the waist under any protective apron being worn by the woman.

(3) An individual monitoring device used for monitoring the lens dose equivalent, to demonstrate compliance with Subsection R313-15-201(1)(b)(i), shall be located at the neck (collar), outside any protective apron being worn by the monitored individual, or at an unshielded location closer to the eye.

(4) An individual monitoring device used for monitoring the dose to the extremities, to demonstrate compliance with Subsection R313-15-201(1)(b)(ii), shall be worn on the extremity likely to receive the highest exposure. Each individual monitoring device shall be oriented to measure the highest dose to the extremity being monitored.

R313-15-601. Control of Access to High Radiation Areas.

(1) The licensee or registrant shall ensure that each entrance or access point to a high radiation area has one or more of the following features:

(a) A control device that, upon entry into the area, causes the level of radiation to be reduced below that level at which an individual might receive a deep dose equivalent of one mSv (0.1 rem) in one hour at 30 centimeters from the source of radiation or from any surface that the radiation penetrates; or

(b) A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the high radiation area and the supervisor of the activity are made aware of the entry; or

(c) Entryways that are locked, except during periods when access to the areas is required, with positive control over each individual entry.

(2) In place of the controls required by Subsection R313-15-601(1) for a high radiation area, the licensee or registrant may substitute continuous direct or electronic surveillance that is capable of preventing unauthorized entry.

(3) The licensee or registrant may apply to the Executive Secretary for approval of alternative methods for controlling access to high radiation areas.

(4) The licensee or registrant shall establish the controls required by Subsections R313-15-601(1) and R313-15-601(3) in a way that does not prevent individuals from leaving a high radiation area.

(5) The licensee or registrant is not required to control each entrance or access point to a room or other area that is a high radiation area solely because of the presence of radioactive materials

prepared for transport and packaged and labeled in accordance with the rules of the U.S. Department of Transportation provided that:

(a) The packages do not remain in the area longer than three days; and

(b) The dose rate at one meter from the external surface of any package does not exceed 0.1 mSv (0.01 rem) per hour.

(6) The licensee or registrant is not required to control entrance or access to rooms or other areas in hospitals solely because of the presence of patients containing radioactive material, provided that there are personnel in attendance who are taking the necessary precautions to prevent the exposure of individuals to radiation or radioactive material in excess of the established limits in Rule R313-15 and to operate within the ALARA provisions of the licensee's or registrant's radiation protection program.

(7) The registrant is not required to control entrance or access to rooms or other areas containing sources of radiation capable of producing a high radiation area as described in Section R313-15-601 if the registrant has met all the specific requirements for access and control specified in other applicable sections of these rules, such as, Rule R313-36 for industrial radiography, Rule R313-28 for x rays in the healing arts, Rule R313-30 for therapeutic radiation machines, and Rule R313-35 for industrial use of x-ray systems.

R313-15-602. Control of Access to Very High Radiation Areas.

(1) In addition to the requirements in Section R313-15-601, the licensee or registrant shall institute measures to ensure that an individual is not able to gain unauthorized or inadvertent access to areas in which radiation levels could be encountered at five Gy (500 rad) or more in one hour at one meter from a source of radiation or any surface through which the radiation penetrates. This requirement does not apply to rooms or areas in which diagnostic x-ray systems are the only source of radiation, or to non-self-shielded irradiators.

(2) The registrant is not required to control entrance or access to rooms or other areas containing sources of radiation capable of producing a very high radiation area as described in Subsection R313-15-602(1) if the registrant has met all the specific requirements for access and control specified in other applicable sections of these rules, such as, Rule R313-36 for industrial radiography, Rule R313-28 for x rays in the healing arts, Rule R313-30 for therapeutic radiation machines, and Rule R313-35 for industrial use of x-ray systems.

R313-15-603. Control of Access to Very High Radiation Areas -- Irradiators.

(1) Section R313-15-603 applies to licensees or registrants with sources of radiation in non-self-shielded irradiators. Section R313-15-603 does not apply to sources of radiation that are used in teletherapy, in industrial radiography, or in completely self-shielded irradiators in which the source of radiation is both stored and operated within the same shielding radiation barrier and, in the designed configuration of the irradiator, is always physically inaccessible to any individual and cannot create a high levels of radiation in an area that is accessible to any individual.

(2) Each area in which there may exist radiation levels in excess of five Gy (500 rad) in one hour at one meter from a source of radiation that is used to irradiate materials shall meet the following requirements:

(a) Each entrance or access point shall be equipped with entry control devices which:

(i) Function automatically to prevent any individual from inadvertently entering a very high radiation area; and

(ii) Permit deliberate entry into the area only after a control device is actuated that causes the radiation level within the area, from the source of radiation, to be reduced below that at which it would be possible for an individual to receive a deep dose equivalent in excess of one mSv (0.1 rem) in one hour; and

(iii) Prevent operation of the source of radiation if it would produce radiation levels in the area that could result in a deep dose equivalent to an individual in excess of one mSv (0.1 rem) in one hour.

(b) Additional control devices shall be provided so that, upon failure of the entry control devices to function as required by Subsection R313-15-603(2)(a):

(i) The radiation level within the area, from the source of radiation, is reduced below that at which it would be possible for an individual to receive a deep dose equivalent in excess of one mSv (0.1 rem) in one hour; and

(ii) Conspicuous visible and audible alarm signals are generated to make an individual attempting to enter the area aware of the hazard and at least one other authorized individual, who is physically present, familiar with the activity, and prepared to render or summon assistance, aware of the failure of the entry control devices.

(c) The licensee or registrant shall provide control devices so that, upon failure or removal of physical radiation barriers other than the sealed source's shielded storage container:

(i) The radiation level from the source of radiation is reduced below that at which it would be possible for an individual to receive a deep dose equivalent in excess of one mSv (0.1 rem) in one hour; and

(ii) Conspicuous visible and audible alarm signals are generated to make potentially affected individuals aware of the hazard and the licensee or registrant or at least one other individual, who is familiar with the activity and prepared to render or summon assistance, aware of the failure or removal of the physical barrier.

(d) When the shield for stored sealed sources is a liquid, the licensee or registrant shall provide means to monitor the integrity of the shield and to signal, automatically, loss of adequate shielding.

(e) Physical radiation barriers that comprise permanent structural components, such as walls, that have no credible probability of failure or removal in ordinary circumstances need not meet the requirements of Subsections R313-15-603(2)(c) and R313-15-603(2)(d).

(f) Each area shall be equipped with devices that will automatically generate conspicuous visible and audible alarm signals to alert personnel in the area before the source of radiation can be put into operation and in time for any individual in the area to operate a clearly identified control device, which shall be installed in the area and which can prevent the source of radiation from being put into operation.

(g) Each area shall be controlled by use of such administrative procedures and such devices as are necessary to ensure that the area is cleared of personnel prior to each use of the source of radiation.

(h) Each area shall be checked by a radiation measurement to ensure that, prior to the first individual's entry into the area after any use of the source of radiation, the radiation level from the source of radiation in the area is below that at which it would be possible for an individual to receive a deep dose equivalent in excess of one mSv (0.1 rem) in one hour.

(i) The entry control devices required in Subsection R313-15-603(2)(a) shall be tested for proper functioning. See Section R313-15-1110 for recordkeeping requirements.

(i) Testing shall be conducted prior to initial operation with the source of radiation on any day, unless operations were continued uninterrupted from the previous day; and

(ii) Testing shall be conducted prior to resumption of operation of the source of radiation after any unintentional interruption; and

(iii) The licensee or registrant shall submit and adhere to a schedule for periodic tests of the entry control and warning systems.

(j) The licensee or registrant shall not conduct operations, other than those necessary to place the source of radiation in safe condition or to effect repairs on controls, unless control devices are functioning properly.

(k) Entry and exit portals that are used in transporting materials to and from the irradiation area, and that are not intended for use by individuals, shall be controlled by such devices and administrative procedures as are necessary to physically protect and warn against inadvertent entry by any individual through these portals. Exit portals for irradiated materials shall be equipped to detect and signal the presence of any loose radioactive material that is carried toward such an exit and automatically to prevent loose radioactive material from being carried out of the area.

(3) Licensees, registrants, or applicants for licenses or registrations for sources of radiation within the purview of Subsection R313-15-603(2) which will be used in a variety of positions or in locations, such as open fields or forests, that make it impractical to comply with certain requirements of Subsection R313-15-603(2), such as those for the automatic control of radiation levels, may apply to the Executive Secretary for approval of alternative safety measures. Alternative safety measures shall provide personnel protection at least equivalent to those specified in Subsection R313-15-603(2). At least one of the alternative measures shall include an entry-preventing interlock control based on a measurement of the radiation that ensures the absence of high radiation levels before an individual can gain access to the area where such sources of radiation are used.

(4) The entry control devices required by Subsections R313-15-603(2) and R313-15-603(3) shall be established in such a way that no individual will be prevented from leaving the area.

R313-15-701. Use of Process or Other Engineering Controls.

The licensee or registrant shall use, to the extent practical, process or other engineering controls, such as, containment, decontamination, or ventilation, to control the concentration of radioactive material in air.

R313-15-702. Use of Other Controls.

(1) When it is not practical to apply process or other engineering controls to control the concentration of radioactive material in the air to values below those that define an airborne

radioactivity area, the licensee or registrant shall, consistent with maintaining the total effective dose equivalent ALARA, increase monitoring and limit intakes by one or more of the following means:

(a) Control of access; or

(b) Limitation of exposure times; or

(c) Use of respiratory protection equipment; or

(d) Other controls.

(2) If the licensee or registrant performs an ALARA analysis to determine whether or not respirators should be used, the licensee may consider safety factors other than radiological factors. The licensee or registrant should also consider the impact of respirator use on workers' industrial health and safety.

R313-15-703. Use of Individual Respiratory Protection Equipment.

If the licensee or registrant uses respiratory protection equipment to limit the intake of radioactive material:

(1) Except as provided in Subsection R313-15-703(2), the licensee or registrant shall use only respiratory protection equipment that is tested and certified by the National Institute for Occupational Safety and Health.

(2) The licensee or registrant may use equipment that has not been tested or certified by the National Institute for Occupational Safety and Health or for which there is no schedule for testing or certification, provided the licensee or registrant has submitted to the Executive Secretary and the Executive Secretary has approved an application for authorized use of that equipment. The application must include a demonstration by testing, or a demonstration on the basis of reliable test information, that the material and performance characteristics of the equipment are capable of providing the proposed degree of protection under anticipated conditions of use.

(3) The licensee or registrant shall implement and maintain a respiratory protection program that includes:

(a) Air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate doses; and

(b) Surveys and bioassays, as necessary, to evaluate actual intakes; and

(c) Testing of respirators for operability, user seal check for face sealing devices and functional check for others, immediately prior to each use; and

(d) Written procedures regarding

(i) Monitoring, including air sampling and bioassays;

(ii) Supervision and training of respirator users;

(iii) Fit testing;

(iv) Respirator selection;

(v) Breathing air quality;

(vi) Inventory and control;

(vii) Storage, issuance, maintenance, repair, testing, and quality assurance of respiratory protection equipment;

(viii) Recordkeeping; and

(ix) Limitations on periods of respirator use and relief from respirator use; and

(e) Determination by a physician prior to initial fitting of respirators, before the first field use of non-face sealing respirators, and either every 12 months thereafter or periodically at a frequency determined by a physician, that the individual user is medically fit to use the respiratory protection equipment; and

(f) Fit testing, with fit factor greater than or equal to ten times the APF for negative pressure devices, and a fit factor greater than or equal to 500 for positive pressure, continuous flow, and pressure-demand devices, before the first field use of tight fitting, face-sealing respirators and periodically thereafter at a frequency not to exceed one year. Fit testing must be performed with the facepiece operating in the negative pressure mode.

(4) The licensee or registrant shall advise each respirator user that the user may leave the area at any time for relief from respirator use in the event of equipment malfunction, physical or psychological distress, procedural or communication failure, significant deterioration of operating conditions, or any other conditions that might require such relief.

(5) The licensee or registrant shall also consider limitations appropriate to the type and mode of use. When selecting respiratory devices the licensee shall provide for vision correction, adequate communication, low temperature work environments, and the concurrent use of other safety or radiological protection equipment. The licensee or registrant shall use equipment in such a way as not to interfere with the proper operation of the respirator.

(6) Standby rescue persons are required whenever one-piece atmosphere-supplying suits, or any combination of supplied air respiratory protection device and personnel protective equipment are used from which an unaided individual would have difficulty extricating himself or herself. The standby persons must be equipped with respiratory protection devices or other apparatus appropriate for the potential hazards. The standby rescue persons shall observe or otherwise maintain continuous communication with the workers (visual, voice, signal line, telephone, radio, or other suitable means), and be immediately available to assist them in case of a failure of the air supply or for any other reason that requires relief from distress. A sufficient number of standby rescue persons must be immediately available to assist all users of this type of equipment and to provide effective emergency rescue if needed.

(7) Atmosphere-supplying respirators must be supplied with respirable air of grade D quality or better as defined by the Compressed Gas Association in publication G-7.1, "Commodity Specification for Air," 1997 ed. and included in 29 CFR 1910.134(i)(1)(ii)(A) through (E), 2000 ed. Grade D quality air criteria include:

(a) Oxygen content (v/v) of 19.5 to 23.5%;

(b) Hydrocarbon (condensed) content of five milligrams per cubic meter of air or less;

(c) Carbon monoxide (CO) content of ten ppm or less;

(d) Carbon dioxide content of 1,000 ppm or less; and

(e) Lack of noticeable odor.

(8) The licensee shall ensure that no objects, materials or substances, such as facial hair, or any conditions that interfere with the face and facepiece seal or valve function, and that are under the control of the respirator wearer, are present between the skin of the wearer's face and the sealing surface of a tight-fitting respirator facepiece.

(9) In estimating the dose to individuals from intake of airborne radioactive materials, the concentration of radioactive material in the air that is inhaled when respirators are worn is initially assumed to be the ambient concentration in air without respiratory protection, divided by the assigned protection factor. If the dose is later found to be greater than the estimated dose, the corrected value must be used. If the dose is later found to be less than the estimated dose, the corrected value may be used.

R313-15-704. Further Restrictions on the Use of Respiratory Protection Equipment.

The Executive Secretary may impose restrictions in addition to the provisions of Section R313-15-702, Section R313-15-703, and Appendix A of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference to:

(1) Ensure that the respiratory protection program of the licensee or registrant is adequate to limit doses to individuals from intakes of airborne radioactive materials consistent with maintaining total effective dose equivalent ALARA; and

(2) Limit the extent to which a licensee or registrant may use respiratory protection equipment instead of process or other engineering controls.

R313-15-705. Application for Use of Higher Assigned Protection Factors.

The licensee or registrant shall obtain authorization from the Executive Secretary before using assigned protection factors in excess of those specified in Appendix A of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference. The Executive Secretary may authorize a licensee or registrant to use higher assigned protection factors on receipt of an application that:

(1) Describes the situation for which a need exists for higher protection factors; and

(2) Demonstrates that the respiratory protection equipment provides these higher protection factors under the proposed conditions of use.

R313-15-801. Security and Control of Licensed or Registered Sources of Radiation.

(1) The licensee or registrant shall secure licensed or registered radioactive material from unauthorized removal or access.

(2) The licensee or registrant shall maintain constant surveillance, and use devices or administrative procedures to prevent unauthorized use of licensed or registered radioactive

material that is in an unrestricted area and that is not in storage.

(3) The registrant shall secure registered radiation machines from unauthorized removal.

(4) The registrant shall use devices or administrative procedures to prevent unauthorized use of registered radiation machines.

R313-15-901. Caution Signs.

(1) Standard Radiation Symbol. Unless otherwise authorized by the Executive Secretary, the symbol prescribed by 10 CFR 20.1901, 2001 ed., which is incorporated by reference, shall use the colors magenta, or purple, or black on yellow background. The symbol prescribed is the three-bladed design as follows:

(a) Cross-hatched area is to be magenta, or purple, or black, and

(b) The background is to be yellow.

(2) Exception to Color Requirements for Standard Radiation Symbol. Notwithstanding the requirements of 10 CFR 20.1901(a), 2001 ed., which is incorporated by reference, licensees or registrants are authorized to label sources, source holders, or device components containing sources of radiation that are subjected to high temperatures, with conspicuously etched or stamped radiation caution symbols and without a color requirement.

(3) Additional Information on Signs and Labels. In addition to the contents of signs and labels prescribed in Rule R313-15, the licensee or registrant shall provide, on or near the required signs and labels, additional information, as appropriate, to make individuals aware of potential radiation exposures and to minimize the exposures.

R313-15-902. Posting Requirements.

(1) Posting of Radiation Areas. The licensee or registrant shall post each radiation area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIATION AREA."

(2) Posting of High Radiation Areas. The licensee or registrant shall post each high radiation area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, HIGH RADIATION AREA" or "DANGER, HIGH RADIATION AREA."

(3) Posting of Very High Radiation Areas. The licensee or registrant shall post each very high radiation area with a conspicuous sign or signs bearing the radiation symbol and words "GRAVE DANGER, VERY HIGH RADIATION AREA."

(4) Posting of Airborne Radioactivity Areas. The licensee or registrant shall post each airborne radioactivity area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, AIRBORNE RADIOACTIVITY AREA" or "DANGER, AIRBORNE RADIOACTIVITY AREA."

(5) Posting of Areas or Rooms in which Licensed or Registered Material is Used or Stored. The licensee or registrant shall post each area or room in which there is used or stored an amount of licensed or registered material exceeding ten times the quantity of such material specified in Appendix C of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference, with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL."

R313-15-903. Exceptions to Posting Requirements.

(1) A licensee or registrant is not required to post caution signs in areas or rooms containing sources of radiation for periods of less than eight hours, if each of the following conditions is met:

(a) The sources of radiation are constantly attended during these periods by an individual who takes the precautions necessary to prevent the exposure of individuals to sources of radiation in excess of the limits established in Rule R313-15; and

(b) The area or room is subject to the licensee's or registrant's control.

(2) Rooms or other areas in hospitals that are occupied by patients are not required to be posted with caution signs pursuant to Section R313-15-902 provided that the patient could be released from licensee control pursuant to Section R313-32-75.

(3) A room or area is not required to be posted with a caution sign because of the presence of a sealed source provided the radiation level at 30 centimeters from the surface of the sealed source container or housing does not exceed 0.05 mSv (0.005 rem) per hour.

(4) A room or area is not required to be posted with a caution sign because of the presence of radiation machines used solely for diagnosis in the healing arts.

(5) Rooms in hospitals or clinics that are used for teletherapy are exempt from the requirement to post caution signs under Section R313-15-902 if:

(a) Access to the room is controlled pursuant to Section R313-32-615; and

(b) Personnel in attendance take necessary precautions to prevent the inadvertent exposure of workers, other patients, and members of the public to radiation in excess of the limits established in Rule R313-15.

R313-15-904. Labeling Containers and Radiation Machines.

(1) The licensee or registrant shall ensure that each container of licensed or registered material bears a durable, clearly visible label bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL." The label shall also provide information, such as the radionuclides present, an estimate of the quantity of radioactivity, the date for which the activity is estimated, radiation levels, kinds of materials, and mass enrichment, to permit individuals handling or using the containers, or working in the vicinity of the containers, to take precautions to avoid or minimize exposures.

(2) Each licensee or registrant shall, prior to removal or disposal of empty uncontaminated containers to unrestricted areas, remove or deface the radioactive material label or otherwise clearly indicate that the container no longer contains radioactive materials.

(3) Each registrant shall ensure that each radiation machine is labeled in a conspicuous manner which cautions individuals that radiation is produced when it is energized.

R313-15-905. Exemptions to Labeling Requirements.

A licensee or registrant is not required to label:

(1) Containers holding licensed or registered material in quantities less than the quantities listed in Appendix C of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference; or

(2) Containers holding licensed or registered material in concentrations less than those specified in Table III of Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference; or

(3) Containers attended by an individual who takes the precautions necessary to prevent the exposure of individuals in excess of the limits established by Rule R313-15; or

(4) Containers when they are in transport and packaged and labeled in accordance with the rules of the U.S. Department of Transportation; or

(5) Containers that are accessible only to individuals authorized to handle or use them, or to work in the vicinity of the containers, if the contents are identified to these individuals by a readily available written record. Examples of containers of this type are containers in locations such as water-filled canals, storage vaults, or hot cells. The record shall be retained as long as the containers are in use for the purpose indicated on the record; or

(6) Installed manufacturing or process equipment, such as piping and tanks.

R313-15-906. Procedures for Receiving and Opening Packages.

(1) Each licensee or registrant who expects to receive a package containing quantities of radioactive material in excess of a Type A quantity, as used in Section R313-19-100, which incorporates 10 CFR 71.4 by reference, shall make arrangements to receive:

(a) The package when the carrier offers it for delivery; or

(b) The notification of the arrival of the package at the carrier's terminal and to take possession of the package expeditiously.

(2) Each licensee or registrant shall:

(a) Monitor the external surfaces of a labeled package for radioactive contamination unless the package contains only radioactive material in the form of gas or in special form as defined in Section R313-12-3; and

(b) Monitor the external surfaces of a labeled package for radiation levels unless the package contains quantities of radioactive material that are less than or equal to the Type A quantity, as used in Section R313-19- 100, which incorporates 10 CFR 71.4 by reference; and

(c) Monitor all packages known to contain radioactive material for radioactive contamination and radiation levels if there is evidence of degradation of package integrity, such as packages that are crushed, wet, or damaged.

(3) The licensee or registrant shall perform the monitoring required by Subsection R313-15-906 (2) as soon as practical after receipt of the package, but not later than three hours after the package is received at the licensee's or registrant's facility if it is received during the licensee's or registrant's normal working hours or if there is evidence of degradation of package integrity, such as a package that is crushed, wet, or damaged. If a package is received after working hours, and has no evidence of degradation of package integrity, the package shall be monitored no later than three hours from the beginning of the next working day.

(4) The licensee or registrant shall immediately notify the final delivery carrier and, by telephone and telegram, mailgram, or facsimile, the Executive Secretary when:

(a) Removable radioactive surface contamination exceeds the limits of Section R313-19-100 which incorporates 10 CFR 71.87(i) by reference; or

(b) External radiation levels exceed the limits of Section R313-19-100 which incorporates 10 CFR 71.47 by reference.

(5) Each licensee or registrant shall:

(a) Establish, maintain, and retain written procedures for safely opening packages in which radioactive material is received; and

(b) Ensure that the procedures are followed and that due consideration is given to special instructions for the type of package being opened.

(6) Licensees or registrants transferring special form sources in vehicles owned or operated by the licensee or registrant to and from a work site are exempt from the contamination monitoring requirements of Subsection R313- 15-906(2), but are not exempt from the monitoring requirement in Subsection R313-15-906(2) for measuring radiation levels that ensures that the source is still properly lodged in its shield.

R313-15-1001. Waste Disposal - General Requirements.

(1) A licensee or registrant shall dispose of licensed or registered material only:

(a) By transfer to an authorized recipient as provided in Section R313-15-1006 or in Rules R313-21, R313-22, R313-24, or R313-25, or to the U.S. Department of Energy; or

(b) By decay in storage; or

(c) By release in effluents within the limits in Section R313-15-301; or

(d) As authorized pursuant to Sections R313-15-1002, R313-15-1003, R313-15-1004, or R313-15-1005.

(2) A person shall be specifically licensed or registered to receive waste containing licensed or registered material from other persons for:

(a) Treatment prior to disposal; or

(b) Treatment or disposal by incineration; or

(c) Decay in storage; or

(d) Disposal at a land disposal facility licensed pursuant to Rule R313-25; or

(e) Storage until transferred to a storage or disposal facility authorized to receive the waste.

R313-15-1002. Method for Obtaining Approval of Proposed Disposal Procedures.

A licensee or registrant or applicant for a license or registration may apply to the Executive Secretary for approval of proposed procedures, not otherwise authorized in these rules, to dispose of licensed or registered material generated in the licensee's or registrant's operations. Each application shall include:

(1) A description of the waste containing licensed or registered material to be disposed of, including the physical and chemical properties that have an impact on risk evaluation, and the proposed manner and conditions of waste disposal; and

(2) An analysis and evaluation of pertinent information on the nature of the environment; and

(3) The nature and location of other potentially affected facilities; and

(4) Analyses and procedures to ensure that doses are maintained ALARA and within the dose limits in Rule R313-15.

R313-15-1003. Disposal by Release into Sanitary Sewerage.

(1) A licensee or registrant may discharge licensed or registered material into sanitary sewerage if each of the following conditions is satisfied:

(a) The material is readily soluble, or is readily dispersible biological material, in water; and

(b) The quantity of licensed or registered radioactive material that the licensee or registrant releases into the sewer in one month divided by the average monthly volume of water released into the sewer by the licensee or registrant does not exceed the concentration listed in Table III of Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference; and

(c) If more than one radionuclide is released, the following conditions shall also be satisfied:

(i) The licensee or registrant shall determine the fraction of the limit in Table III of Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference, represented by discharges into sanitary sewerage by dividing the actual monthly average concentration of each radionuclide released by the licensee or registrant into the sewer by the concentration of that radionuclide listed in Table III of Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference; and

(ii) The sum of the fractions for each radionuclide required by Subsection R313-15-1003(1)(c)(i) does not exceed unity; and

(d) The total quantity of licensed or registered radioactive material that the licensee or registrant releases into the sanitary sewerage system in a year does not exceed 185 GBq (five Ci) of hydrogen-3, 37 GBq (one Ci) of carbon-14, and 37 GBq (one Ci) of all other radioactive materials combined.

(2) Excreta from individuals undergoing medical diagnosis or therapy with radioactive material are not subject to the limitations contained in Subsection R313-15-1003(1).

R313-15-1004. Treatment or Disposal by Incineration.

A licensee or registrant may treat or dispose of licensed or registered material by incineration only in the form and concentration specified in Section R313-15-1005 or as specifically approved by the Executive Secretary pursuant to Section R313-15-1002.

R313-15-1005. Disposal of Specific Wastes.

(1) A licensee or registrant may dispose of the following licensed or registered material as if it were not radioactive:

(a) 1.85 kBq (0.05 uCi), or less, of hydrogen-3 or carbon-14 per gram of medium used for liquid scintillation counting; and

(b) 1.85 kBq (0.05 uCi) or less, of hydrogen-3 or carbon-14 per gram of animal tissue, averaged over the weight of the entire animal.

(2) A licensee or registrant shall not dispose of tissue pursuant to Subsection R313-15-1005(1)(b) in a manner that would permit its use either as food for humans or as animal feed.

(3) The licensee or registrant shall maintain records in accordance with Section R313-15-1109.

R313-15-1006. Transfer for Disposal and Manifests.

(1) The requirements of Section R313-15-1006 and Appendix G of 10 CFR 20.1001 to 20.2402, 2001 ed., which are incorporated into these rules by reference, are designed to:

(a) control transfers of low-level radioactive waste by any waste generator, waste collector, or waste processor licensee, as defined in Appendix G in 10 CFR 20.1001 to 20.2402, 2001 ed., who ships low-level waste either directly, or indirectly through a waste collector or waste processor, to a licensed low-level waste land disposal facility as defined in Section R313-25-2;

(b) establish a manifest tracking system; and

(c) supplement existing requirements concerning transfers and recordkeeping for those wastes.

(2) Any licensee shipping radioactive waste intended for ultimate disposal at a licensed land disposal facility must document the information required on the U.S. Nuclear Regulatory Commission's Uniform Low-Level Radioactive Waste Manifest and transfer this recorded manifest information to the intended consignee in accordance with Appendix G to 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated into these rules by reference.

(3) Each shipment manifest shall include a certification by the waste generator as specified in Section II of Appendix G to 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference.

(4) Each person involved in the transfer of waste for disposal or in the disposal of waste, including the waste generator, waste collector, waste processor, and disposal facility operator, shall comply with the requirements specified in Section III of Appendix G to 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference.

R313-15-1007. Compliance with Environmental and Health Protection Rules.

Nothing in Sections R313-15-1001, R313-15-1002, R313-15-1003, R313-15-1004, R313-15-1005, or R313-15- 1006 relieves the licensee or registrant from complying with other applicable Federal, State and local rules governing any other toxic or hazardous properties of materials that may be disposed of pursuant to Sections R313-15-1001, R313-15-1002, R313-15-1003, R313-15-1004, R313-15-1005, or R313-15-1006.

R313-15-1008. Classification and Characteristics of Low-Level Radioactive Waste.

(1) Classification of Radioactive Waste for Land Disposal

(a) Considerations. Determination of the classification of radioactive waste involves two considerations. First, consideration shall be given to the concentration of long-lived radionuclides (and their shorter- lived precursors) whose potential hazard will persist long after such precautions as institutional controls, improved waste form, and deeper disposal have ceased to be effective. These precautions delay the time when long-lived radionuclides could cause exposures. In addition, the magnitude of the potential dose is limited by the concentration and availability of the radionuclide at the time of exposure. Second, consideration shall be given to the concentration of shorter-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are effective.

(b) Classes of waste.

(i) Class A waste is waste that is usually segregated from other waste classes at the disposal site. The physical form and characteristics of Class A waste shall meet the minimum requirements set forth in Subsection R313-15- 1008(2)(a). If Class A waste also meets the stability requirements set forth in Subsection R313-15-1008(2)(b), it is not necessary to segregate the waste for disposal.

(ii) Class B waste is waste that shall meet more rigorous requirements on waste form to ensure stability after disposal. The physical form and characteristics of Class B waste shall meet both the minimum and stability requirements set forth in Subsection R313-15-1008(2).

(iii) Class C waste is waste that not only shall meet more rigorous requirements on waste form to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of Class C waste shall meet both the minimum and stability requirements set forth in Subsection R313-15-1008(2).

(c) Classification determined by long-lived radionuclides. If the radioactive waste contains only radionuclides listed in Table I, classification shall be determined as follows:

(i) If the concentration does not exceed 0.1 times the value in Table I, the waste is Class A.

(ii) If the concentration exceeds 0.1 times the value in Table I, but does not exceed the value in Table I, the waste is Class C.

(iii) If the concentration exceeds the value in Table I, the waste is not generally acceptable for land disposal.

(iv) For wastes containing mixtures of radionuclides listed in Table I, the total concentration shall be determined by the sum of fractions rule described in Subsection R313-15-1008(1)(g).

TABLE I

Radionuclide	Concentration curie/cubic meter(1)	Concentration nanocurie/gram(2)
C-14	8	
C-14 in activated metal	80	
Ni-59 in activated metal	220	

Nb-94 in activated metal	0.2	
Tc-99	3	
I-129	0.08	
Alpha emitting transuranic radionuclides with half-life greater than five years		100
Pu-241		3,500
Cm-242		20,000
Ra-226		100

NOTE: (1) To convert the Ci/m^3 values to gigabecquerel (GBq)/cubic meter, multipl 37.

(2) To convert the nCi/g values to becquerel (Bq)/gram, multiply the nCi/g

(d) Classification determined by short-lived radionuclides. If the waste does not contain any of the radionuclides listed in Table I, classification shall be determined based on the concentrations shown in Table II. However, as specified in Subsection R313-15-1008(1)(f), if radioactive waste does not contain any nuclides listed in either Table I or II, it is Class A.

(i) If the concentration does not exceed the value in Column 1, the waste is Class A.

(ii) If the concentration exceeds the value in Column 1 but does not exceed the value in Column 2, the waste is Class B.

(iii) If the concentration exceeds the value in Column 2 but does not exceed the value in Column 3, the waste is Class C.

(iv) If the concentration exceeds the value in Column 3, the waste is not generally acceptable for near-surface disposal.

(v) For wastes containing mixtures of the radionuclides listed in Table II, the total concentration shall be determined by the sum of fractions rule described in Subsection R313-15-1008(1)(g).

TABLE II

Radionuclide	Concentration, curie/cubic meter(1)		
	Column 1	Column 2	Column 3
Total of all radionuclides with less than 5-year half-life	700	(2)	(2)
H-3	40	(2)	(2)
Co-60	700	(2)	(2)
Ni-63	3.5	70	700
Ni-63 in activated metal	35	700	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

NOTE: (1) To convert the Ci/m^3 value to gigabecquerel (GBq)/cubic meter, multiply 37.

(2) There are no limits established for these radionuclides in Class B or C as the effects of external radiation and internal heat generation on transportation concentrations for these wastes. These wastes shall be Class B unless the concentr

II determine the waste to be Class C independent of these radionuclides.

(e) Classification determined by both long- and short-lived radionuclides. If the radioactive waste contains a mixture of radionuclides, some of which are listed in Table I and some of which are listed in Table II, classification shall be determined as follows:

(i) If the concentration of a radionuclide listed in Table I is less than 0.1 times the value listed in Table I, the class shall be that determined by the concentration of radionuclides listed in Table II.

(ii) If the concentration of a radionuclide listed in Table I exceeds 0.1 times the value listed in Table I, but does not exceed the value in Table I, the waste shall be Class C, provided the concentration of radionuclides listed in Table II does not exceed the value shown in Column 3 of Table II.

(f) Classification of wastes with radionuclides other than those listed in Tables I and II. If the waste does not contain any radionuclides listed in either Table I or II, it is Class A.

(g) The sum of the fractions rule for mixtures of radionuclides. For determining classification for waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions by dividing each radionuclide's concentration by the appropriate limit and adding the resulting values. The appropriate limits shall all be taken from the same column of the same table. The sum of the fractions for the column shall be less than 1.0 if the waste class is to be determined by that column. Example: A waste contains Sr-90 in a concentration of 1.85 TBq/m^3 (50 Ci/m^3) and Cs-137 in a concentration of 814 GBq/m^3 (22 Ci/m^3). Since the concentrations both exceed the values in Column 1, Table II, they shall be compared to Column 2 values. For Sr-90 fraction, 50/150 = 0.33., for Cs-137 fraction, 22/44 = 0.5; the sum of the fractions = 0.83. Since the sum is less than 1.0, the waste is Class B.

(h) Determination of concentrations in wastes. The concentration of a radionuclide may be determined by indirect methods such as use of scaling factors which relate the inferred concentration of one radionuclide to another that is measured, or radionuclide material accountability, if there is reasonable assurance that the indirect methods can be correlated with actual measurements. The concentration of a radionuclide may be averaged over the volume of the waste, or weight of the waste if the units are expressed as becquerel (nanocurie) per gram.

(2) Radioactive Waste Characteristics

(a) The following are minimum requirements for all classes of waste and are intended to facilitate handling and provide protection of health and safety of personnel at the disposal site.

(i) Wastes shall be packaged in conformance with the conditions of the license issued to the site operator to which the waste will be shipped. Where the conditions of the site license are more restrictive than the provisions of Rule R313-15, the site license conditions shall govern.

(ii) Wastes shall not be packaged for disposal in cardboard or fiberboard boxes.

(iii) Liquid waste shall be packaged in sufficient absorbent material to absorb twice the volume of the liquid.

(iv) Solid waste containing liquid shall contain as little free-standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed one percent of the volume.

(v) Waste shall not be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures, or of explosive reaction with water.

(vi) Waste shall not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste. This does not apply to radioactive gaseous waste packaged in accordance with Subsection R313-15-1008(2)(a)(viii).

(vii) Waste shall not be pyrophoric. Pyrophoric materials contained in wastes shall be treated, prepared, and packaged to be nonflammable.

(viii) Wastes in a gaseous form shall be packaged at an absolute pressure that does not exceed 1.5 atmospheres at 20 degrees celsius. Total activity shall not exceed 3.7 TBq (100 Ci) per container.

(ix) Wastes containing hazardous, biological, pathogenic, or infectious material shall be treated to reduce to the maximum extent practical the potential hazard from the non-radiological materials.

(b) The following requirements are intended to provide stability of the waste. Stability is intended to ensure that the waste does not degrade and affect overall stability of the site through slumping, collapse, or other failure of the disposal unit and thereby lead to water infiltration. Stability is also a factor in limiting exposure to an inadvertent intruder, since it provides a recognizable and nondispersible waste.

(i) Waste shall have structural stability. A structurally stable waste form will generally maintain its physical dimensions and its form, under the expected disposal conditions such as weight of overburden and compaction equipment, the presence of moisture, and microbial activity, and internal factors such as radiation effects and chemical changes. Structural stability can be provided by the waste form itself, processing the waste to a stable form, or placing the waste in a disposal container or structure that provides stability after disposal.

(ii) Notwithstanding the provisions in Subsections R313-15-1008(2)(a)(iii) and R313-15- 1008(2)(a)(iv), liquid wastes, or wastes containing liquid, shall be converted into a form that contains as little free- standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed one percent of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5 percent of the volume of the waste for waste processed to a stable form.

(iii) Void spaces within the waste and between the waste and its package shall be reduced to the extent practical.

(3) Labeling. Each package of waste shall be clearly labeled to identify whether it is Class A, Class B, or Class C waste, in accordance with Subsection R313-15-1008(1).

R313-15-1101. Records - General Provisions.

(1) Each licensee or registrant shall use the SI units becquerel, gray, sievert and coulomb per kilogram, or the special units, curie, rad, rem, and roentgen, including multiples and subdivisions, and shall clearly indicate the units of all quantities on records required by Rule R313-15.

(2) Notwithstanding the requirements of Subsection R313-15-1101(1), when recording information on shipment manifests, as required in Subsection R313-15-1006(2), information must be recorded in SI units or in SI units and the special units specified in Subsection R313-15-1101(1).

(3) The licensee or registrant shall make a clear distinction among the quantities entered on the records required by Rule R313-15, such as, total effective dose equivalent, total organ dose equivalent, shallow dose equivalent, lens dose equivalent, deep dose equivalent, or committed effective dose equivalent.

R313-15-1102. Records of Radiation Protection Programs.

(1) Each licensee or registrant shall maintain records of the radiation protection program, including:

(a) The provisions of the program; and

(b) Audits and other reviews of program content and implementation.

(2) The licensee or registrant shall retain the records required by Subsection R313-15-1102(1)(a) until the Executive Secretary terminates each pertinent license or registration requiring the record. The licensee or registrant shall retain the records required by Subsection R313-15-1102 (1)(b) for three years after the record is made.

R313-15-1103. Records of Surveys.

(1) Each licensee or registrant shall maintain records showing the results of surveys and calibrations required by Section R313-15-501 and Subsection R313-15-906(2). The licensee or registrant shall retain these records for three years after the record is made.

(2) The licensee or registrant shall retain each of the following records until the Executive Secretary terminates each pertinent license or registration requiring the record:

(a) Records of the results of surveys to determine the dose from external sources of radiation used, in the absence of or in combination with individual monitoring data, in the assessment of individual dose equivalents; and

(b) Records of the results of measurements and calculations used to determine individual intakes of radioactive material and used in the assessment of internal dose; and

(c) Records showing the results of air sampling, surveys, and bioassays required pursuant to Subsections R313-15-703(3)(a) and R313-15-703(3)(b); and

(d) Records of the results of measurements and calculations used to evaluate the release of radioactive effluents to the environment.

R313-15-1104. Records of Tests for Leakage or Contamination of Sealed Sources.

Records of tests for leakage or contamination of sealed sources required by Section R313-15-1401 shall be kept in units of becquerel or microcurie and maintained for inspection by the Executive Secretary for five years after the records are made.

R313-15-1105. Records of Prior Occupational Dose.

For each individual who is likely to receive in a year an occupational dose requiring monitoring pursuant to Section R313-15-502, the licensee or registrant shall retain the records of prior occupational dose and exposure history as specified in Section R313-15-205 on form DRC-05 or

equivalent until the Executive Secretary terminates each pertinent license requiring this record. The licensee or registrant shall retain records used in preparing form DRC-05 or equivalent for three years after the record is made.

R313-15-1106. Records of Planned Special Exposures.

(1) For each use of the provisions of Section R313-15-206 for planned special exposures, the licensee or registrant shall maintain records that describe:

(a) The exceptional circumstances requiring the use of a planned special exposure; and

(b) The name of the management official who authorized the planned special exposure and a copy of the signed authorization; and

(c) What actions were necessary; and

(d) Why the actions were necessary; and

(e) What precautions were taken to assure that doses were maintained ALARA; and

(f) What individual and collective doses were expected to result; and

(g) The doses actually received in the planned special exposure.

(2) The licensee or registrant shall retain the records until the Executive Secretary terminates each pertinent license or registration requiring these records.

R313-15-1107. Records of Individual Monitoring Results.

(1) Recordkeeping Requirement. Each licensee or registrant shall maintain records of doses received by all individuals for whom monitoring was required pursuant to Section R313-15-502, and records of doses received during planned special exposures, accidents, and emergency conditions. Assessments of dose equivalent and records made using units in effect before January 1, 1994, need not be changed. These records shall include, when applicable:

(a) The deep dose equivalent to the whole body, lens dose equivalent, shallow dose equivalent to the skin, and shallow dose equivalent to the extremities; and

(b) The estimated intake of radionuclides, see Section R313-15-202; and

(c) The committed effective dose equivalent assigned to the intake of radionuclides; and

(d) The specific information used to calculate the committed effective dose equivalent pursuant to Subsections R313-15-204(1) and R313-15-204(3) and when required by Section R313-15-502; and

(e) The total effective dose equivalent when required by Section R313-15-202; and

(f) The total of the deep dose equivalent and the committed dose to the organ receiving the highest total dose.

(2) Recordkeeping Frequency. The licensee or registrant shall make entries of the records

specified in Subsection R313-15-1107(1) at intervals not to exceed one year.

(3) Recordkeeping Format. The licensee or registrant shall maintain the records specified in Subsection R313-15-1107(1) on form DRC-06, in accordance with the instructions for form DRC-06, or in clear and legible records containing all the information required by form DRC-06.

(4) The licensee or registrant shall maintain the records of dose to an embryo/fetus with the records of dose to the declared pregnant woman. The declaration of pregnancy, including the estimated date of conception, shall also be kept on file, but may be maintained separately from the dose records.

(5) The licensee or registrant shall retain each required form or record until the Executive Secretary terminates each pertinent license or registration requiring the record.

R313-15-1108. Records of Dose to Individual Members of the Public.

(1) Each licensee or registrant shall maintain records sufficient to demonstrate compliance with the dose limit for individual members of the public. See Section R313-15-301.

(2) The licensee or registrant shall retain the records required by Subsection R313-15-1108(1) until the Executive Secretary terminates each pertinent license or registration requiring the record. Requirements for disposition of these records, prior to license termination, are located in Section R313-12-51 for activities licensed under these rules.

R313-15-1109. Records of Waste Disposal.

(1) Each licensee or registrant shall maintain records of the disposal of licensed or registered materials made pursuant to Sections R313-15-1002, R313-15-1003, R313-15-1004, R313-15-1005, Rule R313-25, and disposal by burial in soil, including burials authorized before January 28, 1981.

(2) The licensee or registrant shall retain the records required by Subsection R313-15-1109(1) until the Executive Secretary terminates each pertinent license or registration requiring the record.

R313-15-1110. Records of Testing Entry Control Devices for Very High Radiation Areas.

(1) Each licensee or registrant shall maintain records of tests made pursuant to Subsection R313-15- 603(2)(i) on entry control devices for very high radiation areas. These records shall include the date, time, and results of each such test of function.

(2) The licensee or registrant shall retain the records required by Subsection R313-15-1110(1) for three years after the record is made.

R313-15-1111. Form of Records.

Each record required by Rule R313-15 shall be legible throughout the specified retention period. The record shall be the original or a reproduced copy or a microform, provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of producing a clear copy throughout the required retention period or the record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records, such as letters, drawings, and specifications, shall include all pertinent information, such as stamps, initials, and signatures. The licensee shall

maintain adequate safeguards against tampering with and loss of records.

R313-15-1201. Reports of Stolen, Lost, or Missing Licensed or Registered Sources of Radiation.

(1) Telephone Reports. Each licensee or registrant shall report to the Executive Secretary by telephone as follows:

(a) Immediately after its occurrence becomes known to the licensee or registrant, stolen, lost, or missing licensed or registered radioactive material in an aggregate quantity equal to or greater than 1,000 times the quantity specified in Appendix C of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference, under such circumstances that it appears to the licensee or registrant that an exposure could result to individuals in unrestricted areas;

(b) Within 30 days after its occurrence becomes known to the licensee or registrant, lost, stolen, or missing licensed or registered radioactive material in an aggregate quantity greater than ten times the quantity specified in Appendix C of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference, that is still missing.

(c) Immediately after its occurrence becomes known to the registrant, a stolen, lost, or missing radiation machine.

(2) Written Reports. Each licensee or registrant required to make a report pursuant to Subsection R313-15-1201(1) shall, within 30 days after making the telephone report, make a written report to the Executive Secretary setting forth the following information:

(a) A description of the licensed or registered source of radiation involved, including, for radioactive material, the kind, quantity, and chemical and physical form; and, for radiation machines, the manufacturer, model and serial number, type and maximum energy of radiation emitted;

(b) A description of the circumstances under which the loss or theft occurred; and

(c) A statement of disposition, or probable disposition, of the licensed or registered source of radiation involved; and

(d) Exposures of individuals to radiation, circumstances under which the exposures occurred, and the possible total effective dose equivalent to persons in unrestricted areas; and

(e) Actions that have been taken, or will be taken, to recover the source of radiation; and

(f) Procedures or measures that have been, or will be, adopted to ensure against a recurrence of the loss or theft of licensed or registered sources of radiation.

(3) Subsequent to filing the written report, the licensee or registrant shall also report additional substantive information on the loss or theft within 30 days after the licensee or registrant learns of such information.

(4) The licensee or registrant shall prepare any report filed with the Executive Secretary pursuant to Section R313-15-1201 so that names of individuals who may have received exposure to radiation are stated in a separate and detachable portion of the report.

R313-15-1202. Notification of Incidents.

(1) Immediate Notification. Notwithstanding other requirements for notification, each licensee or registrant shall immediately report each event involving a source of radiation possessed by the licensee or registrant that may have caused or threatens to cause any of the following conditions:

(a) An individual to receive:

(i) A total effective dose equivalent of 0.25 Sv (25 rem) or more; or

(ii) A lens dose equivalent of 0.75 Sv (75 rem) or more; or

(iii) A shallow dose equivalent to the skin or extremities or a total organ dose equivalent of 2.5 Gy (250 rad) or more; or

(b) The release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake five times the occupational ALI. This provision does not apply to locations where personnel are not normally stationed during routine operations, such as hot- cells or process enclosures.

(2) Twenty-Four Hour Notification. Each licensee or registrant shall, within 24 hours of discovery of the event, report to the Executive Secretary each event involving loss of control of a licensed or registered source of radiation possessed by the licensee or registrant that may have caused, or threatens to cause, any of the following conditions:

(a) An individual to receive, in a period of 24 hours:

(i) A total effective dose equivalent exceeding 0.05 Sv (five rem); or

(ii) A lens dose equivalent exceeding 0.15 Sv (15 rem); or

(iii) A shallow dose equivalent to the skin or extremities or a total organ dose equivalent exceeding 0.5 Sv (50 rem); or

(b) The release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake in excess of one occupational ALI. This provision does not apply to locations where personnel are not normally stationed during routine operations, such as hot- cells or process enclosures.

(3) The licensee or registrant shall prepare each report filed with the Executive Secretary pursuant to Section R313-15-1202 so that names of individuals who have received exposure to sources of radiation are stated in a separate and detachable portion of the report.

(4) Licensees or registrants shall make the reports required by Subsections R313-15-1202(1) and R313- 15-1202(2) to the Executive Secretary by telephone, telegram, mailgram, or facsimile.

(5) The provisions of Section R313-15-1202 do not apply to doses that result from planned special exposures, provided such doses are within the limits for planned special exposures and are reported pursuant to Section R313-15-1204.

R313-15-1203. Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Constraints or Limits.

(1) Reportable Events. In addition to the notification required by Section R313-15-1202, each

licensee or registrant shall submit a written report within 30 days after learning of any of the following occurrences:

(a) Incidents for which notification is required by Section R313-15-1202; or

(b) Doses in excess of any of the following:

(i) The occupational dose limits for adults in Section R313-15-201; or

(ii) The occupational dose limits for a minor in Section R313-15-207; or

(iii) The limits for an embryo/fetus of a declared pregnant woman in Section R313-15-208; or

(iv) The limits for an individual member of the public in Section R313-15-301; or

(v) Any applicable limit in the license or registration; or

(vi) The ALARA constraints for air emissions established under Subsection R313-15-101(4); or

(c) Levels of radiation or concentrations of radioactive material in:

(i) A restricted area in excess of applicable limits in the license or registration; or

(ii) An unrestricted area in excess of ten times the applicable limit set forth in Rule R313-15 or in the license or registration, whether or not involving exposure of any individual in excess of the limits in Section R313- 15-301; or

(d) For licensees subject to the provisions of U.S. Environmental Protection Agency's generally applicable environmental radiation standards in 40 CFR 190, levels of radiation or releases of radioactive material in excess of those standards, or of license conditions related to those standards.

(2) Contents of Reports.

(a) Each report required by Subsection R313-15-1203(1) shall describe the extent of exposure of individuals to radiation and radioactive material, including, as appropriate:

(i) Estimates of each individual's dose; and

(ii) The levels of radiation and concentrations of radioactive material involved; and

(iii) The cause of the elevated exposures, dose rates, or concentrations; and

(iv) Corrective steps taken or planned to ensure against a recurrence, including the schedule for achieving conformance with applicable limits, ALARA constraints, generally applicable environmental standards, and associated license or registration conditions.

(b) Each report filed pursuant to Subsection R313-15-1203(1) shall include for each occupationally overexposed individual: the name, Social Security account number, and date of birth. With respect to the limit for the embryo/fetus in Section R313-15-208, the identifiers should be those of the declared pregnant woman. The report shall be prepared so that this information is stated in a separate and detachable portion of the report.

(3) All licensees or registrants who make reports pursuant to Subsection R313-15-1203(1) shall submit the report in writing to the Executive Secretary.

R313-15-1204. Reports of Planned Special Exposures.

The licensee or registrant shall submit a written report to the Executive Secretary within 30 days following any planned special exposure conducted in accordance with Section R313-15-206, informing the Executive Secretary that a planned special exposure was conducted and indicating the date the planned special exposure occurred and the information required by Section R313-15-1106.

R313-15-1205. Reports to Individuals of Exceeding Dose Limits.

When a licensee or registrant is required, pursuant to the provisions of Sections R313-15-1203 or R313-15-1204, to report to the Executive Secretary any exposure of an identified occupationally exposed individual, or an identified member of the public, to sources of radiation, the licensee or registrant shall also provide a copy of the report submitted to the Executive Secretary to the individual. This report shall be transmitted at a time no later than the transmittal to the Executive Secretary.

R313-15-1207. Notifications and Reports to Individuals.

(1) Requirements for notification and reports to individuals of exposure to radiation or radioactive material are specified in Rule R313-18.

(2) When a licensee or registrant is required pursuant to Section R313-15-1203 to report to the Executive Secretary any exposure of an individual to radiation or radioactive material, the licensee or registrant shall also notify the individual. Such notice shall be transmitted at a time not later than the transmittal to the Executive Secretary, and shall comply with the provisions of Rule R313-18.

R313-15-1208. Reports of Leaking or Contaminated Sealed Sources.

If the test for leakage or contamination required pursuant to Section R313-15-1401 indicates a sealed source is leaking or contaminated, a report of the test shall be filed within five days with the Executive Secretary describing the equipment involved, the test results and the corrective action taken.

R313-15-1301. Vacating Premises.

Each specific licensee or registrant shall, no less than 30 days before vacating or relinquishing possession or control of premises which may have been contaminated with radioactive material as a result of his activities, notify the Executive Secretary in writing of intent to vacate. When deemed necessary by the Executive Secretary, the licensee shall decontaminate the premises in such a manner that the annual total effective dose equivalent to any individual after the site is released for unrestricted use should not exceed 0.1 mSv (0.01 rem)above background and that the annual total effective dose equivalent from any specific environmental source during decommissioning activities should not exceed 0.1 mSv (0.01 rem)above background.

R313-15-1401. Testing for Leakage or Contamination of Sealed Sources.

(1) The licensee or registrant in possession of any sealed source shall assure that:

(a) Each sealed source, except as specified in Subsection R313-15-1401(2), is tested for leakage or contamination and the test results are received before the sealed source is put into use unless the licensee or registrant has a certificate from the transferor indicating that the sealed source was tested within six months before transfer to the licensee or registrant.

(b) Each sealed source that is not designed to emit alpha particles is tested for leakage or contamination at intervals not to exceed six months or at alternative intervals approved by the Executive Secretary, an Agreement State, a Licensing State, or the U.S. Nuclear Regulatory Commission.

(c) Each sealed source that is designed to emit alpha particles is tested for leakage or contamination at intervals not to exceed three months or at alternative intervals approved by the Executive Secretary, an Agreement State, a Licensing State, or the Nuclear Regulatory Commission.

(d) For each sealed source that is required to be tested for leakage or contamination, at any other time there is reason to suspect that the sealed source might have been damaged or might be leaking, the licensee or registrant shall assure that the sealed source is tested for leakage or contamination before further use.

(e) Tests for leakage for all sealed sources, except brachytherapy sources manufactured to contain radium, shall be capable of detecting the presence of 185 Bq (0.005 uCi) of radioactive material on a test sample. Test samples shall be taken from the sealed source or from the surfaces of the container in which the sealed source is stored or mounted on which one might expect contamination to accumulate. For a sealed source contained in a device, test samples are obtained when the source is in the "off" position.

(f) The test for leakage for brachytherapy sources manufactured to contain radium shall be capable of detecting an absolute leakage rate of 37 Bq (0.001 uCi) of radon-222 in a 24 hour period when the collection efficiency for radon-222 and its daughters has been determined with respect to collection method, volume and time.

(g) Tests for contamination from radium daughters shall be taken on the interior surface of brachytherapy source storage containers and shall be capable of detecting the presence of 185 Bq (0.005 uCi) of a radium daughter which has a half-life greater than four days.

(2) A licensee or registrant need not perform tests for leakage or contamination on the following sealed sources:

(a) Sealed sources containing only radioactive material with a half-life of less than 30 days;

(b) Sealed sources containing only radioactive material as a gas;

(c) Sealed sources containing 3.7 MBq (100 uCi) or less of beta or photon-emitting material or 370 kBq (ten uCi) or less of alpha-emitting material;

(d) Sealed sources containing only hydrogen-3;

(e) Seeds of iridium-192 encased in nylon ribbon; and

(f) Sealed sources, except teletherapy and brachytherapy sources, which are stored, not being used and identified as in storage. The licensee or registrant shall, however, test each such sealed source for leakage or contamination and receive the test results before any use or transfer unless

it has been tested for leakage or contamination within six months before the date of use or transfer.

(3) Tests for leakage or contamination from sealed sources shall be performed by persons specifically authorized by the Executive Secretary, an Agreement State, a Licensing State, or the U.S. Nuclear Regulatory Commission to perform such services.

(4) Test results shall be kept in units of becquerel or microcurie and maintained for inspection by representatives of the Executive Secretary. Records of test results for sealed sources shall be made pursuant to Section R313-15-1104.

(5) The following shall be considered evidence that a sealed source is leaking:

(a) The presence of 185 Bq (0.005 uCi) or more of removable contamination on any test sample.

(b) Leakage of 37 Bq (0.001 uCi) of radon-222 per 24 hours for brachytherapy sources manufactured to contain radium.

(c) The presence of removable contamination resulting from the decay of 185 Bq (0.005 uCi) or more of radium.

(6) The licensee or registrant shall immediately withdraw a leaking sealed source from use and shall take action to prevent the spread of contamination. The leaking sealed source shall be repaired or disposed of in accordance with Rule R313-15.

(7) Reports of test results for leaking or contaminated sealed sources shall be made pursuant to Section R313-15-1208.

KEY

radioactive material, contamination, waste disposal, safety

Date of Enactment or Last Substantive Amendment

July 23, 2002

Notice of Continuation

April 30, 1998

Authorizing, Implemented, or Interpreted Law

19-3-104; 19-3-108

For questions about the *rulemaking process*, please contact **the Division of Administrative Rules**. *Please Note:* The Division of Administrative Rules is ***not able*** to answer questions about the content or application of these rules.

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DAR File No. 24052
This filing was published in the 01/10/2001, issue, Vol. 2001, No.19, of the Utah State Bulletin.

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Environmental Quality, Radiation Control

R313-15-502

Conditions Requiring Individual Monitoring of External and Internal Occupational Dose

NOTICE OF PROPOSED RULE
DAR File No.: 24052
Filed: 09/13/2001, 02:48
Received by: NL

RULE ANALYSIS

Purpose of the rule or reason for the change:
Five separate registrants of X-ray systems have petitioned the Utah Radiation Control Board for an exemption from the requirements of this rule. The Board has approved each request based on a reasoned justification by the registrant. Another four petitions for an exemption from the requiremnts of Section R313-15-502 have been received and are under consideration. The reason for this change is to allow registrants, who use medical fluoroscopic equipment, an alternative way of demonstrating compliance with the rule. The proposed rule will likely curtail the filing of petitions for exemption.

Summary of the rule or change:
A provision is being added such that a registrant does not need to supply and require the use of personnel monitoring devices if the registrant has conducted tests of the radiation environment in accordance with the provisions of Section R313-15-501. The registrant must demonstrate that the working environment an individual encounters will not likely result in a dose in excess of ten percent of the limits in Subsection R313-15-201(1).

State statutory or constitutional authorization for this rule:
Sections 19-3-104, 19-3-108

Anticipated cost or savings to:
the state budget:
Approximately $500 of staff time and resources of the Radiation Control Board are expended on each petition for an exemption from the requirements in Section R313-15-502. This proposed change will curtail and eliminate this expenditure of resources.

local governments:
There will not be a cost or savings to local govenment as local government is not affected by this rulemaking.

other persons:
Compliance costs for affected persons are expected to remain the same. This is because the tests of the radiation environment used to justify an exemption from the rule are the same as the tests needed under the proposed change.

Compliance costs for affected persons:
Compliance costs for affected persons are expected to remain the same. This is because the tests of the radiation environment used to justify an exemption from the rule are the same as the tests needed under the proposed change.

Comments by the department head on the fiscal impact the rule may have on businesses:
The fiscal impact of this rule may allow registrants to save financial resources. The tests to evaluate the radiation environment may be completed for under $100. A registrant may elect to perform these tests if they want to eliminate the use of personnel monitoring devices. The cost savings from eliminating the use of personnel monitors may eventually exceed the cost of performing the tests of the radiation environment.

The full text of this rule may be inspected, during regular business hours, at the Division of Administrative Rules, or at:
Environmental Quality
Radiation Control
168 N 1950 W
SALT LAKE CITY UT 84116-3085

Direct questions regarding this rule to:
Craig Jones at the above address, by phone at 801-536-4264, by FAX at 801-533-4097, or by Internet E-mail at cjones@deq.state.ut.us

Interested persons may present their views on this rule by submitting written comments to the address above no later than 5:00 p.m. on:
10/31/2001

This rule may become effective on:
11/09/2001

Authorized by:
William Sinclair, Director

RULE TEXT

R313. Environmental Quality, Radiation Control.

R313-15. Standards for Protection Against Radiation.

R313-15-502. Conditions Requiring Individual Monitoring of External and Internal Occupational Dose.

Each licensee or registrant shall monitor exposures from sources of radiation at levels sufficient to demonstrate compliance with the occupational dose limits of Rule R313-15. As a minimum:

(1) Each licensee or registrant shall monitor occupational exposure to radiation from licensed, unlicensed, and registered radiation sources under the control of the licensee and shall supply and require the use of individual monitoring devices by:

(a) Adults likely to receive, in one year from sources external to the body, a dose in excess of ten percent of the limits in Subsection R313-15-201(1); and

(b) Minors likely to receive, in one year, from radiation sources external to the body, a deep dose equivalent in excess of one mSv (0.1 rem), a lens dose equivalent in excess of 1.5 mSv (0.15 rem), or a shallow dose equivalent to the skin or to the extremities in excess of five mSv (0.5 rem); and

(c) Declared pregnant women likely to receive during the entire pregnancy, from radiation sources external to the body, a deep dose equivalent in excess of one mSv (0.1 rem); and

(d) Individuals entering a high or very high radiation area; and

(e) Individuals working with medical fluoroscopic equipment.

(i) An individual monitoring device used for the dose to an embryo/fetus of a declared pregnant woman, pursuant to Subsection R313-15-208(1), shall be located under the protective apron at the waist.

(A) If an individual monitoring device worn by a declared pregnant woman has a monthly reported dose equivalent value in excess of 0.5 mSv (50 mrem), the value to be used for determining the dose to the embryo/fetus, pursuant to Subsection R313-15-208(3)(a) for radiation from medical fluoroscopy, may be the value reported by the individual monitoring device worn at the waist underneath the protective apron which has been corrected for the potential overestimation of dose recorded by the monitoring device because of the overlying tissue of the pregnant individual. This correction shall be performed by a radiation safety officer of an institutional radiation safety committee, a qualified expert approved by the Board, or a representative of the Executive Secretary.

(ii) An individual monitoring device used for lens dose equivalent shall be located at the neck, or an unshielded location closer to the eye, outside the protective apron.

(iii) When only one individual monitoring device is used to determine the effective dose

equivalent for external radiation pursuant to Subsection R313-15-201(3)(b), it shall be located at the neck outside the protective apron. When a second individual monitoring device is used, for the same purpose, it shall be located under the protective apron at the waist. Note: The second individual monitoring device is required for a declared pregnant woman.

(iv) A registrant is not required to supply and require the use of individual monitoring devices provided the registrant has conducted a survey, pursuant to Section R313-15-501, that demonstrates that the working environment the individual encounters will not likely result in a dose in excess of ten percent of the limits in Subsection R313-15-201(1), and that the individual is neither a minor nor a declared pregnant woman.

(2) Each licensee or registrant shall monitor, to determine compliance with Section R313-15-204, the occupational intake of radioactive material by and assess the committed effective dose equivalent to:

(a) Adults likely to receive, in one year, an intake in excess of ten percent of the applicable ALI(s) in Table I, Columns 1 and 2, of Appendix B of 10 CFR 20.1001 to 20.2402, 2001 ed., which is incorporated by reference; and

(b) Minors likely to receive, in one year, a committed effective dose equivalent in excess of one mSv (0.1 rem); and

(c) Declared pregnant women likely to receive, during the entire pregnancy, a committed effective dose equivalent in excess of one mSv (0.1 rem).

Note: All of the occupational doses in Section R313-15-201 continue to be applicable to the declared pregnant worker as long as the embryo/fetus dose limit is not exceeded.

KEY: radioactive material, contamination, waste disposal, safety

2001

Notice of Continuation April 30, 1998

19-3-104

19-3-108

ADDITIONAL INFORMATION
PLEASE NOTE:

- Text to be deleted is struck through and surrounded by brackets (e.g., [~~example~~]). Text to be added is underlined (e.g., example). Some browsers may not depict some or any of these attributes on the screen or when the document is printed.
- Please see the **DISCLAIMER** regarding information available from state web pages.

For questions regarding the *content* or *application* of this rule, please contact Craig Jones at the above address, by phone at 801-536-4264, by FAX at 801-533-4097, or by Internet E-mail at cjones@deq.state.ut.us

For questions about the *rulemaking process*, please contact the **Division of Administrative Rules** (801-538-3764). *Please Note:* The Division of Administrative Rules is *NOT* able to answer questions about the content or application of these administrative rules.

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Last modified: 01/23/2002 8:57 AM

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Rule R313-16. General Requirements Applicable to the Installation, Registration, Inspection, and Use of Radiation Machines.

As in effect on September 1, 2002

Table of Contents

- **Authorizing, Implemented, or Interpreted Law**

R313-16-200. Purpose and Authority.

(1) The purpose of this rule is to prescribe requirements governing the installation, registration, inspection, and use of sources of electronically produced ionizing radiation. This rule provides for the registration of individuals providing inspection services to a facility where one or more radiation machines are installed or located.

(2) The rules set forth herein are adopted pursuant to the provisions of Subsections 19-3-104(3) and 19-3-104(8)(a).

R313-16-215. Definitions.

"Qualified expert" means an individual having the knowledge and training to measure regulatory parameters on radiation machines, to evaluate radiation safety programs, to evaluate radiation levels, and to give advice on radiation protection needs while conducting inspections of radiation machine facilities registered with the Department. Qualified experts are not considered employees or representatives of the Division of Radiation Control or the State.

"Sorting Center" means a facility in which radiation machines are in storage until they are shipped out of state.

"Storage" means a condition in which a radiation machine is not being used for an extended period of time, and has been made inoperable.

R313-16-220. Exemptions.

(1) Electronic equipment that produces radiation incidental to its operation for other purposes is exempt from the registration and notification requirements of Rule R313-16, providing the dose equivalent rate averaged over an area of ten square centimeters does not exceed 0.5 mrem (5.0 uSv) per hour at five centimeters from accessible surfaces of the equipment.

(2) Radiation machines while in transit are exempt from the requirements of Section R313-16-230. See Section R313-16-250 for other applicable requirements.

(3) Television receivers are exempt from the requirements of Rule R313-16.

(4) Radiation machines while in the possession of a manufacturer, assembler, or a sorting center are exempt from the requirements of Section R313-16-230.

(5) Radiation machines owned by an agency of the Federal Government are exempt from the requirements of Rule R313-16.

R313-16-225. Responsibility for Radiation Safety Program.

(1) The registrant shall be ultimately responsible for radiation safety, but may designate another person to implement the radiation safety program. When, in the Executive Secretary's opinion, neither the registrant nor the registrant's designee is sufficiently qualified to insure safe use of the machine; the Executive Secretary may order the registrant to designate another individual who has adequate qualifications.

(2) The registrant or the registrant's designee shall:

(a) develop a detailed program of radiation safety that assures compliance with the applicable requirements of these rules, including Section R313-15-101;

(b) have instructions given concerning radiation hazards and radiation safety practices to individuals who may be occupationally exposed;

(c) have surveys made and other procedures carried out as required by these rules; and

(d) keep a copy of all reports, records, and written policies and procedures required by these rules.

R313-16-230. Registration of Radiation Machines.

(1) Ionizing radiation producing machines not exempted by Section R313-16-220 shall be registered with the Executive Secretary.

(2) Registration renewal shall be required annually. The registration interval is July 1 through June 30 of the following year. The annual registration anniversary date shall be July 1. Renewal application will be considered late and late fees may be assessed if not received by the last day of August.

(3) Registration for the facility is achieved when the Executive Secretary receives the following:

(a) a current and complete application form DRC-10 for registration of radiation machines; and

(b) annual registration fees.

(4) Registration for the current fiscal year shall be acknowledged by the Executive Secretary through receipts for the remittance of the registration fee.

R313-16-231. Additional Requirements for the Issuance of a Registration for Particle Accelerators Excluding Therapeutic Radiation Machines (See Rule R313-30).

(1) In addition to the requirements of Section R313-16-230, a registrant who proposes to use a particle accelerator shall submit an application to the Executive Secretary containing the following:

(a) information demonstrating that the applicant, by reason of training and experience, is qualified to use the accelerator in question for the purpose requested in a manner that will minimize danger to public health and safety or the environment;

(b) a discussion which demonstrates that the applicant's equipment, facilities, and operating and emergency procedures are adequate to protect health and minimize danger to public health and safety or the environment;

(c) the name and qualifications of the individual, appointed by the applicant, to serve as radiation safety officer pursuant to Section R313-35-140;

(d) a description of the applicant's or the staff's experience in the use of particle accelerators and radiation safety training; and

(e) a description of the radiation safety training the applicant will provide to particle accelerator operators.

(2) Registrants who possess and use a particle accelerator that has been registered with the Department prior to January 1, 1999 shall submit a registration application that contains the information in Subsections R313-16-231(1)(a) through (e). The application shall be submitted by July 1, 1999.

R313-16-233. Notification of Intent to Provide Servicing and Services.

(1) Persons engaged in the business of installing or offering to install radiation machines or engaged in the business of furnishing or offering to furnish radiation machine servicing or services in this State shall notify the Executive Secretary of the intent to provide these services within 30 days following the effective date of this rule or, thereafter, prior to furnishing or offering to furnish these services.

(2) The notification shall specify:

(a) that the applicable requirements of these rules have been read and understood;

(b) the services which will be provided;

(c) the training and experience that qualify for the discharge of the services; and

(d) the type of measurement instrument to be used, frequency of calibration, and source of calibration.

(3) For the purpose of Section R313-16-233, services may include but shall not be limited to:

(a) installation or servicing of radiation machines and associated radiation machine components; and

(b) calibration of radiation machines or radiation measurement instruments or devices.

(4) Individuals shall not perform the services listed in Subsection R313-16-233(3) unless they are specifically stated for that individual on the notification of intent required in Subsection R313-16-233(1) and the complete information required by Subsection R313-16-233(2) has been received by the Executive Secretary.

R313-16-235. Designation of Registrant.

The owner or lessee of a radiation machine is the registrant. The registrant shall be responsible for penalties imposed under the Executive Secretary's escalated enforcement authority, see Rule R313-14.

R313-16-240. Reciprocal Recognition of Registration or License.

Radiation machines from jurisdictions other than the State of Utah may be operated in this state for a period of less than 30 days providing that the requirements of Section R313-16-280 have been met and providing they are properly registered or licensed with the State Agency having jurisdiction over the office directing the activities of the individuals operating the radiation machines. Radiation machines operating under reciprocity may be inspected pursuant to Section

R313-16-290.

R313-16-250. Report of Changes.

The registrant shall send written notification within 14 working days to the Executive Secretary when:

(1) there are changes in location or ownership of a radiation machine;

(2) radiation machines are retired from service;

(3) radiation machines are put in storage or returned to service from storage; or

(4) modifications in facility or equipment are made that might reasonably be expected to effect compliance under the terms of these rules.

R313-16-260. Approval Not Implied.

Registration does not constitute approval of activities performed under the registration and no person shall state or imply that activities under the registration have been approved by the Executive Secretary.

R313-16-270. Transferor, Assembler, or Installer Obligation.

(1) Persons who sell, lease, transfer, lend, dispose, assemble, or install a radiation machine in this state shall notify the Executive Secretary within 14 working days of the following:

(a) the name and address of the person who received the machine and also the name and address of the new registrant of the machine if not the same;

(b) the manufacturer, model, and serial number of the master control of the radiation machine and the number of x-ray tubes transferred; and

(c) the date of transfer of the radiation machine.

(2) Radiation machine equipment or accessories shall not be installed if the equipment will not meet the requirements of these rules when installation is completed.

(3) Reporting Compliance. Assemblers who install one or more components into a radiation machine system or subsystem, shall certify that the equipment meets the standards of these rules. A copy of this certification shall be transmitted to the purchaser and to the Executive Secretary within 14 working days following the completion of the installation.

(4) Certification can be accomplished by providing the following in conjunction with the information required by Section R313-16-250 and Subsection R313-16-270(1):

(a) the full name and address of the assembler and the date of assembly or installation;

(b) a statement as to whether the equipment is a replacement for other equipment, in addition to other equipment, or new equipment in a new facility;

(c) an affirmation that the applicable rules have been met;

(d) a statement of the type and intended use of the radiation machine system or subsystem, for example "radiographic-stationary general purpose x-ray;" and

(e) a list of the components which were assembled or installed into the radiation machine system or subsystem, identifying the components by type, manufacturer, model number, and serial number.

R313-16-275. Obligation of Equipment Registrant or Recipient of New Equipment.

The registrant of a radiation machine shall not allow the equipment to be put into operation until it has been determined that the facility in which it is installed meets the shielding and design requirements of Rule R313- 28; see Sections R313-28-32, R313-28-200 and R313-28-450.

R313-16-280. Out-of-State Radiation Machines.

(1) Whenever a radiation machine is to be brought into the state, for either temporary or extended use, the person proposing to bring the machine into the state shall give written notice to the Executive Secretary at least three working days before the machine is to be used in the state. The notice shall include the type of radiation machine; the manufacturer model and serial number of the master control; the nature, duration, and scope of use; and the exact location where the radiation machine is to be used. If, for a specific case, the three working-day period would impose an undue hardship, the person may, upon application to the Executive Secretary, obtain permission to proceed sooner.

(2) In addition, the out-of-state person shall:

(a) comply with the applicable portions of these rules;

(b) supply the Executive Secretary other information as the Executive Secretary requests.

R313-16-290. Inspection of Radiation Machines and Facilities.

(1) Registrants shall assure that radiation machines registered pursuant to Section R313-16-230 are compliant with these rules. Radiation machines, facilities, and radiation safety programs are subject to inspection to assure compliance with these rules and to assist in lowering radiation exposure to as low as reasonably achievable levels, see Section R313-15-101. Inspections may be performed by representatives of the Executive Secretary or by independent qualified experts.

(2) Inspections may, at the Executive Secretary's discretion, be done after the installation of equipment, or after a change in the facility or equipment which might cause a significant change in radiation output or hazards. Inspections may be completed in accordance with the schedule as defined in Table I.

TABLE I

FACILITY TYPE	MAXIMUM TIME BETWEEN INSPECTIONS
Hospital or Radiation Therapy Facility	one year
Medical Facility using Fluoroscopic or Computed Tomography (CT) Units	one year
Medical Facility Using General Radiographic Devices	two years
Chiropractic	two years
Dental	five years

Podiatry	five years
Veterinary	five years
Industrial Facility with High or Very High Radiation Areas Accessible to Individuals	one year
Industrial Facility Using Cabinet X-Ray Units or Units Designed for Other Industrial Purposes	five years
Other	one to five years

(3) The registrant, in a timely manner, shall pay the appropriate inspection fee after completion of the inspection.

(4) Ionizing radiation producing machines which have been officially placed in storage are exempt from inspection fees but are subject to visual verification of their status by representatives of the Executive Secretary.

R313-16-291. Inspection Services.

Registrants shall only utilize qualified experts who have been registered by the Executive Secretary in accordance with Section R313-16-293. Registrants may also utilize inspectors from the Division of Radiation Control in lieu of registered qualified experts.

R313-16-292. Minimum Qualifications for Registration of Inspection Services.

A qualified expert who is engaged in the business of furnishing or offering to furnish inspection services at facilities shall meet the training and experience criteria developed by the Department. At a minimum, the training and experience shall include:

(1) Bachelor's degree in health physics, chemistry, biology, physical or environmental science plus one year full-time paid professional related experience, such as performing radiation safety evaluations in a hospital.

(a) An advanced degree in a related field may be substituted for one year of required experience; or

(2) Five years full-time paid professional, directly related work experience.

R313-16-293. Application for Registration of Inspection Services.

(1) Each qualified expert who is providing or offering to provide inspection services at facilities registered with the Executive Secretary shall complete an application for registration on a form prescribed by the Executive Secretary and shall submit all information required by the Executive Secretary as indicated on the form. A qualified expert must complete the registration process prior to providing services.

(2) Individuals applying for registration under Section R313-16-293 shall personally sign and submit to the Executive Secretary an attestation statement:

(a) that they have read and understand the requirements of these rules; and

(b) that they will document inspection items defined by the Executive Secretary on a form

prescribed by the Executive Secretary; and

(c) that they will follow guidelines for the evaluation of x-ray equipment defined by the Executive Secretary; and

(d) that, except for those facilities where a registered qualified expert is a full-time employee, they will limit inspections to facilities with which they have no direct conflict of interest; and

(e) that radiation exposure measurements and peak tube potential measurements will be made with instruments which have been calibrated biennially by the manufacturer of the instrument or by a calibration laboratory accredited in x-ray calibration procedures by the American Association of Physicians in Medicine, American Association for Laboratory Accreditation, Conference of Radiation Control Program Directors, Health Physics Society or the National Voluntary Laboratory Accreditation Program; and

(f) that the calibration of radiation exposure measuring and peak tube potential measuring instruments used to evaluate compliance of x-ray systems with the requirements of these rules will include at least secondary level traceability to a National Institute of Standards and Technology, or similar international agency, transfer standard instrument or transfer standard source; and

(g) that they will make available to representatives of the Executive Secretary documents concerning the calibration of any radiation exposure measuring or peak tube potential measuring instrument used to evaluate compliance of x-ray systems; and

(h) that they or the registrant will submit to the Executive Secretary, within 30 calendar days after completion of an inspection, a written report of compliance or noncompliance; and

(i) that reports of items of noncompliance will include:

(i) the name of the facility inspected, and

(ii) the date of the inspection, and

(iii) the manufacturer, model number, and serial number or Utah identification number of the control unit for the radiation machine, and

(iv) the requirements of the rule where compliance was not achieved, and

(v) the manner in which the facility or radiation machine failed to meet the requirements, and

(vi) a signed commitment from the registrant of the radiation machine facility that the problem will be fixed within 30 days of the date the written report of noncompliance is submitted to the Executive Secretary; and

(vii) that all reports of compliance or noncompliance will contain a statement signed by the qualified expert acknowledging under penalties of law that all information contained in the report is truthful, accurate, and complete; and

(viii) that they acknowledge that they are subject to the provisions of Section R313-16-300.

R313-16-294. Issuance of Registration Certificate for Inspection Services.

Upon a determination that an applicant meets the requirements of these rules, the Executive Secretary shall issue a registration certificate for inspection services.

R313-16-295. Expiration of Registration Certificates for Inspection Services.

A registration certificate for inspection services shall expire at the end of the day on the date stated therein.

R313-16-296. Renewal of Registration Certificate for Inspection Services.

(1) Qualified experts shall file an application for renewal of a registration certificate for inspection services 30 days in advance of the registration certificate expiration date and in accordance with Section R313- 16-293.

(2) Applicants shall document that they performed a minimum of two inspections in Utah under these rules each year the previous registration certificate was in effect.

R313-16-297. Revocation of Registration Certificate for Inspection Services.

A registration certificate for inspection services may be revoked by the Executive Secretary for any matter of deliberate misconduct pursuant to Section R313-16-300 or for misfeasance, malfeasance or nonfeasance.

R313-13-16-300. Deliberate Misconduct.

(1) Any registrant, applicant for registration, employee of a registrant or applicant; or any contractor, including a supplier or consultant, subcontractor, employee of a contractor or subcontractor of any registrant or applicant for registration, who knowingly provides to any registrant, applicant, contractor, or subcontractor, any components, equipment, materials, or other goods or services that relate to a registrant's, or applicant's activities in these rules, may not:

(a) Engage in deliberate misconduct that causes or would have caused, if not detected, a registrant or applicant to be in violation of any rule or order; or any term, condition, or limitation of any registration issued by the Executive Secretary; or

(b) Deliberately submit to the Executive Secretary, a registrant, an applicant, or a registrant's or applicant's contractor or subcontractor, information that the person submitting the information knows to be incomplete or inaccurate in some respect material to the Executive Secretary.

(2) A person who violates Subsections R313-16-300(1)(a) or (b) may be subject to enforcement action in accordance with Rule R313-14.

(3) For the purposes of Subsection R313-16-300(1)(a), deliberate misconduct by a person means an intentional act or omission that the person knows:

(a) Would cause a registrant or applicant to be in violation of any rule or order; or any term, condition, or limitation, of any registration issued by the Executive Secretary; or

(b) Constitutes a violation of a requirement, procedure, instruction, contract, purchase order, or policy of a registrant, applicant, contractor, or subcontractor.

KEY

x-ray, inspection

Date of Enactment or Last Substantive Amendment

December 14, 2001

Notice of Continuation

July 23, 2001

Authorizing, Implemented, or Interpreted Law

19-3-104

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Rule R313-17. Administrative Procedures.

As in effect on September 1, 2002

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R313-17-1. Application of Rule.

This rule applies to proceedings under Title 19, Chapter 3 (Radiation Control Act).

R313-17-2. Public Notice and Public Comment Period.

(1) The Executive Secretary shall give public notice of, and an opportunity to comment on the following actions:

(a) Proposed licensing action for license categories 4a, b, c, d and 6 identified in R313-70-7 or a proposed approval or denial of a significant radioactive materials license, license amendment, or license renewal.

(b) The initial proposed registration of an ionizing radiation producing machine which operates at a kilovoltage potential (kVp) greater than 200 in an open beam configuration. R313-17-2(1)(b) does not apply to use in the healing arts.

(c) Board activities that may have significant public interest and the Board requests the Executive Secretary to take public comment on those proposed activities.

(2) Public notice shall allow at least 30 days for public comment.

(3) Public notice may describe more than one action listed in R313-17-2(1) and may combine notice of a public hearing with notice of the proposed action.

(4) Public notice shall be given by publication in a newspaper of general circulation in the area affected by the proposed action. Notice shall also be given to persons on a mailing list developed by the Executive Secretary and those who request in writing to be notified.

R313-17-3. Public Comments, Response to Comments and Requests for Public Hearings.

(1) During the public comment period provided under R313-17-2, any interested person may submit written comments on the proposed action and may request a public hearing, if no hearing has already been scheduled.

(2) A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing.

(3) Comments received during the public comment period and during any hearing shall be considered in making the final decision.

(4) At the time of the final decision, the Executive Secretary shall issue a response to comments, which shall include:

(a) Specific provisions, if any, that have been changed in the final action and the reasons for the change; and

(b) A brief description and response to all significant comments raised during the public comment period or during any hearing.

(5) The Executive Secretary's response to public comments shall be available to the public.

R313-17-4. Public Hearings.

(1) This section applies to hearings for public comment on proposed actions specified in R313-17-2. This section does not govern adjudicative proceedings.

(2) The Executive Secretary shall hold a public hearing whenever he finds, on the basis of requests, a significant degree of public interest in the proposed action.

(3) The Executive Secretary may also hold a public hearing at his discretion, whenever, for instance, a hearing might clarify one or more issues involved in the proposed action.

(4) The Executive Secretary shall hold a public hearing whenever he receives written notice of opposition to a proposed action and a request for a hearing within 30 days of public notice under

R313-17-2.

(5)(a) Public notice of the hearing shall be given as specified in R313-17-2.

(b) The public comment period under R313-17-2 shall automatically be extended to the close of any public hearing under this section. The hearing officer may also extend the comment period by so stating at the hearing.

(c) Whenever possible the Executive Secretary shall schedule a hearing under this section at a time and location convenient to the parties involved.

(d) Any person at the hearing may submit oral or written statements and data concerning the proposed action. Reasonable limits may be set upon the time allowed for oral statements and the submission of statements in writing may be required.

(e) A tape recording or written transcript of the hearing shall be made available to the public.

R313-17-5. Administrative Procedures General Provisions.

(1) PURPOSE AND SCOPE

R313-17-5 through R313-17-13 set out procedures for conducting formal adjudicative proceedings in accordance with the Utah Administrative Procedures Act (UAPA), Section 63-46b-1 et seq. and govern:

(a) the contest of the validity of initial order or notice of violation as described in R313-17- 5(2);

(b) the contest of proposed imposition of civil penalties under Section 19-3-109; and

(c) other formal adjudicative proceedings before the Radiation Control Board.

(2) INITIAL PROCEEDINGS EXEMPT FROM UAPA

Proceedings that culminate in the issuance of an initial order or a notice of violation under the Utah Radiation Control Act are not governed by UAPA as specified in Section 63-46b-1(2)(k). This includes, but is not limited to, initial proceedings regarding:

(a) approval, amendment, denial, termination, transfer, revocation, or renewal of licenses;

(b) requests for variances, exemptions, and other approvals;

(c) notices of violation and orders associated with notices of violation;

(d) orders to comply and orders to cease and desist;

(e) impoundment of radioactive material;

(f) orders for decommissioning;

(g) declaratory orders; and

(h) orders for surveying, monitoring, sampling, or information;

(3) DESIGNATION OF PROCEEDINGS

(a) Contest of an initial order or notice of violation or proposed imposition of civil penalties shall be conducted as a formal proceeding.

(b) The Board in accordance with Section 63-46b-4(3) may convert proceedings which are designated to be formal to informal, and proceedings which are designated as informal to formal if conversion is in the public interest and rights of all parties are not unfairly prejudiced.

(c) Unless otherwise stated in R313, informal adjudicative proceedings shall be conducted in accordance with Section 63-46b-5.

(4) APPEARANCES AND REPRESENTATION

(a) An individual who is a participant to a proceeding, or an officer designated by a partnership, corporation, association, or governmental entity which is a participant to a proceeding, may represent his, her, or its interest in the proceeding.

(b) Any participant may be represented by legal counsel.

(5) COMPUTATION OF TIME

Time shall be computed as provided in Rule 6(a) of the Utah Rules of Civil Procedure except that no additional time shall be allowed for service by mail.

R313-17-6. Commencing a Formal Adjudicative Proceeding.

(1) Except as otherwise permitted by emergency orders as described in Section 63-46b-20, all adjudicative proceedings shall be commenced by either:

(a) a Notice of Agency Action in accordance with Section 63-46b-3, if proceedings are commenced by the Board; or

(b) a Request for Agency Action in accordance with R313-17-6(2), if proceedings are commenced by a person other than the Board.

(2)(a) The validity of initial orders, notices of violation and proposed imposition of civil penalties, as described in R313-17-5(1) and (2), may be contested by filing a written Request for Agency Action with the Board and submitted to:

Executive Secretary, Utah Radiation Control Board

Division of Radiation Control

168 North 1950 West

PO Box 144850

Salt Lake City, Utah 84114-4850.

(b) Any such request is governed by and shall comply with the requirements of Section 63-46b-3 (3) and shall be received for filing within 30 days of the issuance of the Executive Secretary's

order or notice of violation.

(c)(i) All initial orders or notices of violation are effective upon issuance and shall become final if not contested within 30 days after the date issued.

(ii) Issuance of such orders or notices of violation means the time a signed order is mailed by certified mail to the recipient's most current address or hand delivered to the recipient.

(iii) If delivery by certified mail is refused, the issued order or notice shall be sent by regular first class mail.

(d) Failure to timely contest an initial order or notice of violation waives any right of administrative contest, reconsideration, review or judicial appeal.

(3) RESPONSE TO REQUEST FOR AGENCY ACTION

In accordance with Section 63-46b-3(3)(d) and (e), notice of the time and place for a hearing shall be provided in the response to a request for agency action, or shall be provided promptly after the hearing is scheduled.

(4) PRE-HEARING RECORD

The Executive Secretary shall compile an administrative record prior to a scheduled hearing and give any party the opportunity to supplement the record. The pre-hearing record shall also consist of pleadings or other documents filed prior to the hearing.

R313-17-7. Parties and Intervention.

(1) DETERMINATION OF A PARTY.

The following persons are Parties to a formal proceeding governed by these rules:

(a) The person to whom an initial order or notice of violation is directed, such as a person who submitted a license application that was approved or disapproved by order of the Executive Secretary;

(b) The Executive Secretary of the Radiation Control Board; and

(c) All persons whose legal rights or interests are substantially affected by the proceeding, who have standing to participate in the proceeding, and to whom the Board has granted intervention under R313-17-7(2).

(2) INTERVENTION

A petition for intervention may be filed by a petitioner to commence an adjudicative proceeding in accordance with R313-17-6(2) or to intervene after a notice of agency action or request for agency action has been filed. A petitioner for intervention shall meet the following requirements:

(a)(i) The request for agency action is timely filed in accordance with R313-17-6(2); or

(ii) The Petition to Intervene in a proceeding commenced by a party other than the Petitioner for Intervention is filed with the Board, with a copy to all parties, within 20 days from the date of the

Notice of Agency Action or Request for Agency Action.

(b) The Petition to Intervene:

(i) Identifies the proceedings in which intervention is sought;

(ii) Contains a statement of facts demonstrating that the petitioner's legal rights or interests are substantially affected by the formal adjudicative proceeding and the petitioner qualifies as an Intervenor under Section 63-46b-9; and

(iii) Includes a statement of relief sought from the Board, including the basis thereof.

(c) Unless modified by the Presiding Officer, any party may respond to a Petition for Intervention during the period allowed for responsive pleadings under Section 63-46b-6. The Chair of the Radiation Control Board may act as Presiding Officer for purposes of this paragraph.

(d) Intervention may only be granted by order of the Board to a petitioner who meets the requirements of R313-17-7(2)(a) and (b).

(3) DESIGNATION OF PARTIES

Unless otherwise designed by the Hearing Officer:

(a) The person filing a Request for Agency Action shall be the Petitioner and the Executive Secretary shall be the Respondent.

(b) In a proceeding requested by a Petitioner for Intervention, the person granted Intervenor status shall be the Petitioner. The Executive Secretary and the person to whom the challenged order or notice is directed shall be the Respondents.

(4) AMICUS CURIAE (Friend of the Court)

Persons may be permitted by the Presiding Officer(s) to enter an appearance as Amicus Curiae (Friend of the Court), subject to conditions established by the Presiding Officer(s).

R313-17-8. Conduct of Proceedings.

(1) ROLE OF BOARD

(a) The Board is the "agency head" as that term is used in Section 63-46b. The Board is also the "presiding officer," as that term is used in Section 63-46b, except:

(i) The Chair of the Board shall be considered the Presiding Officer to the extent that these rules allow; and

(ii) The Board may by order appoint one or more Presiding Officers to preside over all or a portion of the proceedings.

(b) The Chair of the Board may delegate his or her authority as specified in this Rule to another Board member.

(2) APPOINTED PRESIDING OFFICERS

Unless otherwise explicitly provided in an order of appointment, any appointment of a Presiding Officer shall be for the purpose of conducting all aspects of an adjudicative proceeding, except grant of intervention, stays of orders and issuance of the final order. As used in these rules, the term Presiding Officer shall mean Presiding Officers if more than one Presiding Officer is appointed by the Board.

(3) PRE-HEARING CONFERENCES

The Presiding Officer may direct the Parties to appear at a specified time and place for pre-hearing conferences for the purposes of clarifying the issues, simplifying the evidence, facilitating discovery, expediting proceedings, or encouraging settlement.

(4) BRIEFS

(a) Unless otherwise directed by the Presiding Officer, parties to the proceeding may submit a pre- hearing brief at least five business days before the hearing. Post-hearing briefs will be allowed only as authorized by the Presiding Officer.

(b) Response briefs may not be filed unless permitted by the Presiding Officer.

(5) SCHEDULES

(a) The Presiding Officer shall establish schedules for discovery and other pre-hearing proceedings, for the hearing, and for any post-hearing proceedings.

(b) The parties are encouraged to prepare a joint proposed schedule. If the parties cannot agree on a joint proposed schedule, the Presiding Officer may consider proposals by any party.

(6) EXTENSIONS OF TIME

Except as otherwise provided by statute, the Presiding Officer may approve extensions of time limits established by this rule, and may extend time limits adopted in schedules established under R313-17-8(5). The Presiding Officer may also postpone hearings. The Chair of the Board may act as Presiding Officer for purposes of this paragraph.

(7) MOTIONS

All motions shall be filed a minimum of 12 days before a scheduled hearing, unless otherwise directed by the Presiding Officer. A memorandum in opposition to a motion may be filed within ten days of the filing of the motion, or at least one day before any scheduled hearing, whichever is earlier. Memoranda in support of or in opposition to motions may not exceed 15 pages unless otherwise provided by the Presiding Officer.

(8) FILING AND COPIES OF SUBMISSIONS

The original of any motion, brief, petition for intervention, or other submission shall be filed with the Executive Secretary. In addition, the submitter shall provide a copy to each Presiding Officer and to all parties or their counsel of record.

R313-17-9. Hearings.

(1) CONDUCT OF HEARING

The Presiding Officer shall govern the conduct of a hearing, and may establish reasonable limits on the length of witness testimony, cross-examination, oral arguments or opening and closing statements.

(2) ORDER OF PRESENTATION

Unless otherwise directed by the Presiding Officer, the Executive Secretary shall present its case first, followed by the Petitioner and any other party, then the Executive Secretary, and other parties if appropriate, shall have the opportunity for rebuttal.

R313-17-10. Orders.

(1) PROPOSED ORDERS BY PARTIES

Unless otherwise directed by the Presiding Officer, each party may provide proposed orders for the Presiding Officer within ten days of the conclusion of the hearing.

(2) DRAFT ORDERS OF APPOINTED PRESIDING OFFICERS

(a) The appointed Officer presiding over the adjudicative proceeding shall prepare a recommended order, provide a copy of the order to the Board and mail a copy of the order to all parties or their counsel of record.

(b) The Board shall review the recommended order and hearing record.

(c) The Board may give each party the opportunity to make a presentation to the Board specific to the recommended order.

(d) After deliberation, the Board shall determine whether to accept, reject or modify the recommended order. The Board may remand part or all of the matter to the Presiding Officer for further proceedings.

(e) The Board may modify this procedure with notice to all parties.

(3) FINAL ORDERS

The Board shall issue a final order which shall include the information required by Sections 63-46b-10 or 63-46b-5(1)(i).

R313-17-11. Stays of Orders.

(1) STAY OF ORDERS PENDING ADMINISTRATIVE ADJUDICATION

(a) A party seeking a stay of a challenged order during an adjudicative proceeding shall file a motion with the Board. If granted, a stay would suspend the challenged Order for the period as directed by the Board.

(b) The Board may order a stay of the Order that is the subject of the formal adjudicative proceeding if the party seeking the Stay demonstrates the following:

(i) The party seeking the Stay will suffer irreparable harm unless the stay issues;

(ii) The threatened injury to the party seeking the Stay outweighs whatever damage the proposed stay is likely to cause the party restrained or enjoined;

(iii) The Stay, if issued, would not be adverse to the public interest; and

(iv) There is substantial likelihood that the party seeking the Stay will prevail on the merits of the underlying claim, or the case presents serious issues on the merits which should be the subject of further adjudication.

(2) STAY OF THE ORDER PENDING JUDICIAL REVIEW

(a) A party seeking a stay of the Board's final order during judicial review shall file a motion with the Board.

(b) The Board as Presiding Officer may grant a stay of its order during the pendency of judicial review if the standards of R317-17-11(1)(b) are met.

R313-17-12. Reconsideration.

No agency review under Section 63-46b-12 is available. A party may request reconsideration of an order of the Presiding Officer as provided in Section 63-46b-13.

R313-17-13. Disqualification of Presiding Officer(s).

(1) DISQUALIFICATION OF PRESIDING OFFICER

(a) A member of the Board or other Presiding Officer shall disqualify himself or herself from performing the functions of the Presiding Officer regarding any matter in which he or she, or his or her spouse, or a person within the third degree of relationship to either of them, or the spouse of such person:

(i) Is a party to the proceeding, or an officer, director, or trustee of a party;

(ii) Has acted as an attorney in the proceeding or served as an attorney for, or otherwise represented a party concerning the matter in controversy;

(iii) Knows that he or she has an financial interest, either individually or as a fiduciary, in the subject matter in controversy or in a party to the proceeding;

(iv) Knows that he or she has any other interest that could be substantially affected by the outcome of the proceeding; or

(v) Is likely to be a material witness in the proceeding.

(b) A member of the Board or other Presiding Officer is also subject to disqualification under principles of due process and administrative law.

(2) MOTIONS FOR DISQUALIFICATION

A motion for disqualification shall be made first to the Presiding Officer. If the Presiding Officer is appointed, any determination of the Presiding Officer upon a motion for disqualification may be appealed to the Board.

R313-17-14. Other Forms of Address.

Nothing in these rules shall prevent any person from requesting an opportunity to address the Board as a member of the public, rather than as a party. An opportunity to address the Board shall be granted at the discretion of the Board. However, addressing the Board in this manner does not constitute a request for agency action under R313-17- 6.

R313-17-15. Requests for Records.

Requests for records under the Utah Government Record Access and Management Act, Title 63, Chapter 2, Utah Code Ann., are not governed by R313. See R305-1.

KEY

administrative procedures, public comment, public hearings, orders

Date of Enactment or Last Substantive Amendment

January 10, 1997

Notice of Continuation

July 23, 2001

Authorizing, Implemented, or Interpreted Law

19-3-103.5; 19-3-104

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Rule R313-18. Notices, Instructions and Reports to Workers by Licensees or Registrants--Inspections.

As in effect on September 1, 2002

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R313-18-1. Purpose and Authority.

(1) The purpose of this rule is to establish requirements for notices, instructions and reports by licensees or registrants to individuals engaged in work under a license or registration and options available to such individuals in connection with inspections of licensees or registrants.

(2) The rules set forth herein are adopted pursuant to the provisions of Sections 19-3-104(3) and 19-3-104(6).

R313-18-2. General.

The rules of R313-18 shall apply to all persons who receive, possess, use, own or transfer a source of radiation licensed by or registered with the Department pursuant to the rules in R313-16, R313-19 or R313-22.

R313-18-11. Posting of Notices to Workers.

(1) Licensees or registrants shall post current copies of the following documents:

(a) the rules in R313-15 and R313-18;

(b) the license, certificate of registration, conditions or documents incorporated into the license by reference and amendments thereto;

(c) the operating procedures applicable to work under the license or registration; and

(d) a notice of violation involving radiological working conditions, proposed imposition of civil penalty, order issued pursuant to R313-14, or any response from the licensee or registrant.

(2) If posting of a document specified in R313-18-11(1)(a), (b), or (c) is not practicable, the licensee or registrant may post a notice which describes the document and states where it may be examined.

(3) DRC-04 "Notice to Employees," shall be posted by licensees or registrants wherever individuals work in or frequent a portion of a restricted area.

(4) Documents from the Executive Secretary which are posted pursuant to R313-18-11(1)(d) shall be posted within five working days after receipt of the documents from the Executive Secretary; the licensee's or registrant's response, if there is one, shall be posted for a minimum of five working days after dispatch from the licensee or registrant. The documents shall remain posted for a minimum of five working days or until action correcting the violation has been competed, whichever is later.

(5) Documents, notices or forms posted pursuant to R313-18-11 shall appear in a sufficient number of places to permit individuals engaged in work under the license or registration to observe them on the way to or from any particular work location to which the document applies, shall be conspicuous, and shall be replaced if defaced or altered.

R313-18-12. Instructions to Workers.

(1) All individuals who in the course of employment are likely to receive in a year an occupational dose in excess of 1.0 mSv (100 mrem):

(a) shall be kept informed of the storage, transfer, or use of sources of radiation in the licensee's or registrant's workplace;

(b) shall be instructed in the health protection considerations associated with exposure to radiation or radioactive material to the individual and potential offspring, in precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed;

(c) shall be instructed in, and instructed to observe, to the extent within the worker's control, the applicable provisions of these rules and licenses for the protection of personnel from exposure to radiation or radioactive material;

(d) shall be instructed as to their responsibility to report promptly to the licensee or registrant a condition which may constitute, lead to, or cause a violation of the Act, these rules, or a condition of the licensee's license or unnecessary exposure to radiation or radioactive material;

(e) shall be instructed in the appropriate response to warnings made in the event of an unusual occurrence or malfunction that may involve exposure to radiation or radioactive material; and

(f) shall be advised as to the radiation exposure reports which workers shall be furnished pursuant to R313-18-13.

(2) In determining those individuals subject to the requirements of R313-18-12(1), licensees must take into consideration assigned activities during normal and abnormal situations involving exposure to radiation or radioactive material which can reasonably be expected to occur during the life of a licensed facility. The extent of these instructions shall be commensurate with potential radiological health protection considerations for the workplace.

R313-18-13. Notifications and Reports to Individuals.

(1) Radiation exposure data for an individual and the results of measurements, analyses, and calculations of radioactive material deposited or retained in the body of an individual shall be reported to the individual as specified in R313-18-13. The information reported shall include data and results obtained pursuant to these rules, orders, or license conditions, as shown in records maintained by the licensee or registrant pursuant to R313-15-1107. Notifications and reports shall:

(a) be in writing;

(b) include appropriate identifying data such as the name of the licensee or registrant, the name of the individual, and the individual's identification number, preferably social security number;

(c) include the individual's exposure information; and

(d) contain the following statement:

"This report is furnished to you under the provisions of the Utah Administrative Code Section R313-18- 13. You should preserve this report for further reference."

(2) Licensees or registrants shall furnish to each worker annually a written report of the worker's dose as shown in records maintained by the licensee or registrant pursuant to R313-15-1107.

(3) Licensees or registrants shall furnish a written report of the worker's exposure to sources of radiation at the request of a worker formerly engaged in activities controlled by the licensee or registrant. The report shall include the dose record for each year the worker was required to be monitored pursuant to R313-15-502. The report shall be furnished within 30 days from the date of the request, or within 30 days after the dose of the individual has been determined by the licensee or registrant, whichever is later. The report shall cover the period of time that the worker's activities involved exposure to sources of radiation and shall include the dates and locations of work under the license or registration in which the worker participated during this period.

(4) When a licensee or registrant is required pursuant to R313-15-1202, R313-15-1203, or R313-15-1204 to report to the Executive Secretary an exposure of an individual to sources of radiation, the licensee or the registrant shall also provide the individual a written report on the exposure data included therein. Reports shall be transmitted at a time not later than the transmittal to the Executive Secretary.

(5) At the request of a worker who is terminating employment with the licensee or registrant in

work involving exposure to radiation or radioactive material, during the current year, the licensee or registrant shall provide at termination to the worker, or to the worker's designee, a written report regarding the radiation dose received by that worker from operations of the licensee or registrant during the current year or fraction thereof. If the most recent individual monitoring results are not available at that time, a written estimate of the dose shall be provided together with a clear indication that this is an estimate.

R313-18-14. Presence of Representatives of Licensees or Registrants and Workers During Inspection.

(1) Licensees or registrants shall afford representatives of the Board or the Executive Secretary, at reasonable times, the opportunity to inspect materials, machines, activities, facilities, premises, and records pursuant to these rules.

(2) During an inspection, representatives of the Board or the Executive Secretary may consult privately with workers as specified in R313-18-15. The licensee or registrant may accompany representatives during other phases of an inspection.

(3) If, at the time of inspection, an individual has been authorized by the workers to represent them during Department inspections, the licensee or registrant shall notify the representatives of the Board or the Executive Secretary of the authorization and shall give the workers' representative an opportunity to accompany the representatives during the inspection of physical working conditions.

(4) The workers' representative shall be routinely engaged in work under control of the licensee or registrant and shall have received instructions as specified in R313-18-12.

(5) Different representatives of licensees or registrants and workers may accompany the representatives of the Board or the Executive Secretary during different phases of an inspection if there is no resulting interference with the conduct of the inspection. However, only one workers' representative at a time may accompany the representatives of the Board or the Executive Secretary.

(6) With the approval of the licensee or registrant and the workers' representative, an individual who is not routinely engaged in work under control of the licensee or registrant, for example, a consultant to the licensee or registrant or to the workers' representative, shall be afforded the opportunity to accompany representatives of the Board or the Executive Secretary during the inspection of physical working conditions.

(7) Notwithstanding the other provisions of R313-18-14, representatives of the Board or the Executive Secretary are authorized to refuse to permit accompaniment by an individual who deliberately interferes with a fair and orderly inspection. With regard to areas containing information classified by an Agency of the U.S. Government in the interest of national security, an individual who accompanies an inspector may have access to such information only if authorized to do so. With regard to areas containing proprietary information, the workers' representative for that area shall be an individual previously authorized by the licensee or registrant to enter that area.

R313-18-15. Consultation with Workers During Inspections.

(1) Representatives of the Board or the Executive Secretary may consult privately with workers concerning matters of occupational radiation protection and other matters related to applicable provisions of these rules and licenses to the extent the representatives deem necessary for the

conduct of an effective and thorough inspection.

(2) During the course of an inspection, workers may bring privately to the attention of the representatives of the Board or the Executive Secretary, either orally or in writing, a past or present condition which the worker has reason to believe may have contributed to or caused a violation of the Act, these rules, or license condition, or an unnecessary exposure of an individual to sources of radiation under the licensee's or registrant's control. A notice in writing shall comply with the requirements of R313-18-16(1).

(3) The provisions of R313-18-15(2) shall not be interpreted as authorization to disregard instructions pursuant to R313-18-12.

R313-18-16. Request by Workers for Inspections.

(1) A worker or representative of workers believing that a violation of the Act, these rules, or license conditions exists or has occurred in work under a license or registration with regard to radiological working conditions in which the worker is engaged, may request an inspection by giving notice of the alleged violation to the Executive Secretary. The notice shall be in writing, shall set forth the specific grounds for the notice, and shall be signed by the worker or representative of the workers. A copy shall be provided to the licensee or registrant by representatives of the Board or the Executive Secretary no later than at the time of inspection except that, upon the request of the worker giving the notice, his name and the name of individuals referred to therein shall not appear in a copy or on a record published, released, or made available by the Department except for good cause shown.

(2) If, upon receipt of the notice, representatives of the Board or the Executive Secretary, determine that the complaint meets the requirements set forth in R313-18-16(1), and that there are reasonable grounds to believe that the alleged violation exists or has occurred, an inspection shall be made as soon as practicable to determine if the alleged violation exists or has occurred. Inspections pursuant to R313-18-16 need not be limited to matters referred to in the complaint.

(3) A licensee, registrant or contractor or subcontractor of a licensee or registrant shall not discharge or discriminate against a worker because that worker has filed a complaint or instituted or caused to be instituted a proceeding under these rules or has testified or is about to testify in a proceeding or because of the exercise by the worker on behalf of the worker or others of an option afforded by R313-18.

R313-18-17. Inspections Not Warranted -- Informal Review.

(1)(a) If the representatives of the Board or the Executive Secretary determine, with respect to a complaint under Section R313-18-16, that an inspection is not warranted because there are no reasonable grounds to believe that a violation exists or has occurred, the Executive Secretary shall notify the complainant in writing of that determination. The complainant may obtain review of the determination by submitting a written statement of position with the Executive Secretary. The Executive Secretary will provide the licensee or registrant with a copy of the statement by certified mail, excluding, at the request of the complainant, the name of the complainant. The licensee or registrant may submit an opposing written statement of position with the Executive Secretary. The Executive Secretary will provide the complainant with a copy of the statement by certified mail.

(b) Upon the request of the complainant, the Board may hold an informal conference in which the complainant and the licensee or registrant may orally present their views. An informal conference may also be held at the request of the licensee or registrant, but disclosure of the identity of the complainant will be made only following receipt of written authorization from the complainant.

After considering written and oral views presented, the Board shall affirm, modify, or reverse the determination of the representatives of the Board or the Executive Secretary and furnish the complainant and the licensee or registrant a written notification of the decision and the reason therefor.

(2) If the Executive Secretary determines that an inspection is not warranted because the requirements of R313-18-16(1) have not been met, the complainant shall be notified in writing of the determination. The determination shall be without prejudice to the filing of a new complaint meeting the requirements of R313-18-16(1).

KEY

radioactive material, inspection, radiation safety, licensing

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June 11, 1999

Notice of Continuation

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Authorizing, Implemented, or Interpreted Law

19-3-104; 19-3-108

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Rule R313-19. Requirements of General Applicability to Licensing of Radioactive Material.

As in effect on September 1, 2002

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R313-19-1. Purpose and Authority.

(1) The purpose of this rule is to prescribe requirements governing the licensing of radioactive material. This rule also gives notice to all persons who knowingly provide to any licensee, applicant, certificate of registration holder, contractor, or subcontractor, components, equipment, materials, or other goods or services, that relate to a licensee's, applicant's or certificate of registration holder's activities subject to these rules, that they may be individually subject to Executive Secretary enforcement action for violation of Section R313-19-5.

(2) The rules set forth herein are adopted pursuant to the provisions of Sections 19-3-104(3) and 19-3-104(6).

R313-19-2. General.

(1) A person shall not receive, possess, use, transfer, own or acquire radioactive material except as authorized in a specific or general license issued pursuant to Rules R313-21 or R313-22 or as otherwise provided in Rule R313-19.

(2) In addition to the requirements of Rules R313-19, R313-21 or R313-22, all licensees are subject to the requirements of Rules R313-12, R313-15, and R313-18. Licensees authorized to use sealed sources containing radioactive materials in panoramic irradiators with dry or wet storage of radioactive sealed sources, underwater irradiators, or irradiators with high dose rates from radioactive sealed sources are subject to the requirements of Rule R313-34. licensees engaged in industrial radiographic operations are subject to the requirements of Rule R313-36, licensees using radionuclides in the healing arts are subject to the requirements of Rule R313-32, licensees engaged in land disposal of radioactive material are subject to the requirements of Rule R313-25, and licensees engaged in wireline and subsurface tracer studies are subject to the requirements of Rule R313-38.

R313-19-5. Deliberate Misconduct.

(1) Any licensee, certificate of registration holder, applicant for a license or certificate of registration, employee of a licensee, certificate of registration holder or applicant; or any contractor, including a supplier or consultant, subcontractor, employee of a contractor or subcontractor of any licensee or certificate of registration holder or applicant for a license or certificate of registration, who knowingly provides to any licensee, applicant, certificate holder, contractor, or subcontractor, any components, equipment, materials, or other goods or services that relate to a licensee's, certificate holder's or applicant's activities in these rules, may not:

(a) Engage in deliberate misconduct that causes or would have caused, if not detected, a licensee, certificate of registration holder, or applicant to be in violation of any rule or order; or any term, condition, or limitation of any license issued by the Executive Secretary; or

(b) Deliberately submit to the Executive Secretary, a licensee, certificate of registration holder, an applicant, or a licensee's, certificate holder's or applicant's, contractor or subcontractor, information that the person submitting the information knows to be incomplete or inaccurate in some respect material to the Executive Secretary.

(2) A person who violates Subsections R313-19-5(1)(a) or (b) may be subject to enforcement action in accordance with Rule R313-14.

(3) For the purposes of Subsection R313-19-5(1)(a), deliberate misconduct by a person means an intentional act or omission that the person knows:

(a) Would cause a licensee, certificate of registration holder or applicant to be in violation of any rule or order; or any term, condition, or limitation, of any license issued by the Executive Secretary; or

(b) Constitutes a violation of a requirement, procedure, instruction, contract, purchase order, or policy of a licensee, certificate of registration holder, applicant, contractor, or subcontractor.

R313-19-13. Exemptions.

(1) Source material.

(a) A person is exempt from Rules R313-19, R313-21, and R313-22 to the extent that the person receives, possesses, uses, owns, or transfers source material in a chemical mixture, compound,

solution or alloy in which the source material is by weight less than 1/20 of one percent (0.05 percent) of the mixture, compound, solution, or alloy.

(b) A person is exempt from Rules R313-19, R313-21, and R313-22 to the extent that the person receives, possesses, uses or transfers unrefined and unprocessed ore containing source material; provided, that, except as authorized in a specific license, such person shall not refine or process the ore.

(c) A person is exempt from Rules R313-19, R313-21, and R313-22 to the extent that the person receives, possesses, uses or transfers:

(i) any quantities of thorium contained in:

(A) incandescent gas mantles,

(B) vacuum tubes,

(C) welding rods,

(D) electric lamps for illuminating purposes: provided that, each lamp does not contain more than 50 milligrams of thorium,

(E) germicidal lamps, sunlamps, and lamps for outdoor or industrial lighting provided that each lamp does not contain more than two grams of thorium,

(F) rare earth metals and compounds, mixtures, and products containing not more than 0.25 percent by weight thorium, uranium, or any combination of these, or

(G) personnel neutron dosimeters provided that each dosimeter does not contain more than 50 milligrams of thorium;

(ii) source material contained in the following products:

(A) glazed ceramic tableware, provided that the glaze contains not more than 20 percent by weight source material,

(B) piezoelectric ceramic containing not more than two percent by weight source material, or

(C) glassware containing not more than ten percent by weight source material, but not including commercially manufactured glass brick, pane glass, ceramic tile, or other glass or ceramic used in construction;

(iii) photographic film, negatives and prints containing uranium or thorium;

(iv) a finished product or part fabricated of, or containing, tungsten-thorium or magnesium-thorium alloys, provided that the thorium content of the alloy does not exceed four percent by weight and that this exemption shall not be deemed to authorize the chemical, physical, or metallurgical treatment or processing of the product or part;

(v) uranium contained in counterweights installed in aircraft, rockets, projectiles, and missiles, or stored or handled in connection with installation or removal of the counterweights, provided that:

(A) the counterweights are manufactured in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission authorizing distribution by the licensee pursuant to 10 CFR Part 40,

(B) each counterweight has been impressed with the following legend clearly legible through any plating or other covering: "DEPLETED URANIUM",

(C) each counterweight is durably and legibly labeled or marked with the identification of the manufacturer and the statement: "UNAUTHORIZED ALTERATIONS PROHIBITED",

(D) The requirements specified in Subsections R313-19-13(1)(c)(v)(B) and (C) need not be met by counterweights manufactured prior to December 31, 1969, provided that such counterweights are impressed with the legend, "CAUTION - RADIOACTIVE MATERIAL - URANIUM", as previously required by the rules, and

(E) the exemption contained in Subsection R313-19-13(1)(c)(v) shall not be deemed to authorize the chemical, physical, or metallurgical treatment or processing of counterweights other than repair or restoration of any plating or other covering;

(vi) natural or depleted uranium metal used as shielding constituting part of a shipping container which is conspicuously and legibly impressed with the legend "CAUTION - RADIOACTIVE SHIELDING - URANIUM" and the uranium metal is encased in mild steel or equally fire resistant metal of minimum wall thickness of one eighth inch (3.2 mm);

(vii) thorium contained in finished optical lenses, provided that each lens does not contain more than 30 percent by weight of thorium, and that this exemption shall not be deemed to authorize either:

(A) the shaping, grinding, or polishing of a lens or manufacturing processes other than the assembly of such lens into optical systems and devices without alteration of the lens, or

(B) the receipt, possession, use, or transfer of thorium contained in contact lenses, or in spectacles, or in eyepieces in binoculars or other optical instruments;

(viii) uranium contained in detector heads for use in fire detection units, provided that each detector head contains not more than 0.005 microcurie (185.0 Bq) of uranium; or

(ix) thorium contained in a finished aircraft engine part containing nickel-thoria alloy, provided that:

(A) the thorium is dispersed in the nickel-thoria alloy in the form of finely divided thoria (thorium dioxide), and

(B) the thorium content in the nickel-thoria alloy does not exceed four percent by weight.

(d) The exemptions in Subsection R313-19-13(1)(c) do not authorize the manufacture of any of the products described.

(2) Radioactive material other than source material.

(a) Exempt concentrations.

(i) Except as provided in Subsection R313-19-13(2)(a)(ii) a person is exempt from Rules R313-19, R313-21 and R313-22 to the extent that the person receives, possesses, uses, transfers, owns or acquires products or materials containing:

(A) radioactive material introduced in concentrations not in excess of those listed in Section R313- 19-70, or

(B) natural occurring radioactive materials containing less than 15 picocuries per gram radium-226.

(ii) A person may not introduce radioactive material into a product or material knowing or having reason to believe that it will be transferred to persons exempt under Subsection R313-19-13(2)(a)(i) or equivalent regulations of a Licensing State, the U.S. Nuclear Regulatory Commission or an Agreement State, except in accordance with a specific license issued pursuant to Subsection R313-22-75(1) or the general license provided in Section R313-19-30.

(b) Exempt quantities.

(i) Except as provided in Subsections R313-19-13(2)(b)(ii) and (iii) a person is exempt from these rules to the extent that the person receives, possesses, uses, transfers, owns, or acquires radioactive material in individual quantities which do not exceed the applicable quantity set forth in Section R313-19-71.

(ii) Subsection R313-19-13(2)(b) does not authorize the production, packaging or repackaging of radioactive material for purposes of commercial distribution, or the incorporation of radioactive material into products intended for commercial distribution.

(iii) A person may not, for purposes of commercial distribution, transfer radioactive material in the individual quantities set forth in Section R313-19-71, knowing or having reason to believe that the quantities of radioactive material will be transferred to persons exempt under Subsection R313-19-13(2)(b) or equivalent regulations of a Licensing State, the U.S. Nuclear Regulatory Commission or an Agreement State, except in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission, pursuant to 10 C.F.R. Part 32 or by the Executive Secretary pursuant to Subsection R313-22-75(2), which license states that the radioactive material may be transferred by the licensee to persons exempt under Subsection R313-19-13(2)(b) or the equivalent regulations of a Licensing State, the U.S. Nuclear Regulatory Commission or an Agreement State.

(iv) A person who possesses radioactive material received or acquired prior to September 25, 1971, under the general license formerly provided in 10 C.F.R. Part 31.5 is exempt from the requirements for a license set forth in Rule R313-19 to the extent that the person possesses, uses, transfers or owns the radioactive material. This exemption does not apply for radium-226.

(c) Exempt items.

(i) Certain items containing radioactive material. Except for persons who apply radioactive material to, or persons who incorporate radioactive material into the following products, a person is exempt from these rules to the extent that person receives, possesses, uses, transfers, owns or acquires the following products:

(A) Timepieces or hands or dials containing not more than the following specified quantities of radioactive material and not exceeding the following specified levels of radiation:

(I) 25 millicuries (925.0 MBq) of tritium per timepiece;

(II) five millicuries (185.0 MBq) of tritium per hand;

(III) 15 millicuries (555.0 MBq) of tritium per dial. Bezels when used shall be considered as part of the dial;

(IV) 100 microcuries (3.7 MBq) of promethium-147 per watch or 200 microcuries (7.4 MBq) of promethium-147 per any other timepiece;

(V) 20 microcuries (0.74 MBq) of promethium-147 per watch hand or 40 microcuries (1.48 MBq) of promethium-147 per other timepiece hand;

(VI) 60 microcuries (2.22 MBq) of promethium-147 per watch dial or 120 microcuries (4.44 MBq) of promethium-147 per other timepiece dial. Bezels when used shall be considered as part of the dial;

(VII) the radiation dose rate from hands and dials containing promethium-147 will not exceed, when measured through 50 milligrams per square centimeter of absorber:

for wrist watches, 0.1 millirad (1.0 uGy) per hour at ten centimeters from any surface;

for pocket watches, 0.1 millirad (1.0 uGy) per hour at one centimeter from any surface;

for other timepieces, 0.2 millirad (2.0 uGy) per hour at ten centimeters from any surface;

(VIII) one microcurie (37.0 kBq) of radium-226 per timepiece in timepieces manufactured prior to the effective date of these rules.

(B) Lock illuminators containing not more than 15 millicuries (555.0 MBq) of tritium or not more than two millicuries (74.0 MBq) of promethium-147 installed in automobile locks. The levels of radiation from each lock illuminator containing promethium-147 will not exceed one millirad (10 uGy) per hour at one centimeter from any surface when measured through 50 milligrams per square centimeter of absorber.

(C) Precision balances containing not more than one millicurie (37.0 MBq) of tritium per balance or not more than 0.5 millicurie (18.5 MBq) of tritium per balance part.

(D) Automobile shift quadrants containing not more than 25 millicuries (925 MBq) of tritium.

(E) Marine compasses containing not more than 750 millicuries (27.8 GBq) of tritium gas and other marine navigational instruments containing not more than 250 millicuries (9.25 GBq) of tritium gas.

(F) Thermostat dials and pointers containing not more than 25 millicuries (925.0 MBq) of tritium per thermostat.

(G) Electron tubes, including spark gap tubes, power tubes, gas tubes including glow lamps, receiving tubes, microwave tubes, indicator tubes, pick-up tubes, radiation detection tubes, and other completely sealed tubes that are designed to conduct or control electrical currents; provided that each tube does not contain more than one of the following specified quantities of radioactive material:

(I) 150 millicuries (5.55 GBq) of tritium per microwave receiver protector tube or ten millicuries (370.0 MBq) of tritium per any other electron tube;

(II) one microcurie (37.0 kBq) of cobalt-60;

(III) five microcuries (185.0 kBq) of nickel-63;

(IV) 30 microcuries (1.11 MBq) of krypton-85;

(V) five microcuries (185.0 kBq) of cesium-137;

(VI) 30 microcuries (1.11 MBq) of promethium-147;

(VII) one microcurie (37.0 kBq) of radium-226;

and provided further, that the radiation dose rate from each electron tube containing radioactive material will not exceed one millirad (10.0 uGy) per hour at one centimeter from any surface when measured through seven milligrams per square centimeter of absorber.

(H) Ionizing radiation measuring instruments containing, for purposes of internal calibration or standardization, one or more sources of radioactive material, provided that:

(I) each source contains no more than one exempt quantity set forth in Section R313-19-71; and

(II) each instrument contains no more than ten exempt quantities. For purposes of this requirement, an instrument's source(s) may contain either one type or different types of radionuclides and an individual exempt quantity may be composed of fractional parts of one or more of exempt quantities in Section R313-19-71, provided that the sum of the fractions shall not exceed unity;

(III) for purposes of Subsection R313-19-13(2)(c)(i)(H), 0.05 microcurie (1.85 kBq) of americium-241 is considered an exempt quantity under Section R313-19-71.

(I) Spark gap irradiators containing not more than one microcurie (37.0 kBq) of cobalt-60 per spark gap irradiator for use in electrically ignited fuel oil burners having a firing rate of at least three gallons (11.4 liters) per hour.

(ii) Self-luminous products containing radioactive material.

(A) Tritium, krypton-85 or promethium-147. Except for persons who manufacture, process or produce self-luminous products containing tritium, krypton-85 or promethium-147, a person is exempt from these rules to the extent that the person receives, possesses, uses, transfers, owns, or acquires tritium, krypton-85 or promethium-147 in self- luminous products manufactured, processed, produced, imported or transferred in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission pursuant to 10 C.F.R. Part 32.22, which license authorizes the transfer of the product to persons who are exempt from regulatory requirements. The exemption in Subsection R313-19-13(2)(c)(ii) does not apply to tritium, krypton-85, or promethium-147 used in products for frivolous purposes or in toys or adornments.

(B) Radium-226. A person is exempt from these rules, to the extent that such person receives, possesses, uses, transfers, or owns articles containing less than 0.1 microcurie (3.7 kBq) of radium-226 which were acquired prior to the effective date of these rules.

(iii) Gas and aerosol detectors containing radioactive material.

(A) Except for persons who manufacture, process, or produce gas and aerosol detectors containing radioactive material, a person is exempt from these rules to the extent that the person receives, possesses, uses, transfers, owns, or acquires radioactive material in gas and aerosol detectors designed to protect life or property from fires and airborne hazards, provided that detectors containing radioactive material shall have been manufactured, imported, or transferred in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission pursuant to 10 C.F.R. Part 32.26, or a Licensing State pursuant to Subsection R313-22-75(3) or equivalent requirements, which authorizes the transfer of the detectors to persons who are exempt from regulatory requirements.

(B) Gas and aerosol detectors previously manufactured and distributed to general licensees in accordance with a specific license issued by an Agreement State shall be considered exempt under Subsection R313-19- 13(2)(c)(iii)(A), provided that the device is labeled in accordance with the specific license authorizing distribution of the general licensed device, and provided further that they meet the requirements of Subsection R313-22-75(3).

(C) Gas and aerosol detectors containing naturally occurring and accelerator-produced radioactive material (NARM) previously manufactured and distributed in accordance with a specific license issued by a Licensing State shall be considered exempt under Subsection R313-19-13(2)(c)(iii)(A), provided that the device is labeled in accordance with the specific license authorizing distribution, and provided further that they meet the requirements of Subsection R313-22- 75(3).

(iv) Capsules containing carbon-14 urea for "in vivo" diagnostic use for humans.

(A) Except as provided in Subsection R313-19-13(2)(c)(iv)(B), any person is exempt from the requirements in Rules R313-19 and R313-32 provided that the person receives, possesses, uses, transfers, owns, or acquires capsules containing 37 kBq (1 uCi) carbon-14 urea (allowing for nominal variation that may occur during the manufacturing process) each, for "in vivo" diagnostic use for humans.

(B) Any person who desires to use the capsules for research involving human subjects shall apply for and receive a specific license pursuant to Rule R313-32.

(C) Nothing in Subsection R313-19-13(2)(c)(iv) relieves persons from complying with applicable United States Food and Drug Administration, other Federal, and State requirements governing receipt, administration, and use of drugs.

(v) Resins containing scandium-46 and designed for sand consolidation in oil wells. A person is exempt from these rules to the extent that the person receives, possesses, uses, transfers, owns or acquires synthetic plastic resins containing scandium-46 which are designed for sand consolidation in oil wells. The resins shall have been manufactured or imported in accordance with a specific license issued by the U.S. Nuclear Regulatory Commission, or shall have been manufactured in accordance with the specifications contained in a specific license issued by the Executive Secretary or an Agreement State to the manufacturer of resins pursuant to licensing requirements equivalent to those in 10 C.F.R. Part 32.16 and 32.17. This exemption does not authorize the manufacture of any resins containing scandium-46.

(vi) With respect to Subsections R313-19-13(2)(b)(iii), R313-19-13(2)(c)(i), (iii) and (iv), the authority to transfer possession or control by the manufacturer, processor, or producer of equipment, devices, commodities, or other products containing byproduct material whose subsequent possession, use, transfer, and disposal by other persons is exempted from regulatory requirements may be obtained only from the U.S. Nuclear Regulatory Commission, Washington,

D.C. 20555.

R313-19-20. Types of Licenses.

Licenses for radioactive materials are of two types: general and specific.

(1) General licenses provided in Rule R313-21 are effective without the filing of applications with the Executive Secretary or the issuance of licensing documents to the particular persons, although the filing of a registration certificate with the Executive Secretary may be required by the particular general license. The general licensee is subject to the other applicable portions of these rules and limitations of the general license.

(2) Specific licenses require the submission of an application to the Executive Secretary and the issuance of a licensing document by the Executive Secretary. The licensee is subject to applicable portions of these rules as well as limitations specified in the licensing document.

R313-19-25. Prelicensing Inspection.

The Executive Secretary may verify information contained in applications and secure additional information deemed necessary to make a reasonable determination as to whether to issue a license and whether special conditions should be attached thereto by visiting the facility or location where radioactive materials would be possessed or used, and by discussing details of the proposed possession or use of the radioactive materials with the applicant or representatives designated by the applicant. Such visits may be made by representatives of the Board or the Executive Secretary.

R313-19-30. Reciprocal Recognition of Licenses.

(1) Subject to these rules, a person who holds a specific license from the U.S. Nuclear Regulatory Commission, an Agreement State, or Licensing State, and issued by the agency having jurisdiction where the licensee maintains an office for directing the licensed activity and at which radiation safety records are normally maintained, is hereby granted a general license to conduct the activities authorized in the licensing document within this state, except in areas of exclusive federal jurisdiction, for a period not in excess of 180 days in a calendar year provided that:

(a) the licensing document does not limit the activity authorized by the document to specified installations or locations;

(b) the out-of-state licensee notifies the Executive Secretary in writing at least three days prior to engaging in such activity. Notifications shall indicate the location, period, and type of proposed possession and use within the state, and shall be accompanied by a copy of the pertinent licensing document. If, for a specific case, the three-day period would impose an undue hardship on the out-of-state licensee, the licensee may, upon application to the Executive Secretary, obtain permission to proceed sooner. The Executive Secretary may waive the requirement for filing additional written notifications during the remainder of the calendar year following the receipt of the initial notification from a person engaging in activities under the general license provided in Subsection R313-19-30(1);

(c) the out-of-state licensee complies with all applicable rules of the Board and with the terms and conditions of the licensing document, except those terms and conditions which may be inconsistent with applicable rules of the Board;

(d) the out-of-state licensee supplies other information as the Executive Secretary may request;

and

(e) the out-of-state licensee shall not transfer or dispose of radioactive material possessed or used under the general license provided in Subsection R313-19-30(1) except by transfer to a person:

(i) specifically licensed by the Executive Secretary or by the U.S. Nuclear Regulatory Commission, a Licensing State, or an Agreement State to receive the material, or

(ii) exempt from the requirements for a license for material under Subsection R313-19-13(2)(a).

(2) Notwithstanding the provisions of Subsection R313-19-30(1), a person who holds a specific license issued by the U.S. Nuclear Regulatory Commission, a Licensing State, or an Agreement State authorizing the holder to manufacture, transfer, install, or service a device described in Subsection R313-21-22(4) within the areas subject to the jurisdiction of the licensing body is hereby granted a general license to install, transfer, demonstrate, or service a device in this state provided that:

(a) the person shall file a report with the Executive Secretary within thirty days after the end of a calendar quarter in which a device is transferred to or installed in this state. Reports shall identify each general licensee to whom a device is transferred by name and address, the type of device transferred, and the quantity and type of radioactive material contained in the device;

(b) the device has been manufactured, labeled, installed, and serviced in accordance with applicable provisions of the specific license issued to the person by the Nuclear Regulatory Commission, a Licensing State, or an Agreement State;

(c) the person shall assure that any labels required to be affixed to the device under rules of the authority which licensed manufacture of the device bear a statement that "Removal of this label is prohibited"; and

(d) the holder of the specific license shall furnish to the general licensee to whom the device is transferred or on whose premises a device is installed a copy of the general license contained in Subsection R313-21-22(4) or in equivalent rules of the agency having jurisdiction over the manufacture and distribution of the device.

(3) The Executive Secretary may withdraw, limit, or qualify his acceptance of a specific license or equivalent licensing document issued by the U.S. Nuclear Regulatory Commission, a Licensing State or an Agreement State, or a product distributed pursuant to the licensing document, upon determining that the action is necessary in order to prevent undue hazard to public health and safety or the environment.

R313-19-34. Terms and Conditions of Licenses.

(1) Licenses issued pursuant to Rule R313-19 shall be subject to provisions of the Act, now or hereafter in effect, and to all rules, and orders of the Executive Secretary.

(2) Licenses issued or granted under Rules R313-21 and R313-22 and rights to possess or utilize radioactive material granted by a license issued pursuant to Rules R313-21 and R313-22 shall not be transferred, assigned, or in any manner disposed of, either voluntarily or involuntarily, directly or indirectly, through transfer of control of a license to a person unless the Executive Secretary shall, after securing full information find that the transfer is in accordance with the provisions of the Act now or hereafter in effect, and to all rules, and orders of the Executive Secretary, and

shall give his consent in writing.

(3) Persons licensed by the Executive Secretary pursuant to Rules R313-21 and R313-22 shall confine use and possession of the material licensed to the locations and purposes authorized in the license.

(4) Licensees shall notify the Executive Secretary in writing and request termination of the license when the licensee decides to terminate activities involving materials authorized under the license.

(5) Licensees shall notify the Executive Secretary in writing immediately following the filing of a voluntary or involuntary petition for bankruptcy under any Chapter of Title 11, Bankruptcy, of the United States Code by or against:

(a) the licensee;

(b) an entity, as that term is defined in 11 U.S.C.101(14), controlling the licensee or listing the license or licensee as property of the estate; or

(c) an affiliate, as that term is defined in 11 U.S.C.101(2), of the licensee.

(6) The notification specified in Subsection R313-19-34(5) shall indicate:

(a) the bankruptcy court in which the petition for bankruptcy was filed; and

(b) the date of the filing of the petition.

(7) Licensees required to submit emergency plans pursuant to Subsection R313-22-32(8) shall follow the emergency plan approved by the Executive Secretary. The licensee may change the approved plan without the Executive Secretary's approval only if the changes do not decrease the effectiveness of the plan. The licensee shall furnish the change to the Executive Secretary and to affected off-site response organizations within six months after the change is made. Proposed changes that decrease, or potentially decrease, the effectiveness of the approved emergency plan may not be implemented without prior application to and prior approval by the Executive Secretary.

R313-19-41. Transfer of Material.

(1) Licensees shall not transfer radioactive material except as authorized pursuant to Section R313- 19-41.

(2) Except as otherwise provided in the license and subject to the provisions of Subsections R313-19- 41(3) and (4), licensees may transfer radioactive material:

(a) to the Executive Secretary, if prior approval from the Executive Secretary has been received;

(b) to the U.S. Department of Energy;

(c) to persons exempt from the rules in Rule R313-19 to the extent permitted under the exemption;

(d) to persons authorized to receive the material under terms of a general license or its equivalent, or a specific license or equivalent licensing document, issued by the Executive

Secretary, the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State, or to a person otherwise authorized to receive the material by the federal government or an agency thereof, the Executive Secretary, an Agreement State or a Licensing State; or

(e) as otherwise authorized by the Executive Secretary in writing.

(3) Before transferring radioactive material to a specific licensee of the Executive Secretary, the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State, or to a general licensee who is required to register with the Executive Secretary, the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State prior to receipt of the radioactive material, the licensee transferring the material shall verify that the transferee's license authorizes the receipt of the type, form, and quantity of radioactive material to be transferred.

(4) The following methods for the verification required by Subsection R313-19-41(3) are acceptable:

(a) the transferor may possess, and read a current copy of the transferee's specific license or registration certificate;

(b) the transferor may possess a written certification by the transferee that the transferee is authorized by license or registration certificate to receive the type, form, and quantity of radioactive material to be transferred, specifying the license or registration certificate number, issuing agency, and expiration date;

(c) for emergency shipments, the transferor may accept oral certification by the transferee that the transferee is authorized by license or registration certificate to receive the type, form, and quantity of radioactive material to be transferred, specifying the license or registration certificate number, issuing agency, and expiration date, provided that the oral certification is confirmed in writing within ten days;

(d) the transferor may obtain other information compiled by a reporting service from official records of the Executive Secretary, the U.S. Nuclear Regulatory Commission, an Agreement State, or a Licensing State regarding the identity of licensees and the scope and expiration dates of licenses and registration; or

(e) when none of the methods of verification described in Subsection R313-19-41(4) are readily available or when a transferor desires to verify that information received by one of the methods is correct or up-to-date, the transferor may obtain and record confirmation from the Executive Secretary, the U.S. Nuclear Regulatory Commission, an Agreement State, or a Licensing State that the transferee is licensed to receive the radioactive material.

(5) Shipment and transport of radioactive material shall be in accordance with the provisions of Section R313-19-100.

R313-19-50. Reporting Requirements.

(1) Licensees shall notify the Executive Secretary as soon as possible but not later than four hours after the discovery of an event that prevents immediate protective actions necessary to avoid exposures to radiation or radioactive materials that could exceed regulatory limits or releases of licensed material that could exceed regulatory limits. Events may include fires, explosions, toxic gas releases, etc.

(2) The following events involving licensed material require notification of the Executive Secretary

by the licensee within 24 hours:

(a) an unplanned contamination event that:

(i) requires access to the contamination area, by workers or the public, to be restricted for more than 24 hours by imposing additional radiological controls or by prohibiting entry into the area;

(ii) involves a quantity of material greater than five times the lowest annual limit on intake specified in Appendix B of 10 CFR 20.1001 through 20.2402 (2000), which is incorporated by reference, for the material; and

(iii) has access to the area restricted for a reason other than to allow radionuclides with a half-life of less than 24 hours to decay prior to decontamination; or

(b) an event in which equipment is disabled or fails to function as designed when:

(i) the equipment is required by rule or license condition to prevent releases exceeding regulatory limits, to prevent exposures to radiation and radioactive materials exceeding regulatory limits, or to mitigate the consequences of an accident;

(ii) the equipment is required by rule or license condition to be available and operable; and

(iii) no redundant equipment is available and operable to perform the required safety function; or

(c) an event that requires unplanned medical treatment at a medical facility of an individual with spreadable radioactive contamination on the individual's clothing or body; or

(d) an unplanned fire or explosion damaging licensed material or a device, container, or equipment containing licensed material when:

(i) the quantity of material involved is greater than five times the lowest annual limit on intake specified in Appendix B of 10 CFR 20.1001 through 20.2402 (2000), which is incorporated by reference, for the material; and

(ii) the damage affects the integrity of the licensed material or its container.

(3) Preparation and submission of reports. Reports made by licensees in response to the requirements of Section R313-19-50 must be made as follows:

(a) licensees shall make reports required by Subsections R313-19-50(1) and (2) by telephone to the Executive Secretary. To the extent that the information is available at the time of notification, the information provided in these reports must include:

(i) the caller's name and call back telephone number;

(ii) a description of the event, including date and time;

(iii) the exact location of the event;

(iv) the radionuclides, quantities, and chemical and physical form of the licensed material involved; and

(v) available personnel radiation exposure data.

(b) Written report. A licensee who makes a report required by Subsections R313-19-50(1) or (2) shall submit a written follow-up report within 30 days of the initial report. Written reports prepared pursuant to other rules may be submitted to fulfill this requirement if the reports contain all of the necessary information and the appropriate distribution is made. These written reports shall be sent to the Executive Secretary. The report shall include the following:

(i) A description of the event, including the probable cause and the manufacturer and model number, if applicable, of equipment that failed or malfunctioned;

(ii) the exact location of the event;

(iii) the radionuclides, quantities, and chemical and physical form of the licensed material involved;

(iv) date and time of the event;

(v) corrective actions taken or planned and results of evaluations or assessments; and

(vi) the extent of exposure of individuals to radiation or radioactive materials without identification of individuals by name.

R313-19-61. Modification, Revocation, and Termination of Licenses.

(1) The terms and conditions of all licenses shall be subject to amendment, revision, or modification or the license may be suspended or revoked by reason of amendments to the Act, or by reason of rules, and orders issued by the Executive Secretary.

(2) Licenses may be revoked, suspended, or modified, in whole or in part, for any material false statement in the application or any statement of fact required under provisions of the Act, or because of conditions revealed by the application or statement of fact or any report, record, or inspection or other means which would warrant the Executive Secretary to refuse to grant a license on an original application, or for violation of, or failure to observe any of the terms and conditions of the Act, or of the license, or of any rule, or order of the Executive Secretary.

(3) Administrative reviews, modifications, revocations or terminations of licenses will be in accordance with Title 19, Chapter 3.

(4) The Executive Secretary may terminate a specific license upon written request submitted by the licensee to the Executive Secretary.

R313-19-70. Exempt Concentrations of Radioactive Materials.

Refer to Subsection R313-19-13(2)(a)

TABLE

Element (Atomic Number)	Radionuclide	Column I Concentration Material Normally Used As Gas (uCi/ml)	Column II Concentration Liquid (uCi/ml) Solid (uCi/g)

Antimony (51)	Sb-122		3 E-4
	Sb-124		2 E-4
	Sb-125		1 E-3
Argon (18)	Ar-37	1 E-3	
	Ar-41	4 E-7	
Arsenic (33)	As-73		5 E-3
	As-74		5 E-4
	As-76		2 E-4
	As-77		8 E-4
Barium (56)	Ba-131		2 E-3
	Ba-140		3 E-4
Beryllium (4)	Be-7		2 E-2
Bismuth (83)	Bi-206		4 E-4
Bromine (35)	Br-82	4 E-7	3 E-3
Cadmium (48)	Cd-109		2 E-3
	Cd-115m		3 E-4
	Cd-115		3 E-4
Calcium (20)	Ca-45		9 E-5
	Ca-47		5 E-4
Carbon (6)	C-14	1 E-6	8 E-3
Cerium (58)	Ce-141		9 E-4
	Ce-143		4 E-4
	Ce-144		1 E-4
Cesium (55)	Cs-131		2 E-2
	Cs-134m		6 E-2
	Cs-134		9 E-5
Chlorine (17)	Cl-38	9 E-7	4 E-3
Chromium (24)	Cr-51		2 E-2
Cobalt (27)	Co-57		5 E-3
	Co-58		1 E-3
	Co-60		5 E-4
Copper (29)	Cu-64		3 E-3
Dysprosium (66)	Dy-165		4 E-3
	Dy-166		4 E-4
Erbium (68)	Er-169		9 E-4
	Er-171		1 E-3
Europium (63)	Eu-152 (T = 9.2 h)		6 E-4
	Eu-155		2 E-3
Fluorine (9)	F-18	2 E-6	8 E-3
Gadolinium (64)	Gd-153		2 E-3
	Gd-159		8 E-4
Gallium (31)	Ga-72		4 E-4
Germanium (32)	Ge-71		2 E-2
Gold (79)	Au-196		2 E-3
	Au-198		5 E-4
	Au-199		2 E-3
Hafnium (72)	Hf-181		7 E-4
Hydrogen (1)	H-3	5 E-6	3 E-2
Indium (49)	In-113m		1 E-2
	In-114m		2 E-4
Iodine (53)	I-126	3 E-9	2 E-5
	I-131	3 E-9	2 E-5
	I-132	8 E-8	6 E-4
	I-133	1 E-8	7 E-5
	I-134	2 E-7	1 E-3
Iridium (77)	Ir-190		2 E-3
	Ir-192		4 E-4
	Ir-194		3 E-4

Iron (26)	Fe-55		8 E-3
	Fe-59		6 E-4
Krypton (36)	Kr-85m	1 E-6	
	Kr-85	3 E-6	
Lanthanum (57)	La-140		2 E-4
Lead (82)	Pb-203		4 E-3
Lutetium (71)	Lu-177		1 E-3
Manganese (25)	Mn-52		3 E-4
	Mn-54		1 E-3
	Mn-56		1 E-3
Mercury (80)	Hg-197m		2 E-3
	Hg-197		3 E-3
	Hg-203		2 E-4
Molybdenum (42)	Mo-99		2 E-3
Neodymium (60)	Nd-147		6 E-4
	Nd-149		3 E-3
Nickel (28)	Ni-65		1 E-3
Niobium (Columbium) (41)	Nb-95		1 E-3
	Nb-97		9 E-3
Osmium (76)	Os-185		7 E-4
	Os-191m		3 E-2
	Os-191		2 E-3
	Os-193		6 E-4
Palladium (46)	Pd-103		3 E-3
	Pd-109		9 E-4
Phosphorus (15)	P-32		2 E-4
Platinum (78)	Pt-191		1 E-3
	Pt-193m		1 E-2
	Pt-197m		1 E-2
	Pt-197		1 E-3
Potassium (19)	K-42		3 E-3
Praseodymium (59)	Pr-142		3 E-4
	Pr-143		5 E-4
Promethium (61)	Pm-147		2 E-3
	Pm-149		4 E-3
Rhenium (75)	Re-183		6 E-4
	Re-186		9 E-3
	Re-188		6 E-4
Rhodium (45)	Rh-103m		1 E-1
	Rh-105		1 E-3
Rubidium (37)	Rb-86		7 E-4
Ruthenium (44)	Ru-97		4 E-4
	Ru-103		8 E-4
	Ru-105		1 E-3
	Ru-106		1 E-4
Samarium (62)	Sm-153		8 E-4
Scandium (21)	Sc-46		4 E-4
	Sc-47		9 E-4
	Sc-48		3 E-4
Selenium (34)	Se-75		3 E-3
Silicon (14)	Si-31		9 E-3
Silver (47)	Ag-105		1 E-3
	Ag-110m		3 E-4
	Ag-111		4 E-4
Sodium (11)	Na-24		2 E-3
Strontium (38)	Sr-85		1 E-4
	Sr-89		1 E-4
	Sr-91		7 E-4
	Sr-92		7 E-4

Sulfur (16)	S-35	9 E-8	6 E-4
Tantalum (73)	Ta-182		4 E-4
Technetium (43)	Tc-96m		1 E-1
	Tc-96		1 E-3
Tellurium (52)	Te-125m		2 E-3
	Te-127m		6 E-4
	Te-127		3 E-3
	Te-129m		3 E-4
	Te-131m		6 E-4
	Te-132		3 E-4
Terbium (65)	Tb-160		4 E-4
Thallium (81)	Tl-200		4 E-3
	Tl-201		3 E-3
	Tl-202		1 E-3
	Tl-204		1 E-3
Thulium (69)	Tm-170		5 E-4
	Tm-171		5 E-3
Tin (50)	Sn-113		9 E-4
	Sn-125		2 E-4
Tungsten	W-181		4 E-3
(Wolfram)(74)	W-187		7 E-4
Vanadium (23)	V-48		3 E-4
Xenon (54)	Xe-131m	4 E-6	
	Xe-133	3 E-6	
	Xe-135	1 E-6	
Ytterbium (70)	Yb-175		1 E-3
Yttrium (39)	Y-90		2 E-4
	Y-91m		3 E-2
	Y-91		3 E-4
	Y-92		6 E-4
	Y-93		3 E-4
Zinc (30)	Zn-65		1 E-3
	Zn-69m		7 E-4
	Zn-69		2 E-2
Zirconium (40)	Zr-95		6 E-4
	Zr-97		2 E-4
Beta or gamma emitting radioactive material not listed above with half-life less than 3 years		1 E-10	1 E-6

(1) In expressing the concentrations in Section R313-19-70, the activity stat and takes into account the radioactive decay products, because many radionuclides d also radioactive.

(2) For purposes of Subsection R313-19-13(2)(a) where there is involved a com the combination should be derived as follows: Determine for each radionuclide in t radioactivity concentration present in the product and the exempt radioactivity cor 19-70 for the specific radionuclide when not in combination. The sum of the ratios

(3) To convert microcuries (uCi) to SI units of kilobecquerels (kBq), multipl

R313-19-71. Exempt Quantities of Radioactive Materials.

Refer to Subsection R313-19-13(2)(b)

TABLE

RADIOACTIVE MATERIAL	MICROCURIES
Antimony-122 (Sb-122)	100
Antimony-124 (Sb-124)	10
Antimony-125 (Sb-125)	10
Arsenic-73 (As-73)	100
Arsenic-74 (As-74)	10
Arsenic-76 (As-76)	10
Arsenic-77 (As-77)	100
Barium-131 (Ba-131)	10
Barium-133 (Ba-133)	10
Barium-140 (Ba-140)	10
Bismuth-210 (Bi-210)	1
Bromine-82 (Br-82)	10
Cadmium-109 (Cd-109)	10
Cadmium-115m (Cd-115m)	10
Cadmium-115 (Cd-115)	100
Calcium-45 (Ca-45)	10
Calcium-47 (Ca-47)	10
Carbon-14 (C-14)	100
Cerium-141 (Ce-141)	100
Cerium-143 (Ce-143)	100
Cerium-144 (Ce-144)	1
Cesium-129 (Cs-129)	100
Cesium-131 (Cs-131)	1,000
Cesium-134m (Cs-134m)	100
Cesium-134 (Cs-134)	1
Cesium-135 (Cs-135)	10
Cesium-136 (Cs-136)	10
Cesium-137 (Cs-137)	10
Chlorine-36 (Cl-36)	10
Chlorine-38 (Cl-38)	10
Chromium-51 (Cr-51)	1,000
Cobalt-57 (Co-57)	100
Cobalt-58m (Co-58m)	10
Cobalt-58 (Co-58)	10
Cobalt-60 (Co-60)	1
Copper-64 (Cu-64)	100
Dysprosium-165 (Dy-165)	10
Dysprosium-166 (Dy-166)	100
Erbium-169 (Er-169)	100
Erbium-171 (Er-171)	100
Europium-152 (Eu-152) 9.2h	100
Europium-152 (Eu-152) 13 yr	1
Europium-154 (Eu-154)	1
Europium-155 (Eu-155)	10
Fluorine-18 (F-18)	1,000
Gadolinium-153 (Gd-153)	10
Gadolinium-159 (Gd-159)	100
Gallium-67 (Ga-67)	100
Gallium-72 (Ga-72)	10
Germanium-68 (Ge-68)	10
Germanium-71 (Ge-71)	100
Gold-195 (Au 195)	10
Gold-198 (Au-198)	100
Gold-199 (Au-199)	100
Hafnium-181 (Hf-181)	10

Holmium-166 (Ho-166)	100
Hydrogen-3 (H-3)	1,000
Indium-111 (In-111)	100
Indium-113m (In-113m)	100
Indium-114m (In-114m)	10
Indium-115m (In-115m)	100
Indium-115 (In-115)	10
Iodine-123 (I-123)	100
Iodine-125 (I-125)	1
Iodine-126 (I-126)	1
Iodine-129 (I-129)	0.1
Iodine-131 (I-131)	1
Iodine-132 (I-132)	10
Iodine-133 (I-133)	1
Iodine-134 (I-134)	10
Iodine-135 (I-135)	10
Iridium-192 (Ir-192)	10
Iridium-194 (Ir-194)	100
Iron-52 (Fe-52)	10
Iron-55 (Fe-55)	100
Iron-59 (Fe-59)	10
Krypton-85 (Kr-85)	100
Krypton-87 (Kr-87)	10
Lanthanum-140 (La-140)	10
Lutetium-177 (Lu-177)	100
Manganese-52 (Mn-52)	10
Manganese-54 (Mn-54)	10
Manganese-56 (Mn-56)	10
Mercury-197m (Hg-197m)	100
Mercury-197 (Hg-197)	100
Mercury-203 (Hg-203)	10
Molybdenum-99 (Mo-99)	100
Neodymium-147 (Nd-147)	100
Neodymium-149 (Nd-149)	100
Nickel-59 (Ni-59)	100
Nickel-63 (Ni-63)	10
Nickel-65 (Ni-65)	100
Niobium-93m (Nb-93m)	10
Niobium-95 (Nb-95)	10
Niobium-97 (Nb-97)	10
Osmium-185 (Os-185)	10
Osmium-191m (Os-191m)	100
Osmium-191 (Os-191)	100
Osmium-193 (Os-193)	100
Palladium-103 (Pd-103)	100
Palladium-109 (Pd-109)	100
Phosphorus-32 (P-32)	10
Platinum-191 (Pt-191)	100
Platinum-193m (Pt-193m)	100
Platinum-193 (Pt-193)	100
Platinum-197m (Pt-197m)	100
Platinum-197 (Pt-197)	100
Polonium-210 (Po-210)	0.1
Potassium-42 (K-42)	10
Potassium-43 (K-43)	10
Praseodymium-142 (Pr-142)	100
Praseodymium-143 (Pr-143)	100
Promethium-147 (Pm-147)	10
Promethium-149 (Pm-149)	10

Rhenium-186 (Re-186)	100
Rhenium-188 (Re-188)	100
Rhodium-103m (Rh-103m)	100
Rhodium-105 (Rh-105)	100
Rubidium-81 (Rb-81)	10
Rubidium-86 (Rb-86)	10
Rubidium-87 (Rb-87)	10
Ruthenium-97 (Ru-97)	100
Ruthenium-103 (Ru-103)	10
Ruthenium-105 (Ru-105)	10
Ruthenium-106 (Ru-106)	1
Samarium-151 (Sm-151)	10
Samarium-153 (Sm-153)	100
Scandium-46 (Sc-46)	10
Scandium-47 (Sc-47)	100
Scandium-48 (Sc-48)	10
Selenium-75 (Se-75)	10
Silicon-31 (Si-31)	100
Silver-105 (Ag-105)	10
Silver-110m (Ag-110m)	1
Silver-111 (Ag-111)	100
Sodium-22 (Na-22)	10
Sodium-24 (Na-24)	10
Strontium-85 (Sr-85)	10
Strontium-89 (Sr-89)	1
Strontium-90 (Sr-90)	0.1
Strontium-91 (Sr-91)	10
Strontium-92 (Sr-92)	10
Sulfur-35 (S-35)	100
Tantalum-182 (Ta-182)	10
Technetium-96 (Tc-96)	10
Technetium-97m (Tc-97m)	100
Technetium-97 (Tc-97)	100
Technetium-99m (Tc-99m)	100
Technetium-99 (Tc-99)	10
Tellurium-125m (Te-125m)	10
Tellurium-127m (Te-127m)	10
Tellurium-127 (Te-127)	100
Tellurium-129m (Te-129m)	10
Tellurium-129 (Te-129)	100
Tellurium 131m (Te-131m)	10
Tellurium-132 (Te-132)	10
Terbium-160 (Tb-160)	10
Thallium-200 (Tl-200)	100
Thallium-201 (Tl-201)	100
Thallium-202 (Tl-202)	100
Thallium-204 (Tl-204)	10
Thulium-170 (Tm-170)	10
Thulium-171 (Tm-171)	10
Tin-113 (Sn-113)	10
Tin-125 (Sn-125)	10
Tungsten-181 (W-181)	10
Tungsten-185 (W-185)	10
Tungsten-187 (W-187)	100
Vanadium-48 (V-48)	10
Xenon-131m (Xe-131m)	1,000
Xenon-133 (Xe-133)	100
Xenon-135 (Xe-135)	100
Ytterbium-175 (Yb-175)	100

Yttrium-87 (Y-87)	10
Yttrium-88 (Y-88)	10
Yttrium-90 (Y-90)	10
Yttrium-91 (Y-91)	10
Yttrium-92 (Y-92)	100
Yttrium-93 (Y-93)	100
Zinc-65 (Zn-65)	10
Zinc-69m (Zn-69m)	100
Zinc-69 (Zn-69)	1,000
Zirconium-93 (Zr-93)	10
Zirconium-95 (Zr-95)	10
Zirconium-97 (Zr-97)	10
Any radioactive material not listed above other than alpha emitting radioactive material.	0.1

(1) To convert microcuries (uCi) to SI units of kilobecquerels (kBq), multipl

R313-19-100. Transportation.

For purposes of Section R313-19-100, 10 CFR 71.4, 71.10, 71.12, 71.13(a) and (b) through 71.16, 71.47, 71.81, 71.85 through 71.89, 71.97 (1998), and Appendix A to part 71 are incorporated by reference with the following clarifications or exceptions:

(1) The substitution of the following:

(a) "Issued by the Executive Secretary" for reference to "issued by the Commission" in 10 CFR 71.4;

(b) "Licensee" for reference to "licensee of the Commission";

(c) "Subsection R313-19-100(3)" for reference to "10 CFR 71.5";

(d) "Subsection R313-15-906(5)" for reference to "10 CFR 20.1906(e)";

(e) "Section R313-15-502" for reference to "10 CFR 20.1502"; and

(f) "Utah" for reference to "the United States" in 10 CFR 71.10(b)(3);

(2) The exclusion of the following:

(a) "close reflection by water" and "optimum interspersed hydrogenous moderation" in 10 CFR 71.4;

(b) "10 CFR 71.12(b)", "10 CFR 71.14(b)", and "10 CFR 71.16(b)"; and

(c) "subpart H" in 10 CFR 71.12(c)(2), 71.14(c)(2), 71.16(d)(2), and 71.81;

(3) Transportation of licensed material.

(a) Each licensee who transports licensed material outside the site of usage, as specified in the

license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the U.S. Department of Transportation (DOT) regulations in 49 CFR 170 through 189 (1998) appropriate to the mode of transport.

(i) The licensee shall particularly note DOT regulations in the following areas:

(A) Packaging--49 CFR 173.1 through 173.13, 173.21 through 173.40, and 173.401 through 173.476;

(B) Marking and labeling--49 CFR 172.300 through 172.338, 172.400 through 172.407, 172.436 through 172.440, and 172.400 through 172.450;

(C) Placarding--49 CFR 172.500 through 172.560 and Appendices B and C;

(D) Accident reporting--49 CFR 171.15 and 171.16;

(E) Shipping papers and emergency information--49 CFR 172.200 through 172.205 and 172.600 through 172.606;

(F) Hazardous material employee training--49 CFR 172.700 through 172.704; and

(G) Hazardous material shipper/carrier registration--49 CFR 107.601 through 107.620.

(ii) The licensee shall also note DOT regulations pertaining to the following modes of transportation:

(A) Rail--49 CFR 174.1 through 174.86 and 174.700 through 174.750;

(B) Air--49 CFR 175;

(C) Vessel--49 CFR 176.1 through 176.99 and 176.700 through 176.715; and

(D) Public Highway--49 CFR 177 and 390 through 397.

(b) If DOT regulations are not applicable to a shipment of licensed material, the licensee shall conform to the standards and requirements of the DOT specified in paragraph (a) of this section to the same extent as if the shipment or transportation were subject to DOT regulations. A request for modification, wavier, or exemption from those requirements, and any notification referred to in those requirements, must be filed with, or made to, the Executive Secretary.

KEY

license, reciprocity, transportation, exemptions

Date of Enactment or Last Substantive Amendment

January 26, 2001

Notice of Continuation

October 10, 2001

Authorizing, Implemented, or Interpreted Law

19-3-104; 19-3-108

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Rule R313-21. General Licenses.

As in effect on September 1, 2002

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R313-21-1. Purpose and Scope.

(1) R313-21 establishes general licenses for the possession and use of radioactive material contained in certain items and a general license for ownership of radioactive material.

(2) The rules set forth herein are adopted pursuant to the provisions of Sections 19-3-104(3)and 19- 3-104(6).

R313-21-21. General Licenses--Source Material.

(1) A general license is hereby issued authorizing commercial and industrial firms, research, educational and medical institutions, and state and local government agencies to use and transfer not more than 15 pounds (6.82 kg) of source material at any one time for research, development, educational, commercial, or operational purposes. A person authorized to use or transfer source material, pursuant to this general license, may not receive more than a total of 150 pounds (68.2 kg) of source material in any one calendar year.

(2) Persons who receive, possess, use, or transfer source material pursuant to the general license issued in R313-21-21(1) are exempt from the provisions of R313-15 and R313-18, to the extent that such receipt, possession, use or transfer is within the terms of the general license; provided, however, that this exemption shall not be deemed to apply to a person who is also in possession of source material under a specific license issued pursuant to R313-22.

(3) Persons who receive, possess, use, or transfer source material pursuant to the general license in R313-21-21(1) are prohibited from administering source material, or the radiation therefrom, either externally or internally, to human beings except as may be authorized by the Executive Secretary in a specific license.

(4) A general license is hereby issued authorizing the receipt of title to source material without regard to quantity. This general license does not authorize a person to receive, possess, use, or transfer source material.

(5) Depleted uranium in industrial products and devices.

(a) A general license is hereby issued to receive, acquire, possess, use, or transfer, in accordance with the provisions of R313-21-21(5)(b), (c), (d), and (e), depleted uranium contained in industrial products or devices for the purpose of providing a concentrated mass in a small volume of the product or device.

(b) The general license in R313-21-21(5)(a) applies only to industrial products or devices which have been manufactured either in accordance with a specific license issued to the manufacturer of the products or devices pursuant to R313-22-75(12) or in accordance with a specific license issued to the manufacturer by a Licensing State, the Nuclear Regulatory Commission or an Agreement State which authorizes manufacture of the products or devices for distribution to persons generally licensed by the Nuclear Regulatory Commission or an Agreement State.

(c)(i) Persons who receive, acquire, possess, or use depleted uranium pursuant to the general license established by R313-21-21(5)(a) shall file form DRC-12 "Registration Form-Use of Depleted Uranium Under General License," with the Executive Secretary. The form shall be submitted within 30 days after the first receipt or acquisition of depleted uranium. The registrant shall furnish on form DRC-12 the following information and other information as may be required by that form:

(A) name and address of the registrant;

(B) a statement that the registrant has developed and will maintain procedures designed to establish physical control over the depleted uranium described in R313-21-21(5)(a) and designed to prevent transfer of such depleted uranium in any form, including metal scrap, to persons not authorized to receive the depleted uranium; and

(C) name or title, address, and telephone number of the individual duly authorized to act for and on behalf of the registrant in supervising the procedures identified in R313-21-21(5)(c)(i)(B).

(ii) The registrant possessing or using depleted uranium under the general license established by R313-21-21(5)(a) shall report in writing to the Executive Secretary any changes in information previously furnished on the "Registration Form - Use of Depleted Uranium Under General License." The report shall be submitted within 30 days after the effective date of the change.

(d) A person who receives, acquires, possesses, or uses depleted uranium pursuant to the general license established by R313-21-21(5)(a):

(i) shall not introduce depleted uranium, in any form, into a chemical, physical, or metallurgical treatment or process, except a treatment or process for repair or restoration of any plating or other covering of the depleted uranium;

(ii) shall not abandon depleted uranium;

(iii) shall transfer or dispose of depleted uranium only by transfer in accordance with the provisions of R313-19-41. In the case where the transferee receives the depleted uranium pursuant to the general license established by R313-21-21(5)(a), the transferor shall furnish the transferee a copy of this rule and a copy of form DRC-12. In the case where the transferee

receives the depleted uranium pursuant to a general license contained in the Nuclear Regulatory Commission's or Agreement State's regulation equivalent to R313-21-21(5)(a), the transferor shall furnish the transferee a copy of this rule and a copy of form DRC-12 accompanied by a note explaining that use of the product or device is regulated by the Nuclear Regulatory Commission or Agreement State under requirements substantially the same as those in this rule;

(iv) within 30 days of any transfer, shall report in writing to the Executive Secretary the name and address of the person receiving the depleted uranium pursuant to the transfer;

(v) shall not export depleted uranium except in accordance with a license issued by the Nuclear Regulatory Commission pursuant to 10 CFR Part 110; and

(vi) shall pay annual fees pursuant to R313-70.

(e) Any person receiving, acquiring, possessing, using, or transferring depleted uranium pursuant to the general license established by R313-21-21(5)(a) is exempt from the requirements of R313-15 and R313-18 of these rules with respect to the depleted uranium covered by that general license.

R313-21-22. General Licenses*--Radioactive Material Other Than Source Material.

NOTE: *Different general licenses are issued in this section, each of which has its own specific conditions and requirements.

(1) Certain devices and equipment. A general license is hereby issued to transfer, receive, acquire, own, possess, and use radioactive material incorporated in the following devices or equipment which have been manufactured, tested and labeled by the manufacturer in accordance with the specific license issued to the manufacturer by the Nuclear Regulatory Commission for use pursuant to 10 CFR 31.3. This general license is subject to the provisions of R313-12-51 through R313-12-70, R313-15, R313-18 and R313-19 of these rules.

(a) Static Elimination Devices. Devices designed for use as static eliminators which contain, as a sealed source or sources, radioactive material consisting of a total of not more than 500 microcuries (18.5 MBq) of polonium-210 per device.

(b) Ion Generating Tube. Devices designed for ionization of air which contain, as a sealed source or sources, radioactive material consisting of a total of not more than 500 microcuries (18.5 MBq) of polonium-210 per device or a total of not more than 50 millicuries (1.85 GBq) of hydrogen-3 (tritium) per device.

(2) RESERVED.

(3) RESERVED.

(4) Certain measuring, gauging or controlling devices.

(a) A general license is hereby issued to commercial and industrial firms and research, educational and medical institutions, individuals in the conduct of their business, and state or local government agencies to own, acquire, receive, possess, use or transfer, in accordance with the provisions of R313-21-22(4)(b), (c) and (d), radioactive material excluding special nuclear material, contained in devices designed and manufactured for the purpose of detecting, measuring, gauging or controlling thickness, density, level, interface location, radiation, leakage, or qualitative or quantitative chemical composition, or for producing light or an ionized

atmosphere.

(b) The general license in R313-21-22(4)(a) applies only to radioactive material contained in devices which have been manufactured and labeled in accordance with the specifications contained in a specific license issued by the Executive Secretary pursuant to R313-22-75 (4) or in accordance with specific license issued by the Nuclear Regulatory Commission, an Agreement State or a Licensing State, which authorizes distribution of devices to persons generally licensed by the Nuclear Regulatory Commission, an Agreement State or Licensing State.*

NOTE: *Regulations under the Federal Food, Drug, and Cosmetic Act authorizing the use of radioactive control devices in food production require certain additional labeling thereon which is found in 21 CFR 179.21.

(c) Any person who owns, acquires, receives, possesses, uses or transfers radioactive material in a device pursuant to the general license in R313-21-22(4)(a):

(i) shall register all devices by submitting form DRC-13, "Registration Form - Radioactive Material in Certain Measuring, Gauging or Controlling Devices Under General License," to the Executive Secretary within 30 days after the first receipt or acquisition of a device, however:

(A) devices containing no more than ten millicuries of polonium-210 and used for producing an ionized atmosphere need not be registered; and

(B) devices containing hydrogen-3 (tritium) and used for producing light need not be registered;

(ii) shall furnish on form DRC-13 the following information and other information as may be required by that form:

(A) name and address of the registrant;

(B) a statement that the registrant has developed and will maintain procedures designed to establish physical control over the device described in R313-21-22(4)(a) and designed to prevent transfer of the device other than to a specific licensee authorized to receive it or to another general licensees only as authorized by R313-21-22(4)(c)(xii); and

(C) name or title, address, and telephone number of the individual duly authorized to act for and on behalf of the registrant in supervising and maintaining the procedures identified in R313-21-22 (4)(c)(ii)(B);

(iii) shall report in writing to the Executive Secretary any changes in information previously furnished on form DRC-13. The information shall be submitted within 30 days after the effective date of a change;

(iv) other than those persons using less than ten millicuries polonium-210 or hydrogen-3 (tritium) for producing light or an ionized atmosphere, shall submit the appropriate fee as required by R313-70-7(11) within 30 days after the first receipt or acquisition of the device.

(v) shall assure that all labels affixed to the device at the time of receipt, and bearing a statement that removal of the label is prohibited, are maintained thereon and shall comply with all instructions and precautions provided by the labels;

(vi) shall assure that the device is tested for leakage of radioactive material and proper operation of the on-off mechanism and indicator, if any, at no longer than six-month intervals or at other

intervals as are specified in the label, however:

(A) devices containing only krypton need not be tested for leakage of radioactive material; and

(B) devices containing only tritium or not more than 100 microcuries (3.7 MBq) of other beta or gamma emitting material or 10 microcuries (0.37 MBq) of alpha emitting material and devices held in storage in the original shipping container prior to initial installation need not be tested;

(vii) shall assure that the tests required by R313-21-22(4)(c)(vi) and other testing, installation, servicing, and removal from installation involving the radioactive materials, its shielding or containment, are performed:

(A) in accordance with the instructions provided by the labels; or

(B) by a person holding a specific license from the Executive Secretary, a Licensing State, the Nuclear Regulatory Commission or an Agreement State which authorizes the activities in R313-21-22(4)(c)(vii);

(viii) shall maintain records showing compliance with the requirements of R313-21-22(4)(c)(vi) and (vii). The records shall show the results of tests. The records also shall show the dates of performance and the names of persons performing, testing, installing, servicing, and removal from installation concerning the radioactive material, its shielding or containment. Records of tests for leakage of radioactive material required by R313-21-22(4)(c)(vi) shall be maintained for three years after the next required leak test is performed or the sealed source is transferred or disposed of. Records of tests of the on-off mechanism and indicator required by R313-21-22(4)(c)(vi) shall be maintained for three years after the next required test of the on-off mechanism and indicator is performed or until the sealed source is transferred or disposed of. Records which are required by R313-21-22(4)(c)(vii) shall be maintained for a period of two years from the date of the recorded event or until the device is transferred or disposed of;

(ix) upon the occurrence of a failure of or damage to, or any indication of a possible failure of or damage to, the shielding of the radioactive material or the on-off mechanism or indicator, or upon the detection of 0.005 microcurie (185 Bq) or more removable radioactive material, shall immediately suspend operation of the device until it has been repaired by the manufacturer or other person holding a specific license from the Executive Secretary, a Licensing State, the Nuclear Regulatory Commission, or an Agreement State to repair the devices, or disposed of by transfer to a person authorized by a specific license to receive the radioactive material contained in the device and, within 30 days, furnish to the Executive Secretary a report containing a brief description of the event and the remedial action taken;

(x) shall not abandon any device containing radioactive material;

(xi) except as provided in R313-21-22(4)(c)(xii), shall transfer or dispose of the device containing radioactive material only by transfer to a person holding a specific license of the Executive Secretary, the Nuclear Regulatory Commission, an Agreement State, or a Licensing State whose specific license authorizes the person to receive the device and within 30 days after transfer of a device to a specific licensee shall furnish to the Executive Secretary a report containing identification of the device by manufacturer's name and model number and the name and address of the person receiving the device. No report is required if the device is transferred to the specific licensee in order to obtain a replacement device;

(xii) shall transfer the device to another general licensee only:

(A) where the device remains in use at a particular location. In this case, the transferor shall give the transferee a copy of R313-21-22(4) and any safety documents identified in the label of the device and within 30 days of the transfer, report to the Executive Secretary the manufacturer's name and model number of device transferred, the name and address of the transferee, and the name or position of an individual who may constitute a point of contact between the Executive Secretary and the transferee; or

(B) where the device is held in storage in the original shipping container at its intended location of use prior to initial use by a general licensee;

(xiii) shall comply with the provisions of R313-15-1201 and R313-15-1202 for reporting radiation incidents, theft or loss of licensed material, but shall be exempt from the other requirements of R313-15 and R313-18; and

(xiv) shall pay annual fees pursuant to R313-70.

(d) The general license in R313-21-22(4)(a) does not authorize the manufactureof devices containing radioactive material.

(e) The general license provided in R313-21-22(4)(a) is subject to the provisions of R313-12-51 through R313-12-53, R313-12-70, R313-14, R313-19-34, R313-19-41, R313-19-61, and R313-19-100.

(5) Luminous safety devices for aircraft.

(a) A general license is hereby issued to own, receive, acquire, possess and use tritium or promethium-147 contained in luminous safety devices for use in aircraft, provided:

(i) each device contains not more than 10 curies (370.0 GBq) of tritium or 300 millicuries (11.1 GBq) of promethium-147; and

(ii) each device has been manufactured, assembled or imported in accordance with a specific license issued by the Nuclear Regulatory Commission, or each device has been manufactured or assembled in accordance with the specifications contained in a specific license issued by the Executive Secretary or an Agreement State to the manufacturer or assembler of the device pursuant to licensing requirements equivalent to those in 10 CFR 32.53.

(b) Persons who own, receive, acquire, possess or use luminous safety devices pursuant to the general license in R313-21-22(5) are exempt from the requirements of R313-15 and R313-18, except that they shall comply with the provisions of R313-15-1201 and R313-15-1202.

(c) This general license does not authorize the manufacture, assembly, or repair of luminous safety devices containing tritium or promethium-147.

(d) This general license does not authorize the ownership, receipt, acquisition, possession or use of promethium-147 contained in instrument dials.

(e) This general license is subject to the provisions of R313-12-51 through R313-12-70, R313-14, R313-19-34, R313-19-41, R313-19-61, and R313-19-100.

(6) Ownership of radioactive material. A general license is hereby issued to own radioactive material without regard to quantity. Notwithstanding any other provisions of R313-21, this general license does not authorize the manufacture, production, transfer, receipt, possession or

use of radioactive material.

(7) Calibration and reference sources.

(a) A general license is hereby issued to those persons listed below to own, receive, acquire, possess, use and transfer, in accordance with the provisions of R313-21-22(7)(d) and (e), americium-241 in the form of calibration or reference sources:

(i) any person who holds a specific license issued by the Executive Secretary which authorizes that person to receive, possess, use and transfer radioactive material; and

(ii) any person who holds a specific license issued by the Nuclear Regulatory Commission which authorizes that person to receive, possess, use and transfer special nuclear material.

(b) A general license is hereby issued to own, receive, possess, use and transfer plutonium in the form of calibration or reference sources in accordance with the provisions of R313-21-22(7)(d) and (e) to a person who holds a specific license issued by the Executive Secretary which authorizes that person to receive, possess, use and transfer radioactive material.

(c) A general license is hereby issued to own, receive, possess, use and transfer radium-226 in the form of calibration or reference sources in accordance with the provisions of R313-21-22(7)(d) and (e) to a person who holds a specific license issued by the Executive Secretary which authorizes that person to receive, possess, use and transfer radioactive material.

(d) The general licenses in R313-21-22(7)(a), (b) and (c) apply only to calibration or reference sources which have been manufactured in accordance with the specifications contained in a specific license issued to the manufacturer or importer of the sources by the Nuclear Regulatory Commission pursuant to 10 CFR 32.57 or 10 CFR 70.39 or which have been manufactured in accordance with the specifications contained in a specific license issued to the manufacturer by the Executive Secretary, a Licensing State, or an Agreement State pursuant to licensing requirements equivalent to those contained in 10 CFR 32.57 or 10 CFR 70.39.

(e) The general licenses provided in R313-21-22(7)(a), (b), and (c) are subject to the provisions of R313-12-51 through R313-12-53, R313-12-70, R313-14, R313-19-34, R313-19-41, R313-19-61, R313-19-100, R313-15 and R313-18. In addition, persons who own, receive, acquire, possess, use or transfer one or more calibration or reference sources pursuant to these general licenses:

(i) shall not possess at any one time, at any one location of storage or use, more than 5 microcuries (185.0 kBq) of americium-241, 5 microcuries (185.0 kBq) of plutonium, or 5 microcuries (185.0 kBq) of radium-226 in a source;

(ii) shall not receive, possess, use or transfer a source unless the source, or the storage container, bears a label which includes one of the following statements or a substantially similar statement which contains the information called for in one of the following statements, as appropriate:

(A) The receipt, possession, use and transfer of this source, Model No. ....., Serial No. ....., are subject to a general license and the regulations of the United States Nuclear Regulatory Commission or of a state with which the Commission has entered into an agreement for the exercise of regulatory authority. Do not remove this label.

CAUTION - RADIOACTIVE MATERIAL

THIS SOURCE CONTAINS (AMERICIUM-241)(PLUTONIUM)*

DO NOT TOUCH RADIOACTIVE PORTION OF THIS SOURCE.

.....

Typed or printed name of the manufacturer or importer

NOTE: *Show the name of the appropriate material.

(B) The receipt, possession, use and transfer of this source, Model No....., Serial No....., are subject to a general license and the regulations of a Licensing State. Do not remove this label.

CAUTION - RADIOACTIVE MATERIAL

THIS SOURCE CONTAINS RADIUM-226

DO NOT TOUCH RADIOACTIVE PORTION OF THIS SOURCE.

.....

Typed or printed name of the manufacturer or importer

(iii) shall not transfer, abandon, or dispose of a source except by transfer to a person authorized by a license from the Executive Secretary, a Licensing State, the Nuclear Regulatory Commission, or an Agreement State to receive the source;

(iv) shall store a source, except when the source is being used, in a closed container adequately designed and constructed to contain americium-241, plutonium, or radium-226 which might otherwise escape during storage; and

(v) shall not use a source for any purpose other than the calibration of radiation detectors or the standardization of other sources.

(f) These general licenses do not authorize the manufacture of calibration or reference sources containing americium-241, plutonium, or radium-226.

(8) RESERVED.

(9) General license for use of radioactive material for certain in vitro clinical or laboratory testing.*

NOTE: *The New Drug provisions of the Federal Food, Drug and Cosmetic Act also govern the availability and use of any specific diagnostic drug in interstate commerce.

(a) A general license is hereby issued to any physician, veterinarian, clinical laboratory or hospital to receive, acquire, possess, transfer or use, for the following stated tests, in accordance with the provisions of R313-21-22(9) (b), (c), (d), (e), and (f) the following radioactive materials in prepackaged units for use in in-vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals:

(i) iodine-125, in units not exceeding 10 microcuries (370.0 kBq) each;

(ii) iodine-131, in units not exceeding 10 microcuries (370.0 kBq) each;

(iii) carbon-14, in units not exceeding 10 microcuries (370.0 kBq) each;

(iv) hydrogen-3 (tritium), in units not exceeding 50 microcuries (1.85 MBq) each;

(v) iron-59, in units not exceeding 20 microcuries (740.0 kBq) each;

(vi) cobalt-57, in units not exceeding 10 microcuries (370.0 kBq) each;

(vii) selenium-75, in units not to exceed 10 microcuries (370.0 kBq) each; or

(viii) mock iodine-125, reference or calibration sources, in units not exceeding 0.05 microcurie (1.85 kBq) of iodine-129 and 0.005 microcurie (185.0 Bq) of americium-241 each.

(b) A person shall not receive, acquire, possess, use or transfer radioactive material pursuant to the general license established by R313-21-22(9)(a) until that person has filed form DRC-07, "Registration Form-In Vitro Testing with Radioactive Material Under General License," with the Executive Secretary and received a Certificate of Registration signed by the Executive Secretary, or until that person has been authorized pursuant to R313-32 to use radioactive material under the general license in R313-21-22(9). The physician, veterinarian, clinical laboratory or hospital shall furnish on form DRC-07 the following information and other information as may be required by that form:

(i) name and address of the physician, veterinarian, clinical laboratory or hospital;

(ii) the location of use; and

(iii) a statement that the physician, veterinarian, clinical laboratory or hospital has appropriate radiation measuring instruments to carry out in vitro clinical or laboratory tests with radioactive material as authorized under the general license in R313-21-22(9)(a) and that the tests will be performed only by personnel competent in the use of radiation measuring instruments and in the handling of the radioactive material.

(c) A person who receives, acquires, possesses or uses radioactive material pursuant to the general license established by R313-21-22(9)(a) shall comply with the following:

(i) The general licensee shall not possess at any one time, pursuant to the general license in R313- 21-22(9)(a) at any one location of storage or use, a total amount of iodine-125, iodine-131, selenium-75, iron-59 and cobalt-57, or any combination, in excess of 200 microcuries (7.4 MBq).

(ii) The general licensee shall store the radioactive material, until used, in the original shipping container or in a container providing equivalent radiation protection.

(iii) The general licensee shall use the radioactive material only for the uses authorized by R313-21-22(9)(a).

(iv) The general licensee shall not transfer the radioactive material to a person who is not authorized to receive it pursuant to a license issued by the Executive Secretary, the Nuclear

Regulatory Commission, an Agreement State or Licensing State, nor transfer the radioactive material in a manner other than in the unopened, labeled shipping container as received from the supplier.

(v) The general licensee shall dispose of the Mock Iodine-125 reference or calibration sources described in R313-21-22(9)(a)(viii) as required by R313-15-1001.

(vi) The general licensee shall pay annual fees pursuant to R313-70.

(d) The general licensee shall not receive, acquire, possess, or use radioactive material pursuant to R313-21-22(9)(a):

(i) Except as prepackaged units which are labeled in accordance with the provision of an applicable specific license issued pursuant to R313-22-75(8) or in accordance with the provisions of a specific license issued by the Nuclear Regulatory Commission, an Agreement State or Licensing State which authorizes the manufacture and distribution of iodine-125, iodine-131, carbon-14, hydrogen-3(tritium), iron-59, selenium-75, cobalt-57, or Mock Iodine-125 to persons generally licensed under R313-21-22(9) or its equivalent, and

(ii) Unless one of the following statements, as appropriate, or a substantially similar statement which contains the information called for in one of the following statements, appears on a label affixed to prepackaged units or appears in a leaflet or brochure which accompanies the package:

"This radioactive material shall be received, acquired, possessed and used only by physicians, veterinarians, clinical laboratories or hospitals and only for in vitro clinical or laboratory tests not involving internal or external administration of the material, or the radiation therefrom, to human beings or animals. Its receipt, acquisition, possession, use and transfer are subject to the regulations and a general license of the United States Nuclear Regulatory Commission or of a state with which the Commission has entered into an agreement for the exercise of regulatory authority.

.....

Name of Manufacturer"

"This radioactive material shall be received, acquired, possessed and used only by physicians, veterinarians, clinical laboratories or hospitals and only for in vitro clinical or laboratory tests not involving internal or external administration of the material, or the radiation therefrom, to human beings or animals. Its receipt, acquisition, possession, use and transfer are subject to the regulations and a general license of a Licensing State.

.....

Name of Manufacturer"

(e) The physician, veterinarian, clinical laboratory or hospital possessing or using radioactive material under the general license in R313-21-22(9)(a) shall report in writing to the Executive Secretary, changes in the information previously furnished in the "Registration Form-In Vitro Testing with Radioactive Material Under General License", form DRC -07. The report shall be furnished within 30 days after the effective date of a change.

(f) Any person using radioactive material pursuant to the general license of R313-21-22(9)(a) is exempt from the requirements of R313-15 and R313-18 with respect to radioactive material

covered by that general license, except that persons using the Mock Iodine-125 described in R313-21-22(9)(a)(viii) shall comply with the provisions of R313- 15-1001, R313-15-1201 and R313-15-1202.

(10) Ice Detection Devices.

(a) A general license is hereby issued to own, receive, acquire, possess, use and transfer strontium- 90 contained in ice detection devices, provided each device contains no more than 50 microcuries (1.85 MBq) of strontium-90 and each device has been manufactured or imported in accordance with a specific license issued by the Nuclear Regulatory Commission or each device has been manufactured in accordance with the specifications contained in a specific license issued by the Executive Secretary or an Agreement State to the manufacturer of the device pursuant to licensing requirements equivalent to those in 10 CFR 32.61.

(b) Persons who own, receive, acquire, possess, use or transfer strontium-90 contained in ice detection devices pursuant to the general license in R313-21-22(10)(a):

(i) shall, upon occurrence of visually observable damage, such as a bend or crack or discoloration from over-heating to the device, discontinue use of the device until it has been inspected, tested for leakage and repaired by a person holding a specific license from the Nuclear Regulatory Commission or an Agreement State to manufacture or service the device; or shall dispose of the device pursuant to the provisions of these rules;

(ii) shall assure that all labels affixed to the device at the time of receipt, and which bear a statement which prohibits removal of the labels, are maintained thereon; and

(iii) are exempt from the requirements of R313-15 and R313-18 of these rules except that the persons shall comply with the provisions of R313-15-1001, R313-15-1201 and R313-15-1202.

(c) This general license does not authorize the manufacture, assembly, disassembly or repair of strontium-90 in ice detection devices.

(d) This general license is subject to the provision of R313-12-51 through R313-12-53, R313-12-70, R313-14, R313-19-34, R313-19-41, R313-19-61, and R313-19-100 of these rules.

KEY

radioactive material, general licenses, source material

Date of Enactment or Last Substantive Amendment

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Notice of Continuation

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Authorizing, Implemented, or Interpreted Law

19-3-104

Rule converted into HTML by the Division of Administrative Rules.

For questions regarding the *content* or *application* of rules under Title R313, please contact the promulgating agency (Environmental Quality, Radiation Control). A list of agencies with links to their homepages is available at **http://www.utah.gov/government/agencylist.html**.

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Rule R313-22. Specific Licenses.

As in effect on September 1, 2002

Table of Contents

R313-22-1. Purpose and Authority.

(1) The purpose of this rule is to prescribe the requirements for the issuance of specific licenses.

(2) The rules set forth herein are adopted pursuant to the provisions of Subsections 19-3-104(3) and 19-3-104(6).

R313-22-2. General.

The provisions and requirements of Rule R313-22 are in addition to, and not in substitution for,

other requirements of these rules. In particular the provisions of Rule R313-19 apply to applications and licenses subject to Rule R313-22.

R313-22-4. Definitions.

"Alert" means events may occur, are in progress, or have occurred that could lead to a release of radioactive material but that the release is not expected to require a response by off-site response organizations to protect persons off-site.

"Principal activities" means activities authorized by the license which are essential to achieving the purpose(s) for which the license was issued or amended. Storage during which no licensed material is accessed for use or disposal and activities incidental to decontamination or decommissioning are not principal activities.

"Site Area Emergency" means events may occur, are in progress, or have occurred that could lead to a significant release of radioactive material and that could require a response by off-site response organizations to protect persons off-site.

R313-22-30. Specific License by Rule.

A license by rule is issued in the following circumstances, without the necessity of filing an application for a specific license as required by Subsection R313-22-32(1), and the licensee shall be subject to the applicable provisions of Sections R313-22-33, R313-22-34, R313-22-35, R313-22-36 and R313-22-37:

(1) When a site must be timely remediated of contamination by radioactive materials that are subject to licensing under these rules but are unlicensed;

(2) When radioactive materials existing as a result of improper handling, spillage, accidental contamination, or unregulated or illegal possession, transfer, or receipt, must be stored and those materials have not been licensed under these rules.

R313-22-32. Filing Application for Specific Licenses.

(1) Applications for specific licenses shall be filed on a form prescribed by the Executive Secretary.

(2) The Executive Secretary may, after the filing of the original application, and before the expiration of the license, require further statements in order to enable the Executive Secretary to determine whether the application should be granted or denied or whether a license should be modified or revoked.

(3) Applications shall be signed by the applicant or licensee or a person duly authorized to act for and on the applicant's behalf.

(4) An application for a license may include a request for a license authorizing one or more activities.

(5) In the application, the applicant may incorporate by reference information contained in previous applications, statements, or reports filed with the Executive Secretary, provided the references are clear and specific.

(6) An application for a specific license to use radioactive material in the form of a sealed source

or in a device that contains the sealed source shall identify the source or device by manufacturer and model number as registered with the U.S. Nuclear Regulatory Commission under 10 CFR 32.210, 2001 ed. or the equivalent regulations of an Agreement State.

(7) As provided by Section R313-22-35, certain applications for specific licenses filed under these rules shall contain a proposed decommissioning funding plan or a certification of financial assurance for decommissioning. In the case of renewal applications submitted before January 1, 1995, this submittal may follow the renewal application but shall be submitted on or before January 1, 1995.

(8)(a) Applications to possess radioactive materials in unsealed form, on foils or plated sources, or sealed in glass in excess of the quantities in Section R313-22-90, "Quantities of Radioactive Materials Requiring Consideration of the Need for an Emergency Plan for Responding to a Release", shall contain either:

(i) An evaluation showing that the maximum dose to a individual off-site due to a release of radioactive materials would not exceed one rem effective dose equivalent or five rems to the thyroid; or

(ii) An emergency plan for responding to a release of radioactive material.

(b) One or more of the following factors may be used to support an evaluation submitted under Subsection R313-22-32(8)(a)(i):

(i) The radioactive material is physically separated so that only a portion could be involved in an accident;

(ii) All or part of the radioactive material is not subject to release during an accident because of the way it is stored or packaged;

(iii) The release fraction in the respirable size range would be lower than the release fraction shown in Section R313-22-90 due to the chemical or physical form of the material;

(iv) The solubility of the radioactive material would reduce the dose received;

(v) Facility design or engineered safety features in the facility would cause the release fraction to be lower than shown in Section R313-22-90;

(vi) Operating restrictions or procedures would prevent a release fraction as large as that shown in Section R313-22-90; or

(vii) Other factors appropriate for the specific facility.

(c) An emergency plan for responding to a release of radioactive material submitted under Subsection R313-22-32(8)(a)(ii) shall include the following information:

(i) Facility description. A brief description of the licensee's facility and area near the site.

(ii) Types of accidents. An identification of each type of radioactive materials accident for which protective actions may be needed.

(iii) Classification of accidents. A classification system for classifying accidents as alerts or site

area emergencies.

(iv) Detection of accidents. Identification of the means of detecting each type of accident in a timely manner.

(v) Mitigation of consequences. A brief description of the means and equipment for mitigating the consequences of each type of accident, including those provided to protect workers on-site, and a description of the program for maintaining equipment.

(vi) Assessment of releases. A brief description of the methods and equipment to assess releases of radioactive materials.

(vii) Responsibilities. A brief description of the responsibilities of licensee personnel should an accident occur, including identification of personnel responsible for promptly notifying off-site response organizations and the Executive Secretary; also responsibilities for developing, maintaining, and updating the plan.

(viii) Notification and coordination. A commitment to and a brief description of the means to promptly notify off-site response organizations and request off-site assistance, including medical assistance for the treatment of contaminated injured on-site workers when appropriate. A control point shall be established. The notification and coordination shall be planned so that unavailability of some personnel, parts of the facility, and some equipment will not prevent the notification and coordination. The licensee shall also commit to notify the Executive Secretary immediately after notification of the appropriate off-site response organizations and not later than one hour after the licensee declares an emergency.

NOTE: These reporting requirements do not supersede or release licensees of complying with the requirements under the Emergency Planning and Community Right-to-Know Act of 1986, Title III, Public Law 99-499 or other state or federal reporting requirements, including 40 CFR 302, 2000 ed.

(ix) Information to be communicated. A brief description of the types of information on facility status, radioactive releases, and recommended protective actions, if necessary, to be given to off-site response organizations and to the Executive Secretary.

(x) Training. A brief description of the frequency, performance objectives and plans for the training that the licensee will provide workers on how to respond to an emergency including special instructions and orientation tours the licensee would offer to fire, police, medical and other emergency personnel. The training shall familiarize personnel with site-specific emergency procedures. Also, the training shall thoroughly prepare site personnel for their responsibilities in the event of accident scenarios postulated as most probable for the specific site including the use of team training for the scenarios.

(xi) Safe shutdown. A brief description of the means of restoring the facility to a safe condition after an accident.

(xii) Exercises. Provisions for conducting quarterly communications checks with off-site response organizations and biennial on-site exercises to test response to simulated emergencies. Quarterly communications checks with off-site response organizations shall include the check and update of all necessary telephone numbers. The licensee shall invite off-site response organizations to participate in the biennial exercises. Participation of off-site response organizations in biennial exercises although recommended is not required. Exercises shall use accident scenarios postulated as most probable for the specific site and the scenarios shall not be known to most

exercise participants. The licensee shall critique each exercise using individuals not having direct implementation responsibility for the plan. Critiques of exercises shall evaluate the appropriateness of the plan, emergency procedures, facilities, equipment, training of personnel, and overall effectiveness of the response. Deficiencies found by the critiques shall be corrected.

(xiii) Hazardous chemicals. A certification that the applicant has met its responsibilities under the Emergency Planning and Community Right-to-Know Act of 1986, Title III, Public Law 99-499, if applicable to the applicant's activities at the proposed place of use of the radioactive material.

(d) The licensee shall allow the off-site response organizations expected to respond in case of an accident 60 days to comment on the licensee's emergency plan before submitting it to the Executive Secretary. The licensee shall provide any comments received within the 60 days to the Executive Secretary with the emergency plan.

R313-22-33. General Requirements for the Issuance of Specific Licenses.

(1) A license application shall be approved if the Executive Secretary determines that:

(a) the applicant and all personnel who will be handling the radioactive material are qualified by reason of training and experience to use the material in question for the purpose requested in accordance with these rules in a manner as to minimize danger to public health and safety or the environment;

(b) the applicant's proposed equipment, facilities, and procedures are adequate to minimize danger to public health and safety or the environment;

(c) the applicant's facilities are permanently located in Utah, otherwise the applicant shall seek reciprocal recognition as required by Section R313-19-30;

(d) the issuance of the license will not be inimical to the health and safety of the public;

(e) the applicant satisfies applicable special requirements in Sections R313-22-50 and R313-22-75, and Rules R313-24, R313-25, R313-32, R313-34, R313-36, or R313-38; and

(f) in the case of an application for a license to receive and possess radioactive material for commercial waste disposal by land burial, or for the conduct of other activities which the Executive Secretary determines will significantly affect the quality of the environment, the Executive Secretary, before commencement of construction of the plant or facility in which the activity will be conducted, has concluded, after weighing the environmental, economic, technical and other benefits against environmental costs and considering available alternatives, that the action called for is the issuance of the proposed license, with any appropriate conditions to protect environmental values. The Executive Secretary shall respond to the application within 60 days. Commencement of construction prior to a negative cost-benefit conclusion shall be grounds for denial of a license to receive and possess radioactive material in the plant or facility. As used in this paragraph the term "commencement of construction" means clearing of land, excavation, or other substantial action that would adversely affect the environment of a site. The term does not mean site exploration, necessary borings to determine foundation conditions, or other preconstruction monitoring or testing to establish background information related to the suitability of the site or the protection of environmental values.

R313-22-34. Issuance of Specific Licenses.

(1) Upon a determination that an application meets the requirements of the Act and the rules of

the Board, the Executive Secretary will issue a specific license authorizing the proposed activity in a form and containing conditions and limitations as the Executive Secretary deems appropriate or necessary.

(2) The Executive Secretary may incorporate in licenses at the time of issuance, additional requirements and conditions with respect to the licensee's receipt, possession, use and transfer of radioactive material subject to Rule R313-22 as he deems appropriate or necessary in order to:

(a) minimize danger to public health and safety or the environment;

(b) require reports and the keeping of records, and to provide for inspections of activities under the license as may be appropriate or necessary; and

(c) prevent loss or theft of material subject to Rule R313-22.

R313-22-35. Financial Assurance and Recordkeeping for Decommissioning.

(1) Applicants for a specific license authorizing the possession and use of unsealed radioactive material of half-life greater than 120 days and in quantities exceeding 10^5 times the applicable quantities set forth in Appendix B of 10 CFR 30.1 through 30.72, 2001 ed., which is incorporated by reference, shall submit a decommissioning funding plan as described in Subsection R313-22-35(5). The decommissioning funding plan shall also be submitted when a combination of radionuclides is involved if R divided by 10^5 is greater than one, where R is defined here as the sum of the ratios of the quantity of each radionuclide to the applicable value in Appendix B of 10 CFR 30.1 through 30.72, 2001 ed., which is incorporated by reference.

(2) Applicants for a specific license authorizing possession and use of radioactive material of half-life greater than 120 days and in quantities specified in Subsection R313-22-35(4) shall either:

(a) submit a decommissioning funding plan as described in Subsection R313-22-35(5); or

(b) submit a certification that financial assurance for decommissioning has been provided in the amount prescribed by Subsection R313-22-35(4) using one of the methods described in Subsection R313-22-35(6). For an applicant, this certification may state that the appropriate assurance will be obtained after the application has been approved and the license issued but before the receipt of licensed material. If the applicant defers execution of the financial instrument until after the license has been issued, a signed original of the financial instrument obtained to satisfy the requirements of Subsection R313-22-35(6) shall be submitted to the Executive Secretary before receipt of licensed material. If the applicant does not defer execution of the financial instrument, the applicant shall submit to the Executive Secretary, as part of the certification, a signed original of the financial instrument obtained to satisfy the requirements in Subsection R313-22-35(6).

(3)(a) Holders of a specific license issued on or after January 1, 1995, which is of a type described in Subsections R313-22-35(1) or (2) shall provide financial assurance for decommissioning in accordance with the criteria set forth in Section R313-22-35.

(b) Holders of a specific license issued before January 1, 1995, and of a type described in Subsection R313-22-35(1) shall submit, on or before January 1, 1995, a decommissioning funding plan as described in Subsection R313-22-35(5) or a certification of financial assurance for decommissioning in an amount at least equal to $750,000 in accordance with the criteria set forth in Section R313-22-35. If the licensee submits the certification of financial assurance rather than a decommissioning funding plan, the licensee shall include a decommissioning funding plan in any

application for license renewal.

(c) Holders of a specific license issued before January 1, 1995, and of a type described in Subsection R313-22-35(2) shall submit, on or before January 1, 1995, a decommissioning funding plan as described in Subsection R313-22-35(5) or a certification of financial assurance for decommissioning in accordance with the criteria set forth in Section R313-22-35.

(d) A licensee who has submitted an application before January 1, 1995, for renewal of license in accordance with Section R313-22-37 shall provide financial assurance for decommissioning in accordance with Subsections R313-22-35(1) and (2). This assurance shall be submitted before January 1, 1997.

(4) Table of required amounts of financial assurance for decommissioning by quantity of material:

TABLE

Greater than 10^4 but less than or equal to 10^5 times the applicable quantities of radioactive material, as defined in Appendix B of 10 CFR 30.1 through 30.72, 2001 ed., which is incorporated by reference, in unsealed form. For a combination of radionuclides, if R, as defined in Subsection R313-22-35(1) divided by 10^4 is greater than one but R divided by 10^5 is less than or equal to one:	$750,000
Greater than 10^3 but less than or equal to 10^4 times the applicable quantities of radioactive material, as defined in Appendix B of 10 CFR 30.1 through 30.72, 2001 ed., which is incorporated by reference, in unsealed form. For a combination of radionuclides, if R, as defined in Subsection R313-22-35(1) divided by 10^3 is greater than one but R divided by 10^4 is less than or equal to one:	$150,000
Greater than 10^{10} times the applicable quantities of radioactive material, as defined in Appendix B of 10 CFR 30.1 through 30.72, 2001 ed., which is incorporated by reference, in sealed sources or plated foils. For combination of radionuclides, if R, as defined in R313-22-35(1), divided by 10^{10} is greater than one:	$75,000

(5) A decommissioning funding plan shall contain a cost estimate for decommissioning and a description of the method of assuring funds for decommissioning from Subsection R313-22-35(6), including means for adjusting cost estimates and associated funding levels periodically over the life of the facility. The decommissioning funding plan shall also contain a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning and a signed original of the financial instrument obtained to satisfy the requirements of Subsection R313-22-35(6).

(6) Financial assurance for decommissioning shall be provided by one or more of the following methods:

(a) Prepayment. Prepayment is the deposit prior to the start of operation into an account segregated from licensee assets and outside the licensee's administrative control of cash or liquid assets so that the amount of funds would be sufficient to pay decommissioning costs. Prepayment may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities;

(b) A surety method, insurance, or other guarantee method. These methods shall guarantee that decommissioning costs will be paid. A surety method may be in the form of a surety bond, letter of credit, or line of credit. A parent company guarantee of funds for decommissioning costs based on a financial test may be used if the guarantee and test are as contained in Subsection R313-22-35(8). A parent company guarantee may not be used in combination with other financial methods to satisfy the requirements of Section R313-22-35. A guarantee of funds by the applicant or licensee for decommissioning costs based on a financial test may be used if the guarantee and test are as contained in Subsection R313-22-35(9). A guarantee by the applicant or licensee may not be used in combination with any other financial methods to satisfy the requirements of Section R313-22-35 or in any situation where the applicant or licensee has a parent company holding majority control of the voting stock of the company. A surety method or insurance used to provide financial assurance for decommissioning shall contain the following conditions:

(i) the surety method or insurance shall be open-ended or, if written for a specified term, such as five years, shall be renewed automatically unless 90 days or more prior to the renewal date the issuer notifies the Executive Secretary, the beneficiary, and the licensee of its intention not to renew. The surety method or insurance shall also provide that the full face amount be paid to the beneficiary automatically prior to the expiration without proof of forfeiture if the licensee fails to provide a replacement acceptable to the Executive Secretary within 30 days after receipt of notification of cancellation,

(ii) the surety method or insurance shall be payable to a trust established for decommissioning costs. The trustee and trust shall be acceptable to the Executive Secretary. An acceptable trustee includes an appropriate state or federal government agency or an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency, and

(iii) the surety method or insurance shall remain in effect until the Executive Secretary has terminated the license;

(c) An external sinking fund in which deposits are made at least annually, coupled with a surety method or insurance, the value of which may decrease by the amount being accumulated in the sinking fund. An external sinking fund is a fund established and maintained by setting aside funds periodically in an account segregated from licensee assets and outside the licensee's administrative control in which the total amount of funds would be sufficient to pay decommissioning costs at the time termination of operation is expected. An external sinking fund may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities. The surety or insurance provisions shall be as stated in Subsection R313-22-35(6)(b);

(d) In the case of Federal, State or local government licensees, a statement of intent containing a cost estimate for decommissioning or an amount based on the Table in Subsection R313-22-35(4) and indicating that funds for decommissioning will be obtained when necessary; or

(e) When a governmental entity is assuming custody and ownership of a site, an arrangement

that is deemed acceptable by such governmental entity.

(7) Persons licensed under Rule R313-22 shall keep records of information important to the decommissioning of a facility in an identified location until the site is released for unrestricted use. Before licensed activities are transferred or assigned in accordance with Subsection R313-19-34(2), licensees shall transfer all records described in Subsections R313-22-35(7)(a) through (d) to the new licensee. In this case, the new licensee will be responsible for maintaining these records until the license is terminated. If records important to the decommissioning of a facility are kept for other purposes, reference to these records and their locations may be used. Information the Executive Secretary considers important to decommissioning consists of the following:

(a) records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site. These records may be limited to instances when contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas as in the case of possible seepage into porous materials such as concrete. These records shall include any known information on identification of involved nuclides, quantities, forms, and concentrations;

(b) as-built drawings and modification of structures and equipment in restricted areas where radioactive materials are used or stored, and of locations of possible inaccessible contamination such as buried pipes which may be subject to contamination. If required drawings are referenced, each relevant document need not be indexed individually. If drawings are not available, the licensee shall substitute appropriate records of available information concerning these areas and locations;

(c) except for areas containing only sealed sources, provided the sources have not leaked or no contamination remains after a leak, or radioactive materials having only half-lives of less than 65 days, a list contained in a single document and updated every two years, including all of the following:

(i) all areas designated and formerly designated as restricted areas as defined under Section R313- 12-3;

(ii) all areas outside of restricted areas that require documentation under Subsection R313-22- 35 (7)(a);

(iii) all areas outside of restricted areas where current and previous wastes have been buried as documented under Section R313-15-1109; and

(iv) all areas outside of restricted areas which contain material such that, if the license expired, the licensee would be required to either decontaminate the area to meet the criteria for decommissioning in Sections R313- 15-401 through R313-15-406, or apply for approval for disposal under Section R313-15-1002; and

(d) records of the cost estimate performed for the decommissioning funding plan or of the amount certified for decommissioning, and records of the funding method used for assuring funds if either a funding plan or certification is used.

(8) Criteria relating to use of financial tests and parent company guarantees for providing reasonable assurance of funds for decommissioning.

(a) To pass the financial test referred to in Subsection R313-22-35(6)(b), the parent company

shall meet one of the following criteria:

(i) The parent company shall have all of the following:

(A) Two of the following three ratios: a ratio of total liabilities to net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities greater than 0.1; and a ratio of current assets to current liabilities greater than 1.5;

(B) Net working capital and tangible net worth each at least six times the current decommissioning cost estimates, or prescribed amount if a certification is used;

(C) Tangible net worth of at least $10 million; and

(D) Assets located in the United States amounting to at least 90 percent of total assets or at least six times the current decommissioning cost estimates, or prescribed amount if a certification is used; or

(ii) The parent company shall have all of the following:

(A) A current rating for its most recent bond issuance of AAA, AA, A, or BBB as issued by Standard and Poor's or Aaa, Aa, A or Baa as issued by Moody's;

(B) Tangible net worth at least six times the current decommissioning cost estimate, or prescribed amount if a certification is used;

(C) Tangible net worth of at least $10 million; and

(D) Assets located in the United States amounting to at least 90 percent of total assets or at least six times the current decommissioning cost estimates, or prescribed amount if certification is used.

(b) The parent company's independent certified public accountant shall have compared the data used by the parent company in the financial test, which is derived from the independently audited, year end financial statements for the latest fiscal year, with the amounts in such financial statement. In connection with that procedure the licensee shall inform the Executive Secretary within 90 days of any matters coming to the auditor's attention which cause the auditor to believe that the data specified in the financial test should be adjusted and that the company no longer passes the test.

(c)(i) After the initial financial test, the parent company shall repeat the passage of the test within 90 days after the close of each succeeding fiscal year.

(ii) If the parent company no longer meets the requirements of Subsection R313-22-35(8)(a) the licensee shall send notice to the Executive Secretary of intent to establish alternative financial assurance as specified in Section R313-22-35. The notice shall be sent by certified mail within 90 days after the end of the fiscal year for which the year end financial data show that the parent company no longer meets the financial test requirements. The licensee shall provide alternate financial assurance within 120 days after the end of such fiscal year.

(d) The terms of a parent company guarantee which an applicant or licensee obtains shall provide that:

(i) The parent company guarantee will remain in force unless the guarantor sends notice of

cancellation by certified mail to the licensee and the Executive Secretary. Cancellation may not occur, however, during the 120 days beginning on the date of receipt of the notice of cancellation by both the licensee and the Executive Secretary, as evidenced by the return receipts.

(ii) If the licensee fails to provide alternate financial assurance as specified in Section R313-22-35 within 90 days after receipt by the licensee and Executive Secretary of a notice of cancellation of the parent company guarantee from the guarantor, the guarantor will provide such alternative financial assurance in the name of the licensee.

(iii) The parent company guarantee and financial test provisions shall remain in effect until the Executive Secretary has terminated the license.

(iv) If a trust is established for decommissioning costs, the trustee and trust shall be acceptable to the Executive Secretary. An acceptable trustee includes an appropriate State or Federal Government agency or an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency.

(9) Criteria relating to use of financial tests and self guarantees for providing reasonable assurance of funds for decommissioning.

(a) To pass the financial test referred to in Subsection R313-22-35(6)(b), a company shall meet all of the following criteria:

(i) Tangible net worth at least ten times the total current decommissioning cost estimate, or the current amount required if certification is used, for all decommissioning activities for which the company is responsible as self-guaranteeing licensee and as parent-guarantor;

(ii) Assets located in the United States amounting to at least 90 percent of total assets or at least ten times the total current decommissioning cost estimate, or the current amount required if certification is used, for all decommissioning activities for which the company is responsible as self-guaranteeing licensee and as parent-guarantor; and

(iii) A current rating for its most recent bond issuance of AAA, AA, or A as issued by Standard and Poor's, or Aaa, Aa, or A as issued by Moody's.

(b) To pass the financial test, a company shall meet all of the following additional requirements:

(i) The company shall have at least one class of equity securities registered under the Securities Exchange Act of 1934;

(ii) The company's independent certified public accountant shall have compared the data used by the company in the financial test which is derived from the independently audited, yearend financial statements for the latest fiscal year, with the amounts in such financial statement. In connection with that procedure, the licensee shall inform the Executive Secretary within 90 days of any matters coming to the attention of the auditor that cause the auditor to believe that the data specified in the financial test should be adjusted and that the company no longer passes the test; and

(iii) After the initial financial test, the company shall repeat passage of the test within 90 days after the close of each succeeding fiscal year.

(c) If the licensee no longer meets the requirements of Subsection R313-22-35(9)(a), the licensee shall send immediate notice to the Executive Secretary of its intent to establish alternate

financial assurance as specified in Section R313-22-35 within 120 days of such notice.

(d) The terms of a self-guarantee which an applicant or licensee furnishes shall provide that:

(i) The guarantee will remain in force unless the licensee sends notice of cancellation by certified mail to the Executive Secretary. Cancellation may not occur, however, during the 120 days beginning on the date of receipt of the notice of cancellation by the Executive Secretary, as evidenced by the return receipt.

(ii) The licensee shall provide alternative financial assurance as specified in Section R313-22-35 within 90 days following receipt by the Executive Secretary of a notice of a cancellation of the guarantee.

(iii) The guarantee and financial test provisions shall remain in effect until the Executive Secretary has terminated the license or until another financial assurance method acceptable to the Executive Secretary has been put in effect by the licensee.

(iv) The licensee shall promptly forward to the Executive Secretary and the licensee's independent auditor all reports covering the latest fiscal year filed by the licensee with the Securities and Exchange Commission pursuant to the requirements of section 13 of the Securities and Exchange Act of 1934.

(v) If, at any time, the licensee's most recent bond issuance ceases to be rated in a category of "A" or above by either Standard and Poor's or Moody's, the licensee shall provide notice in writing of such fact to the Executive Secretary within 20 days after publication of the change by the rating service. If the licensee's most recent bond issuance ceases to be rated in any category of A or above by both Standard and Poor's and Moody's, the licensee no longer meets the requirements of Subsection R313-22-35(9)(a).

(vi) The applicant or licensee shall provide to the Executive Secretary a written guarantee, a written commitment by a corporate officer, which states that the licensee will fund and carry out the required decommissioning activities or, upon issuance of an order by the Board, the licensee shall set up and fund a trust in the amount of the current cost estimates for decommissioning.

R313-22-36. Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas.

(1) A specific license expires at the end of the day on the expiration date stated in the license unless the licensee has filed an application for renewal under Section R313-22-37 no less than 30 days before the expiration date stated in the existing license. If an application for renewal has been filed at least 30 days prior to the expiration date stated in the existing license, the existing license expires at the end of the day on which the Executive Secretary makes a final determination to deny the renewal application or, if the determination states an expiration date, the expiration date stated in the determination.

(2) A specific license revoked by the Executive Secretary expires at the end of the day on the date of the Executive Secretary's final determination to revoke the license, or on the expiration date stated in the determination, or as otherwise provided by an Order issued by the Executive Secretary.

(3) A specific license continues in effect, beyond the expiration date if necessary, with respect to possession of radioactive material until the Executive Secretary notifies the licensee in writing that the license is terminated. During this time, the licensee shall:

(a) limit actions involving radioactive material to those related to decommissioning; and

(b) continue to control entry to restricted areas until they are suitable for release so that there is not an undue hazard to public health and safety or the environment.

(4) Within 60 days of the occurrence of any of the following, a licensee shall provide notification to the Executive Secretary in writing of such occurrence, and either begin decommissioning its site, or any separate building or outdoor area that contains residual radioactivity so that the building or outdoor area is suitable for release so that there is not an undue hazard to public health and safety or the environment, or submit within 12 months of notification a decommissioning plan, if required by Subsection R313-22-36(7), and begin decommissioning upon approval of that plan if:

(a) the license has expired pursuant to Subsections R313-22-36(1) or (2); or

(b) the licensee has decided to permanently cease principal activities at the entire site or in any separate building or outdoor area that contains residual radioactivity such that the building or outdoor area is unsuitable for release because of an undue hazard to public health and safety or the environment; or

(c) no principal activities under the license have been conducted for a period of 24 months; or

(d) no principal activities have been conducted for a period of 24 months in any separate building or outdoor area that contains residual radioactivity such that the building or outdoor area is unsuitable for release because of an undue hazard to public health and safety or the environment.

(5) Coincident with the notification required by Subsection R313-22-36(4), the licensee shall maintain in effect all decommissioning financial assurances established by the licensee pursuant to Section R313-22-35 in conjunction with a license issuance or renewal or as required by Section R313-22-36. The amount of the financial assurance must be increased, or may be decreased, as appropriate, to cover the detailed cost estimate for decommissioning established pursuant to Subsection R313-22-36(7)(d)(v).

(a) A licensee who has not provided financial assurance to cover the detailed cost estimate submitted with the decommissioning plan shall do so on or before August 15, 1997.

(b) Following approval of the decommissioning plan, a licensee may reduce the amount of the financial assurance as decommissioning proceeds and radiological contamination is reduced at the site with the approval of the Executive Secretary.

(6) The Executive Secretary may grant a request to extend the time periods established in Subsection R313-22-36(4) if the Executive Secretary determines that this relief is not detrimental to the public health and safety and is otherwise in the public interest. The request must be submitted no later than 30 days before notification pursuant to Subsection R313-22-36(4). The schedule for decommissioning set forth in Subsection R313-22-36(4) may not commence until the Executive Secretary has made a determination on the request.

(7)(a) A decommissioning plan shall be submitted if required by license condition or if the procedures and activities necessary to carry out decommissioning of the site or separate building or outdoor area have not been previously approved by the Executive Secretary and these procedures could increase potential health and safety impacts to workers or to the public, such as in any of the following cases:

(i) procedures would involve techniques not applied routinely during cleanup or maintenance operations;

(ii) workers would be entering areas not normally occupied where surface contamination and radiation levels are significantly higher than routinely encountered during operation;

(iii) procedures could result in significantly greater airborne concentrations of radioactive materials than are present during operation; or

(iv) procedures could result in significantly greater releases of radioactive material to the environment than those associated with operation.

(b) The Executive Secretary may approve an alternate schedule for submittal of a decommissioning plan required pursuant to Subsection R313-22-36(4) if the Executive Secretary determines that the alternative schedule is necessary to the effective conduct of decommissioning operations and presents no undue risk from radiation to the public health and safety and is otherwise in the public interest.

(c) Procedures such as those listed in Subsection R313-22-36(7)(a) with potential health and safety impacts may not be carried out prior to approval of the decommissioning plan.

(d) The proposed decommissioning plan for the site or separate building or outdoor area must include:

(i) a description of the conditions of the site or separate building or outdoor area sufficient to evaluate the acceptability of the plan;

(ii) a description of planned decommissioning activities;

(iii) a description of methods used to ensure protection of workers and the environment against radiation hazards during decommissioning;

(iv) a description of the planned final radiation survey; and

(v) an updated detailed cost estimate for decommissioning, comparison of that estimate with present funds set aside for decommissioning, and a plan for assuring the availability of adequate funds for completion of decommissioning.

(vi) For decommissioning plans calling for completion of decommissioning later than 24 months after plan approval, the plan shall include a justification for the delay based on the criteria in Subsection R313-22-36(8).

(e) The proposed decommissioning plan will be approved by the Executive Secretary if the information therein demonstrates that the decommissioning will be completed as soon as practical and that the health and safety of workers and the public will be adequately protected.

(8)(a) Except as provided in Subsection R313-22-36(9), licensees shall complete decommissioning of the site or separate building or outdoor area as soon as practical but no later than 24 months following the initiation of decommissioning.

(b) Except as provided in Subsection R313-22-36(9), when decommissioning involves the entire site, the licensee shall request license termination as soon as practical but no later than 24 months following the initiation of decommissioning.

(9) The Executive Secretary may approve a request for an alternative schedule for completion of decommissioning of the site or separate building or outdoor area, and license termination if appropriate, if the Executive Secretary determines that the alternative is warranted by consideration of the following:

(a) whether it is technically feasible to complete decommissioning within the allotted 24-month period;

(b) whether sufficient waste disposal capacity is available to allow completion of decommissioning within the allotted 24-month period;

(c) whether a significant volume reduction in wastes requiring disposal will be achieved by allowing short-lived radionuclides to decay;

(d) whether a significant reduction in radiation exposure to workers can be achieved by allowing short-lived radionuclides to decay; and

(e) other site-specific factors which the Executive Secretary may consider appropriate on a case-by- case basis, such as the regulatory requirements of other government agencies, lawsuits, ground-water treatment activities, monitored natural ground-water restoration, actions that could result in more environmental harm than deferred cleanup, and other factors beyond the control of the licensee.

(10) As the final step in decommissioning, the licensee shall:

(a) certify the disposition of all licensed material, including accumulated wastes, by submitting a completed Form DRC-14 or equivalent information; and

(b) conduct a radiation survey of the premises where the licensed activities were carried out and submit a report of the results of this survey, unless the licensee demonstrates in some other manner that the premises are suitable for release in accordance with the criteria for decommissioning in Sections R313-15-401 through R313-15-406. The licensee shall, as appropriate:

(i) report levels of gamma radiation in units of millisieverts (microroentgen) per hour at one meter from surfaces, and report levels of radioactivity, including alpha and beta, in units of megabecquerels (disintegrations per minute or microcuries) per 100 square centimeters-- removable and fixed-- for surfaces, megabecquerels (microcuries) per milliliter for water, and becquerels (picocuries) per gram for solids such as soils or concrete; and

(ii) specify the survey instrument(s) used and certify that each instrument is properly calibrated and tested.

(11) Specific licenses, including expired licenses, will be terminated by written notice to the licensee when the Executive Secretary determines that:

(a) radioactive material has been properly disposed;

(b) reasonable effort has been made to eliminate residual radioactive contamination, if present; and

(c) documentation is provided to the Executive Secretary that:

(i) a radiation survey has been performed which demonstrates that the premises are suitable for release in accordance with the criteria for decommissioning in Sections R313-15-401 through R313-15-406; or

(ii) other information submitted by the licensee is sufficient to demonstrate that the premises are suitable for release in accordance with the criteria for decommissioning in Sections R313-15-401 through R313-15-406.

R313-22-37. Renewal of Licenses.

Application for renewal of a specific license shall be filed on a form prescribed by the Executive Secretary and in accordance with Section R313-22-32.

R313-22-38. Amendment of Licenses at Request of Licensee.

Applications for amendment of a license shall be filed in accordance with Section R313-22-32 and shall specify the respects in which the licensee desires the license to be amended and the grounds for the amendment.

R313-22-39. Executive Secretary Action on Applications to Renew or Amend.

In considering an application by a licensee to renew or amend the license, the Executive Secretary will use the criteria set forth in Sections R313-22-33, R313-22-50, and R313-22-75 and in Rules R313-24, R313-25, R313-32, R313-34, R313-36, or R313-38, as applicable.

R313-22-50. Special Requirements for Specific Licenses of Broad Scope.

Authority to transfer possession or control by the manufacturer, processor, or producer of any equipment, device, commodity or other product containing byproduct material whose subsequent possession, use, transfer and disposal by all other persons who are exempted from regulatory requirements may be obtained only from the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

(1) The different types of broad licenses are set forth below:

(a) A "Type A specific license of broad scope" is a specific license authorizing receipt, acquisition, ownership, possession, use and transfer of any chemical or physical form of the radioactive material specified in the license, but not exceeding quantities specified in the license, for any authorized purpose. The quantities specified are usually in the multicurie range.

(b) A "Type B specific license of broad scope" is a specific license authorizing receipt, acquisition, ownership, possession, use and transfer of any chemical or physical form of radioactive material specified in Section R313-22-100 for any authorized purpose. The possession limit for a Type B broad license, if only one radionuclide is possessed thereunder, is the quantity specified for that radionuclide in Section R313-22-100, Column I. If two or more radionuclides are possessed thereunder, the possession limits are determined as follows: For each radionuclide, determine the ratio of the quantity possessed to the applicable quantity specified in Section R313-22-100, Column I, for that radionuclide. The sum of the ratios for the radionuclides possessed under the license shall not exceed unity.

(c) A "Type C specific license of broad scope" is a specific license authorizing receipt, acquisition, ownership, possession, use and transfer of any chemical or physical form of radioactive material specified in Section R313-22-100, for any authorized purpose. The possession limit for a Type C

broad license, if only one radionuclide is possessed thereunder, is the quantity specified for that radionuclide in Section R313-22-100, Column II. If two or more radionuclides are possessed thereunder, the possession limits are determined as follows: For each radionuclide, determine the ratio of the quantity possessed to the applicable quantity specified in Section R313-22-100, Column II, for that radionuclide. The sum of the ratios for the radionuclides possessed under the license shall not exceed unity.

(2) An application for a Type A specific license of broad scope shall be approved if all of the following are complied with:

(a) the applicant satisfies the general requirements specified in Section R313-22-33;

(b) the applicant has engaged in a reasonable number of activities involving the use of radioactive material; and

(c) the applicant has established administrative controls and provisions relating to organization and management, procedures, recordkeeping, material control and accounting, and management review that are necessary to assure safe operations, including:

(i) the establishment of a radiation safety committee composed of such persons as a radiation safety officer, a representative of management, and persons trained and experienced in the safe use of radioactive material;

(ii) the appointment of a radiation safety officer who is qualified by training and experience in radiation protection, and who is available for advice and assistance on radiation safety matters; and

(iii) the establishment of appropriate administrative procedures to assure:

(A) control of procurement and use of radioactive material,

(B) completion of safety evaluations of proposed uses of radioactive material which take into consideration such matters as the adequacy of facilities and equipment, training and experience of the user, and the operating or handling procedures, and

(C) review, approval, and recording by the radiation safety committee of safety evaluations of proposed uses prepared in accordance with Subsection R313-22-50(2)(c)(iii)(B) prior to use of the radioactive material.

(3) An application for a Type B specific license of broad scope shall be approved if all of the following are complied with:

(a) the applicant satisfies the general requirements specified in Section R313-22-33;

(b) the applicant has established administrative controls and provisions relating to organization and management, procedures, recordkeeping, material control and accounting, and management review that are necessary to assure safe operations, including:

(i) the appointment of a radiation safety officer who is qualified by training and experience in radiation protection, and who is available for advice and assistance on radiation safety matters; and

(ii) the establishment of appropriate administrative procedures to assure:

(A) control of procurement and use of radioactive material,

(B) completion of safety evaluations of proposed uses of radioactive material which take into consideration such matters as the adequacy of facilities and equipment, training and experience of the user, and the operating or handling procedures, and

(C) review, approval, and recording by the radiation safety officer of safety evaluations of proposed uses prepared in accordance with Subsection R313-22-50(3)(b)(iii)(B) prior to use of the radioactive material.

(4) An application for a Type C specific license of broad scope shall be approved, if:

(a) the applicant satisfies the general requirements specified in Section R313-22-33;

(b) the applicant submits a statement that radioactive material will be used only by, or under the direct supervision of individuals, who have received:

(i) a college degree at the bachelor level, or equivalent training and experience, in the physical or biological sciences or in engineering; and

(ii) at least forty hours of training and experience in the safe handling of radioactive material, and in the characteristics of ionizing radiation, units of radiation dose and quantities, radiation detection instrumentation, and biological hazards of exposure to radiation appropriate to the type and forms of radioactive material to be used; and

(c) the applicant has established administrative controls and provisions relating to procurement of radioactive material, procedures, recordkeeping, material control and accounting, and management review necessary to assure safe operations.

(5) Specific licenses of broad scope are subject to the following conditions:

(a) unless specifically authorized by the Executive Secretary, persons licensed pursuant to this section shall not:

(i) conduct tracer studies in the environment involving direct release of radioactive material;

(ii) receive, acquire, own, possess, use, or transfer devices containing 100,000 curies (3.7 PBq) or more of radioactive material in sealed sources used for irradiation of materials;

(iii) conduct activities for which a specific license issued by the Executive Secretary under Section R313-22-75, and Rules R313-25, R313-32 or R313-36 is required; or

(iv) add or cause the addition of radioactive material to a food, beverage, cosmetic, drug or other product designed for ingestion or inhalation by, or application to, a human being.

(b) Type A specific licenses of broad scope issued under Rule R313-22 shall be subject to the condition that radioactive material possessed under the license may only be used by, or under the direct supervision of, individuals approved by the licensee's radiation safety committee.

(c) Type B specific license of broad scope issued under Rule R313-22 shall be subject to the condition that radioactive material possessed under the license may only be used by, or under the direct supervision of, individuals approved by the licensee's radiation safety officer.

(d) Type C specific license of broad scope issued under Rule R313-22 shall be subject to the condition that radioactive material possessed under the license may only be used, by or under the direct supervision of, individuals who satisfy the requirements of Subsection R313-22-50(4).

R313-22-75. Special Requirements for a Specific License to Manufacture, Assemble, Repair, or Distribute Commodities, Products, or Devices Which Contain Radioactive Material.

(1) Licensing the introduction of radioactive material into products in exempt concentrations.

(a) In addition to the requirements set forth in Section R313-22-33, a specific license authorizing the introduction of radioactive material into a product or material owned by or in the possession of the licensee or another to be transferred to persons exempt under Subsection R313-19-13(2)(a) will be issued if:

(i) the applicant submits a description of the product or material into which the radioactive material will be introduced, intended use of the radioactive material and the product or material into which it is introduced, method of introduction, initial concentration of the radioactive material in the product or material, control methods to assure that no more than the specified concentration is introduced into the product or material, estimated time interval between introduction and transfer of the product or material, and estimated concentration of the radioactive material in the product or material at the time of transfer; and

(ii) the applicant provides reasonable assurance that the concentrations of radioactive material at the time of transfer will not exceed the concentrations in Section R313-19-70, that reconcentration of the radioactive material in concentrations exceeding those in Section R313-19-70 is not likely, that use of lower concentrations is not feasible, and that the product or material is not likely to be incorporated in any food, beverage, cosmetic, drug or other commodity or product designed for ingestion or inhalation by, or application to a human being.

(b) Persons licensed under Subsection R313-22-75(1) shall file an annual report with the Executive Secretary which shall identify the type and quantity of products or materials into which radioactive material has been introduced during the reporting period; name and address of the person who owned or possessed the product and material, into which radioactive material has been introduced, at the time of introduction; the type and quantity of radionuclide introduced into the product or material; and the initial concentrations of the radionuclide in the product or material at time of transfer of the radioactive material by the licensee. If no transfers of radioactive material have been made pursuant to Subsection R313-22-75(1) during the reporting period, the report shall so indicate. The report shall cover the year ending June 30, and shall be filed within thirty days thereafter.

(2) Licensing the distribution of radioactive material in exempt quantities. Authority to transfer possession or control by the manufacturer, processor or producer of equipment, devices, commodities or other products containing byproduct material whose subsequent possession, use, transfer, and disposal by other persons who are exempted from regulatory requirements may be obtained only from the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

(a) An application for a specific license to distribute naturally occurring and accelerator-produced radioactive material (NARM) to persons exempted from these rules pursuant to Subsection R313-19-13(2)(b) will be approved if:

(i) the radioactive material is not contained in a food, beverage, cosmetic, drug or other commodity designed for ingestion or inhalation by, or application to, a human being;

(ii) the radioactive material is in the form of processed chemical elements, compounds, or mixtures, tissue samples, bioassay samples, counting standards, plated or encapsulated sources, or similar substances, identified as radioactive and to be used for its radioactive properties, but is not incorporated into a manufactured or assembled commodity, product, or device intended for commercial distribution; and

(iii) the applicant submits copies of prototype labels and brochures and the Executive Secretary approves the labels and brochures;

(b) The license issued under Subsection R313-22-75(2)(a) is subject to the following conditions:

(i) No more than ten exempt quantities shall be sold or transferred in a single transaction. However, an exempt quantity may be composed of fractional parts of one or more of the exempt quantities provided the sum of the fractions shall not exceed unity.

(ii) Exempt quantities shall be separated and individually packaged. No more than ten packaged exempt quantities shall be contained in any outer package for transfer to persons exempt pursuant to Subsection R313-19- 13(2)(b). The outer package shall not allow the dose rate at the external surface of the package to exceed 0.5 millirem (5.0 uSv) per hour.

(iii) The immediate container of a quantity or separately packaged fractional quantity of radioactive material shall bear a durable, legible label which:

(A) identifies the radionuclide and the quantity of radioactivity; and

(B) bears the words "Radioactive Material."

(iv) In addition to the labeling information required by Subsection R313-22-75(2)(b)(iii), the label affixed to the immediate container, or an accompanying brochure, shall:

(A) state that the contents are exempt from Licensing State requirements;

(B) bear the words "Radioactive Material - Not for Human Use - Introduction into Foods, Beverages, Cosmetics, Drugs, or Medicinals, or into Products Manufactured for Commercial Distribution is Prohibited - Exempt Quantities Should Not Be Combined;" and

(C) set forth appropriate additional radiation safety precautions and instructions relating to the handling, use, storage and disposal of the radioactive material.

(c) Persons licensed under Subsection R313-22-75(2) shall maintain records identifying, by name and address, persons to whom radioactive material is transferred for use under Subsection R313-19-13(2)(b) or the equivalent regulations of a Licensing State, and stating the kinds and quantities of radioactive material transferred. An annual summary report stating the total quantity of radionuclides transferred under the specific license shall be filed with the Executive Secretary. Reports shall cover the year ending June 30, and shall be filed within thirty days thereafter. If no transfers of radioactive material have been made pursuant to Subsection R313-22-75(2) during the reporting period, the report shall so indicate.

(3) Licensing the incorporation of naturally occurring and accelerator-produced radioactive material (NARM) into gas and aerosol detectors. An application for a specific license authorizing the incorporation of NARM into gas and aerosol detectors to be distributed to persons exempt under Subsection R313-19-13(2)(c)(iii) will be approved if the application satisfies requirements equivalent to those contained in 10 CFR 32.26, 2001 ed. The maximum quantity of radium-226 in

each device shall not exceed 0.1 microcurie (3.7 kBq).

(4) Licensing the manufacture and distribution of devices to persons generally licensed under Subsection R313-21-22(4).

(a) An application for a specific license to manufacture or distribute devices containing radioactive material, excluding special nuclear material, to persons generally licensed under Subsection R313-21-22(4) or equivalent regulations of the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State will be approved if:

(i) the applicant satisfies the general requirements of Section R313-22-33;

(ii) the applicant submits sufficient information relating to the design, manufacture, prototype testing, quality control, labels, proposed uses, installation, servicing, leak testing, operating and safety instructions, and potential hazards of the device to provide reasonable assurance that:

(A) the device can be safely operated by persons not having training in radiological protection,

(B) under ordinary conditions of handling, storage and use of the device, the radioactive material contained in the device will not be released or inadvertently removed from the device, and it is unlikely that a person will receive in one year, a dose in excess of ten percent of the annual limits specified in Subsection R313-15-201(1), and

(C) under accident conditions, such as fire and explosion, associated with handling, storage and use of the device, it is unlikely that a person would receive an external radiation dose or dose commitment in excess of the following organ doses:

TABLE

Whole body; head and trunk; active blood-forming organs; gonads; or lens of eye	150.0 mSv (15 rems)
Hands and forearms; feet and ankles; localized areas of skin averaged over areas no larger than one square centimeter	2.0 Sv (200 rems)
Other organs	500.0 mSv (50 rems); and

(iii) each device bears a durable, legible, clearly visible label or labels approved by the Executive Secretary, which contain in a clearly identified and separate statement:

(A) instructions and precautions necessary to assure safe installation, operation and servicing of the device; documents such as operating and service manuals may be identified in the label and used to provide this information,

(B) the requirement, or lack of requirement, for leak testing, or for testing an "on-off" mechanism and indicator, including the maximum time interval for testing, and the identification of radioactive material by radionuclide, quantity of radioactivity, and date of determination of the quantity, and

(C) the information called for in one of the following statements, as appropriate, in the same or substantially similar form:

(I) "The receipt, possession, use and transfer of this device, Model No. ....., Serial No. ....., are subject to a general license or the equivalent, and the regulations of the U.S. Nuclear Regulatory Commission or a state with which the U.S. Nuclear Regulatory Commission has entered into an agreement for the exercise of regulatory authority. This label shall be maintained on the device in a legible condition. Removal of this label is prohibited." The label shall be printed with the words "CAUTION -RADIOACTIVE MATERIAL" and the name of the manufacturer or distributor shall appear on the label. The model, serial number, and name of the manufacturer or distributor may be omitted from this label provided the information is elsewhere specified in labeling affixed to the device.

(II) "The receipt, possession, use and transfer of this device, Model No. ....., Serial No. ....., are subject to a general license or the equivalent, and the regulations of a Licensing State. This label shall be maintained on the device in a legible condition. Removal of this label is prohibited." The label shall be printed with the words "CAUTION - RADIOACTIVE MATERIAL" and the name of the manufacturer or distributor shall appear on the label. The model, serial number, and name of the manufacturer or distributor may be omitted from this label provided the information is elsewhere specified in labeling affixed to the device.

(b) In the event the applicant desires that the device be required to be tested at intervals longer than six months, either for proper operation of the "on-off" mechanism and indicator, if any, or for leakage of radioactive material or for both, the applicant shall include in the application sufficient information to demonstrate that a longer interval is justified by performance characteristics of the device or similar devices and by design features which have a significant bearing on the probability or consequences of leakage of radioactive material from the device or failure of the "on-off" mechanism and indicator. In determining the acceptable interval for the test for leakage of radioactive material, the Executive Secretary will consider information which includes, but is not limited to:

(i) primary containment, or source capsule;

(ii) protection of primary containment;

(iii) method of sealing containment;

(iv) containment construction materials;

(v) form of contained radioactive material;

(vi) maximum temperature withstood during prototype tests;

(vii) maximum pressure withstood during prototype tests;

(viii) maximum quantity of contained radioactive material;

(ix) radiotoxicity of contained radioactive material; and

(x) operating experience with identical devices or similarly designed and constructed devices.

(c) In the event the applicant desires that the general licensee under Subsection R313-21-22(4), or under equivalent regulations of the U.S. Nuclear Regulatory Commission, an Agreement State

or a Licensing State be authorized to install the device, collect the sample to be analyzed by a specific licensee for leakage of radioactive material, service the device, test the "on-off" mechanism and indicator, or remove the device from installation, the applicant shall include in the application written instructions to be followed by the general licensee, estimated calendar quarter doses associated with this activity or activities, and basis for these estimates. The submitted information shall demonstrate that performance of this activity or activities by an individual untrained in radiological protection, in addition to other handling, storage, and use of devices under the general license, is unlikely to cause that individual to receive a dose in excess of ten percent of the annual limits specified in Subsection R313-15-201(1).

(d) Persons licensed under Subsection R313-22-75(4) to distribute devices to generally licensed persons shall:

(i) furnish a copy of the general license contained in Subsection R313-21-22(4) to each person to whom the person directly or through an intermediate person transfers radioactive material in a device for use pursuant to the general license contained in Subsection R313-21-22(4);

(ii) furnish a copy of the general license contained in the U.S. Nuclear Regulatory Commission's, Agreement State's, or Licensing State's regulation equivalent to Subsection R313-21-22(4), or alternatively, furnish a copy of the general license contained in Subsection R313-21-22(4) to each person to whom he directly or through an intermediate person transfers radioactive material in a device for use pursuant to the general license of the U.S. Nuclear Regulatory Commission, the Agreement State or the Licensing State. If a copy of the general license in Subsection R313-21-22(4) is furnished to such a person, it shall be accompanied by a note explaining that the use of the device is regulated by the U.S. Nuclear Regulatory Commission, Agreement State or Licensing State under requirements substantially the same as those in Subsection R313-21-22(4);

(iii) report to the Executive Secretary all transfers of such devices to persons for use under the general license in Subsection R313-21-22(4). The reports shall identify the general licensee by name and address, an individual by name or position who may constitute a point of contact between the Executive Secretary and the general licensee, the type and model number of device transferred, and the quantity and type of radioactive material contained in the device. If one or more intermediate persons will temporarily possess the device at the intended place of use prior to its possession by the user, the report shall include identification of each intermediate person by name, address, contact, and relationship to the intended user. If no transfers have been made to persons generally licensed under Subsection R313- 21-22(4) during the reporting period, the report shall so indicate. The report shall cover each calendar quarter and shall be filed within thirty days thereafter;

(iv) furnish reports to other agencies.

(A) Report to the U.S. Nuclear Regulatory Commission all transfers of those devices to persons for use under the U.S. Nuclear Regulatory Commission general license in 10 CFR 31.5, 2001 ed.

(B) Report to the responsible State agency all transfers of devices manufactured and distributed pursuant to Subsection R313-22-75(4) for use under a general license in that State's regulations equivalent to Subsection R313-21-22(4).

(C) The reports shall identify each general licensee by name and address, an individual by name or position who may constitute a point of contact between the responsible agency and general licensee, the type and model of the device transferred, and the quantity and type of radioactive material contained in the device. If one or more intermediate persons will temporarily possess the device at the intended place of use prior to its possession by the user, the report shall include identification of each intermediate person by name, address, contact, and relationship to the

intended user. The report shall be submitted within thirty days after the end of each calendar quarter in which a device is transferred to the generally licensed person.

(D) If transfers have not been made to U.S. Nuclear Regulatory Commission licensees during the reporting period, this information shall be reported to the U.S. Nuclear Regulatory Commission.

(E) If transfers have not been made to general licensees within a particular state during the reporting period, this information shall be reported to the responsible state agency upon request of that agency; and

(v) keep records showing the name, address and the point of contact for each general licensee to whom the person directly or through an intermediate person transfers radioactive material in devices for use pursuant to the general license provided in Subsection R313-21-22(4), or equivalent regulations of the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State. The records shall show the date of each transfer, the radionuclide and the quantity of radioactivity in each device transferred, the identity of intermediate persons, and compliance with the report requirements of Subsection R313-22-75(4).

(5) Special requirements for the manufacture, assembly or repair of luminous safety devices for use in aircraft. An application for a specific license to manufacture, assemble or repair luminous safety devices containing tritium or promethium-147 for use in aircraft for distribution to persons generally licensed under Subsection R313-21-22(5) will be approved if:

(a) the applicant satisfies the general requirements of Section R313-22-33; and

(b) the applicant satisfies the requirements of 10 CFR 32.53 through 32.56 and 32.101, 2001 ed, or their equivalent.

(6) Special requirements for license to manufacture calibration sources containing americium-241, plutonium or radium-226 for distribution to persons generally licensed under Subsection R313-21-22(7). An application for a specific license to manufacture calibration and reference sources containing americium-241, plutonium or radium-226 to persons generally licensed under Subsection R313-21-22(7) will be approved if:

(a) the applicant satisfies the general requirements of Section R313-22-33; and

(b) the applicant satisfies the requirements of 10 CFR 32.57 through 32.59, 32.102 and 10 CFR 70.39, 2001 ed., or their equivalent.

(7) Manufacture and distribution of radioactive material for certain in vitro clinical or laboratory testing under general license. An application for a specific license to manufacture or distribute radioactive material for use under the general license of Subsection R313-21-22(9) will be approved if:

(a) the applicant satisfies the general requirements specified in Section R313-22-33;

(b) the radioactive material is to be prepared for distribution in prepackaged units of:

(i) iodine-125 in units not exceeding ten microcuries (370.0 kBq) each;

(ii) iodine-131 in units not exceeding ten microcuries (370.0 kBq) each;

(iii) carbon-14 in units not exceeding ten microcuries (370.0 kBq) each;

(iv) hydrogen-3 (tritium) in units not exceeding 50 microcuries (1.85 MBq) each;

(v) iron-59 in units not exceeding 20 microcuries (740.0 kBq) each;

(vi) cobalt-57 in units not exceeding ten microcuries (370.0 kBq) each;

(vii) selenium-75 in units not exceeding ten microcuries (370.0 kBq) each; or

(viii) mock iodine-125 in units not exceeding 0.05 microcurie (1.85 kBq) of iodine-129 and 0.005 microcurie (185.0 Bq) of americium-241 each;

(c) prepackaged units bear a durable, clearly visible label:

(i) identifying the radioactive contents as to chemical form and radionuclide, and indicating that the amount of radioactivity does not exceed ten microcuries (370.0 kBq) of iodine-125, iodine-131, carbon-14, cobalt-57, or selenium-75; 50 microcuries (1.85 MBq) of hydrogen-3 (tritium); 20 microcuries (740.0 kBq) of iron-59; or Mock Iodine-125 in units not exceeding 0.05 microcuries (1.85 kBq) of iodine-129 and 0.005 microcurie (185.0 Bq) of americium-241 each; and

(ii) displaying the radiation caution symbol described in Section R313-15-901 and the words, "CAUTION, RADIOACTIVE MATERIAL", and "Not for Internal or External Use in Humans or Animals";

(d) one of the following statements, as appropriate, or a substantially similar statement which contains the information called for in one of the following statements, appears on a label affixed to each prepackaged unit or appears in a leaflet or brochure which accompanies the package:

(i) "This radioactive material shall be received, acquired, possessed and used only by physicians, veterinarians, clinical laboratories or hospitals and only for in vitro clinical or laboratory tests not involving internal or external administration of the material, or the radiation therefrom, to human beings or animals. Its receipt, acquisition, possession, use and transfer are subject to the regulations and a general license of the U.S. Nuclear Regulatory Commission or of a state with which the U.S. Nuclear Regulatory Commission has entered into an agreement for the exercise of regulatory authority.

..... Name of Manufacturer"

(ii) "This radioactive material shall be received, acquired, possessed and used only by physicians, veterinarians, clinical laboratories or hospitals and only for in vitro clinical or laboratory tests not involving internal or external administration of the material, or the radiation therefrom, to human beings or animals. Its receipt, acquisition, possession, use and transfer are subject to the regulations and a general license of a Licensing State.

..... Name of Manufacturer"

(e) the label affixed to the unit, or the leaflet or brochure which accompanies the package, contains adequate information as to the precautions to be observed in handling and storing radioactive material. In the case of the Mock Iodine-125 reference or calibration source, the information accompanying the source shall also contain directions to the licensee regarding the waste disposal requirements set out in Section R313-15-1001.

(8) Licensing the manufacture and distribution of ice detection devices. An application for a

specific license to manufacture and distribute ice detection devices to persons generally licensed under Subsection R313-21- 22(10) will be approved if:

(a) the applicant satisfies the general requirements of Section R313-22-33; and

(b) the criteria of 10 CFR 32.61, 32.62, 32.103, 2001 ed. are met.

(9) Manufacture and distribution of radiopharmaceuticals containing radioactive material for medical use under group licenses.

(a) An application for a specific license to manufacture and distribute radiopharmaceuticals containing radioactive material for use by persons licensed pursuant to Rule R313-32 will be approved if:

(i) the applicant satisfies the general requirements specified in Section R313-22-33;

(ii) the applicant submits evidence that the applicant is at least one of the following:

(A) registered or licensed with the U.S. Food and Drug Administration (FDA) as a drug manufacturer;

(B) registered or licensed with a state agency as a drug manufacturer;

(C) licensed as a pharmacy by a State Board of Pharmacy; or

(D) operating as a nuclear pharmacy within a medical institution.

(iii) the applicant submits information on the radionuclide; the chemical and physical form; the maximum activity per vial, syringe, generator, or other container of the radioactive drug; and the shielding provided by the packaging to show it is appropriate for the safe handling and storage of the radioactive drugs by medical use licensees; and

(iv) the applicant satisfies the following labeling requirements:

(A) A label is affixed to each transport radiation shield, whether it is constructed of lead, glass, plastic, or other material, of a radioactive drug to be transferred for commercial distribution. The label must include the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL"; the name of the radioactive drug or its abbreviation; and the quantity of radioactivity at a specified date and time. For radioactive drugs with a half life greater than 100 days, the time may be omitted.

(B) A label is affixed to each syringe, vial, or other container used to hold a radioactive drug to be transferred for commercial distribution. The label must include the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL" and an identifier that ensures that the syringe, vial, or other container can be correlated with the information on the transport radiation shield label.

(b) A licensee described by Subsections R313-22-75(9)(a)(ii)(C) or (D):

(i) May prepare radioactive drugs for medical use, as defined in Section R313-32-2, provided that the radioactive drug is prepared by either an authorized nuclear pharmacist, as specified in Subsections R313-22- 75(9)(b)(ii) and (iii), or an individual under the supervision of an

authorized nuclear pharmacist as specified in Section R313-32-25.

(ii) May allow a pharmacist to work as an authorized nuclear pharmacist if:

(A) this individual qualifies as an authorized nuclear pharmacist as defined in Section R313-32- 2;

(B) this individual meets the requirements specified in Subsection R313-32-980(2) and Section R313- 32-972 and the licensee has received an approved license amendment identifying this individual as an authorized nuclear pharmacist; or

(C) this individual is designated as an authorized nuclear pharmacist in accordance with Subsection R313-22-75(9)(b)(iii).

(iii) The actions authorized in Subsections R313-22-75(9)(b)(i) and (ii) are permitted in spite of more restrictive language in license conditions.

(iv) May designate a pharmacist, as defined in Section R313-32-2, as an authorized nuclear pharmacist if the individual is identified as of January 1, 1997 as an "authorized user" on a nuclear pharmacy license issued by the Executive Secretary under Subsection R313-22-75(9).

(v) Shall provide to the Executive Secretary a copy of each individual's certification by the Board of Pharmaceutical Specialties, the U.S. Nuclear Regulatory Commission or Agreement State license, or the permit issued by a licensee of broad scope, and a copy of the state pharmacy licensure or registration, no later than 30 days after the date that the licensee allows, pursuant to Subsections R313-22-75(9)(b)(ii)(A) and (B), the individual to work as an authorized nuclear pharmacist.

(c) A licensee shall possess and use instrumentation to measure the radioactivity of radioactive drugs. The licensee shall have procedures for use of the instrumentation. The licensee shall measure, by direct measurement or by combination of measurements and calculations, the amount of radioactivity in dosages of alpha-, beta-, or photon-emitting radioactive drugs prior to transfer for commercial distribution. In addition, the licensee shall:

(i) perform tests before initial use, periodically, and following repair, on each instrument for accuracy, linearity, and geometry dependence, as appropriate for the use of the instrument; and make adjustments when necessary; and

(ii) check each instrument for constancy and proper operation at the beginning of each day of use.

(d) Nothing in Subsection R313-22-75(9) relieves the licensee from complying with applicable FDA, or Federal, and State requirements governing radioactive drugs.

(10) Manufacture and distribution of sources or devices containing radioactive material for medical use. An application for a specific license to manufacture and distribute sources and devices containing radioactive material to persons licensed pursuant to Section R313-32-18 for use as a calibration or reference source or for the uses listed in Sections R313-32-400 and R313-32-500 will be approved if:

(a) the applicant satisfies the general requirements in Section R313-22-33;

(b) the applicant submits sufficient information regarding each type of source or device pertinent to an evaluation of its radiation safety, including:

(i) the radioactive material contained, its chemical and physical form and amount,

(ii) details of design and construction of the source or device,

(iii) procedures for, and results of, prototype tests to demonstrate that the source or device will maintain its integrity under stresses likely to be encountered in normal use and accidents,

(iv) for devices containing radioactive material, the radiation profile of a prototype device,

(v) details of quality control procedures to assure that production sources and devices meet the standards of the design and prototype tests,

(vi) procedures and standards for calibrating sources and devices,

(vii) legend and methods for labeling sources and devices as to their radioactive content, and

(viii) instructions for handling and storing the source or device from the radiation safety standpoint, these instructions are to be included on a durable label attached to the source or device or attached to a permanent storage container for the source or device; provided that instructions which are too lengthy for a label may be summarized on the label and printed in detail on a brochure which is referenced on the label;

(c) the label affixed to the source or device, or to the permanent storage container for the source or device, contains information on the radionuclide, quantity and date of assay, and a statement that the source or device is licensed by the Executive Secretary for distribution to persons licensed pursuant to Sections R313-32-18, R313-32-400, and R313-32-500 or under equivalent regulations of the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State; provided that labeling for sources which do not require long term storage may be on a leaflet or brochure which accompanies the source;

(d) in the event the applicant desires that the source or device be required to be tested for leakage of radioactive material at intervals longer than six months, the applicant shall include in the application sufficient information to demonstrate that a longer interval is justified by performance characteristics of the source or device or similar sources or devices and by design features that have a significant bearing on the probability or consequences of leakage of radioactive material from the source; and

(e) in determining the acceptable interval for test of leakage of radioactive material, the Executive Secretary shall consider information that includes, but is not limited to:

(i) primary containment or source capsule,

(ii) protection of primary containment,

(iii) method of sealing containment,

(iv) containment construction materials,

(v) form of contained radioactive material,

(vi) maximum temperature withstood during prototype tests,

(vii) maximum pressure withstood during prototype tests,

(viii) maximum quantity of contained radioactive material,

(ix) radiotoxicity of contained radioactive material, and

(x) operating experience with identical sources or devices or similarly designed and constructed sources or devices.

(11) Requirements for license to manufacture and distribute industrial products containing depleted uranium for mass-volume applications.

(a) An application for a specific license to manufacture industrial products and devices containing depleted uranium for use pursuant to Subsection R313-21-21(5) or equivalent regulations of the U.S. Nuclear Regulatory Commission or an Agreement State will be approved if:

(i) the applicant satisfies the general requirements specified in Section R313-22-33;

(ii) the applicant submits sufficient information relating to the design, manufacture, prototype testing, quality control procedures, labeling or marking, proposed uses and potential hazards of the industrial product or device to provide reasonable assurance that possession, use or transfer of the depleted uranium in the product or device is not likely to cause an individual to receive a radiation dose in excess of ten percent of the annual limits specified in Subsection R313-15-201 (1); and

(iii) the applicant submits sufficient information regarding the industrial product or device and the presence of depleted uranium for a mass-volume application in the product or device to provide reasonable assurance that unique benefits will accrue to the public because of the usefulness of the product or device.

(b) In the case of an industrial product or device whose unique benefits are questionable, the Executive Secretary will approve an application for a specific license under Subsection R313-22-75(11) only if the product or device is found to combine a high degree of utility and low probability of uncontrolled disposal and dispersal of significant quantities of depleted uranium into the environment.

(c) The Executive Secretary may deny an application for a specific license under Subsection R313-22- 75(11) if the end use of the industrial product or device cannot be reasonably foreseen.

(d) Persons licensed pursuant to Subsection R313-22-75(11)(a) shall:

(i) maintain the level of quality control required by the license in the manufacture of the industrial product or device, and in the installation of the depleted uranium into the product or device;

(ii) label or mark each unit to:

(A) identify the manufacturer of the product or device and the number of the license under which the product or device was manufactured, the fact that the product or device contains depleted uranium, and the quantity of depleted uranium in each product or device; and

(B) state that the receipt, possession, use and transfer of the product or device are subject to a general license or the equivalent and the regulations of the U.S. Nuclear Regulatory Commission or an Agreement State;

(iii) assure that the uranium before being installed in each product or device has been impressed with the following legend clearly legible through a plating or other covering: "Depleted Uranium";

(iv) furnish to each person to whom depleted uranium in a product or device is transferred for use pursuant to the general license contained in Subsection R313-21-21(5) or its equivalent:

(A) a copy of the general license contained in Subsection R313-21-21(5) and a copy of form DRC-12; or

(B) a copy of the general license contained in the U.S. Nuclear Regulatory Commission's or Agreement State's regulation equivalent to Subsection R313-21-21(5) and a copy of the U.S. Nuclear Regulatory Commission's or Agreement State's certificate, or alternatively, furnish a copy of the general license contained in Subsection R313-21-21(5) and a copy of form DRC-12 with a note explaining that use of the product or device is regulated by the U.S. Nuclear Regulatory Commission or an Agreement State under requirements substantially the same as those in Subsection R313-21- 21(5);

(v) report to the Executive Secretary all transfers of industrial products or devices to persons for use under the general license in Subsection R313-21-21(5). The report shall identify each general licensee by name and address, an individual by name or position who may constitute a point of contact between the Executive Secretary and the general licensee, the type and model number of device transferred, and the quantity of depleted uranium contained in the product or device. The report shall be submitted within thirty days after the end of the calendar quarter in which the product or device is transferred to the generally licensed person. If no transfers have been made to persons generally licensed under Subsection R313-21-21(5) during the reporting period, the report shall so indicate;

(vi) provide certain other reports as follows:

(A) report to the U.S. Nuclear Regulatory Commission all transfers of industrial products or devices to persons for use under the U.S. Nuclear Regulatory Commission general license in 10 CFR 40.25, 2001 ed.;

(B) report to the responsible state agency all transfers of devices manufactured and distributed pursuant to Subsection R313-22-75(11) for use under a general license in that state's regulations equivalent to Subsection R313-21-21(5),

(C) reports shall identify each general licensee by name and address, an individual by name or position who may constitute a point of contact between the agency and the general licensee, the type and model number of the device transferred, and the quantity of depleted uranium contained in the product or device. The report shall be submitted within thirty days after the end of each calendar quarter in which a product or device is transferred to the generally licensed person,

(D) if no transfers have been made to U.S. Nuclear Regulatory Commission licensees during the reporting period, this information shall be reported to the U.S. Nuclear Regulatory Commission, and

(E) if no transfers have been made to general licensees within a particular Agreement State during the reporting period, this information shall be reported to the responsible Agreement State agency upon the request of that agency; and

(vii) records shall be kept showing the name, address and point of contact for each general licensee to whom the person transfers depleted uranium in industrial products or devices for use

pursuant to the general license provided in Subsection R313-21-21(5) or equivalent regulations of the U.S. Nuclear Regulatory Commission or an Agreement State. The records shall be maintained for a period of two years and shall show the date of each transfer, the quantity of depleted uranium in the product or device transferred, and compliance with the report requirements of Subsection R313-22- 75(11).

R313-22-90. Quantities of Radioactive Materials Requiring Consideration of the Need for an Emergency Plan for Responding to a Release. Refer to Subsection R313-22-32 (8).

TABLE

Radioactive Material(1)	Release Fraction	Quantity (curies)
Actinium-228	.001	4,000
Americium-241	.001	2
Americium-242	.001	2
Americium-243	.001	2
Antimony-124	.01	4,000
Antimony-126	.01	6,000
Barium-133	.01	10,000
Barium-140	.01	30,000
Bismuth-207	.01	5,000
Bismuth-210	.01	600
Cadmium-109	.01	1,000
Cadmium-113	.01	80
Calcium-45	.01	20,000
Californium-252 (20 mg)	.001	9
Carbon-14	.01 Non CO	50,000
Cerium-141	.01	10,000
Cerium-144	.01	300
Cesium-134	.01	2,000
Cesium-137	.01	3,000
Chlorine-36	.5	100
Chromium-51	.01	300,000
Cobalt-60	.001	5,000
Copper-64	.01	200,000
Curium-242	.001	60
Curium-243	.001	3
Curium-244	.001	4
Curium-245	.001	2
Europium-152	.01	500
Europium-154	.01	400
Europium-155	.01	3,000
Germanium-68	.01	2,000
Gadolinium-153	.01	5,000
Gold-198	.01	30,000
Hafnium-172	.01	400
Hafnium-181	.01	7,000
Holmium-166m	.01	100
Hydrogen-3	.5	20,000
Iodine-125	.5	10
Iodine-131	.5	10
Indium-114m	.01	1,000
Iridium-192	.001	40,000

Iron-55	.01	40,000
Iron-59	.01	7,000
Krypton-85	1.0	6,000,000
Lead-210	.01	8
Manganese-56	.01	60,000
Mercury-203	.01	10,000
Molybdenum-99	.01	30,000
Neptunium-237	.001	2
Nickel-63	.01	20,000
Niobium-94	.01	300
Phosphorus-32	.5	100
Phosphorus-33	.5	1,000
Polonium-210	.01	10
Potassium-42	.01	9,000
Promethium-145	.01	4,000
Promethium-147	.01	4,000
Ruthenium-106	.01	200
Samarium-151	.01	4,000
Scandium-46	.01	3,000
Selenium-75	.01	10,000
Silver-110m	.01	1,000
Sodium-22	.01	9,000
Sodium-24	.01	10,000
Strontium-89	.01	3,000
Strontium-90	.01	90
Sulfur-35	.5	900
Technetium-99	.01	10,000
Technetium-99m	.01	400,000
Tellurium-127m	.01	5,000
Tellurium-129m	.01	5,000
Terbium-160	.01	4,000
Thulium-170	.01	4,000
Tin-113	.01	10,000
Tin-123	.01	3,000
Tin-126	.01	1,000
Titanium-44	.01	100
Vanadium-48	.01	7,000
Xenon-133	1.0	900,000
Yttrium-91	.01	2,000
Zinc-65	.01	5,000
Zirconium-93	.01	400
Zirconium-95	.01	5,000
Any other beta-gamma emitter	.01	10,000
Mixed fission products	.01	1,000
Mixed corrosion products	.01	10,000
Contaminated equipment, beta-gamma	.001	10,000
Irradiated material, any form other than solid noncombustible	.01	1,000
Irradiated material, solid noncombustible	.001	10,000
Mixed radioactive waste, beta-gamma	.01	1,000
Packaged mixed waste, beta-gamma(2)	.001	10,000
Any other alpha emitter	.001	2
Contaminated equipment, alpha	.0001	20
Packaged waste, alpha(2)	.0001	20
Combinations of radioactive materials listed above(1)	-----	-----

(1) For combinations of radioactive materials, consideration of the need for

of the ratios of the quantity of each radioactive material authorized to the quanti
R313-22-90 exceeds one.

(2) Waste packaged in Type B containers does not require an emergency plan.

R313-22-100. Limits for Broad Licenses. Refer to Section R313-22-50.

TABLE

RADIOACTIVE MATERIAL	COLUMN I CURIES	COLUMN II CURIES
Antimony-122	1	0.01
Antimony-124	1	0.01
Antimony-125	1	0.01
Arsenic-73	10	0.1
Arsenic-74	1	0.01
Arsenic-76	1	0.01
Arsenic-77	10	0.1
Barium-131	10	0.1
Barium-140	1	0.01
Beryllium-7	10	0.1
Bismuth-210	0.1	0.001
Bromine-82	10	0.1
Cadmium-109	1	0.01
Cadmium-115m	1	0.01
Cadmium-115	10	0.1
Calcium-45	1	0.01
Calcium-47	10	0.1
Carbon-14	100	1
Cerium-141	10	0.1
Cerium-143	10	0.1
Cerium-144	0.1	0.001
Cesium-131	100	1
Cesium-134m	100	1
Cesium-134	0.1	0.001
Cesium-135	1	0.01
Cesium-136	10	0.1
Cesium-137	0.1	0.001
Chlorine-36	1	0.01
Chlorine-38	100	1
Chromium-51	100	1
Cobalt-57	10	0.1
Cobalt-58m	100	1
Cobalt-58	1	0.01
Cobalt-60	0.1	0.001
Copper-64	10	0.1
Dysprosium-165	100	1
Dysprosium-166	10	0.1
Erbium-169	10	0.1
Erbium-171	10	0.1
Europium-152 (9.2h)	10	0.1
Europium-152 (13y)	0.1	0.001
Europium-154	0.1	0.001
Europium-155	1	0.01
Fluorine-18	100	1
Gadolinium-153	1	0.01
Gadolinium-159	10	0.1
Gallium-72	10	0.1

Germanium-71	100	1
Gold-198	10	0.1
Gold-199	10	0.1
Hafnium-181	1	0.01
Holmium-166	10	0.1
Hydrogen-3	100	1
Indium-113m	100	1
Indium-114m	1	0.01
Indium-115m	100	1
Indium-115	1	0.01
Iodine-125	0.1	0.001
Iodine-126	0.1	0.001
Iodine-129	0.1	0.01
Iodine-131	0.1	0.001
Iodine-132	10	0.1
Iodine-133	1	0.01
Iodine-134	10	0.1
Iodine-135	1	0.01
Iridium-192	1	0.01
Iridium-194	10	0.1
Iron-55	10	0.1
Iron-59	1	0.01
Krypton-85	100	1
Krypton-87	10	0.1
Lanthanum-140	1	0.01
Lutetium-177	10	0.1
Manganese-52	1	0.01
Manganese-54	1	0.01
Manganese-56	10	0.1
Mercury-197m	10	0.1
Mercury-197	10	0.1
Mercury-203	1	0.01
Molybdenum-99	10	0.1
Neodymium-147	10	0.1
Neodymium-149	10	0.1
Nickel-59	10	0.1
Nickel-63	1	0.01
Nickel-65	10	0.1
Niobium-93m	1	0.01
Niobium-95	1	0.01
Niobium-97	100	1
Osmium-185	1	0.01
Osmium-191m	100	1
Osmium-191	10	0.1
Osmium-193	10	0.1
Palladium-103	10	0.1
Palladium-109	10	0.1
Phosphorus-32	1	0.01
Platinum-191	10	0.1
Platinum-193m	100	1
Platinum-193	10	0.1
Platinum-197m	100	1
Platinum-197	10	0.1
Polonium-210	0.01	0.0001
Potassium-42	1	0.01
Praseodymium-142	10	0.1
Praseodymium-143	10	0.1
Promethium-147	1	0.01
Promethium-149	10	0.1

Radium-226	0.01	0.0001
Rhenium-186	10	0.1
Rhenium-188	10	0.1
Rhodium-103m	1,000	10
Rhodium-105	10	0.1
Rubidium-86	1	0.01
Rubidium-87	1	0.01
Ruthenium-97	100	1
Ruthenium-103	1	0.01
Ruthenium-105	10	0.1
Ruthenium-106	0.1	0.001
Samarium-151	1	0.01
Samarium-153	10	0.1
Scandium-46	1	0.01
Scandium-47	10	0.1
Scandium-48	1	0.01
Selenium-75	1	0.01
Silicon-31	10	0.1
Silver-105	1	0.01
Silver-110m	0.1	0.001
Silver-111	10	0.1
Sodium-22	0.1	0.001
Sodium-24	1	0.01
Strontium-85m	1,000	10
Strontium-85	1	0.01
Strontium-89	1	0.01
Strontium-90	0.01	0.0001
Strontium-91	10	0.1
Strontium-92	10	0.1
Sulphur-35	10	0.1
Tantalum-182	1	0.01
Technetium-96	10	0.1
Technetium-97m	10	0.1
Technetium-97	10	0.1
Technetium-99m	100	1
Technetium-99	1	0.01
Tellurium-125m	1	0.01
Tellurium-127m	1	0.01
Tellurium-127	10	0.1
Tellurium-129m	1	0.01
Tellurium-129	100	1
Tellurium-131m	10	0.1
Tellurium-132	1	0.01
Terbium-160	1	0.01
Thallium-200	10	0.1
Thallium-201	10	0.1
Thallium-202	10	0.1
Thallium-204	1	0.01
Thulium-170	1	0.01
Thulium-171	1	0.01
Tin-113	1	0.01
Tin-125	1	0.01
Tungsten-181	1	0.01
Tungsten-185	1	0.01
Tungsten-187	10	0.1
Vanadium-48	1	0.01
Xenon-131m	1,000	10
Xenon-133	100	1
Xenon-135	100	1

Ytterbium-175	10	0.1
Yttrium-90	1	0.01
Yttrium-91	1	0.01
Yttrium-92	10	0.1
Yttrium-93	1	0.01
Zinc-65	1	0.01
Zinc-69m	10	0.1
Zinc-69	100	1
Zirconium-93	1	0.01
Zirconium-95	1	0.01
Zirconium-97	1	0.01
Any radioactive material other than source material, special nuclear material, or alpha-emitting radioactive material not listed above	0.1	0.001

R313-22-210. Registration of Product Information.

Licensees who manufacture or initially distribute a sealed source or device containing a sealed source whose product is intended for use under a specific license or general license are deemed to have provided reasonable assurance that the radiation safety properties of the source or device are adequate to protect health and minimize danger to life and the environment if the sealed source or device has been evaluated in accordance with 10 CFR 32.210, 2001 ed. or equivalent regulations of an Agreement State.

KEY

specific licenses, decommissioning, broad scope, radioactive materials

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Rule R313-25. License Requirements for Land Disposal of Radioactive Waste - General Provisions.

As in effect on September 1, 2002

Table of Contents

R313-25-1. Purpose and Scope.

The rules in this chapter establish procedures, criteria, and terms and conditions upon which the Department issues licenses for the land disposal of wastes received from other persons. The requirements of R313-25 are in addition to, and not in substitution for, other applicable requirements of these rules.

R313-25-2. Definitions.

As used in R313-25, the following definitions apply:

"Active maintenance" means significant activity needed during the period of institutional control to maintain a reasonable assurance that the performance objectives in R313-25-19 and R313-25-20 are met. Active maintenance may include the pumping and treatment of water from a disposal unit, the replacement of a disposal unit cover, or other episodic or continuous measures. Active maintenance does not include custodial activities like repair of fencing, repair or replacement of monitoring equipment, revegetation, minor additions to soil cover, minor repair of disposal unit covers, and general disposal site upkeep.

"Buffer zone" means a portion of the disposal site that is controlled by the licensee and that lies under the disposal units and between the disposal units and the boundary of the site.

"Commencement of construction" means clearing of land, excavation, or other substantial action that could adversely affect the environment of a land disposal facility. The term does not mean disposal site exploration, necessary roads for disposal site exploration, borings to determine foundation conditions, or other preconstruction monitoring or testing to establish background information related to the suitability of the disposal site or the protection of environmental values.

"Custodial agency" means an agency of the government designated to act on behalf of the government owner of the disposal site.

"Disposal" means the isolation of wastes from the biosphere by placing them in a land disposal facility.

"Disposal site" means that portion of a land disposal facility which is used for disposal of waste. It consists of disposal units and a buffer zone.

"Disposal unit" means a discrete portion of the disposal site into which waste is placed for disposal. For near-surface disposal, the disposal unit may be a trench.

"Engineered barrier" means a man-made structure or device intended to improve the land disposal facility's performance under R313-25.

"Hydrogeologic unit" means a soil or rock unit or zone that has a distinct influence on the storage or movement of ground water.

"Inadvertent intruder" means a person who may enter the disposal site after closure and engage in

activities unrelated to post closure management, such as agriculture, dwelling construction, or other pursuits which could, by disturbing the site, expose individuals to radiation.

"Intruder barrier" means a sufficient depth of cover over the waste that inhibits contact with waste and helps to ensure that radiation exposures to an inadvertent intruder will meet the performance objectives set forth in R313-25, or engineered structures that provide equivalent protection to the inadvertent intruder.

"Land disposal facility" means the land, buildings and structures, and equipment which are intended to be used for the disposal of radioactive waste.

"Monitoring" means observing and making measurements to provide data to evaluate the performance and characteristics of the disposal site.

"Near-surface disposal facility" means a land disposal facility in which waste is disposed of within approximately the upper 30 meters of the earth's surface.

"Site closure and stabilization" means those actions that are taken upon completion of operations that prepare the disposal site for custodial care, and that assure that the disposal site will remain stable and will not need ongoing active maintenance.

"Stability" means structural stability.

"Surveillance" means monitoring and observation of the disposal site to detect needs for maintenance or custodial care, to observe evidence of intrusion, and to ascertain compliance with other license and regulatory requirements.

"Treatment" means the stabilization or the reduction in volume of waste by a chemical or a physical process.

"Waste" means those low-level radioactive wastes as defined in Section 19-3-102 that are acceptable for disposal in a land disposal facility. For the purposes of this definition, low-level waste has the same meaning as it does in the Low-Level Radioactive Waste Policy Act, Pub.L. 96-573, 94 Stat. 3347; thus, the term denotes radioactive waste not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, waste does not mean byproduct material as defined in 42 U.S.C. 2011(e)(2) of the Atomic Energy Act, uranium or thorium tailings and waste.

R313-25-3. Siting Criteria and Pre-licensing Plan Approval for Commercial Radioactive Waste Disposal Facilities.

(1) Persons proposing to construct or operate commercial radioactive waste disposal facilities, including waste incinerators, shall obtain a plan approval from the Executive Secretary before applying for a license. Plans shall meet the siting criteria and plan approval requirements of Section R313-25-3 and Section 19-3-105.

(2) The siting criteria and plan approval requirements in R313-25-3 apply to prelicensing plan approval applications.

(3) Treatment and disposal facilities, including commercial radioactive waste incinerators, shall not be located:

(a) within or underlain by:

(i) national, state, and county parks, monuments, and recreation areas; designated wilderness and wilderness study areas; wild and scenic river areas;

(ii) ecologically and scientifically significant natural areas, including wildlife management areas and

habitats for listed or proposed endangered species as designated by federal law;

(iii) 100 year floodplains;

(iv) areas 200 feet from Holocene faults;

(v) underground mines, salt domes and salt beds;

(vi) dam failure flood areas;

(vii) areas subject to landslide, mud flow, or other earth movement, unless adverse impacts can be mitigated;

(viii) farmlands classified or evaluated as "prime", "unique", or of "statewide importance" by the U.S. Department of Agricultural Soil Conservation Service under the Prime Farmland Protection Act;

(ix) areas five miles of existing permanent dwellings, residential areas, and other habitable structures, including schools, churches, and historic structures;

(x) areas five miles of surface waters including intermittent streams, perennial streams, rivers, lakes, reservoirs, and wetlands;

(xi) areas 100 feet of uranium mill tailings;

(xii) areas 1000 feet of archeological sites to which adverse impacts cannot reasonably be mitigated;

(xiii) recharge zones of aquifers containing ground water which has a total dissolved solids content of less than 10,000 mg/l; or

(xiv) drinking water source protection areas designated by the State Drinking Water Committee;

(b) in areas:

(i) above or underlain by aquifers containing ground water which has a total dissolved solids content of less than 500 mg/l and which aquifers do not exceed state ground water standards for pollutants;

(ii) above or underlain by aquifers containing ground water which has a total dissolved solids content between 3000 and 10,000 mg/l when the distance from the surface to the ground water is less than 100 ft.;

(iii) areas, such as areas of extensive withdrawal of water, gas, or oil;

(iv) above or underlain by weak and unstable soils, including soils that lose their ability to support foundations as a result of hydrocompaction, expansion, or shrinkage;

(v) above or underlain by karst terrains.

(4) Incinerators associated with land disposal facilities may not be located above aquifers containing ground water which has a total dissolved solids content below 3000 mg/l. Incinerators not associated with ground disposal facilities shall not be located above aquifers containing ground water which has a total dissolved solids content below 500 mg/l.

(5) Facilities may not be located within a distance to existing drinking water wells and watersheds for public water supplies of one year ground water travel time plus 1000 feet for incinerators and of five years ground water travel time plus 1000 feet for land disposal facilities.

(6) The plan approval application shall include hydraulic conductivity and other information necessary

to estimate adequately the ground water travel distance.

(7) The plan approval application shall include the results of studies adequate to identify the presence of ground water aquifers in the area of the proposed site and to assess the quality of the ground water of all aquifers identified in the area of the proposed site.

(8) The Executive Secretary may require the applicant to conduct vadose zone or other near surface monitoring.

(9) Emergency response and safety.

(a) The plan approval application shall demonstrate the availability and adequacy of emergency services, including medical and fire response. The application shall provide evidence that the applicant has coordinated emergency response plans with local and regional emergency response resources.

(b) The plan approval application shall include plans for responding to emergencies both at the site and those involving the transport of wastes within the state. Details of the proposed emergency response plan shall be given in the plan approval application and will be stipulated in the plan approval and radioactive materials license.

(c) The plan approval application shall show proposed routes for transportation of radioactive wastes within the state. The Executive Secretary will not approve plans that propose radioactive waste transportation routes over roads or bridges where weight restrictions would be exceeded. The Executive Secretary will not approve plans that pose adverse impact or risk of harm to inhabited areas. The plan approval application shall address risks to inhabited areas, including both residential and non-residential areas; the width, condition, and types of roads to be used; roadside development on proposed routes; seasonal and climatic factors which may affect safety; alternate emergency access to the facility; the type, size, and configuration of vehicles proposed to haul wastes; transportation restrictions on proposed routes; and the transportation means and routes available to evacuate the population at risk in the event of accidents, including spills and fires.

(10) Siting Authority. The Executive Secretary recognizes that Titles 10 and 17 of the Utah Code give cities and counties authority for local use planning and zoning. Nothing in R313-25-3 precludes cities and counties from establishing additional requirements as provided by applicable state and federal law.

R313-25-4. License Required.

(1) Persons shall not receive, possess, or dispose of waste at a land disposal facility unless authorized by a license issued by the Executive Secretary pursuant to R313-25 and R313-22.

(2) Persons shall file an application with the Executive Secretary pursuant to R313-22-32 and obtain a license as provided in R313-25 before commencement of construction of a land disposal facility. Failure to comply with this requirement may be grounds for denial of a license and other penalties established by law and rules.

R313-25-5. Content of Application.

In addition to the requirements set forth in R313-22-33, an application to receive from others, possess, and dispose of wastes shall consist of general information, specific technical information, institutional information, and financial information as set forth in R313-25-6 through R313-25-10.

R313-25-6. General Information.

The general information shall include the following:

(1) identity of the applicant including:

(a) the full name, address, telephone number, and description of the business or occupation of the applicant;

(b) if the applicant is a partnership, the names and addresses of the partners and the principal location where the partnership does business;

(c) if the applicant is a corporation or an unincorporated association;

(i) the state where it is incorporated or organized and the principal location where it does business; and

(ii) the names and addresses of its directors and principal officers; and

(d) if the applicant is acting as an agent or representative of another person in filing the application, the applicant shall provide, with respect to the other person, information required under R313-25-6(1).

(2) Qualifications of the applicant shall include the following;

(a) the organizational structure of the applicant, both offsite and onsite, including a description of lines of authority and assignments of responsibilities, whether in the form of administrative directives, contract provisions, or otherwise;

(b) the technical qualifications, including training and experience of the applicant and members of the applicant's staff, to engage in the proposed activities. Minimum training and experience requirements for personnel filling key positions described in R313-25-6(2)(a) shall be provided;

(c) a description of the applicant's personnel training program; and

(d) the plan to maintain an adequate complement of trained personnel to carry out waste receipt, handling, and disposal operations in a safe manner.

(3) A description of:

(a) the location of the proposed disposal site;

(b) the general character of the proposed activities;

(c) the types and quantities of waste to be received, possessed, and disposed of;

(d) plans for use of the land disposal facility for purposes other than disposal of wastes; and

(e) the proposed facilities and equipment; and

(4) proposed schedules for construction, receipt of waste, and first emplacement of waste at the proposed land disposal facility.

R313-25-7. Specific Technical Information.

The application shall include certain technical information. The following information is needed to determine whether or not the applicant can meet the performance objectives and the applicable technical requirements of R313-25:

(1) A description of the natural and demographic disposal site characteristics shall be based on and determined by disposal site selection and characterization activities. The description shall include

geologic, geochemical, geotechnical, hydrologic, ecologic, archaeologic, meteorologic, climatologic, and biotic features of the disposal site and vicinity.

(2) Descriptions of the design features of the land disposal facility and of the disposal units for near-surface disposal shall include those design features related to infiltration of water; integrity of covers for disposal units; structural stability of backfill, wastes, and covers; contact of wastes with standing water; disposal site drainage; disposal site closure and stabilization; elimination to the extent practicable of long-term disposal site maintenance; inadvertent intrusion; occupational exposures; disposal site monitoring; and adequacy of the size of the buffer zone for monitoring and potential mitigative measures.

(3) Descriptions of the principal design criteria and their relationship to the performance objectives.

(4) Descriptions of the natural events or phenomena on which the design is based and their relationship to the principal design criteria.

(5) Descriptions of codes and standards which the applicant has applied to the design, and will apply to construction of the land disposal facilities.

(6) Descriptions of the construction and operation of the land disposal facility. The description shall include as a minimum the methods of construction of disposal units; waste emplacement; the procedures for and areas of waste segregation; types of intruder barriers; onsite traffic and drainage systems; survey control program; methods and areas of waste storage; and methods to control surface water and ground water access to the wastes. The description shall also include a description of the methods to be employed in the handling and disposal of wastes containing chelating agents or other non-radiological substances which might affect meeting the performance objectives of R313-25

(7) A description of the disposal site closure plan, including those design features which are intended to facilitate disposal site closures and to eliminate the need for active maintenance after closure.

(8) Identification of the known natural resources at the disposal site whose exploitation could result in inadvertent intrusion into the wastes after removal of active institutional control.

(9) Descriptions of the kind, amount, classification and specifications of the radioactive material proposed to be received, possessed, and disposed of at the land disposal facility.

(10) Descriptions of quality assurance programs, tailored to low-level waste disposal, including audit and managerial controls, for the determination of natural disposal site characteristics and for quality control during the design, construction, operation, and closure of the land disposal facility and the receipt, handling, and emplacement of waste.

(11) A description of the radiation safety program for control and monitoring of radioactive effluents to ensure compliance with the performance objective in R313-25-19 and monitoring of occupational radiation exposure to ensure compliance with the requirements of R313-15 and to control contamination of personnel, vehicles, equipment, buildings, and the disposal site. The applicant shall describe procedures, instrumentation, facilities, and equipment appropriate to both routine and emergency operations.

(12) A description of the environmental monitoring program to provide data and to evaluate potential health and environmental impacts and the plan for taking corrective measures if migration is indicated.

(13) Descriptions of the administrative procedures that the applicant will apply to control activities at the land disposal facility.

(14) A description of the facility electronic recordkeeping system as required in R313-25-33.

R313-25-8. Technical Analyses.

The specific technical information shall also include the following analyses needed to demonstrate that the performance objectives of R313-25 will be met:

(1) Analyses demonstrating that the general population will be protected from releases of radioactivity shall consider the pathways of air, soil, ground water, surface water, plant uptake, and exhumation by burrowing animals. The analyses shall clearly identify and differentiate between the roles performed by the natural disposal site characteristics and design features in isolating and segregating the wastes. The analyses shall clearly demonstrate a reasonable assurance that the exposures to humans from the release of radioactivity will not exceed the limits set forth in R313-25-19.

(2) Analyses of the protection of inadvertent intruders shall demonstrate a reasonable assurance that the waste classification and segregation requirements will be met and that adequate barriers to inadvertent intrusion will be provided.

(3) Analysis of the protection of individuals during operations shall include assessments of expected exposures due to routine operations and likely accidents during handling, storage, and disposal of waste. The analysis shall provide reasonable assurance that exposures will be controlled to meet the requirements of R313-15.

(4) Analyses of the long-term stability of the disposal site shall be based upon analyses of active natural processes including erosion, mass wasting, slope failure, settlement of wastes and backfill, infiltration through covers over disposal areas and adjacent soils, and surface drainage of the disposal site. The analyses shall provide reasonable assurance that there will not be a need for ongoing active maintenance of the disposal site following closure.

R313-25-9. Institutional Information.

The institutional information submitted by the applicant shall include:

(1) A certification by the federal or state agency which owns the disposal site that the agency is prepared to accept transfer of the license when the provisions of R313-25-16 are met and will assume responsibility for institutional control after site closure and for post-closure observation and maintenance.

(2) Evidence, if the proposed disposal site is on land not owned by the federal or a state government, that arrangements have been made for assumption of ownership in fee by the federal or a state agency.

R313-25-10. Financial Information.

This information shall demonstrate that the applicant is financially qualified to carry out the activities for which the license is sought. The information shall meet other financial assurance requirements of R313- 25.

R313-25-11. Requirements for Issuance of a License.

A license for the receipt, possession, and disposal of waste containing radioactive material will be issued by the Executive Secretary upon finding that:

(1) the issuance of the license will not constitute an unreasonable risk to the health and safety of the public;

(2) the applicant is qualified by reason of training and experience to carry out the described disposal operations in a manner that protects health and minimizes danger to life or property;

(3) the applicant's proposed disposal site, disposal design, land disposal facility operations, including equipment, facilities, and procedures, disposal site closure, and post-closure institutional control, are adequate to protect the public health and safety as specified in the performance objectives of R313-25-19;

(4) the applicant's proposed disposal site, disposal site design, land disposal facility operations, including equipment, facilities, and procedures, disposal site closure, and post-closure institutional control are adequate to protect the public health and safety in accordance with the performance objectives of R313-25-20;

(5) the applicant's proposed land disposal facility operations, including equipment, facilities, and procedures, are adequate to protect the public health and safety in accordance with R313-15;

(6) the applicant's proposed disposal site, disposal site design, land disposal facility operations, disposal site closure, and post-closure institutional control plans are adequate to protect the public health and safety in that they will provide reasonable assurance of the long-term stability of the disposed waste and the disposal site and will eliminate to the extent practicable the need for continued maintenance of the disposal site following closure;

(7) the applicant's demonstration provides reasonable assurance that the requirements of R313-25 will be met;

(8) the applicant's proposal for institutional control provides reasonable assurance that control will be provided for the length of time found necessary to ensure the findings in R313-25-11(3) through (6) and that the institutional control meets the requirements of R313-25-28.

(9) the financial or surety arrangements meet the requirements of R313-25.

R313-25-12. Conditions of Licenses.

(1) A license issued under R313-25, or a right thereunder, may not be transferred, assigned, or disposed of, either voluntarily or involuntarily, directly or indirectly, through transfer of control of the license to a person, unless the Executive Secretary finds, after securing full information, that the transfer is in accordance with the provisions of the Radiation Control Act and Rules and gives his consent in writing in the form of a license amendment.

(2) The Executive Secretary may require the licensee to submit written statements under oath.

(3) The license will be terminated only on the full implementation of the final closure plan, including post-closure observation and maintenance, as approved by the Executive Secretary.

(4) The licensee shall submit to the provisions of the Act now or hereafter in effect, and to all findings and orders of the Executive Secretary. The terms and conditions of the license are subject to amendment, revision, or modification, by reason of amendments to, or by reason of rules, and orders issued in accordance with the terms of the Act and these rules.

(5) Persons licensed by the Executive Secretary pursuant to R313-25 shall confine possession and use of the materials to the locations and purposes authorized in the license.

(6) The licensee shall not dispose of waste until the Executive Secretary has inspected the land disposal facility and has found it to conform with the description, design, and construction described in the application for a license.

(7) The Executive Secretary may incorporate, by rule or order, into licenses at the time of issuance or thereafter, additional requirements and conditions with respect to the licensee's receipt, possession, and disposal of waste as the Executive Secretary deems appropriate or necessary in order to:

(a) protect health or to minimize danger to life or property;

(b) require reports and the keeping of records, and to provide for inspections of licensed activities as the Executive Secretary deems necessary or appropriate to effectuate the purposes of the Radiation Control Act and Rules.

(8) The authority to dispose of wastes expires on the expiration date stated in the license. An expiration date on a license applies only to the above ground activities and to the authority to dispose of waste. Failure to renew the license shall not relieve the licensee of responsibility for implementing site closure, post-closure observation, and transfer of the license to the site owner.

R313-25-13. Application for Renewal or Closure.

(1) An application for renewal or an application for closure under R313-25-14 shall be filed at least 90 days prior to license expiration.

(2) Applications for renewal of a license shall be filed in accordance with R313-25-5 through 25-10. Applications for closure shall be filed in accordance with R313-25-14. Information contained in previous applications, statements, or reports filed with the Executive Secretary under the license may be incorporated by reference if the references are clear and specific.

(3) If a licensee has filed an application in proper form for renewal of a license, the license shall not expire unless and until the Executive Secretary has taken final action to deny application for renewal.

(4) In evaluating an application for license renewal, the Executive Secretary will apply the criteria set forth in R313-25-11.

R313-25-14. Contents of Application for Site Closure and Stabilization.

(1) Prior to final closure of the disposal site, or as otherwise directed by the Executive Secretary, the licensee shall submit an application to amend the license for closure. This closure application shall include a final revision and specific details of the disposal site closure plan included in the original license application submitted and approved under R313-25-7(7). The plan shall include the following:

(a) additional geologic, hydrologic, or other data pertinent to the long-term containment of emplaced wastes obtained during the operational period;

(b) the results of tests, experiments, or other analyses relating to backfill of excavated areas, closure and sealing, waste migration and interaction with emplacement media, or other tests, experiments, or analyses pertinent to the long-term containment of emplaced waste within the disposal site;

(c) proposed revision of plans for:

(i) decontamination or dismantlement of surface facilities;

(ii) backfilling of excavated areas; or

(iii) stabilization of the disposal site for post-closure care.

(d) Significant new information regarding the environmental impact of closure activities and long-term performance of the disposal site.

(2) Upon review and consideration of an application to amend the license for closure submitted in accordance with R313-25-14(1), the Executive Secretary shall issue an amendment authorizing closure if there is reasonable assurance that the long-term performance objectives of R313-25 will be met.

R313-25-15. Post-Closure Observation and Maintenance.

The licensee shall observe, monitor, and carry out necessary maintenance and repairs at the disposal site until the site closure is complete and the license is transferred by the Executive Secretary in accordance with R313- 25-16. The licensee shall remain responsible for the disposal site for an additional five years. The Executive Secretary may approve closure plans that provide for shorter or longer time periods of post-closure observation and maintenance, if sufficient rationale is developed for the variance.

R313-25-16. Transfer of License.

Following closure and the period of post-closure observation and maintenance, the licensee may apply for an amendment to transfer the license to the disposal site owner. The license shall be transferred when the Executive Secretary finds:

(1) that the disposal site was closed according to the licensee's approved disposal site closure plan;

(2) that the licensee has provided reasonable assurance that the performance objectives of R313-25 have been met;

(3) that funds for care and records required by R313-25-33(4) and (5) have been transferred to the disposal site owner;

(4) that the post-closure monitoring program is operational and can be implemented by the disposal site owner; and

(5) that the Federal or State agency which will assume responsibility for institutional control of the disposal site is prepared to assume responsibility and ensure that the institutional requirements found necessary under R313-25-11(8) will be met.

R313-25-17. Termination of License.

(1) Following the period of institutional control needed to meet the requirements of R313-25-11, the licensee may apply for an amendment to terminate the license.

(2) This application will be reviewed in accordance with the provisions of R313-22-32.

(3) A license shall be terminated only when the Executive Secretary finds:

(a) that the institutional control requirements of R313-25-11(8) have been met;

(b) that additional requirements resulting from new information developed during the institutional control period have been met;

(c) that permanent monuments or markers warning against intrusion have been installed; and

(d) that records required by R313-25-33(4) and (5) have been sent to the party responsible for institutional control of the disposal site and a copy has been sent to the Executive Secretary immediately prior to license termination.

R313-25-18. General Requirement.

Land disposal facilities shall be sited, designed, operated, closed, and controlled after closure so that reasonable assurance exists that exposures to individuals do not exceed the limits stated in R313-25-19 and 25-22.

R313-25-19. Protection of the General Population from Releases of Radioactivity.

Concentrations of radioactive material which may be released to the general environment in ground water, surface water, air, soil, plants or animals shall not result in an annual dose exceeding an equivalent of 0.25 mSv (0.025 rem) to the whole body, 0.75 mSv (0.075 rem) to the thyroid, and 0.25 mSv (0.025 rem) to any other organ of any member of the public. No greater than 0.04 mSv (0.004 rem)committed effective dose equivalent or total effective dose equivalent to any member of the public shall come from groundwater. Reasonable efforts should be made to maintain releases of radioactivity in effluents to the general environment as low as is reasonably achievable.

R313-25-20. Protection of Individuals from Inadvertent Intrusion.

Design, operation, and closure of the land disposal facility shall ensure protection of any individuals inadvertently intruding into the disposal site and occupying the site or contacting the waste after active institutional controls over the disposal site are removed.

R313-25-21. Protection of Individuals During Operations.

Operations at the land disposal facility shall be conducted in compliance with the standards for radiation protection set out in R313-15 of these rules, except for release of radioactivity in effluents from the land disposal facility, which shall be governed by R313-25-19. Every reasonable effort should be made to maintain radiation exposures as low as is reasonably achievable, ALARA.

R313-25-22. Stability of the Disposal Site After Closure.

The disposal facility shall be sited, designed, used, operated, and closed to achieve long-term stability of the disposal site and to eliminate, to the extent practicable, the need for ongoing active maintenance of the disposal site following closure so that only surveillance, monitoring, or minor custodial care are required.

R313-25-23. Disposal Site Suitability Requirements for Land Disposal - Near-Surface Disposal.

(1) The primary emphasis in disposal site suitability is given to isolation of wastes and to disposal site features that ensure that the long-term performance objectives are met.

(2) The disposal site shall be capable of being characterized, modeled, analyzed and monitored.

(3) Within the region where the facility is to be located, a disposal site should be selected so that projected population growth and future developments are not likely to affect the ability of the disposal facility to meet the performance objectives of R313-25.

(4) Areas shall be avoided having known natural resources which, if exploited, would result in failure to meet the performance objectives of R313-25.

(5) The disposal site shall be generally well drained and free of areas of flooding or frequent ponding. Waste disposal shall not take place in a 100-year flood plain, coastal high-hazard area or wetland, as defined in Executive Order 11988, "Floodplain Management Guidelines."

(6) Upstream drainage areas shall be minimized to decrease the amount of runoff which could erode or inundate waste disposal units.

(7) The disposal site shall provide sufficient depth to the water table that ground water intrusion, perennial or otherwise, into the waste will not occur. The Executive Secretary will consider an exception to this requirement to allow disposal below the water table if it can be conclusively shown that disposal site characteristics will result in molecular diffusion being the predominant means of radionuclide movement and the rate of movement will result in the performance objectives being

met. In no case will waste disposal be permitted in the zone of fluctuation of the water table.

(8) The hydrogeologic unit used for disposal shall not discharge ground water to the surface within the disposal site.

(9) Areas shall be avoided where tectonic processes such as faulting, folding, seismic activity, vulcanism, or similar phenomena may occur with such frequency and extent to significantly affect the ability of the disposal site to meet the performance objectives of R313-25 or may preclude defensible modeling and prediction of long-term impacts.

(10) Areas shall be avoided where surface geologic processes such as mass wasting, erosion, slumping, landsliding, or weathering occur with sufficient such frequency and extent to significantly affect the ability of the disposal site to meet the performance objectives of R313-25, or may preclude defensible modeling and prediction of long-term impacts.

(11) The disposal site shall not be located where nearby facilities or activities could adversely impact the ability of the site to meet the performance objectives of R313-25 or significantly mask the environmental monitoring program.

R313-25-24. Disposal Site Design for Near-Surface Land Disposal.

(1) Site design features shall be directed toward long-term isolation and avoidance of the need for continuing active maintenance after site closure.

(2) The disposal site design and operation shall be compatible with the disposal site closure and stabilization plan and lead to disposal site closure that provides reasonable assurance that the performance objectives will be met.

(3) The disposal site shall be designed to complement and improve, where appropriate, the ability of the disposal site's natural characteristics to assure that the performance objectives will be met.

(4) Covers shall be designed to minimize, to the extent practicable, water infiltration, to direct percolating or surface water away from the disposed waste, and to resist degradation by surface geologic processes and biotic activity.

(5) Surface features shall direct surface water drainage away from disposal units at velocities and gradients which will not result in erosion that will require ongoing active maintenance in the future.

(6) The disposal site shall be designed to minimize to the extent practicable the contact of water with waste during storage, the contact of standing water with waste during disposal, and the contact of percolating or standing water with wastes after disposal.

R313-25-25. Near Surface Land Disposal Facility Operation and Disposal Site Closure.

(1) Wastes designated as Class A pursuant to R313-15-307 of these rules shall be segregated from other wastes by placing them in disposal units which are sufficiently separated from disposal units for the other waste classes so that any interaction between Class A wastes and other wastes will not result in the failure to meet the performance objectives of R313-25. This segregation is not necessary for Class A wastes if they meet the stability requirements of R313-15-308(2).

(2) Wastes designated as Class C pursuant to R313-15-307 shall be disposed of so that the top of the waste is a minimum of five meters below the top surface of the cover or shall be disposed of with intruder barriers that are designed to protect against an inadvertent intrusion for at least 500 years.

(3) Except as provided in R313-25-1(1), only waste classified as Class A, B, or C shall be acceptable for near-surface disposal. Wastes shall be disposed of in accordance with the requirements of R313-25-25(4) through 11.

(4) Wastes shall be emplaced in a manner that maintains the package integrity during emplacement, minimizes the void spaces between packages, and permits the void spaces to be filled.

(5) Void spaces between waste packages shall be filled with earth or other material to reduce future subsidence within the fill.

(6) Waste shall be placed and covered in a manner that limits the radiation dose rate at the surface of the cover to levels that at a minimum will permit the licensee to comply with all provisions of R313-15-105 at the time the license is transferred pursuant to R313-25-16.

(7) The boundaries and locations of disposal units shall be accurately located and mapped by means of a land survey. Near-surface disposal units shall be marked in such a way that the boundaries of the units can be easily defined. Three permanent survey marker control points, referenced to United States Geological Survey or National Geodetic Survey control stations, shall be established on the site to facilitate surveys. The United States Geological Survey or National Geodetic Survey control stations shall provide horizontal and vertical controls as checked against United States Geological Survey or National Geodetic Survey record files.

(8) A buffer zone of land shall be maintained between any buried waste and the disposal site boundary and beneath the disposed waste. The buffer zone shall be of adequate dimensions to carry out environmental monitoring activities specified in R313-25-26(4) and take mitigative measures if needed.

(9) Closure and stabilization measures as set forth in the approved site closure plan shall be carried out as the disposal units are filled and covered.

(10) Active waste disposal operations shall not have an adverse effect on completed closure and stabilization measures.

(11) Only wastes containing or contaminated with radioactive material shall be disposed of at the disposal site.

(12) Proposals for disposal of waste that are not generally acceptable for near-surface disposal because the wastes form and disposal methods shall be different and, in general, more stringent than those specified for Class C waste, may be submitted to the Executive Secretary for approval.

R313-25-26. Environmental Monitoring.

(1) At the time a license application is submitted, the applicant shall have conducted a preoperational monitoring program to provide basic environmental data on the disposal site characteristics. The applicant shall obtain information about the ecology, meteorology, climate, hydrology, geology, geochemistry, and seismology of the disposal site. For those characteristics that are subject to seasonal variation, data shall cover at least a 12-month period.

(2) During the land disposal facility site construction and operation, the licensee shall maintain an environmental monitoring program. Measurements and observations shall be made and recorded to provide data to evaluate the potential health and environmental impacts during both the construction and the operation of the facility and to enable the evaluation of long-term effects and need for mitigative measures. The monitoring system shall be capable of providing early warning of releases of waste from the disposal site before they leave the site boundary.

(3) After the disposal site is closed, the licensee responsible for post-operational surveillance of the disposal site shall maintain a monitoring system based on the operating history and the closure and stabilization of the disposal site. The monitoring system shall be capable of providing early warning of releases of waste from the disposal site before they leave the site boundary.

(4) The licensee shall have plans for taking corrective measures if the environmental monitoring program detects migration of waste which would indicate that the performance objectives may not be met.

R313-25-27. Alternative Requirements for Design and Operations.

The Executive Secretary may, upon request or on his own initiative, authorize provisions other than those set forth in R313-25-24 and 25-26 for the segregation and disposal of waste and for the design and operation of a land disposal facility on a specific basis, if it finds reasonable assurance of compliance with the performance objectives of R313-25.

R313-25-28. Institutional Requirements.

(1) Land Ownership. Disposal of waste received from other persons may be permitted only on land owned in fee by the Federal or a State government.

(2) Institutional Control. The land owner or custodial agency shall conduct an institutional control program to physically control access to the disposal site following transfer of control of the disposal site from the disposal site operator. The institutional control program shall also include, but not be limited to, conducting an environmental monitoring program at the disposal site, periodic surveillance, minor custodial care, and other equivalents as determined by the Executive Secretary, and administration of funds to cover the costs for these activities. The period of institutional controls will be determined by the Executive Secretary, but institutional controls may not be relied upon for more than 100 years following transfer of control of the disposal site to the owner.

R313-25-30. Applicant Qualifications and Assurances.

The applicant shall show that it either possesses the necessary funds, or has reasonable assurance of obtaining the necessary funds, or by a combination of the two, to cover the estimated costs of conducting all licensed activities over the planned operating life of the project, including costs of construction and disposal.

R313-25-31. Funding for Disposal Site Closure and Stabilization.

(1) The applicant shall provide assurances prior to the commencement of operations that sufficient funds will be available to carry out disposal site closure and stabilization, including:

(a) decontamination or dismantlement of land disposal facility structures, and

(b) closure and stabilization of the disposal site so that following transfer of the disposal site to the site owner, the need for ongoing active maintenance is eliminated to the extent practicable and only minor custodial care, surveillance, and monitoring are required. These assurances shall be based on Executive Secretary approved cost estimates reflecting the Executive Secretary approved plan for disposal site closure and stabilization. The applicant's cost estimates shall take into account total costs that would be incurred if an independent contractor were hired to perform the closure and stabilization work.

(2) In order to avoid unnecessary duplication and expense, the Executive Secretary will accept financial sureties that have been consolidated with earmarked financial or surety arrangements established to meet requirements of Federal or other State agencies or local governmental bodies for decontamination, closure, and stabilization. The Executive Secretary will accept these arrangements only if they are considered adequate to satisfy the requirements of R313-25-31 and if they clearly identify that the portion of the surety which covers the closure of the disposal site is clearly identified and committed for use in accomplishing these activities.

(3) The licensee's financial or surety arrangement shall be submitted annually for review by the Executive Secretary to assure that sufficient funds will be available for completion of the closure plan.

(4) The amount of the licensee's financial or surety arrangement shall change in accordance with changes in the predicted costs of closure and stabilization. Factors affecting closure and stabilization cost estimates include inflation, increases in the amount of disturbed land, changes in engineering plans, closure and stabilization that have already been accomplished, and other conditions affecting costs. The financial or surety arrangement shall be sufficient at all times to cover the costs of closure and stabilization of the disposal units that are expected to be used before the next license renewal.

(5) The financial or surety arrangement shall be written for a specified period of time and shall be automatically renewed unless the person who issues the surety notifies the Executive Secretary; the beneficiary, the site owner; and the principal, the licensee, not less than 90 days prior to the renewal date of its intention not to renew. In such a situation, the licensee shall submit a replacement surety within 30 days after notification of cancellation. If the licensee fails to provide a replacement surety acceptable to the Executive Secretary, the beneficiary may collect on the original surety.

(6) Proof of forfeiture shall not be necessary to collect the surety so that, in the event that the licensee could not provide an acceptable replacement surety within the required time, the surety shall be automatically collected prior to its expiration. The conditions described above shall be clearly stated on surety instruments.

(7) Financial or surety arrangements generally acceptable to the Executive Secretary include surety bonds, cash deposits, certificates of deposit, deposits of government securities, escrow accounts, irrevocable letters or lines of credit, trust funds, and combinations of the above or other types of arrangements as may be approved by the Executive Secretary. Self-insurance, or an arrangement which essentially constitutes self-insurance, will not satisfy the surety requirement for private sector applicants.

(8) The licensee's financial or surety arrangement shall remain in effect until the closure and stabilization program has been completed and approved by the Executive Secretary, and the license has been transferred to the site owner.

R313-25-32. Financial Assurances for Institutional Controls.

(1) Prior to the issuance of the license, the applicant shall provide for Executive Secretary approval, a binding arrangement, between the applicant and the disposal site owner that ensures that sufficient funds will be available to cover the costs of monitoring and required maintenance during the institutional control period. The binding arrangement shall be reviewed annually by the Executive Secretary to ensure that changes in inflation, technology, and disposal facility operations are reflected in the arrangements.

(2) Subsequent changes to the binding arrangement specified in R313-25-32(1) relevant to institutional control shall be submitted to the Executive Secretary for prior approval.

R313-25-33. Maintenance of Records, Reports, and Transfers.

(1) Licensees shall maintain records and make reports in connection with the licensed activities as may be required by the conditions of the license or by the rules and orders of the Executive Secretary.

(2) Records which are required by these rules or by license conditions shall be maintained for a period specified by the appropriate rules or by license condition. If a retention period is not otherwise specified, these records shall be maintained and transferred to the officials specified in R313-25-33(4) as a condition of license termination unless the Executive Secretary otherwise authorizes their disposition.

(3) Records which shall be maintained pursuant to R313-25 may be the original or a reproduced copy or microfilm if this reproduced copy or microfilm is capable of producing copy that is clear and legible

at the end of the required retention period.

(4) Notwithstanding R313-25-33(1) through (3), copies of records of the location and the quantity of wastes contained in the disposal site shall be transferred upon license termination to the chief executive of the nearest municipality, the chief executive of the county in which the facility is located, the county zoning board or land development and planning agency, the State Governor, and other state, local, and federal governmental agencies as designated by the Executive Secretary at the time of license termination.

(5) Following receipt and acceptance of a shipment of waste, the licensee shall record the date that the shipment is received at the disposal facility, the date of disposal of the waste, a traceable shipment manifest number, a description of any engineered barrier or structural overpack provided for disposal of the waste, the location of disposal at the disposal site, the condition of the waste packages as received, discrepancies between the materials listed on the manifest and those received, the volume of any pallets, bracing, or other shipping or onsite generated materials that are contaminated, and are disposed of as contaminated or suspect materials, and evidence of leakage or damaged packages or radiation or contamination levels in excess of limits specified in U.S. Department of Transportation and Executive Secretary regulations or rules. The licensee shall briefly describe repackaging operations of the waste packages included in the shipment, plus other information required by the Executive Secretary as a license condition.

(6) Licensees authorized to dispose of waste received from other persons shall file a copy of their financial report or a certified financial statement annually with the Executive Secretary in order to update the information base for determining financial qualifications.

(7)(a) Licensee authorized to dispose of waste received from other persons, pursuant to R313-25, shall submit annual reports to the Executive Secretary. Reports shall be submitted by the end of the first calendar quarter of each year for the preceding year.

(b) The reports shall include:

(i) specification of the quantity of each of the principal contaminants released to unrestricted areas in liquid and in airborne effluents during the preceding year;

(ii) the results of the environmental monitoring program;

(iii) a summary of licensee disposal unit survey and maintenance activities;

(iv) a summary, by waste class, of activities and quantities of radionuclides disposed of;

(v) instances in which observed site characteristics were significantly different from those described in the application for a license; and

(vi) other information the Executive Secretary may require.

(c) If the quantities of waste released during the reporting period, monitoring results, or maintenance performed are significantly different from those predicted, the report shall cover this specifically.

(8) In addition to the other requirements in R313-25-33, the licensee shall store, or have stored, manifest and other information pertaining to receipt and disposal of radioactive waste in an electronic recordkeeping system.

(a) The manifest information that must be electronically stored is:

(i) that required in Appendix G of 10 CFR 20.1001 to 20.2402, 1997 ed., which is incorporated into these rules by reference, with the exception of shipper and carrier telephone numbers and shipper and consignee certifications; and

(ii) that information required in R313-25-33(5).

(b) As specified in facility license conditions, the licensee shall report the stored information, or subsets of this information, on a computer-readable medium.

R313-25-34. Tests on Land Disposal Facilities.

Licensees shall perform, or permit the Executive Secretary to perform, any tests the Executive Secretary deems appropriate or necessary for the administration of the rules in R313-25, including, but not limited to, tests of;

(1) wastes;

(2) facilities used for the receipt, storage, treatment, handling or disposal of wastes;

(3) radiation detection and monitoring instruments; or

(4) other equipment and devices used in connection with the receipt, possession, handling, treatment, storage, or disposal of waste.

R313-25-35. Executive Secretary Inspections of Land Disposal Facilities.

(1) Licensees shall afford to the Executive Secretary, at reasonable times, opportunity to inspect waste not yet disposed of, and the premises, equipment, operations, and facilities in which wastes are received, possessed, handled, treated, stored, or disposed of.

(2) Licensees shall make available to the Executive Secretary for inspection, upon reasonable notice, records kept by it pursuant to these rules. Authorized representatives of the Executive Secretary may copy and take away copies of, for the Executive Secretary's use, any records required to be kept pursuant to R313-25.

KEY

radiation, radioactive waste disposal

Date of Enactment or Last Substantive Amendment

March 10, 2000

Notice of Continuation

October 10, 2001

Authorizing, Implemented, or Interpreted Law

19-3-104; 19-3-108

Rule converted into HTML by the Division of Administrative Rules.

For questions regarding the *content* or *application* of rules under Title R313, please contact the promulgating agency (Environmental Quality, Radiation Control). A list of agencies with links to their homepages is available at **http://www.utah.gov/government/agencylist.html**.

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Rule R313-26. Generator Site Access Permit Requirements for Accessing Utah Radioactive Waste Disposal Facllltles.

As in effect on September 1, 2002

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R313-26-1. Purpose and Scope.

The purpose of this rule is to establish procedures, criteria, and terms and conditions upon which the Executive Secretary issues permits to generators for accessing a land disposal facility located within the State. This rule also contains requirements for shippers. The requirements of Rule R313-26 are in addition to, and not in substitution for, other applicable requirements of these rules.

R313-26-2. Definitions.

As used in Rule R313-26, the following definitions apply:

"Broker" means a person who performs one or more of the following functions for a generator: arranges for transportation of the radioactive waste; collects or consolidates shipments of radioactive waste; or processes radioactive waste in some manner. "Broker" does not include a carrier whose sole function is to transport the radioactive waste.

"Disposal" means the isolation of wastes from the biosphere by placing them in a land disposal facility.

"Generator" means a person who:

(a) possesses any material or component:

(i) that contains radioactivity or is radioactively contaminated; and

(ii) for which the person foresees no further use; and

(b) transfers the material or component to:

(i) a commercial radioactive waste treatment or disposal facility; or

(ii) a broker.

"Generator Site Access Permit" means an authorization to deliver radioactive wastes to a land disposal facility located within the State.

"Land disposal facility" has the same meaning as that given in Section R313-25-2.

"Manifest" means the document, as defined in Appendix G of 10 CFR 20,used for identifying the quantity, composition, origin, and destination of radioactive waste during its transport to a disposal facility.

"Packager" means broker as defined in Section R313-26-2.

"Radioactive waste" means any material that contains radioactivity or is radioactively contaminated and is intended for ultimate disposal at a licensed land disposal facility in Utah.

"Shipper" means the person who offers radioactive waste for transportation, typically consigning this type of waste to a broker or land disposal facility.

R313-26-3. Generator Site Access Permits.

A generator or broker shall obtain a Generator Site Access Permit from the Executive Secretary before transferring radioactive waste to a land disposal facility in Utah.

(1) Generator Site Access Permit applications shall be filed on a form prescribed by the Executive Secretary.

(2) Applications shall be received by the Executive Secretary at least 30 days prior to any shipments being delivered to a land disposal facility in Utah.

(3) Each Generator Site Access Permit application shall include a certification to the Executive Secretary that the shipper shall comply with all applicable State or Federal laws, administrative rules and regulations, licenses, or license conditions of the land disposal facility regarding the packaging, transportation, storage, disposal and delivery of radioactive wastes.

(4) Generator Site Access Permit fees shall be assessed annually by the Executive Secretary based on the following classifications:

(a) Generators shipping more than 1000 cubic feet of radioactive waste annually to a land disposal facility in Utah.

(b) Generators shipping 1000 cubic feet or less of radioactive waste annually to a land disposal facility in Utah.

(c) Brokers shipping radioactive waste to a land disposal facility in Utah.

(5) Generator Site Access Permits shall be valid for a maximum of one year from the date of issuance. The Executive Secretary may modify individual Generator Site Access Permit terms and prorate the annual fees accordingly for administrative purposes.

(6) Generator Site Access Permits may be renewed by filing a new application with the Executive Secretary. To ensure timely renewal, generators and brokers shall submit applications, for Generator Site Access Permit renewal, a minimum of 30 days prior to the expiration date of their Generator Site Access Permit.

(7) Generator Site Access Permit fees are not refundable.

(8) Transfer of a Generator Site Access Permit shall be approved by the Executive Secretary.

(9) The number of Generator Site Access Permits required by each generator shall be determined by the following requirements:

(a) Generators who own multiple facilities within the same state may apply for one Generator Site Access Permit, provided the same contact person within the generator's company shall be responsible for responding to the Executive Secretary for matters pertaining to the waste shipments.

(b) Facilities which are owned by the same generator and located in different states shall obtain separate Generator Site Access Permits.

(c) Persons who both generate and broker wastes shall obtain separate Generator Site Access Permits.

R313-26-4. Shipper's Requirements.

(1) The shipper shall provide the Executive Secretary a copy of the Nuclear Regulatory Commission's "Uniform Low Level Radioactive Waste Manifest" for shipments consigned for disposal within Utah.

(2) The manifest shall be delivered to the Executive Secretary prior to the shipment arriving at the disposal site, but not more than thirty days prior to shipment departure.

(3) The generator's and broker's Generator Site Access Permit numbers shall be documented on the manifest.

(4) Generators and brokers shall ensure that all Generator Site Access Permits are current prior to shipment of waste to a land disposal facility located in the state, and that the waste will arrive at the land disposal facility prior to the expiration date of the Generator Site Access Permits.

(5) A broker shall ensure all radioactive waste contained within a shipment accepted for disposal at a land disposal facility in the state is traceable to the original generators and states, regardless of whether the waste is shipped directly from the point of generation to the disposal facility, or shipped through a broker.

R313-26-5. Land Disposal Facility Licensee Requirements.

The land disposal facility licensee shall ensure that generators and brokers have a current, unencumbered Generator Site Access Permit prior to accepting a generator's or broker's waste.

R313-26-6. Enforcement.

Generator Site Access Permittees shall be subject to the provisions of Rule R313-14 for violations of federal regulations, state rules or requirements in the current land disposal facility operating license regarding radioactive waste packaging, transportation, labeling, notification, classification, marking, manifesting or description.

KEY

radioactive waste generator permit

Date of Enactment or Last Substantive Amendment

September 14, 2001

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19-3-106.4

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Rule R313-28. Use of X-Rays in the Healing Arts.

As in effect on September 1, 2002

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- **Authorizing, Implemented, or Interpreted Law**

R313-28-10. Purpose and Scope.

(1) The purpose of the rules in R313-28 is to prescribe the requirements for the use of x-rays in the healing arts.

(2) The rules set forth herein are adopted pursuant to the provisions of Sections 19-3-104(3) and 19-3-104(6).

R313-28-20. Definitions.

As used in R313-28, the following definitions apply:

"Accessible surface" means the external surface of the enclosure or housing provided by the manufacturer.

"Actual focal spot" refer to "Focal spot."

"Aluminum equivalent" means the thickness of aluminum, type 1100 alloy, affording the same attenuation, under specified conditions, as the material in question. The nominal chemical composition of type 1100 aluminum alloy is 99.00 percent minimum aluminum, 0.12 percent copper.

"Assembler" means individuals engaged in the business of assembling, replacing, or installing one or more components into an x-ray system or subsystem. The term includes the owner of an x-ray system or his or her employee or agent if they assemble components into an x-ray system that is subsequently used to provide professional or commercial services.

"Attenuation block" means a block or stack, having appropriate dimensions 20 cm by 20 cm by 3.8 cm, of type 1100 aluminum alloy or other materials having equivalent attenuation.

"Automatic EXPOSURE control" means a device which automatically controls one or more technique factors in order to obtain, at a preselected location, a required quantity of radiation. Phototimer and ion chamber devices are included in this category.

"Barrier" refer to "Protective barrier".

"Beam axis" means a line from the source through the centers of the x-ray fields.

"Beam-limiting device" means a device which provides a means to restrict the dimensions of the x-ray field.

"Certified components" means components of x-ray systems which are subject to regulations promulgated under Public Law 90-602, the Radiation Control for Health and Safety Act of 1968.

"Certified system" means an x-ray system which has one or more certified components.

"Changeable filters" means filters designed to be removed by the operator.

"Coefficient of variation (C)" means the ratio of the standard deviation to the mean value of a population of observations.

"Computed tomography" means the production of a tomogram by the acquisition and computer processing of x-ray transmission data.

"Control panel" means that part of the x-ray control upon which are mounted the switches, knobs, push buttons, and other hardware necessary for setting the technique factors.

"Cooling curve" means the graphical relationship between heat units stored and cooling time.

"CT" means computed tomography.

"CT gantry" means the tube housing assemblies, beam-limiting devices, detectors, and the supporting structures and frames which house these components.

"Dead-man switch" means a switch so constructed that a circuit closing contact can be maintained only by continuous pressure on the switch by the operator.

"Diagnostic source assembly" means the tube housing assembly with a beam-limiting device attached.

"Diagnostic x-ray system" means an x-ray system designed for irradiation of part of the human body for the purpose of recording or visualization for diagnostic purposes.

"Entrance EXPOSURE rate" means the EXPOSURE free in air per unit time at the point where the useful beam enters the patient.

"Equipment" refer to "X-ray equipment".

"Field emission equipment" means equipment which uses an x-ray tube in which electron emission from the cathode is due solely to the action of an electric field.

"Filter" means material placed in the useful beam to absorb preferentially selected radiations.

"Fluoroscopic imaging assembly" means a subsystem in which x-ray photons produce a fluoroscopic image. It includes equipment housing, electrical interlocks, the primary protective barrier, and structural material providing linkage between the image receptor and the diagnostic source assembly.

"Focal spot" means the area on the anode of the x-ray tube bombarded by the electrons accelerated from the cathode and from which the useful beam originates. Also referred to as "Actual focal spot."

"Gonad shield" means a protective barrier for the testes or ovaries.

"Half-value layer or HVL" means the thickness of specified material which attenuates the beam of radiation to an extent that the EXPOSURE rate is reduced to one-half of its original value. In this definition, the contribution of scatter radiation, other than that which might be present initially in the beam concerned, is deemed to be excluded.

"Healing arts screening" means the testing of a human population which is asymptomatic for the disease for which the screening is being performed. Excluded from this definition are those individuals whose risk factors for the disease are greater than for the population at large".

"Heat unit" means a unit of energy equal to the product of the peak kilovoltage, milliamperes, and seconds: for example, kVp times mA times seconds.

"HVL" refer to "half value layer."

"Image intensifier" means a device installed in its housing which instantaneously converts an x-ray pattern into a light image of higher energy density.

"Image receptor" means a device, for example, a fluorescent screen radiographic film, solid state detector, or gaseous detector, which transforms incident x-ray photons to produce a visible image or stores the information in a form which can be made into a visible image. In those cases where means are provided to preselect a portion of the image receptor, the term "image receptor" shall mean the preselected portion of the device.

"Irradiation" means the exposure of matter to ionizing radiation.

"Kilovolts peak" refer to "Peak tube potential".

"kV" means kilovolts.

"kVp" refer to "Peak tube potential."

"Lead equivalent" means the thickness of lead affording the same attenuation, under specified conditions, as the material in question.

"Leakage radiation" means radiation emanating from the diagnostic source assembly except for:

(a) the useful beam, and

(b) radiation produced when the exposure switch or timer is not activated.

"Leakage technique factors" means the technique factors associated with the diagnostic source assembly which are used in measuring leakage radiation. They are defined as follows:

(a) For diagnostic source assemblies intended for capacitor energy storage equipment, the maximum- rated peak tube potential and the maximum-rated number of exposures in an hour for operation at the maximum-rated peak tube potential with the quantity of charge per exposure being ten millicoulombs, ten milliampere seconds, or the minimum obtainable from the unit, whichever is larger.

(b) For diagnostic source assemblies intended for field emission equipment rated for pulsed operation, the maximum-rated peak tube potential and the maximum-rated number of x-ray pulses in an hour for operation at the maximum-rated peak tube potential.

(c) For other diagnostic source assemblies, the maximum-rated peak tube potential and the maximum- rated continuous tube current for the maximum-rated peak tube potential.

"Light field" means that area of the intersection of the light beam from the beam-limiting device and one of the set of planes parallel to and including the plane of the image receptor, whose perimeter is the locus of points at which the illumination is one-fourth of the maximum in the intersection.

"mA" means tube current in milliamperes.

"mAs" means milliampere second or the product of the tube current in milliamperes and the time of exposure in seconds.

"Mammography imaging medical physicist" means an individual who conducts mammography surveys of mammography facilities.

"Mammography survey" means an evaluation of x-ray imaging equipment and oversight of a mammography facility's quality control program.

"Mobile x-ray equipment" refer to "X-ray equipment".

"Multiple scan average dose" means the average dose at the center of a series of scans, specified at the center of the axis of rotation of a CT x-ray system.

"New installation" means change, modification or relocation of new or existing shielding or equipment.

"Operator of diagnostic x-ray equipment" means either:

(a) The individual responsible for insuring that the appropriate technique factors are set on the x-ray equipment, or

(b) The individual who makes the radiation exposure.

"Patient" means an individual subjected to healing arts examination, diagnosis, or treatment.

"PBL" refer to "Positive beam limitation."

"Peak tube potential" means the maximum value of the potential difference across the x-ray tube during an exposure.

"Phantom" means a volume of material behaving in a manner similar to tissue with respect to the attenuation and scattering of radiation.

"PID" refer to "Position indicating device."

"Portable x-ray equipment" refer to "X-ray equipment".

"Position indicating device (PID)" means a device, on dental x-ray equipment which indicates the beam position and establishes a definite source-surface (skin) distance. The device may or may not incorporate or serve as a beam-limiting device.

"Positive beam limitation" means the automatic or semi-automatic adjustment of an x-ray beam to the size of the selected image receptor, whereby exposures cannot be made without such adjustment.

"Primary beam scatter" means scattered radiation which has been deviated in direction or energy by materials irradiated by the primary beam.

"Primary protective barrier" refer to "Protective barrier".

"Protective apron" means an apron made of radiation absorbing materials, used to reduce radiation exposure.

"Protective barrier" means a barrier of radiation absorbing material used to reduce radiation exposure.

(a) "Primary protective barrier" means the material, excluding filters, placed in the useful beam to reduce the radiation exposure for protection purposes.

(b) "Secondary protective barrier" means the material which attenuates stray radiation.

"Protective glove" means a glove made of radiation absorbing materials used to reduce radiation exposure.

"Radiation therapy simulation system" means a radiographic or fluoroscopic x-ray system intended for localizing the volume to be exposed during radiation therapy and for confirming the position and size of the therapeutic irradiation field.

"Radiograph" means an image receptor on which the image is created directly or indirectly by an x-ray pattern and results in a permanent record.

"Rating" means the operating limits of an x-ray system or subsystem as specified by the component manufacturer.

"Recording" means producing a permanent form of an image resulting from x-ray photons.

"Reference plane" means a plane which is displaced from and parallel to the tomographic plane.

"Scan" means the complete process of collecting x-ray transmission data for the production of a tomogram. Data can be collected simultaneously during a single scan for the production of one or more tomograms.

"Scan increment" means the amount of relative displacement of the patient with respect to the computer tomographic x-ray system between successive scans measured along the direction of such displacement.

"Scattered radiation" means radiation that, during passage through matter, has been deviated in direction, energy or both direction and energy. Also refer to "Primary Beam Scatter".

"Shutter" means a device attached to the tube housing assembly which can intercept the entire cross sectional area of the useful beam and which has a lead equivalency at least that of the tube housing assembly.

"SID" refer to "Source-image receptor distance".

"Source" means the focal spot of the x-ray tube.

"Source to image receptor distance" means the distance from the source to the center of the input surface of the image receptor.

"Special purpose x-ray system" means that which is designed for irradiation of specific body parts.

"Spot film" means a radiograph which is made during a fluoroscopic examination to permanently record conditions which exist during that fluoroscopic procedure.

"Spot film device" means a device intended to transport or position a radiographic image receptor between the x-ray source and fluoroscopic image receptor, including a device intended to hold a cassette over the input end of an image intensifier for the purpose of making a radiograph.

"SSD" means the distance between the source and the skin entrance plane of the patient.

"Stationary x-ray equipment" refer to "X-ray equipment".

"Stray radiation" means the sum of leakage and scattered radiation.

"Technique factors" means the following conditions of operation

(a) For capacitor energy storage equipment, peak tube potential in kV and quantity of charge in mAs.

(b) For field emission equipment rated for pulsed operation, peak tube potential in kV and number of x-ray pulses.

(c) For other equipment, peak tube potential in kV and either;

(i) the tube current in mA and exposure time in seconds, or

(ii) the product of tube current and exposure time in mAs.

"Termination of irradiation" means the stopping of irradiation in a fashion which will not permit continuance of irradiation without the resetting of operating conditions at the control panel.

"Tomogram" means the depiction of the x-ray attenuation properties of a section through the body.

"Tomographic plane" means that geometric plane which is identified as corresponding to the output tomogram.

"Tomographic section" means the volume of an object whose x-ray attenuation properties are imaged in a tomogram.

"Tube" means an x-ray tube, unless otherwise specified.

"Tube housing assembly" means the tube housing with tube installed. It includes high-voltage or filament transformers and other appropriate elements when they are contained within the tube housing.

"Tube rating chart" means the set of curves which specify the rated limits of operation of the tube in terms of the technique factors.

"Useful beam" means the radiation emanating from the tube housing port or the radiation head and passing through the aperture of the beam limiting device when the switch or timer is activated.

"Visible area" means that portion of the input surface of the image receptor over which incident x-ray photons are producing a visible image.

"X-ray exposure control" means a device, switch, button, or other similar means by which an operator initiates or terminates the radiation exposure. The x-ray exposure control may include associated equipment, for example, timers and back-up timers.

"X-ray equipment" means an x-ray system, subsystem, or component thereof. Types of x-ray equipment are as follows:

(a) "Mobile" means x-ray equipment mounted on a permanent base with wheels or casters for moving while completely assembled.

(b) "Portable" means x-ray equipment designed to be hand-carried.

(c) "Stationary" means x-ray equipment which is installed in a fixed location.

"X-ray field" means that area of the intersection of the useful beam and one of the sets of planes parallel to and including the plane of the image receptor, whose perimeter is the locus of points at which the EXPOSURE rate is one-fourth of the maximum in the intersection.

"X-ray high-voltage generator" means a device which transforms electrical energy from the potential supplied by the x-ray control to the tube operating potential. The device may also include means for transforming alternating current to direct current, filament transformers for the x-ray tube high-voltage switches, electrical protective devices, and other appropriate elements.

"X-ray system" means an assemblage of components for the controlled production of x-rays. It includes minimally an x-ray high-voltage generator, an x-ray control, a tube housing assembly, a beam-limiting device, and the necessary supporting structures. Additional components which function with the system are considered integral parts of the system.

"X-ray tube" means an electron tube which is designed to be used primarily for the production of x- rays.

R313-28-31. General and Administrative Requirements.

(1) Persons shall not make, sell, lease, transfer, lend, or install x-ray equipment or the accessories used in connection with x-ray equipment unless the accessories and equipment, when properly placed in operation and properly used, will meet the applicable requirements of these rules.

(2) The registrant shall be responsible for directing the operation of the x-ray machines which are under the registrant's administrative control. The registrant or registrant's agent shall assure that the requirements of R313-28-31(2)(a) through R313-28-31(2)(i) are met in the operation of the x-ray machines.

(a) An x-ray machine which does not meet the provisions of these rules shall not be operated for diagnostic purposes, when directed by the Executive Secretary.

(b) Individuals who will be operating the x-ray equipment shall be instructed in the registrant's written radiation safety program and be qualified in the safe use of the equipment. Required operator qualifications are listed in R313-28-350.

(c) The registrant of a facility shall create and make available to x-ray operators written safety procedures, including patient holding and restrictions of the operating technique required for the safe operation of the x-ray systems. Individuals who operate x-ray systems shall be responsible for complying with these rules.

(d) Except for individuals who cannot be moved out of the room and the patient being examined, only the staff and ancillary personnel or other individuals needed for the medical procedure or training shall be present in the room during the radiographic exposure and shall be positioned as follows:

(i) individuals other than the patient shall be positioned so that no part of the body will be struck by the useful beam unless protected by not less than 0.5 mm lead equivalent material;

(ii) the x-ray operator, other staff, ancillary personnel and other individuals needed for the medical procedure shall be protected from primary beam scatter by protective aprons or barriers unless it can be shown that by virtue of distances employed, EXPOSURE levels are reduced to the limits specified in R313-15-201; and

(iii) patients who are not being examined and cannot be removed from the room shall be protected from the primary beam scatter by whole body protective barriers of not less than 0.25 mm lead equivalent material or shall be so positioned that the nearest portion of the body is at least two meters from both the tube head and nearest edge of the image receptor.

(e) For patients who have not passed reproductive age, gonad shielding of not less than 0.5 mm lead equivalent material shall be used during radiographic procedures in which the gonads are in the useful beam, except for cases in which this would interfere with the diagnostic procedure.

(f) Individuals shall not be exposed to the useful beam except for healing arts purposes unless the exposure has been authorized by a licensed practitioner of the healing arts. Deliberate exposures for the following purposes are prohibited:

(i) exposure of an individual for training, demonstration or other non-healing arts purposes; and

(ii) exposure of an individual for the purpose of healing arts screening except as authorized by R313-28-31(2)(i).

(g) When a patient or film must be provided with auxiliary support during a radiation exposure:

(i) mechanical holding devices shall be used when the technique permits. The written procedures, required by R313-28-31(2)(c), shall list individual projections where mechanical holding devices can be utilized;

(ii) written safety procedures, as required by R313-28-31(2)(c), shall indicate the requirements for selecting an individual to hold patients or films and the procedure that individual shall follow;

(iii) the individual holding patients or films during radiographic examinations shall be instructed in personal radiation safety and protected as required by R313-28-31(2)(d)(i);

(iv) Individuals shall not be used routinely to hold film or patients;

(v) In those cases where the patient must hold the film, except during intraoral examinations, portions of the body other than the area of clinical interest struck by the useful beam shall be protected by not less than 0.5 mm lead equivalent material; and

(vi) Facilities shall have protective aprons and gloves available in sufficient numbers to provide protection to personnel who are involved with x-ray operations and who are otherwise not shielded.

(h) Personnel monitoring. Individuals who are associated with the operation of an x-ray system are subject to the applicable requirements of R313-15.

(i) Healing arts screening. Persons proposing to conduct a healing arts screening program shall not initiate the program without prior approval of the Executive Secretary or in the case of a research program, by an Investigational Review Board which has been approved by the United States Food and Drug Administration. When requesting approval, that person shall submit the information outlined in R313-28-400. If information submitted becomes invalid or outdated, the Executive Secretary shall be notified immediately.

(3) Maintenance of records and information. The registrant shall maintain at least the following information for each x-ray machine:

(a) model numbers of major components;

(b) record of surveys or calculations to demonstrate compliance with R313-15-302, calibration, maintenance and modifications performed on the x-ray machine; and

(c) a shielding design report for the x-ray suite which states assumed values for workload and use factors and includes a drawing of surrounding areas showing assumed values for occupancy factors.

(4) X-ray records. Facilities shall maintain an x-ray record containing the patient's name, the types of examinations, and the dates the examinations were performed. When the patient or film must be provided with human auxiliary support, the name of the human holder shall be recorded. The registrant shall retain these records for three years after the record is made.

(5) Portable or mobile equipment shall be used only for examinations where it is impractical to transfer the patient to a stationary radiographic installation.

(6) Procedures and auxiliary equipment designed to minimize patient and personnel exposure commensurate with the needed diagnostic information shall be utilized.

(a) The speed of the screen and film combinations used shall be the fastest speed consistent with the diagnostic objective of the examinations. Film cassettes without intensifying screens shall not be used for routine diagnostic radiological imaging, with the exception of standard film packets for intra-oral use in dental radiography. If the requirements of R313-28-31(6)(a) cannot be met, an exemption may be requested pursuant to R313-12-55.

(b) The radiation exposure to the patient shall be the minimum exposure required to produce images of good diagnostic quality.

(c) X-ray systems, other than fluoroscopic, computed tomography, dental or veterinary units, shall not be utilized in procedures where the source to patient distance is less than 30 centimeters.

R313-28-32. Plan Review.

(1) Prior to construction,the floor plans, shielding specifications and equipment arrangement of all

new installations, or modifications of existing installations, utilizing ionizing radiation shall be submitted to the Executive Secretary. The required information is denoted in R313-28-200 and R313-28-450.

(2) If the services of a consultant are used to review the shielding specifications, a copy of the report must be submitted to the Executive Secretary within 14 working days.

(3) The Executive Secretary may require additional modifications should a subsequent analysis of operating conditions, for example, a change in workload or use and occupancy factors, indicate the possibility of an individual receiving a dose in excess of the limits prescribed in R313-15.

R313-28-35. General Requirements for Diagnostic X-Ray Systems.

In addition to other requirements of R313-28, all diagnostic x-ray systems shall meet the following requirements:

(1) Warning label. The control panel containing the main power switch shall bear the warning statement, legible and accessible to view: "WARNING: This x-ray unit may be dangerous to patient and operator unless safe exposure factors and operating instructions are observed."

(2) Battery charge indicator. On battery powered generators, visual means shall be provided on the control panel to indicate whether the battery is in a state of charge adequate for proper operation.

(3) Leakage radiation from the diagnostic source assembly. The leakage radiation from the diagnostic source assembly measured at a distance of one meter in any direction from the source shall not exceed 25.8 uC/kg (100 milliroentgens) in one hour when the x-ray tube is operated at its leakage technique factors.

(4) Radiation from components other than the diagnostic source assembly. The radiation emitted by a component other than the diagnostic source assembly shall not exceed 0.516 uC/kg (two milliroentgens) in one hour at five centimeters from accessible surfaces of the component when it is operated in an assembled x-ray system under the conditions for which it was designed. Compliance shall be determined by measurements averaged over an area of 100 square centimeters with no linear dimension greater than 20 centimeters.

(5) Beam quality.

(a) The half value layer of the useful beam for a given x-ray tube potential shall not be less than the values shown in R313-28-35, Table I. If it is necessary to determine such half-value layer at an x-ray tube potential which is not listed in Table I, linear interpolation or extrapolation may be made.

TABLE I

DESIGN OPERATING RANGE (KILO VOLTS PEAK	MEASURED POTENTIAL (KILOVOLTS PEAK)	DENTAL INTRA-ORAL MANUFACTURED BEFORE AUGUST 1, 1974 AND ON OR AFTER DECEMBER 1, 1980	ALL OTHER DIAGNOSTIC X-RAY SYSTEMS
Below 51	30	(use prohibited)	0.3
	40	(use prohibited)	0.4
	50	1.5	0.5
	51	1.5	1.2

	60	1.5	1.3
	70	1.5	1.5
Above 70	71	2.1	2.1
	80	? ?	? ?
	90	2.5	2.5
	100	2.7	2.7
	110	3.0	3.0
	120	3.2	3.2
	130	3.5	3.5
	140	3.8	3.8
	150	4.1	4.1

(b) For capacitor discharge equipment, compliance with the requirements of R313-28-35(5)(a) shall be determined with the system fully charged and a setting of 10 mAs for exposures.

(c) The required minimal half-value layer of the useful beam shall include the filtration contributed by materials which are permanently present between the focal spot of the tube and the patient.

(d) Filtration control. For x-ray systems which have variable kVp and variable filtration for the useful beam, a device shall link the kVp selector with the filters and shall prevent an exposure unless the minimum amount of filtration necessary to produce the HVL required by R313-28-35 (5)(a) is in the useful beam for the given kVp which has been selected.

(6) Multiple tubes. When two or more radiographic tubes are controlled by one exposure switch, the tube or tubes which have been selected shall be clearly indicated prior to initiation of the exposure. For equipment manufactured after August 1, 1974, indications shall be both on the x-ray control panel and at or near the tube housing assembly which has been selected.

(7) Mechanical support of tube head. The tube housing assembly supports shall be adjusted so that the tube housing assembly will remain stable during an exposure unless the tube housing movement during exposure is a designed function of the x-ray system.

(8) Technique indicators.

(a) The technique factors to be used during an exposure shall be indicated before the exposure begins, except when automatic EXPOSURE controls are used, in which case the technique factors which are set prior to the exposure shall be indicated.

(b) On equipment having fixed technique factors, the requirements, in R313-28-35(8)(a) may be met by permanent markings. Indication of technique factors shall be visible from the operator's position except in the case of spot films made by the fluoroscopist.

(9) Maintaining compliance. Diagnostic x-ray systems and their associated components certified pursuant to the provisions of 21 CFR Part 1020 shall be maintained in compliance with applicable requirements of that standard.

(10) Locks. All position locking, holding, and centering devices on x-ray system components and systems shall function as intended.

(11) X-ray systems which have been granted a variance by the Director, Center for Devices and Radiological Health, Food and Drug Administration (Director), from the performance standards for ionizing radiation emitting products, in accordance with 21 CFR 1010.4, 1996 edition, shall be

deemed to satisfy the requirements in R313-28 that corresond to the variance granted by the Director. The registrant shall insure that labeling pursuant to CFR 1010.5(f) remains legible and visible on the x-ray system.

R313-28-40. Fluoroscopic X-Ray Systems.

All fluoroscopic x-ray systems used shall be image intensified and meet the following requirements:

(1) Primary barrier.

(a) The fluoroscopic imaging assembly shall be provided with a primary protective barrier which intercepts the entire cross section of the useful beam at SIDs for which the unit was designed.

(b) The x-ray tube used for fluoroscopy shall not produce x-rays unless the barrier is in position to intercept the entire useful beam.

(2) Fluoroscopic beam limitation.

(a) For certified fluoroscopic systems with or without a spot film device neither the length nor the width of the x-ray field in the plane of the image receptor shall exceed that of the visible area of the image receptor by more than three percent of the SID. The sum of the excess length and the excess width shall be no greater than four percent of the SID.

(b) For uncertified fluoroscopic systems with a spot film device, the x-ray beam with the shutters fully open, during fluoroscopy or spot filming, shall be no larger than the largest image receptor size for which the device is designed. Measurements shall be made at the minimum SID available but at no less than 20 centimeters table top to the film plane distance.

(c) For uncertified fluoroscopic systems without a spot film device, the requirements of R313-28-40(1) apply.

(d) Other requirements for fluoroscopic beam limitation:

(i) means shall be provided to permit further limitation of the field. Beam-limiting devices manufactured after May 22, 1979, and incorporated in equipment with a variable SID or visible area of greater than 300 square centimeters shall be provided with means for stepless adjustment of the x-ray field;

(ii) equipment with a fixed SID and a visible area of 300 square centimeters or less shall be provided with either stepless adjustment of the x-ray field or with means to further limit the x-ray field size at the plane of the image receptor to 125 square centimeters or less;

(iii) if provided, stepless adjustment shall at the greatest SID, provide continuous field sizes from the maximum attainable to a field size of five centimeters by five centimeters or less;

(iv) for equipment manufactured after February 25, 1978, when the angle between the image receptor and beam axis is variable, means shall be provided to indicate when the axis of the x-ray beam is perpendicular to the plane of the image receptor; and

(v) for non-circular x-ray fields used with circular image receptors, the error in alignment shall be determined along the length and width dimensions of the x-ray field which pass through the center of the visible area of the image receptor.

(3) Spot-film beam limitation. Spot-film devices shall meet the following requirements:

(a) means shall be provided between the source and the patient for adjustment of the x-ray field size in the plane of the film to the size of that portion of the film which has been selected on the spot film selector. Adjustments shall be automatically accomplished except when the x-ray field size in the plane of the film is smaller than that of the selected portion of the film. For spot film devices manufactured after June 21, 1979, if the x-ray field size is less than the size of the selected portion of the film, the means for adjustment of the field size shall be only at the operator's option;

(b) neither the length nor the width of the x-ray field in the plane of the image receptor shall differ from the corresponding dimensions of the selected portion of the image receptor by more than three percent of the SID when adjusted for full coverage of the selected portion of the image receptor. The sum, without regard to sign, of the length and width differences shall not exceed four percent of the SID;

(c) it shall be possible to adjust the x-ray field size in the plane of the film to a size smaller than the selected portion of the film. The minimum field size at the greatest SID shall be equal to, or less than, five by five centimeters;

(d) the center of the x-ray field in the plane of the film shall be aligned with the center of the selected portion of the film to within two percent of the SID; and

(e) on spot film devices manufactured after February 25, 1978, if the angle between the plane of the image receptor and beam axis is variable, means shall be provided to indicate when the axis of the x-ray beam is perpendicular to the plane of the image receptor, and compliance shall be determined with the beam axis indicated to be perpendicular to the plane of the image receptor.

(4) Override. If a means exists to override the automatic x-ray field size adjustments required in R313-28-40(2) and (3), that means:

(a) shall be designed for use only in the event of system failure;

(b) shall incorporate a signal visible at the fluoroscopist's position which will indicate whenever the automatic field size adjustment is overridden; and

(c) shall be clearly and durably labeled as follows: FOR X-RAY FIELD LIMITATION SYSTEM FAILURE.

(5) Activation of the fluoroscopic tube. X-ray production in the fluoroscopic mode shall be controlled by a dead-man switch. When recording serial fluoroscopic images, the fluoroscopist shall be able to terminate the x-ray exposure immediately, but means may be provided to permit completion of a single exposure of the series in process.

(6) Entrance EXPOSURE rate allowable limits.

(a) For fluoroscopic equipment manufactured before May 19, 1995, the following requirements apply:

(i) fluoroscopic equipment which is provided with automatic exposure rate control shall not be operable at combinations of tube potential and current which will result in an EXPOSURE rate in excess of 2.58 mC/kg (ten roentgens) per minute at the point where the center of the useful beam enters the patient, except:

(A) during recording of fluoroscopic images, or

(B) when an optional high level control is provided. When so provided, the equipment shall not be operable at combinations of tube potential and current which will result in an EXPOSURE rate in excess of 1.29 mC/kg (five roentgens) per minute at the point where the center of the useful beam enters the patient unless the high level control is activated. Special means of activation of high level controls shall be required. The high level control shall be operable only when continuous manual activation is provided by the operator. A continuous signal audible to the fluoroscopist shall indicate that the high level control is being employed.

(ii) fluoroscopic equipment which is not provided with automatic exposure rate control shall not be operable at combinations of tube potential and current which will result in a EXPOSURE rate in excess of 1.29 mC/kg (five roentgens) per minute at the point where the center of the useful beam enters the patient, except:

(A) during recording of fluoroscopic images, or

(B) when an optional high level control is activated. Special means of activation of high level controls shall be required. The high level control shall be operable only when continuous manual activation is provided by the operator. A continuous signal audible to the fluoroscopist shall indicate that the high level control is being employed.

(iii) fluoroscopic equipment which is provided with both automatic exposure rate control and a manual mode shall not be operable at combinations of tube potential and current that will result in an exposure rate of 2.58 mC/kg (ten roentgens) per minute in either mode at the point where the center of the useful beam enters the patient except:

(A) during recording of fluoroscopic images, or

(B) when an optional high level control is provided. When so provided, the equipment shall not be operable at combinations of tube potential and current which will result in an EXPOSURE rate in excess of 1.29 mC/kg (five roentgens) per minute at the point where the center of the useful beam enters the patient unless the high level control is activated. Special means of activation of high level controls shall be required. The high level control shall be operable only when continuous manual activation is provided by the operator. A continuous signal audible to the fluoroscopist shall indicate that the high level control is being employed.

(b) For fluoroscopic equipment manufactured on and after May 19, 1995, the following requirements apply:

(i) fluoroscopic equipment operable at combinations of tube potential and current which will result in an EXPOSURE rate greater than 1.29 mC/kg (five roentgens) per minute at the point where the center of the useful beam enters the patient shall be equipped with automatic exposure rate control. Provision for manual selection of technique factors may be provided.

(ii) fluoroscopic equipment shall not be operable at combinations of tube potential and current which will result in an EXPOSURE rate in excess of 2.58 mC/kg (ten roentgens) per minute at the point where the center of the useful beam enters the patient except:

(A) during recording of images from an x-ray image-intensifier tube using photographic film or a video camera when the x-ray source is operated in pulsed mode, or

(B) when an optional high level control is activated. When the high level control is activated, the

equipment shall not be operable at combinations of tube potential and current which will result in an EXPOSURE rate in excess of 5.16 mC/kg (20 roentgens) per minute at the point where the center of the useful beam enters the patient. Special means of activation of high level controls shall be required. The high level control shall be operable only when continuous manual activation is provided by the operator. A continuous signal audible to the fluoroscopist shall indicate that the high level control is being employed.

(c) Compliance with the requirements of R313-28-40(6) shall be determined as follows:

(i) if the source is below the x-ray table, the EXPOSURE rate shall be measured one centimeter above the tabletop or cradle;

(ii) if the source is above the x-ray table, the EXPOSURE rate shall be measured at 30 centimeters above the tabletop with the end of the beam-limiting device or spacer positioned as closely as possible to the point of measurement;

(iii) for a C-arm type of fluoroscope, the exposure rate shall be measured 30 centimeters from the input surface of the fluoroscopic imaging assembly, with the source positioned at available SID's, provided that the end of the beam-limiting device or spacer is no closer than 30 centimeters from the input surface of the fluoroscopic imaging assembly; or

(iv) for a lateral type fluoroscope, the exposure rate shall be measured at a point 15 centimeters from the centerline of the x-ray table and in the direction of the x-ray source with the end of the beam-limiting device or spacer positioned as close as possible to the point of measurement. If the tabletop is movable, it shall be positioned as close as possible to the lateral x-ray source with the end of the beam-limiting device or spacer no closer than 15 centimeters to the x-ray table.

(d) Fluoroscopic radiation therapy simulation systems are exempt from the requirements of R313-28- 40(6).

(7) Measurement of entrance EXPOSURE rates shall be performed for both maximum and typical values as follows:

(a) measurements shall be made annually or after maintenance of the system which might affect the EXPOSURE rate;

(b) results of these measurements shall be posted where the fluoroscopist may have ready access to the results while using the fluoroscope and in the record required in R313-28-31(3)(b). The measurement results shall be stated in roentgens per minute and include the machine settings used in determining results. The name of the person performing the measurements and the date the measurements were performed shall be included in the results;

(c) conditions of the annual measurement of maximum entrance EXPOSURE rate shall be performed as follows:

(i) the measurement shall be made under the conditions that satisfy the requirements of R313-28- 40(6)(c);

(ii) the kVp, mA, and other selectable parameters shall be adjusted to those settings which give the maximum entrance EXPOSURE rate; and

(iii) x-ray systems that incorporate automatic exposure rate control shall have sufficient attenuative material placed in the useful beam to produce the maximum output of that system;

and

(d) conditions of the annual measurement of typical entrance EXPOSURE rate are as follows:

(i) the measurement shall be made under the conditions that satisfy the requirements of R313-28- 40(6)(c);

(ii) the kVp, mA, and other selectable parameters shall be those settings typical of clinical use of the x-ray system; and

(iii) the x-ray system that incorporates automatic EXPOSURE rate control shall have an appropriate phantom placed in the useful beam to produce a milliamperage and kilovoltage typical of the use of the x-ray system.

(8) Barrier transmitted radiation rate limits.

(a) The EXPOSURE rate due to transmission through the primary protective barrier with the attenuation block in the useful beam, combined with radiation from the image intensifier, if provided, shall not exceed 0.516 uC/kg (two milliroentgens) per hour at ten centimeters from accessible surfaces of the fluoroscopic imaging assembly beyond the plane of the image receptor for each mC/kg (roentgen) per minute of entrance EXPOSURE rate.

(b) Measuring compliance of barrier transmission.

(i) The EXPOSURE rate due to transmission through the primary protective barrier combined with radiation from the image intensifier shall be determined by measurements averaged over an area of 100 square centimeters with no linear dimension greater than 20 centimeters.

(ii) If the source is below the tabletop, the measurement shall be made with the input surface of the fluoroscopic imaging assembly positioned 30 centimeters above the tabletop.

(iii) If the source is above the tabletop and the SID is variable, the measurement shall be made with the end of the beam-limiting device or spacer as close to the tabletop as it can be placed, provided that it shall not be closer than 30 centimeters.

(iv) Movable grids and compression devices shall be removed from the useful beam during the measurement.

(9) Indication of potential and current. During fluoroscopy and cinefluorography, x-ray tube potential and current shall be continuously indicated.

(10) Source-skin distance. The source to skin distance shall not be less than:

(a) 38 centimeters on stationary fluoroscopic systems manufactured on or after August 1, 1974;

(b) 35.5 centimeters on stationary fluoroscopic systems manufactured prior to August 1, 1974;

(c) 30 centimeters on all mobile fluoroscopes; or

(d) 20 centimeters for all mobile fluoroscopes when used for specific surgical applications.

(11) Fluoroscopic timer.

(a) Means shall be provided to preset the cumulative on-time of the fluoroscopic x-ray tube. The maximum cumulative time of the timing device shall not exceed five minutes without resetting.

(b) A signal audible to the fluoroscopist shall indicate the completion of a preset cumulative on-time. The signal shall continue to sound while x-rays are produced until the timing device is reset.

(12) Control of scatter radiation.

(a) The tables of fluoroscopic assemblies when combined with normal operating procedures shall provide protection from scatter radiation so that unprotected parts of a staff or ancillary individual's body shall not be exposed to unattenuated scattered radiation which originates from under the table. The attenuation required shall be not less than 0.25 mm lead equivalent.

(b) Equipment configuration when combined with procedures shall not allow portions of a staff member's or ancillary person's body, except the extremities, to be exposed to unattenuated scattered radiation emanating from above the tabletop unless:

(i) the radiation has passed through not less than 0.25 mm lead equivalent material including, but not limited to, drapes, bucky-slot cover panel, or self supporting curtains, in addition to the lead equivalency provided by the protective apron referred to in R313-28-31(2)(d),

(ii) that individual is at least 120 centimeters from the center of the useful beam, or

(iii) it is not feasible to attach shielding to special procedures equipment and personnel are wearing protective aprons.

(13) Spot film exposure reproducibility. Fluoroscopic systems equipped with radiographic spot film mode shall meet the exposure reproducibility requirements of R313-28-54.

(14) Radiation therapy simulation systems. Radiation therapy simulation systems shall be exempt from all the requirements R313-28-40(1), (8), and (11) provided that:

(a) the systems are designed and used in such a manner that no individual other than the patient is in the x-ray room during periods of time when the system is producing x-rays; and

(b) the systems which do not meet the requirements of R313-28-40(11) are provided with a means of indicating the cumulative time that an individual patient has been exposed to x-rays. Procedures shall require, in these cases, that the timer be reset between examinations.

R313-28-51. Radiographic Systems Other than Fluoroscopic, Dental Intraoral, or Computed Tomography -- Beam Limitation.

The useful beam shall be limited to the area of clinical interest and show evidence of collimation. This shall be deemed to have been met if a positive beam limiting device meeting the manufacturer's specifications or the requirements of R313-28-300 has been properly used or if evidence of collimation is shown on at least three sides or three corners of the film, for example, projections of the shutters of the collimator, cone cutting at the corners or a border at the film's edge.

(1) General purpose stationary and mobile x-ray systems.

(a) Only x-ray systems provided with a means for independent stepless adjustment of at least two dimensions of the x-ray field shall be used.

(b) A method shall be provided for visually defining the perimeter of the x-ray field. The total misalignment of the edges of the visually defined field with the respective edges of the x-ray field along either the length or width of the visually defined field shall not exceed two percent of the distance from the source to the center of the visually defined field when the surface upon which it appears is perpendicular to the axis of the x-ray beam.

(c) The Board may grant an exemption on non-certified x-ray systems to R313-28-51(1)(a) and (b) provided the registrant makes a written application for the exemption and in that application:

(i) demonstrates it is impractical to comply with R313-28-51(1)(a) and (b); and

(ii) demonstrates the purpose of R313-28-51(1)(a) and (b) will be met by other methods.

(2) In addition to the requirements of R313-28-51(1) above, stationary general purpose x-ray systems, both certified and non-certified shall meet the following requirements:

(a) a method shall be provided to indicate when the axis of the x-ray beam is perpendicular to the plane of the image receptor, to align the center of the x-ray field with respect to the center of the image receptor to within two percent of the SID, and to indicate the SID to within two percent;

(b) the beam-limiting device shall numerically indicate the field size in the plane of the image receptor to which it is adjusted; and

(c) indication of field size dimensions and SID's shall be specified in inches or centimeters and shall be such that aperture adjustments result in x-ray field dimensions in the plane of the image receptor which correspond to those of the image receptor to within two percent of the SID when the beam axis is perpendicular to the plane of the image receptor.

(3) Radiographic equipment designed for only one image receptor size at a fixed SID shall be provided with means to limit the field at the plane of the image receptor to dimensions no greater than those of the image receptor, and to align the center of the x-ray field with the center of the image receptor to within two percent of the SID, or shall be provided with means to both size and align the x-ray field so that the x-ray field at the plane of the image receptor does not extend beyond the edges of the image receptor.

(4) Special purpose x-ray systems.

(a) Means shall be provided to limit the x-ray field in the plane of the image receptor so that the x-ray field does not exceed each dimension of the image receptor by more than two percent of the SID when the axis of the x-ray beam is perpendicular to the plane of the image receptor.

(b) Means shall be provided to align the center of the x-ray field with the center of the image receptor to within two percent of the SID, or means shall be provided to both size and align the x-ray field so that the x-ray field at the plane of the image receptor does not extend beyond the edges of the image receptor. Compliance shall be determined with the axis of the x-ray beam perpendicular to the plane of the image receptor.

(c) R313-28-51(4)(a) and R313-28-51(4)(b) may be met with a system that meets the requirements for a general purpose x-ray system as specified in R313-28-51(1) or, when alignment means are also provided, may be met with either;

(i) an assortment of removable, fixed-aperture, beam-limiting devices sufficient to meet the

requirements for the combination of image receptor sizes and SID's for which the unit is designed with the beam limiting device having clear and permanent markings to indicate the image receptor size and SID for which it is designed; or

(ii) a beam-limiting device having multiple fixed apertures sufficient to meet the requirement for the combinations of image receptor sizes and SID's for which the unit is designed. Permanent, clearly legible markings shall indicate the image receptor size and SID for which the aperture is designed and shall indicate which aperture is in position for use.

R313-28-52. Radiographic Systems Other Than Fluoroscopic, Dental Intraoral, or Computed Tomography -- Radiation Exposure Control Devices.

(1) Exposure Initiation. Means shall be provided to initiate the radiation exposure by a deliberate action on the part of the operator, for example, the depression of a switch. Radiation exposure shall not be initiated without a deliberate action. In addition, it shall not be possible to initiate an exposure when the timer is set to a "zero" or "off" position if either position is provided.

(2) Exposure termination. Means shall be provided to terminate the exposure at a preset time interval, preset product of current and time, a preset number of pulses, or a preset radiation exposure to the image receptor. Except for dental panoramic systems, termination of an exposure shall cause automatic resetting of the timer to its initial setting or to "zero."

(3) Manual Exposure Control: An x-ray control shall be incorporated into x-ray systems so that an exposure can be terminated at times except for:

(a) exposure of one-half second or less; or

(b) during serial radiography when means shall be provided to permit completion of a single exposure of the series in process.

(4) Automatic EXPOSURE controls, phototimers. When automatic EXPOSURE control is provided:

(a) indication shall be made on the control panel when this mode of operation is selected;

(b) when the x-ray tube potential is equal to or greater than 51 kVp, the minimum exposure time for field emission equipment rated for pulsed operation shall be equal to or less than the interval equivalent to two pulses; and

(c) the minimum exposure time for all equipment other than that specified in R313-28-52(4)(b) shall be equal to or less than 1/60 second or a time interval required to deliver five mAs, whichever is greater.

(5) Exposure Indication. Means shall be provided for visual indication observable at or from the operator's protected position whenever x-rays are produced. In addition, a signal audible to the operator shall indicate that the exposure has terminated.

(6) Exposure Duration, Timer, Linearity. For systems having independent selection of exposure time settings, the average ratio of exposure to the indicated milliampere-seconds product obtained at two consecutive timer settings or at two settings not differing by more than a factor of two shall not differ by more than 0.10 times their sum.

(7) Exposure Control Location. The x-ray exposure control shall be placed so that the operator can view the patient while making the exposure.

(8) Operator Protection.

(a) Stationary x-ray systems shall be required to have the x-ray exposure switch permanently mounted in a protected area.

(b) Mobile and portable x-ray systems which are:

(i) used continuously for greater than one week at the same location, one room or suite, shall meet the requirements of R313-28-52(8)(a); or

(ii) used for less than one week at one location, one room, or suite shall be provided with either a protective barrier at least two meters (6.5 feet) high for operator protection during exposures, or means shall be provided to allow the operator to be at least 2.7 meters (nine feet) from the tube housing assembly during the exposure.

R313-28-53. Radiographic Systems Other Than Fluoroscopic, or Dental Intraoral Systems -- Source-to-Skin or Receptor Distance.

Mobile or portable radiographic systems shall be provided with a means to limit the source-to-skin distance to 30 or more centimeters.

R313-28-54. Radiographic Systems Other Than Fluoroscopic, or Dental Intraoral Systems -- Exposure Reproducibility.

When technique factors, including control panel selections associated with automatic exposure control systems, are held constant the coefficient of variation of exposure for both manual and automatic exposure control systems shall not exceed 0.05. This requirement applies to clinically used techniques.

R313-28-55. Radiographic Systems - Standby Radiation From Capacitor Discharge Equipment.

Radiation emitted from the x-ray tube when the system is fully charged and the exposure switch or timer is not activated shall not exceed a rate of 0.516 uC/kg (two milliroentgens) per hour at five centimeters from accessible surfaces of the diagnostic source assembly, with the beam-limiting device fully open

R313-28-56. Radiographic Systems Other Than Fluoroscopic, or Dental Intraoral Systems -- Accuracy.

Deviation of measured technique factors from indicated values of kVp and exposure time shall not exceed the limits specified for that system by its manufacturer. In the absence of manufacturer's specifications, the deviation shall not exceed ten percent of the indicated value for kVp and ten percent of the indicated value for times greater than 50 milliseconds.

R313-28-57. Radiographic Systems Other Than Fluoroscopic, or Dental Intraoral Systems -- mA/mAs Linearity.

The following requirements apply when the equipment is operated on a power supply as specified by the manufacturer for fixed x-ray tube potentials within the range of 40 percent to 100 percent of the maximum rated potentials.

(1) Equipment having independent selection of x-ray tube current, mA. Where the tube current is

continuous, the average ratios of exposure to the indicated milliampere-seconds product, C/kg/mAs or mR/mAs, obtained at two consecutive tube current settings or at two settings differing by no more than a factor of two shall not differ by more than 0.10 times their sum.

(2) Equipment having a combined x-ray tube current-exposure time product, mAs, selector, but not a separate tube current, mA, selector. Where the tube current is continuous, the average ratios of exposure to the indicated milliampere-seconds product, C/kg/mAs or mR/mAs, obtained at two consecutive milliampere-seconds settings or at two settings differing by no more than a factor of two shall not differ by more than 0.10 times their sum.

R313-28-80. Intraoral Dental Radiographic Systems.

In addition to the provisions of R313-28-31, R313-28-32 and R313-28-35, the requirements of this section apply to x-ray equipment and associated facilities used for dental radiography. Criteria for extraoral dental radiographic systems are covered in R313-28-51, R313-28-52 and R313-28-53. Intraoral dental radiographic systems used must meet the requirements of R313-28-80.

(1) Source-to-Skin distance (SSD). X-ray systems designed for use with an intraoral image receptor shall be provided with means to limit source-to-skin distance to not less than:

(a) 18 centimeters if operable above 50 kilovolts peak, or

(b) 10 centimeters if not operable above 50 kilovolts peak.

(2) Field limitation. Radiographic systems designed for use with an intraoral image receptor shall be provided with means to limit the x-ray field so that:

(a) if the minimum source-to-skin distance (SSD) is 18 centimeters or more, the x-ray field, at the minimum SSD, shall be containable in a circle having a diameter of no more than seven centimeters; and

(b) if the minimum SSD is less than 18 centimeters, the x-ray field, at the minimum SSD, shall be containable in a circle having a diameter of no more than six centimeters.

(3) Exposure Initiation.

(a) Means shall be provided to initiate the radiation exposure by a deliberate action on the part of the operator, for example, the depression of a switch. Radiation exposure shall not be initiated without a deliberate action; and

(b) It shall not be possible to make an exposure when the timer is set to a "zero" or "off" position if either position is provided.

(4) Exposure Termination.

(a) Means shall be provided to terminate the exposure at a preset time interval, preset product of current and time, a preset number of pulses, or a preset radiation exposure to the image receptor.

(b) An x-ray exposure control shall be incorporated into x-ray systems so that an exposure of more than 0.5 seconds can be terminated immediately by the operator.

(c) Termination of an exposure shall cause automatic resetting of the timer to its initial setting or to "zero."

(5) Exposure Indication. Means shall be provided for visual indication, observable from the operator's protected position, whenever x-rays are produced. In addition, a signal audible to the operator shall indicate that the exposure has terminated.

(6) Timer Linearity. For systems having independent selection of exposure time settings, the average ratio of exposure to the indicated milliampere-seconds product obtained at two consecutive timer settings or at two settings not differing by more than a factor of two shall not differ by more than 0.10 times their sum.

(7) Exposure Control Location and Operator Protection.

(a) Stationary x-ray systems shall be required to have the x-ray exposure control mounted in a protected area or a means to allow the operator to be at least 2.7 meters (9.0 feet) from the tube housing assembly while making exposures; and

(b) Mobile and portable x-ray systems which are:

(i) used for greater than one week in the same location, for example, a room or suite, shall meet the requirements of R313-28-80(7)(a); or

(ii) used for less than one week in the same location shall be provided with either a protective barrier at least two meters high for operator protection, or means to allow the operator to be at least 2.7 meters (nine feet) from the tube housing assembly while making exposures.

(8) Exposure Reproducibility. When all technique factors are held constant, the coefficient of variation of exposure shall not exceed 0.05 for certified x-ray systems or 0.10 for non-certified x-ray systems. This requirement applies to clinically used techniques.

(9) mA/mAs Linearity. The following requirements apply when the equipment is operated on a power supply as specified by the manufacturer for fixed x-ray tube potentials within the range of 40 to 100 percent of the maximum rated potentials.

(a) For equipment having independent selection of x-ray tube current, the average ratios of exposure to the indicated milliampere-seconds product obtained at two consecutive tube current settings or, when the tube current selection is continuous, two settings differing by no more than a factor of two shall not differ by more than 0.10 times their sum.

(b) For equipment having a combined x-ray tube current-exposure time product selector but not a separate tube current selector, the average ratios of exposure to the indicated milliampere-seconds product obtained at two consecutive mAs selector settings, or when the mAs selector provides continuous selection, at two settings differing by no more than a factor of two shall not differ by more than 0.10 times their sum.

(10) Accuracy. Deviation of technique factors from indicated values shall not exceed the limits specified for that system by its manufacturer. In the absence of manufacturer's specifications the deviation shall not exceed ten percent of the indicated value.

(11) Administrative Controls.

(a) Patient and film holding devices shall be used when the technique permits and holding is

required.

(b) The x-ray tube housing and the position indicating device shall not be hand-held during an exposure.

(c) The x-ray system shall be operated so that the useful beam at the patient's skin does not exceed the requirements of R313-28-80(2).

(d) Dental fluoroscopy without image intensification shall not be used.

R313-28-120. Mammography X-Ray Systems - Equipment Design and Performance Standards.

Only x-ray equipment meeting the following standards shall be used for mammography examinations.

(1) Equipment Design.

(a) FDA Standards. The requirements of 21 CFR 1020.30 and 21 CFR 1020.31, 1990 ed., are adopted and incorporated by reference.

(b) Dedicated Equipment. The x-ray equipment shall be specifically designed for mammography.

(c) Compression. Devices parallel to the imaging plane shall be available to immobilize and compress the breast during mammography procedures.

(d) Image Receptor. The x-ray equipment shall have both an 18 cm by 24 cm and a 24 cm by 30 cm image receptor and moving grids matched to each image receptor size.

(e) Automatic Exposure Control. X-ray equipment used in healing arts screening shall have automatic exposure control capabilities with a post exposure meter which indicates either milliampere-seconds or time values.

(f) Focal Spot. The focal spot size and source to image receptor distance configurations shall be limited to those appropriate for mammography.

(g) Beam Limitation. The x-ray equipment must allow for the x-ray field to extend to or beyond the chest wall edge of the image receptor.

(h) Magnification. X-ray equipment used in a noninvasive manner, requiring techniques beyond those utilized in standard mammography of asymptomatic patients, shall have x-ray magnification capability for noninvasive procedures. The equipment shall be able to provide at least one magnification within the range of 1.4 to 2.0.

(2) Performance Standards.

(a) State Standards. The x-ray equipment shall meet the applicable performance standards in R313- 28.

(b) Filtration. The useful beam shall have a half-value layer between the values of the measured kilovolts peak divided by 100 and the measured kilovolts peak divided by 100 plus 0.1 mm of aluminum equivalent. These values are to include the contribution to filtration by the compression

device.

(c) Minimum Radiation Output. X-ray equipment installed after the effective date of this rule shall meet the following standard: at 28 kilovolts peak on the focal spot used in routine healing arts screening the x-ray equipment shall be capable of sustaining a minimum output of 500 mR per second for at least three seconds. This output shall be measured at a point 4.5 centimeters from the surface of the patient support device when the source to image receptor distance is at its maximum and the compression paddle is in the beam. Existing x-ray equipment shall meet this minimum radiation output standard within one year of the effective date of this rule.

(d) Exposure Linearity. For kilovolts peak settings used clinically, the exposure per mAs shall be within plus or minus ten percent of the average exposure per mAs for those mAs stations or time stations, if applicable, that are tested.

(e) Automatic Exposure Control. The automatic exposure control mode shall produce consistent film density under changing patient and examination conditions. These conditions include breast thickness, adiposity, kilovolts peak and density settings. This requirement will be deemed satisfied when:

(i) an automatic exposure control technique guide is posted, and

(ii) for a series of films obtained for attenuator thicknesses of two to seven centimeters the resulting radiographic optical densities are within plus or minus 0.2 of the average value when the kVp and density control setting are adjusted as indicated on the technique guide. The attenuator used for determining compliance shall be either acrylic or other tissue equivalent material.

(f) Patient Dose. The x-ray equipment must be capable of giving an average glandular dose to an average size breast of average tissue density that does not exceed 3.0 mGy (0.3 rad) with a grid or 1.0 mGy (0.1 rad) without a grid. This will be deemed satisfied when using an acrylic phantom of 4.5 cm thickness. In addition, under all clinical use conditions, the average glandular dose to the breast must be less than 5.0 mGy (0.5 rad) per film for healing arts screening procedures.

(3) Mammography X-ray Equipment Quality Control.

(a) Initial Installation. Upon completion of the initial installation of the x-ray equipment, and before it is commissioned for clinical use, the equipment shall be evaluated by a mammography imaging medical physicist who has been approved by the Board. The evaluation results shall be submitted to the Executive Secretary for review and approval.

(b) Annual Evaluation. At intervals not to exceed 12 months or at the request of the Executive Secretary, the x-ray equipment shall be evaluated by a mammography imaging medical physicist who has been approved by the Board.

(c) The registrant shall develop and implement a quality control testing procedure for monitoring the radiation performance of the x-ray equipment.

R313-28-140. Qualifications of Mammography Imaging Medical Physicist.

An individual seeking certification by the Board for approval as a mammography imaging medical physicist shall file an application for certification on forms furnished by the Division. The Board may certify individuals who meet the requirements for initial qualifications. To remain certified by the Board as a mammography imaging medical physicist, an individual shall satisfy the requirements for continuing qualifications.

(1) Initial qualifications.

(a) Be certified by the American Board of Radiology in Radiological Physics or Diagnostic Radiological Physics, or the American Board of Medical Physicists in Diagnostic Imaging Physics; or

(b) Satisfy the following educational and experience requirements:

(i) Have a master's or higher degree from an accredited university or college in physical sciences; and

(ii) Have two years full-time experience conducting mammography surveys. Five mammography surveys shall be equal to one year full-time experience.

(2) Continuing qualifications.

(a) During the three-year period after certification, the individual shall earn 15 hours of continuing educational credits in mammography imaging; and

(b) Perform at least two mammography surveys annually.

(3) Mammography imaging medical physicists who fail to maintain the required continuing qualifications stated in R313-28-140(2) shall re-establish their qualifications before independently surveying another mammography facility. To re-establish their qualifications, mammography imaging physicists who fail to meet:

(a) The continuing education requirements of R313-28-140(2)(a) must obtain a sufficient number of continuing educational credits to bring their total credits up to the required 15 in the previous three years.

(b) The continuing experience requirement of R313-28-140(2)(b) must obtain experience by surveying two mammography facilities for each year of not meeting the continuing experience requirements under the supervision of a mammography imaging medical physicist approved by the Board.

R313-28-160. Computed Tomography X-ray Equipment.

(1) Equipment Requirements.

(a) In the event of equipment failure affecting data collection, means shall be provided to terminate the x-ray exposure automatically by either de-energizing the x-ray source or intercepting the x-ray beam with a shutter mechanism through the use of either a back-up timer or devices which monitor equipment function.

(b) A visible signal shall indicate when the x-ray exposure has been terminated through the means required by R313-28-160 (1)(a).

(c) The operator shall be able to terminate the x-ray exposure at any time during a scan, or series of scans, of greater than 0.5 second duration.

(2) Tomographic Plane Indication and Alignment.

(a) Means shall be provided to permit visual determination of the location of a reference plane. This reference plane can be offset from the location of the tomographic plane.

(b) If a device using a light source is used to satisfy R313-28-160 (2)(a), the light source shall provide illumination at levels sufficient to permit visual determination of the location of the tomographic plane or reference plane.

(c) The total error in the indicated location of the tomographic plane or reference plane shall not exceed 5 millimeters.

(3) Beam-On and Shutter Status Indicators.

(a) The computed tomography (CT) x-ray control panel and CT gantry shall provide visual indication whenever x-rays are produced and, if applicable, whether the shutter is open or closed.

(b) Each emergency button or switch shall be clearly labeled as to its function.

(4) Indication of CT Conditions of Operation.

(a) The CT x-ray system shall be designed such that technique factors, tomographic section thickness, and scan increment shall be indicated prior to the initiation of a scan or series of scans.

(5) Quality Assurance Procedures. Quality assurance procedures shall be conducted on the CT x-ray equipment.

(a) The quality assurance procedures shall be in writing. Such procedures shall include, but not be limited to, the following:

(i) Specifications of the tests that are to be performed, including instructions to be employed in the performance of those tests; and

(ii) Specifications of the frequency at which tests are to be performed, the acceptable tolerance for each parameter measured and actions to be taken if tolerances are exceeded.

(b) The parameters measured to satisfy R313-28-160(5)(a)(ii) shall include, but not be limited to, kVp, mA and reproducibility of dose appropriate to the type of CT procedures performed.

(c) Records of tests performed to satisfy the requirements of R313-28-160(5)(a) and (b) shall be maintained for three years for inspection by the Division.

(6) Dose Calibration.

(a) Radiation measurements shall be performed at least annually and after change or replacement of components which could cause a change in the radiation output.

(b) The calibration of the radiation measuring instrument shall be traceable to a national standard and shall be calibrated at intervals not to exceed two years.

(c) Measurements shall be specified in terms of the multiple scan average dose, using phantoms and technique factors appropriate to the type of CT procedures performed.

R313-28-200. Information on Radiation Shielding Required for Plan Reviews.

In order to evaluate a need for radiation shielding associated with a plan review, the following information must be submitted.

(1) The plans showing, as a minimum, the following:

(a) the normal location of the radiation producing equipment's radiation port, the port's travel and traverse limits, general directions of the radiation beam, locations of windows, the location of the operator's booth, and the location of the x-ray control panel;

(b) structural composition and thickness of walls, doors, partitions, floor, and ceiling of the rooms concerned;

(c) the dimensions, including height, floor to floor, of the rooms concerned;

(d) the type of occupancy of adjacent areas inclusive of space above and below the rooms concerned. If there is an exterior wall, show distance to the closest existing occupied areas;

(e) the make and model of the x-ray equipment, the maximum energy output, and the energy waveform; and

(f) the type of examination or treatment which will be performed with the equipment.

(2) Information on the anticipated workload of the x-ray systems in mA-minutes per week.

(3) A report showing all basic assumptions used in the development of the shielding specifications.

R313-28-300. Additional Requirements Applicable to Certified Systems Only.

Diagnostic x-ray systems incorporating one or more certified components shall be required to comply with the following additional requirements which relate to the certified component.

(1) Beam limitation for stationary and mobile general purpose x-ray systems.

(a) There shall be provided a means of stepless adjustment of the size of the x-ray field. The minimum field size at an SID of 100 centimeters shall be equal to or less than five centimeters by five centimeters.

(b) When a light localizer is used to define the x-ray field, it shall provide an average illumination of not less than 160 LUX (15 foot-candles) at 100 centimeters or at the maximum SID, whichever is less. The average illumination shall be based upon measurements made in the approximate center of the quadrants of the light field. Radiation therapy simulation systems are exempt from this requirement.

(2) Beam Limitation for Portable X-ray Systems. Beam limitation for portable x-ray systems shall meet the additional field limitation requirements of R313-28-51(1) or R313-28-300(1).

(3) Beam limitation and alignment on stationary general purpose x-ray systems equipped with PBL.

(a) PBL shall prevent the production of x-rays when:

(i) either the length or the width of the x-ray field in the plane of the image receptor differs, except as permitted by R313-28-300(3)(c), from the corresponding image receptor dimensions by more than three percent of the SID; or

(ii) the sum of the length and width differences as stated in R313-28-300(3)(a)(i) without regard to sign exceeds four percent of the SID.

(b) Compliance with R313-28-300(3)(a) shall be determined when the equipment indicates that the beam axis is perpendicular to the plane of the image receptor. Compliance shall be determined no sooner than five seconds after insertion of the image receptor.

(c) The PBL system shall be capable of operation, at the discretion of the operator, so that the field size at the image receptor can be adjusted to a size smaller than the image receptor through stepless adjustment of the field size. The minimum field size at a distance of 100 centimeters shall be equal to or less than five centimeters by five centimeters.

(d) The PBL system shall be designed so that if a change in image receptor does not cause an automatic return to PBL function as described in R313-28-300(3)(a), then change of the image receptor size or SID must cause the automatic return.

(4) Tube Stands for Portable X-Ray Systems. A tube stand or other mechanical support shall be used for portable x-ray systems, so that the x-ray tube housing assembly need not be hand-held during exposures.

R313-28-350. Qualifications of Operators.

Operators of diagnostic x-ray systems must be licensed to practice in Utah in accordance with Title 58 Chapter 54.

(1) The registrant shall document that the operator of diagnostic x-ray equipment is trained in the proper choice of technique factors to be used and in the safe and effective operation of the x-ray equipment.

R313-28-400. Information to be Submitted by Persons Proposing to Conduct Healing Art Screening.

Individuals requesting that the Executive Secretary approve a healing arts screening program shall submit the following information for evaluation:

(1) name and address of the applicant and, where applicable, the names and addresses of agents within this State;

(2) diseases or conditions for which the x-ray examinations are to be used;

(3) description, in detail, of the x-ray examinations proposed in the screening program including the frequency of screening and the duration of the entire screening program;

(4) description of the population to be examined in the screening program including age, sex, physical condition, and other appropriate information; and

(5) an evaluation of known alternate methods not involving ionizing radiation which could achieve the goals of the screening program and why these methods are not used in preference to the x-ray examinations.

R313-28-450. Minimum Design Requirements for an X-ray Machine Operator's Booth - New Installations Only.

(1) Space requirements:

(a) The operator shall be allotted not less than 0.70 square meter (7.5 square feet) of unobstructed floor space in the booth.

(b) The minimum space as indicated above may be geometric configurations with no dimension of less than 0.61 meters (two feet).

(c) The space shall be allotted excluding encumbrances by the console, for example, overhang or cables, or other similar encroachments.

(d) The booth shall be located or constructed to ensure that unattenuated primary beam scatter originating on the examination table or at the wall mounted image receptor will not reach the operator's position in the booth.

(2) Structural Requirements.

(a) The booth walls shall be permanently fixed barriers of at least 2.13 meters (seven feet) high.

(b) When a door or movable panel is used as an integral part of the booth shielding, it must have a permissive device which will prevent an exposure when the door or panel is not closed.

(c) Shielding shall be provided to meet the requirements of R313-15.

(3) X-Ray Exposure Control Placement: The x-ray exposure control for the system shall be fixed within the booth and:

(a) shall be at least one meter (40 inches) from points subject to primary beam scatter, leakage or primary beam radiation; and

(b) shall allow the operator to use the majority of the available viewing windows.

(4) Viewing system requirements:

(a) When the viewing system is a window:

(i) the viewing window shall have a visible area of at least 0.09 square meters (one square foot);

(ii) regardless of size or shape, at least 0.09 square meters (one square foot) of the window area must be centered no less than 0.6 meters (two feet) from the open edge of the booth and no less than 1.5 meters (five feet) from the floor; and

(iii) the window shall have at least the same lead equivalence of that required in the booth's wall in which it is mounted.

(b) When the viewing system is by mirrors, the mirrors shall be so located as to accomplish the general requirements of R313-28-450(4)(a).

(c) When the viewing system is by electronic means:

(i) the camera shall be so located as to accomplish the general requirements of R313-28-450(4)(a); and

(ii) there shall be an alternate viewing system as a backup for the primary system.

KEY

dental, x-ray, mammography, beam limitation

Date of Enactment or Last Substantive Amendment

December 14, 2001

Notice of Continuation

October 10, 2001

Authorizing, Implemented, or Interpreted Law

19-3-104

DAR File No. 24109
This filing was published in the 11/01/2001, issue, Vol. 2001, No.21, of the Utah State Bulletin.

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Environmental Quality, Radiation Control

R313-28-31

General and Administrative Requirements

NOTICE OF PROPOSED RULE
DAR File No.: 24109
Filed: 10/12/2001, 09:36
Received by: NL

RULE ANALYSIS

Purpose of the rule or reason for the change:
This rule is being changed to clarify a requirement involving the use of mechanical holding devices. Various devices are sometimes used to support a patient or X-ray film during a radiation exposure.

Summary of the rule or change:
The rule is being changed so that written procedures must contain a list of individual projections where mechancial holding devices can be used instead of a list of projections where holding devices cannot be utilized.

State statutory or constitutional authorization for this rule:
Sections 19-3-104 and 19-3-108

Anticipated cost or savings to:
the state budget:
There is no anticipated cost or savings to the State budget as this clarification to the rule does not have a fiscal impact on the State budget.

local governments:
There will not be a cost or savings to local government as local government is not affected by this rulemaking.

other persons:
There may be an insignificant cost savings for affected persons. This is because any list of procedures where mechanical holding devices can be utilized is inherently smaller than any list of

procedures where mechanical holding devices cannot be used.

Compliance costs for affected persons:
There may be an insignificant cost savings for affected persons. This is because any list of procedures where mechanical holding devices can be utilized is inherently smaller than any list of procedures where mechanical holding devices cannot be used.

Comments by the department head on the fiscal impact the rule may have on businesses:
The fiscal impact of this rule may allow registrants to realize small savings as they develop written radiation safety procedures.

The full text of this rule may be inspected, during regular business hours, at the Division of Administrative Rules, or at:
Environmental Quality
Radiation Control
168 N 1950 W
SALT LAKE CITY UT 84116-3085

Direct questions regarding this rule to:
Craig Jones at the above address, by phone at 801-536-4264, by FAX at 801-533-4097, or by Internet E-mail at cjones@deq.state.ut.us

Interested persons may present their views on this rule by submitting written comments to the address above no later than 5:00 p.m. on:
12/03/2001

This rule may become effective on:
12/14/2001

Authorized by:
William Sinclair, Director

RULE TEXT

R313. Environmental Quality, Radiation Control.

R313-28. Use of X-Rays in the Healing Arts.

R313-28-31. General and Administrative Requirements.

(1) Persons shall not make, sell, lease, transfer, lend, or install x-ray equipment or the accessories used in connection with x-ray equipment unless the accessories and equipment, when properly placed in operation and properly used, will meet the applicable requirements of these

rules.

(2) The registrant shall be responsible for directing the operation of the x-ray machines which are under the registrant's administrative control. The registrant or registrant's agent shall assure that the requirements of R313-28-31(2)(a) through R313-28-31(2)(i) are met in the operation of the x-ray machines.

(a) An x-ray machine which does not meet the provisions of these rules shall not be operated for diagnostic purposes, when directed by the Executive Secretary.

(b) Individuals who will be operating the x-ray equipment shall be instructed in the registrant's written radiation safety program and be qualified in the safe use of the equipment. Required operator qualifications are listed in R313-28-350.

(c) The registrant of a facility shall create and make available to x-ray operators written safety procedures, including patient holding and restrictions of the operating technique required for the safe operation of the x-ray systems. Individuals who operate x-ray systems shall be responsible for complying with these rules.

(d) Except for individuals who cannot be moved out of the room and the patient being examined, only the staff and ancillary personnel or other individuals needed for the medical procedure or training shall be present in the room during the radiographic exposure and shall be positioned as follows:

(i) individuals other than the patient shall be positioned so that no part of the body will be struck by the useful beam unless protected by not less than 0.5 mm lead equivalent material;

(ii) the x-ray operator, other staff, ancillary personnel and other individuals needed for the medical procedure shall be protected from primary beam scatter by protective aprons or barriers unless it can be shown that by virtue of distances employed, EXPOSURE levels are reduced to the limits specified in R313-15-201; and

(iii) patients who are not being examined and cannot be removed from the room shall be protected from the primary beam scatter by whole body protective barriers of not less than 0.25 mm lead equivalent material or shall be so positioned that the nearest portion of the body is at least two meters from both the tube head and nearest edge of the image receptor.

(e) For patients who have not passed reproductive age, gonad shielding of not less than 0.5 mm lead equivalent material shall be used during radiographic procedures in which the gonads are in the useful beam, except for cases in which this would interfere with the diagnostic procedure.

(f) Individuals shall not be exposed to the useful beam except for healing arts purposes unless the exposure has been authorized by a licensed practitioner of the healing arts. Deliberate exposures for the following purposes are prohibited:

(i) exposure of an individual for training, demonstration or other non-healing arts purposes; and

(ii) exposure of an individual for the purpose of healing arts screening except as

authorized by R313-28-31(2)(i).

(g) When a patient or film must be provided with auxiliary support during a radiation exposure:

(i) mechanical holding devices shall be used when the technique permits. The written procedures, required by R313-28-31(2)(c), shall list individual projections where mechanical holding devices can[~~not~~] be utilized;

(ii) written safety procedures, as required by R313-28-31(2)(c), shall indicate the requirements for selecting an individual to hold patients or films and the procedure that individual shall follow;

(iii) the individual holding patients or films during radiographic examinations shall be instructed in personal radiation safety and protected as required by R313-28-31(2)(d)(i);

(iv) Individuals shall not be used routinely to hold film or patients;

(v) In those cases where the patient must hold the film, except during intraoral examinations, portions of the body other than the area of clinical interest struck by the useful beam shall be protected by not less than 0.5 mm lead equivalent material; and

(vi) Facilities shall have protective aprons and gloves available in sufficient numbers to provide protection to personnel who are involved with x-ray operations and who are otherwise not shielded.

(h) Personnel monitoring. Individuals who are associated with the operation of an x-ray system are subject to the applicable requirements of R313-15.

(i) Healing arts screening. Persons proposing to conduct a healing arts screening program shall not initiate the program without prior approval of the Executive Secretary or in the case of a research program, by an Investigational Review Board which has been approved by the United States Food and Drug Administration. When requesting approval, that person shall submit the information outlined in R313-28-400. If information submitted becomes invalid or outdated, the Executive Secretary shall be notified immediately.

(3) Maintenance of records and information. The registrant shall maintain at least the following information for each x-ray machine:

(a) model numbers of major components;

(b) record of surveys or calculations to demonstrate compliance with R313-15-302, calibration, maintenance and modifications performed on the x-ray machine; and

(c) a shielding design report for the x-ray suite which states assumed values for workload and use factors and includes a drawing of surrounding areas showing assumed values for occupancy factors.

(4) X-ray records. Facilities shall maintain an x-ray record containing the patient's name,

the types of examinations, and the dates the examinations were performed. When the patient or film must be provided with human auxiliary support, the name of the human holder shall be recorded. The registrant shall retain these records for three years after the record is made.

(5) Portable or mobile equipment shall be used only for examinations where it is impractical to transfer the patient to a stationary radiographic installation.

(6) Procedures and auxiliary equipment designed to minimize patient and personnel exposure commensurate with the needed diagnostic information shall be utilized.

(a) The speed of the screen and film combinations used shall be the fastest speed consistent with the diagnostic objective of the examinations. Film cassettes without intensifying screens shall not be used for routine diagnostic radiological imaging, with the exception of standard film packets for intra-oral use in dental radiography. If the requirements of R313-28-31 (6)(a) cannot be met, an exemption may be requested pursuant to R313-12-55.

(b) The radiation exposure to the patient shall be the minimum exposure required to produce images of good diagnostic quality.

(c) X-ray systems, other than fluoroscopic, computed tomography, dental or veterinary units, shall not be utilized in procedures where the source to patient distance is less than 30 centimeters.

KEY: dental, x-ray, mammography, beam limitation

[~~December 8, 2000~~]2001

Notice of Continuation May 1, 1997

19-3-104

ADDITIONAL INFORMATION

PLEASE NOTE:

- Text to be deleted is struck through and surrounded by brackets (e.g., [~~example~~]). Text to be added is underlined (e.g., example). Some browsers may not depict some or any of these attributes on the screen or when the document is printed.
- Please see the **DISCLAIMER** regarding information available from state web pages.

For questions regarding the *content* or *application* of this rule, please contact Craig Jones at the above address, by phone at 801-536-4264, by FAX at 801-533-4097, or by Internet E-mail at cjones@deq.state.ut.us

For questions about the *rulemaking process*, please contact the **Division of Administrative**

Rules (801-538-3764). *Please Note:* The Division of Administrative Rules is *NOT* able to answer questions about the content or application of these administrative rules.

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Last modified: 01/22/2002 11:15 AM

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Rule R313-30. Therapeutic Radiation Machines.

As in effect on September 1, 2002

Table of Contents

R313-30-1. Scope and Applicability.

(1) R313-30 establishes requirements, for which the registrant is responsible, for use of therapeutic radiation machines. The provisions of R313-30 are in addition to, and not in substitution for, other applicable provisions of these rules.

(2) The use of therapeutic radiation machines shall be by, or under the supervision of, a licensed practitioner of the healing arts who meets the training and experience criteria established by R313-30-3(3).

(3) R313-30 shall only apply to therapeutic radiation machines which accelerate electrons into a target to produce bremsstrahlung or which accelerate electrons to produce a clinically useful electron beam.

R313-30-2. Definitions.

As used in R313-30, the following definitions apply:

"Absorbed dose (D)" means the mean energy imparted by ionizing radiation to matter. Absorbed dose is determined as the quotient of dE by dM, where dE is the mean energy imparted by ionizing radiation to matter of mass dM. The SI unit of absorbed dose is joule per kilogram and the special name of the unit of absorbed dose is the gray (Gy). The previously used special unit of absorbed dose (rad) is being replaced by the gray.

"Absorbed dose rate" means absorbed dose per unit time, for machines with timers, or dose monitor unit per unit time for linear accelerators.

"Accessible surfaces" means surface of equipment or of an equipment part that can be easily or accidentally touched by persons without the use of a tool, or without opening an access panel or door.

"Added filtration" means filtration which is in addition to the inherent filtration.

"Air kerma (K)" means the kinetic energy released in air by ionizing radiation. Kerma is determined as the quotient of dE by dM, where dE is the sum of the initial kinetic energies of the charged ionizing particles liberated by uncharged ionizing particles in air of mass dM. The SI unit of air kerma is joule per kilogram and the special name for the unit of kerma is the gray (Gy).

"Barrier" See "Protective barrier."

"Beam axis" means the axis of rotation of the radiation head.

"Beam-limiting device" means a field defining collimator which provides a means to restrict the dimensions of the useful beam.

"Beam monitoring system" means a system designed and installed in the radiation head to detect and measure the radiation present in the useful beam.

"Beam scattering foil" means a thin piece of material, usually metallic, placed in the beam to scatter a beam of electrons in order to provide a more uniform electron distribution in the useful beam.

"Bent beam linear accelerator" means a linear accelerator geometry in which the accelerated electron beam must change direction by passing through a bending magnet.

"Changeable filters" means filters, exclusive of inherent filtration, which can be removed from the useful beam through electronic, mechanical, or physical processes.

"Contact therapy system" means a therapeutic radiation machine with a short target to skin distance (TSD), usually less than five centimeters.

"Detector" See "Radiation detector."

"Dose monitor unit (DMU)" means a unit response from the beam monitoring system from which the absorbed dose can be calculated.

"External beam radiation therapy" means therapeutic irradiation in which the source of radiation is at a distance from the body.

"Field-flattening filter" means a filter used to homogenize the absorbed dose rate over the radiation field.

"Filter" means material placed in the useful beam to change beam quality in therapeutic radiation machines subject to R313-30-6.

"Gantry" means that part of a therapeutic radiation machine supporting and allowing movements of the radiation head about a center of rotation.

"Gray (Gy)" means the SI unit of absorbed dose, kerma, and specific energy imparted equal to 1 joule per kilogram. The previous unit of absorbed dose (rad) is being replaced by the gray. Note that 1 Gy equals 100 rad.

"Half-value layer (HVL)" means the thickness of a specified material which attenuates x-radiation or gamma radiation to the extent that the air kerma rate, exposure rate or absorbed dose rate is reduced to one-half of the value measured without the material at the same point.

"Interlock" means a device preventing the start or continued operation of equipment unless certain predetermined conditions prevail.

"Interruption of irradiation" means the stopping of irradiation with the possibility of continuing irradiation without resetting of operating conditions at the control panel.

"Irradiation" means the exposure of a living being or matter to ionizing radiation.

"Isocenter" means the center of the sphere through which the useful beam axis passes while the gantry moves through its full range of motions.

"Kilovolt (kV) or kilo electron volt (keV)" means the energy equal to that acquired by a particle with one electron charge in passing through a potential difference of one thousand volts in a vacuum. Current convention is to use kV for photons and keV for electrons.

"Lead equivalent" means the thickness of the material in question affording the same attenuation, under specified conditions, as lead.

"Leakage radiation" means radiation emanating from the therapeutic radiation machine except for the useful beam.

"Light field" means the area illuminated by light, simulating the radiation field.

"mA" means milliampere.

"Megavolt (MV) or mega electron volt (MeV)" means the energy equal to that acquired by a particle with one electron charge in passing through a potential difference of one million volts in a vacuum. Current convention is to use MV for photons and MeV for electrons.

"Monitor unit (MU)" See "Dose monitor unit."

"Moving beam radiation therapy" means radiation therapy with continuous displacement of one or more mechanical axes relative to the patient during irradiation. It includes arc therapy, skip therapy, conformal therapy and rotational therapy.

"Nominal treatment distance" means:

(a) For electron irradiation, the distance from the scattering foil, virtual source, or exit window of the electron beam to the entrance surface of the irradiated object along the central axis of the useful beam.

(b) For x-ray irradiation, the virtual source or target to isocenter distance along the central axis of the useful beam. For non-isocentric equipment, this distance shall be that specified by the manufacturer.

"Patient" means an individual subjected to machine produced external beam radiation for the purposes of medical therapy.

"Peak tube potential" means the maximum value of the potential difference across the x-ray tube during an exposure.

"Periodic quality assurance check" means a procedure which is performed to ensure that a previous calibration continues to be valid.

"Phantom" means an object which attenuates, absorbs, and scatters ionizing radiation in the same quantitative manner as tissue.

"Practical range of electrons" corresponds to classical electron range where the only remaining contribution to dose is from bremsstrahlung x-rays.

"Primary dose monitoring system" means a system which will monitor the useful beam during irradiation and which will terminate irradiation when a pre-selected number of dose monitor units have been delivered.

"Primary protective barrier" See "Protective barrier."

"Protective barrier" means a barrier of radiation absorbing materials used to reduce radiation exposure. The types of protective barriers are as follows:

(a) "Primary protective barrier" means the material, excluding filters, placed in the useful beam or a barrier which attenuates the primary beam.

(b) "Secondary protective barrier" means the material which attenuates stray radiation.

"Radiation detector" means a device which, in the presence of radiation provides, by either direct or indirect means a signal or other indication suitable for use in measuring one or more quantities of incident radiation.

"Radiation field" See "Useful beam."

"Radiation head" means the structure from which the useful beam emerges.

"Radiation Therapy Physicist" means an individual qualified in accordance with R313-30-3(4).

"Redundant beam monitoring system" means a combination of two dose monitoring systems in which each system is designed to terminate irradiation in accordance with a pre-selected number of dose monitor units.

"Scattered radiation" means ionizing radiation emitted by interaction of ionizing radiation with matter, the interaction being accompanied by a change in direction of the radiation.

"Secondary dose monitoring system" means a system which will terminate irradiation in the event of failure of the primary dose monitoring system.

"Secondary protective barrier" See "Protective barrier."

"Shadow tray" means a device attached to the radiation head to support auxiliary beam blocking material.

"Shutter" means a device attached to the tube housing assembly which can totally intercept the useful beam and which has a lead equivalency not less than that of the tube housing assembly.

"Sievert (Sv)" means the SI unit of dose equivalent. The unit of dose equivalent is the joule per kilogram. The previous unit of dose equivalent (rem) is being replaced by the sievert. Note that 1 Sv equals 100 rem.

"Simulator, or radiation therapy simulation system" means an x-ray system intended for localizing the volume to be exposed during radiation therapy and reproducing the position and size of the therapeutic irradiation field.

"Source" means the region or material from which the radiation emanates.

"Source-skin distance (SSD)" See "Target-skin distance."

"Stationary beam radiation therapy" means radiation therapy without displacement of the radiation source relative to the patient during irradiation.

"Stray radiation" means the sum of leakage and scattered radiation.

"Target" means that part of an x-ray tube or particle accelerator onto which is directed a beam of accelerated particles to produce ionizing radiation or other particles.

"Target-skin distance (TSD)" means the distance measured along the beam axis from the center of the front surface of the x-ray target or electron virtual source to the surface of the irradiated object or patient.

"Tenth-value layer (TVL)" means the thickness of a specified material which, x-radiation or gamma radiation to the extent that the air kerma rate, exposure rate or absorbed dose rate is reduced to one-tenth of the value measured without the material at the same point.

"Termination of irradiation" means the stopping of irradiation in a fashion which will not permit continuance of irradiation without the resetting of operating conditions at the control panel.

"Therapeutic radiation machine" means x-ray or electron-producing equipment designed and used for external beam radiation therapy.

"Tube" means an x-ray tube, unless otherwise specified.

"Tube housing assembly" means the tube housing with tube installed. It includes high-voltage and filament transformers and other appropriate elements that are contained within the tube

housing.

"Useful beam" means the radiation emanating from the tube housing port or the radiation head and passing through the aperture of the beam limiting device when the exposure controls are in a mode to cause the therapeutic radiation machine to produce radiation.

"Virtual source" means a point from which radiation appears to originate.

"Wedge filter" means a filter which effects continuous change in transmission over all or a part of the radiation field.

"X-ray tube" means an electron tube which is designed to be used primarily for the production of x- rays.

R313-30-3. General Administrative Requirements for Facilities Using Therapeutic Radiation Machines.

(1) Administrative Controls. The registrant shall be responsible for directing the operation of the therapeutic radiation machines which have been registered with the Department. The registrant or the registrant's agent shall ensure that the requirements of R313-30 are met in the operation of the therapeutic radiation machines.

(2) A therapeutic radiation machine which does not meet the provisions of these rules shall not be used for irradiation of patients.

(3) Training for External Beam Radiation Therapy Authorized Users. The registrant for a therapeutic radiation machine subject to R313-30-6 or R313-30-7 shall require the authorized user to be a physician who:

(a) Is certified in:

(i) Radiology or therapeutic radiology by the American Board of Radiology; or

(ii) Radiation oncology by the American Osteopathic Board of Radiology; or

(iii) Radiology, with specialization in radiotherapy, as a British "Fellow of the Faculty of Radiology" or "Fellow of the Royal College of Radiology"; or

(iv) Therapeutic radiology by the Canadian Royal College of Physicians and Surgeons; or

(b) Is in the active practice of therapeutic radiology, and has completed 200 hours of instruction in basic radiation techniques applicable to the use of an external beam radiation therapy unit, 500 hours of supervised work experience, and a minimum of three years of supervised clinical experience.

(i) To satisfy the requirement for instruction, the classroom and laboratory training shall include:

(A) Radiation physics and instrumentation;

(B) Radiation protection;

(C) Mathematics pertaining to the use and measurement of radioactivity; and

(D) Radiation biology.

(ii) To satisfy the requirement for supervised work experience, training shall be under the supervision of an authorized user and shall include:

(A) Review of the full calibration measurements and periodic quality assurance checks;

(B) Preparing treatment plans and calculating treatment times;

(C) Using administrative controls to prevent misadministrations;

(D) Implementing emergency procedures to be followed in the event of the abnormal operation of a external beam radiation therapy unit or console; and

(E) Checking and using radiation survey meters.

(iii) To satisfy the requirement for a period of supervised clinical experience, training shall include one year in a formal training program approved by the Residency Review Committee for Radiology of the Accreditation Council for Graduate Medical Education or the Committee on Postdoctoral Training of the American Osteopathic Association and an additional two years of clinical experience in therapeutic radiology under the supervision of an authorized user. The supervised clinical experience shall include:

(A) Examining individuals and reviewing their case histories to determine their suitability for external beam radiation therapy treatment, and limitations and contraindications;

(B) Selecting proper dose and how it is to be administered;

(C) Calculating the external beam radiation therapy doses and collaborating with the authorized user in the review of patients' progress and consideration of the need to modify originally prescribed doses as warranted by patients' reaction to radiation; and

(D) Post-administration follow-up and review of case histories.

(iv) An individual who satisfies the requirements in R313-30-3(b), but not R313-30-3(a), must submit an application to the Executive Secretary and must satisfy the requirements in R313-30-3 (a) within one year of initial application to the Executive Secretary.

(c) After December 31, 1994, a physician shall not act as an authorized user for a therapeutic radiation machine until the physician's training has been reviewed and approved by the Executive Secretary.

(4) Training for Radiation Therapy Physicist. The registrant for a therapeutic radiation machine subject to R313-30-6 or R313-30-7 shall require the Radiation Therapy Physicist to:

(a) Satisify the provisions of R313-16, as a provider of radiation services in the area of calibration and compliance surveys of external beam radiation therapy units; and

(b) Be certified by the American Board of Radiology in:

(i) Therapeutic radiological physics; or

(ii) Roentgen-ray and gamma-ray physics; or

(iii) X-ray and radium physics; or

(iv) Radiological physics; or

(c) Be certified by the American Board of Medical Physics in Radiation Oncology Physics; or

(d) Be certified by the Canadian College of Medical Physics; or

(e) Hold a master's or doctor's degree in physics, biophysics, radiological physics, or health physics, and have completed one year of full time training in therapeutic radiological physics and also one year of full time work experience under the supervision of a Radiation Therapy Physicist at a medical institution. To meet this requirement, the individual shall have performed the tasks listed in R313-30-4(1), R313-30-6(16), R313-30-7(19), R313-30- 6(17), and R313-30-7(20) under the supervision of a Radiation Therapy Physicist during the year of work experience.

(f) Notwithstanding the provisions of R313-30-3(4)(e), certification pursuant to R313-30-3(4)(b), (c) or (d) shall be required on or before December 31, 1999 for all persons currently qualifying as a Radiation Therapy Physicist pursuant to R313-30-3(4)(e).

(5) Qualifications of Operators.

(a) Individuals who will be operating a therapeutic radiation machine for medical use shall be American Registry of Radiologic Technologists (ARRT) Registered Radiation Therapy Technologists.

(b) The names and training of personnel currently operating a therapeutic radiation machine shall be kept on file at the facility. Information on former operators shall be retained for a period of at least two years beyond the last date they were authorized to operate a therapeutic radiation machine at that facility.

(6) Written safety procedures and rules shall be developed by a Radiation Therapy Physicist and shall be available in the control area of a therapeutic radiation machine, including restrictions required for the safe operation of the particular therapeutic radiation machine. The operator shall be familiar with these rules as required in R313-18- 12(1)(c).

(7) Individuals shall not be exposed to the useful beam except for medical therapy purposes. Exposure for medical therapy purposes shall be ordered in writing by an authorized user who is specifically identified on the Certificate of Registration. This provision specifically prohibits deliberate exposure of an individual for training, demonstration or other non-healing-arts purposes.

(8) Visiting Authorized User. Notwithstanding the provisions of R313-30-3(7), a registrant may permit a physician to act as a visiting authorized user under the term of the registrant's Certificate of Registration for up to 60 days per calendar year under the following conditions:

(a) The visiting authorized user has the prior written permission of the registrant's management and, if the use occurs on behalf of an institution, the institution's Radiation Safety Committee; and

(b) The visiting authorized user meets the requirements established for authorized users in R313-30- 3(3)(a) and R313-30-3(3)(b); and

(c) The registrant maintains copies of records specified by R313-30-3(8) for five years from the date of the last visit.

(9) Individuals associated with the operation of a therapeutic radiation machine shall be instructed in and shall comply with the provisions of the registrant's quality management program. In addition to the requirements of R313-30, these individuals are also subject to the requirements of R313-15-201, R313-15-202, R313-15-205 and R313-15- 502.

(10) Information and Maintenance Record and Associated Information. The registrant shall maintain the following information in a separate file or package for therapeutic radiation machines, for inspection by the representatives of the Executive Secretary:

(a) Report of acceptance testing;

(b) Records of surveys, calibrations, and periodic quality assurance checks of the therapeutic radiation machine required by R313-30, as well as the names of persons who performed the activities;

(c) Records of major maintenance and modifications performed on the therapeutic radiation machine after the effective date of these rules, as well as the names of persons who performed the services; and

(d) Signature of person authorizing the return of therapeutic radiation machine to clinical use after service, repair, or upgrade.

(11) Records Retention. Records required by R313-30 shall be retained until disposal is authorized by the Executive Secretary unless another retention period is specifically authorized in R313-30. Required records shall be retained in an active file from at least the time of generation until the next inspection by a representative of the Executive Secretary. A required record generated prior to the last inspection may be microfilmed or otherwise archived as long as a complete copy of said record can be retrieved until the Executive Secretary authorizes final disposal.

R313-30-4. General Technical Requirements for Facilities Using Therapeutic Radiation Machines.

(1) Protection Surveys.

(a) The registrant shall ensure that radiation protection surveys of new facilities, and existing facilities not previously surveyed are performed with an operable radiation measurement survey instrument calibrated in accordance with R313-30-8. The radiation protection survey shall be performed by, or under the direction of, a Radiation Therapy Physicist or a Certified Health Physicist and shall verify that, with the therapeutic radiation machine in a "BEAM- ON" condition, with the largest clinically available treatment field and with a scattering phantom in the useful beam of radiation:

(i) Radiation levels in restricted areas are not likely to cause personnel exposures in excess of the limits specified in R313-15-201(1); and

(ii) Radiation levels in unrestricted areas do not exceed the limits specified in R313-15-301(1).

(b) In addition to the requirements of R313-30-4(1)(a), a radiation protection survey shall also be performed prior to subsequent medical use and:

(i) After making changes in the treatment room shielding;

(ii) After making changes in the location of the therapeutic radiation machine within the treatment room;

(iii) After relocation of, or modification of, the therapeutic radiation machine; or

(iv) Before using the therapeutic radiation machine in a manner that could result in increased radiation levels in areas outside the external beam radiation therapy treatment room.

(c) The survey record shall indicate instances where the facility, in the opinion of the Radiation Therapy Physicist or a Certified Health Physicist, is in violation of applicable radiation protection rules. The survey record shall also include the date of the measurements, the reason the survey is required, the manufacturer's name, model number and serial number of the therapeutic radiation machine, the instruments used to measure radiation levels, a plan of the areas surrounding the treatment room that were surveyed, the measured dose rate at several points in areas expressed in microsieverts, millirems, per hour, the calculated maximum level of radiation over a period of one week for restricted and unrestricted areas, and the signature of the individual responsible for conducting the survey;

(d) If the results of the surveys required by R313-30-4(1)(a) or R313-30-4(1)(b) indicate radiation levels in excess of the respective limit specified in R313-30-4(1)(a), the registrant shall lock the control in the "OFF" position and not use the unit:

(i) Except as may be necessary to repair, replace, or test the therapeutic radiation machine, the therapeutic radiation machine shielding, or the treatment room shielding; or

(ii) Until the registrant has received a specific exemption from the Board.

(2) Modification of Radiation Therapy Unit or Room Before Beginning a Treatment Program. If the survey required by R313-30-4(1) indicates that an individual in an unrestricted area may be exposed to levels of radiation greater than those permitted by R313-15-301(1) of these rules, before beginning the treatment program the registrant shall:

(a) Either equip the unit with beam direction interlocks or add additional radiation shielding to ensure compliance with R313-15-301(1) of these rules;

(b) Perform the survey required by R313-30-4(1) again; and

(c) Include in the report required by R313-30-4(4) the results of the initial survey, a description of the modification made to comply with R313-30-4(2)(a), and the results of the second survey; or

(d) Request and receive a registration amendment under R313-15-301(3) of these rules that authorizes radiation levels in unrestricted areas greater than those permitted by R313-15-301(1) of these rules.

(3) Possession of Survey Instruments. Facility locations authorized to use a therapeutic radiation machine in accordance with R313-30-6 and R313-30-7 shall possess appropriately calibrated portable monitoring equipment. As a minimum, the equipment shall include a portable radiation measurement survey instrument capable of measuring dose rates over the range 10 uSv (1 mrem) per hour to 10 mSv (1000 mrem) per hour. The survey instruments shall be operable and calibrated in accordance with R313-30-8.

(4) Reports of External Beam Radiation Therapy Surveys and Measurements. The registrant for a therapeutic radiation machine subject to R313-30-6 or R313-30-7 shall furnish a copy of the records required in R313-30-4(1) and R313-30-4(2) to the Executive Secretary within 30 days following completion of the action that initiated the record requirement.

R313-30-5. Quality Management Program.

(1) In addition to the definitions in R313-30-2, the following definitions are applicable to a quality management program:

"Course" means the entire treatment consisting of multiple fractions as prescribed in the written directive.

"Misadministration" means the administration of an external beam radiation therapy dose:

(a) Involving the wrong patient, wrong treatment modality, or wrong treatment site;

(b) When the treatment consists of three or fewer fractions and the calculated total administered dose differs from the total prescribed dose by more than ten percent of the total prescribed dose;

(c) When the calculated weekly administered dose differs from the weekly prescribed dose by more than 30 percent; or

(d) When the calculated total administered dose differs from the total prescribed dose by more than 20 percent of the total prescribed dose;

"Prescribed dose" means the total dose and dose per fraction as documented in the written directive.

"Recordable event" means the administration of an external beam radiation therapy dose when the calculated weekly administered dose differs by 15 percent or more from the weekly prescribed dose;

"Written directive" means an order in writing for a specific patient, dated and signed by an authorized user prior to the administration of radiation, containing the following information: total dose, dose per fraction, treatment site and overall treatment period.

(2) Scope and Applicability. Applicants or registrants subject to R313-30-6 or R313-30-7 shall establish and maintain a written quality management program to provide high confidence that radiation will be administered as directed by the authorized user. The quality management program shall include written policies and procedures to meet the following specific objectives:

(a) Prior to administration, a written directive is prepared for an external beam radiation therapy dose;

(i) Notwithstanding R313-30-5(2)(a), a written revision to an existing written directive may be made provided that the revision is dated and signed by an authorized user prior to administration of the external beam radiation therapy dose or the next external beam radiation therapy fractional dose;

(ii) Notwithstanding R313-30-5(2)(a), if, because of the patient's condition, a delay in order to provide a written revision to an existing written directive would jeopardize the patient's health, an oral revision to an existing written directive shall be acceptable, provided that the oral revision is

documented immediately in the patient's record and a revised written directive is signed by an authorized user within 48 hours of the oral revision;

(iii) Notwithstanding R313-30-5(2)(a), if, because of the emergent nature of the patient's condition, a delay in order to provide a written directive would jeopardize the patient's health, an oral directive shall be acceptable, provided that the information contained in the oral directive is documented immediately in the patient's record and a written directive is prepared and signed by an authorized user within 24 hours of the oral directive.

(b) Prior to the administration of a course of radiation treatments, the patient's identity is verified, by more than one method, as the individual named in the written directive;

(c) External beam radiation therapy final plans of treatment and related calculations are in accordance with the respective written directives;

(d) An administration is in accordance with the written directive; and

(e) Unintended deviations from the written directive is identified and evaluated, and appropriate action are taken.

(3) Development of Quality Management Program.

(a) An application for registration subject to R313-30-6 or R313-30-7 shall include a quality management program that specifies staff, duties and responsibilities, and equipment and procedures as part of the application required by R313-16 of these rules. The registrant shall implement the program upon issuance of a Certificate of Registration by the Executive Secretary;

(b) Existing registrants subject to R313-30-6 or R313-30-7 shall submit to the Executive Secretary a written certification that a quality management program has been implemented by December 31, 1994.

(4) As a part of the quality management program, the registrant shall:

(a) Develop procedures for, and conduct a review of, the quality management program including, since the last review, an evaluation of a representative sample of patient administrations, recordable events, and misadministrations to verify compliance with the quality management program;

(b) Conduct these reviews annually. The intervals should not exceed 12 months and shall not exceed 13 months;

(c) Evaluate these reviews to determine the effectiveness of the quality management program and, if required, make modifications to meet the requirements of R313-30-5(2); and

(d) Maintain records of these reviews, including the evaluations and findings of the reviews, in a form that can be readily audited, for three years.

(5) The registrant shall evaluate and respond, within 30 days after discovery of the recordable event, to recordable events by:

(a) Assembling the relevant facts including the cause;

(b) Identifying what corrective actions are required to prevent recurrence; and

(c) Retaining a record, in a form that can be readily audited, for three years, of the relevant facts and what corrective actions were taken.

(6) The registrant shall retain:

(a) Written directives; and

(b) A record of administered radiation doses, in a form that can be readily audited, for three years after the date of administration.

(7) The registrant may make modifications to the quality management program to increase the program's efficiency provided the program's effectiveness is not decreased.

(8) The registrant shall evaluate misadministrations and shall take the following actions in response to a misadministration:

(a) Notify the Executive Secretary by telephone no later than the next calendar day after discovery of the misadministration;

(b) Submit a written report to the Executive Secretary within 15 days after discovery of the misadministration. The written report shall include: the registrant's name; the prescribing physician's name; a brief description of the event; why the event occurred; the effect on the patient; what improvements are needed to prevent recurrence; actions taken to prevent recurrence; whether the registrant notified the patient or the patient's responsible relative or guardian, this person will subsequently be referred to as "the patient," and if not, why not; and if the patient was notified, what information was provided to the patient. The report shall not include the patient's name or other information that could lead to identification of the patient;

(c) Notify the referring physician and also notify the patient of the misadministration no later than 24 hours after its discovery, unless the referring physician personally informs the registrant either that the physician will inform the patient, or that, based on medical judgment, telling the patient would be harmful. The registrant is not required to notify the patient without first consulting the referring physician. If the referring physician or patient cannot be reached within 24 hours, the registrant shall notify the patient as soon as possible thereafter. The registrant shall not delay appropriate medical care for the patient, including necessary remedial care as a result of the misadministration, because of a delay in notification;

(d) Retain a record of misadministrations for five years. The record shall contain the names of individuals involved; including the prescribing physician, allied health personnel, the patient, and the patient's referring physician; the patient's social security number or identification number if one has been assigned; a brief description of the event; why it occurred; the effect on the patient; what improvements are needed to prevent recurrence; and the actions taken to prevent recurrence; and

(e) If the patient was notified, furnish, within 15 days after discovery of the misadministration, a written report to the patient by sending either a copy of the report that was submitted to the Executive Secretary, or a brief description of both the event and the consequences as they may effect the patient, provided a statement is included that the report submitted to the Executive Secretary can be obtained from the registrant;

(9) Aside from the notification requirement, nothing in R313-30-5(8) affects the rights or duties

of registrants and physicians in relation to patients, the patient's responsible relatives or guardians, or to others.

R313-30-6. Therapeutic Radiation Machines of Less Than 500 kV.

(1) Leakage Radiation. When the x-ray tube is operated at its maximum rated tube current for the maximum kV, the leakage air kerma rate shall not exceed the value specified at the distance specified for that classification of therapeutic radiation machine:

(a) Systems 5-50 kV. The leakage air kerma rate measured at a position five centimeters from the tube housing assembly shall not exceed 1 mGy (100 mrad) in one hour.

(b) Systems greater than 50 and less than 500 kV. The leakage air kerma rate measured at a distance of one meter from the source in every direction shall not exceed 1 cGy (1 rad) in one hour. This air kerma rate measurement may be averaged over areas no larger than 100 square centimeters. In addition, the air kerma rate at a distance of five centimeters from the surface of the tube housing assembly shall not exceed 30 cGy (30 rad) per hour.

(2) Permanent Beam Limiting Devices. Permanent diaphragms or cones used for limiting the useful beam shall provide at least the same degree of attenuation as required for the tube housing assembly.

(3) Adjustable or Removable Beam Limiting Devices.

(a) Adjustable or removable beam limiting devices, diaphragms, cones or blocks shall not transmit more than five percent of the useful beam for the most penetrating beam used;

(b) When adjustable beam limiting devices are used, the position and shape of the radiation field shall be indicated by a light beam.

(4) Filter System. The filter system shall be so designed that:

(a) Filters can not be accidentally displaced at every possible tube orientation;

(b) For equipment installed after the effective date of these rules, an interlock system prevents irradiation if the proper filter is not in place;

(c) The air kerma rate escaping from the filter slot shall not exceed 1 cGy (1 rad) per hour at one meter under operating conditions; and

(d) Filters shall be marked as to its material of construction and its thickness.

(5) Tube Immobilization.

(a) The x-ray tube shall be so mounted that it can not accidentally turn or slide with respect to the housing aperture; and

(b) The tube housing assembly shall be capable of being immobilized for stationary portal treatments.

(6) Source Marking. The tube housing assembly shall be so marked that it is possible to determine the location of the source to within five millimeters, and the marking shall be readily

accessible for use during calibration procedures.

(7) Beam Block. Contact therapy tube housing assemblies shall have a removable shield of material, equivalent in attenuation to 0.5 millimeters of lead at 100 kV, which can be positioned over the entire useful beam exit port during periods when the beam is not in use.

(8) Timer. A suitable irradiation control device shall be provided to terminate the irradiation after a pre-set time interval.

(a) A timer which has a display shall be provided at the treatment control panel. The timer shall have a pre-set time selector. The timer shall activate with an indication of "BEAM-ON" and retain its reading after irradiation is interrupted or terminated. After irradiation is terminated and before irradiation can be reinitiated, it shall be necessary to reset the timer;

(b) For equipment manufactured after the effective date of these rules, the timer shall be a cumulative timer with an elapsed time indicator. Otherwise, the timer may be a countdown timer;

(c) The timer shall terminate irradiation when a pre-selected time has elapsed, if the dose monitoring system present has not previously terminated irradiation;

(d) The timer shall permit pre-setting and determination of exposure times as short as one second;

(e) The timer shall not permit an exposure if set at zero;

(f) The timer shall not activate until the shutter is opened when irradiation is controlled by a shutter mechanism unless calibration includes a timer error correction to compensate for mechanical lag; and

(g) Timer shall be accurate to within one percent of the selected value or to within one second, whichever is greater.

(9) Control Panel Functions. The control panel, in addition to the displays required by other provisions in R313-30-6, shall have:

(a) An indication of whether electrical power is available at the control panel and if activation of the x-ray tube is possible;

(b) An indication of whether x-rays are being produced;

(c) Means for indicating x-ray tube potential and current;

(d) The means for terminating an exposure at any time;

(e) A locking device which will prevent unauthorized use of the therapeutic radiation machine; and

(f) For therapeutic radiation machines manufactured after the effective date of these rules, a positive display of specific filters in the beam.

(10) Multiple Tubes. When a control panel may energize more than one x-ray tube:

(a) It shall be possible to activate only one x-ray tube at a time;

(b) There shall be an indication at the control panel identifying which x-ray tube is activated; and

(c) There shall be an indication at the tube housing assembly when that tube is energized.

(11) Target-to-Skin Distance (TSD). There shall be a means of determining the central axis TSD to within one centimeter and of reproducing this measurement to within two millimeters thereafter.

(12) Shutters. Unless it is possible to bring the x-ray output to the prescribed exposure parameters within five seconds after the x-ray "ON" switch is energized, the beam shall be attenuated by a shutter having a lead equivalency not less than that of the tube housing assembly. In addition, after the unit is at operating parameters, the shutter shall be controlled electrically by the operator from the control panel. An indication of shutter position shall appear at the control panel.

(13) Low Filtration X-ray Tubes. Therapeutic radiation machines equipped with a beryllium or other low-filtration window shall have a label clearly marked on the tube housing assembly and shall be provided with a permanent warning device on the control panel that is activated when no additional filtration is present, to indicate that the dose rate is very high.

(14) Facility Design Requirements for Therapeutic Radiation Machines Capable of Operating in the Range 50 kV to 500 kV. In addition to shielding adequate to meet requirements of R313-30-9, the treatment room shall meet the following design requirements:

(a) Aural Communication. Provision shall be made for continuous two-way aural communication between the patient and the operator at the control panel;

(b) Viewing Systems. Provision shall be made to permit continuous observation of the patient during irradiation and the viewing system shall be so located that the operator can observe the patient from the control panel. The therapeutic radiation machine shall not be used for patient irradiation unless at least one viewing system is operational.

(15) Additional Requirements. Treatment rooms which contain a therapeutic radiation machine capable of operating above 150 kV shall meet the following additional requirements:

(a) Protective barriers shall be fixed except for entrance doors or beam interceptors;

(b) The control panel shall be located outside the treatment room or in a totally enclosed booth, which has a ceiling, inside the room;

(c) Interlocks shall be provided so that entrance doors, including doors to interior booths, shall be closed before treatment can be initiated or continued. If the radiation beam is interrupted by a door opening, it shall not be possible to restore the machine to operation without closing the door and reinitiating irradiation by manual action at the control panel; and

(d) When a door referred to in R313-30-6(15)(c) is opened while the x-ray tube is activated, the irradiation shall be interrupted either electrically or by the closure of the shutter.

(16) Full Calibration Measurements.

(a) Full calibration of a therapeutic radiation machine subject to R313-30-6 shall be performed

by, or under the direct supervision of, a Radiation Therapy Physicist:

(i) Before the first medical use following installation or reinstallation of the therapeutic radiation machine;

(ii) Annually. The intervals should not exceed 12 months and shall not exceed 13 months; and

(iii) Before medical use under the following conditions:

(A) Whenever quality assurance check measurements indicate that the radiation output differs by more than five percent from the value obtained at the last full calibration and the difference cannot be reconciled; and

(B) Following a component replacement, major repair, or modification of components that could significantly affect the characteristics of the radiation beam.

(iv) Notwithstanding the requirements of R313-30-6(16)(a)(iii):

(A) Full calibration of therapeutic radiation machines with multi-energy capabilities is required only for those modes and energies that are not within their acceptable range; and

(B) If the repair, replacement or modification does not affect all energies, full calibration shall be performed on the affected energy that is in most frequent clinical use at the facility. The remaining energies may be validated with quality assurance check procedures against the criteria in R313-30-6(16)(a)(iii)(A).

(v) The registrant shall use the dosimetry system described in R313-30-8(6)(a) to perform the full calibration required in R313-30-6(16)(b);

(b) To satisfy the requirement of R313-30-6(16)(a), full calibration shall include measurements recommended for annual calibration by NCRP Report 69, "Dosimetry of X-Ray and Gamma Ray Beams for Radiation Therapy in the Energy Range 10 keV to 50 MeV," 1981 ed., which is adopted and incorporated by reference.

(c) The registrant shall maintain a record of calibrations for the duration of the registration. The record shall include the date of the calibration, the manufacturer's name, model number, and serial number for both the therapeutic radiation machine and the x-ray tube, the model numbers and serial numbers of the instruments used to calibrate the therapeutic radiation machine, and the signature of the Radiation Therapy Physicist responsible for performing the calibration.

(17) Periodic Quality Assurance Checks.

(a) Periodic quality assurance checks shall be performed on therapeutic radiation machines subject to R313-30-6, which are capable of operation at greater than 50 kV.

(b) To satisfy the requirement of R313-30-6(17)(a), quality assurance checks shall meet the following requirements:

(i) The registrant shall perform quality assurance checks in accordance with written procedures established by the Radiation Therapy Physicist; and

(ii) The quality assurance check procedures shall specify the frequency at which tests or

measurements are to be performed. The quality assurance check procedures shall specify that the quality assurance check shall be performed during the calibration specified in R313-30-6(16)(a). The acceptable tolerance for parameters measured in the quality assurance check, when compared to the value for that parameter determined in the calibration specified in R313-30-6 (16)(a), shall be stated.

(c) The cause for a parameter exceeding a tolerance set by the Radiation Therapy Physicist shall be investigated and corrected before the system is used for patient irradiation;

(d) Whenever a quality assurance check indicates a significant change in the operating characteristics of a system, as specified in the Radiation Therapy Physicist's quality assurance check procedures, the system shall be recalibrated as required in R313-30-6(16)(a);

(e) The registrant shall use the dosimetry system described in R313-30-8(6)(b) to make the quality assurance check required in R313-30-6(17)(b);

(f) The registrant shall have the Radiation Therapy Physicist review and sign the results of radiation output quality assurance checks monthly. The interval should not exceed 30 days and shall not exceed 40 days;

(g) Therapeutic radiation machines subject to R313-30-6 shall have safety quality assurance checks of external beam radiation therapy facilities performed monthly. The interval should not exceed 30 days and shall not exceed 40 days;

(h) Notwithstanding the requirements of R313-30-6(17)(f) and R313-30-6(17)(g), the registrant shall ensure that no therapeutic radiation machine is used to administer radiation to humans unless the quality assurance checks required by R313-30-6(17)(f) and R313-30-6(17)(g) have been performed within the required interval immediately prior to the administration;

(i) To satisfy the requirement of R313-30-6(17)(g), safety quality assurance checks shall ensure proper operation of:

(i) Electrical interlocks at external beam radiation therapy room entrances;

(ii) Proper operation of the "BEAM-ON" and termination switches;

(iii) Beam condition indicator lights on the access doors, control console, and in the radiation therapy room;

(iv) Viewing systems;

(v) If applicable, electrically operated treatment room doors from inside and outside the treatment room;

(j) The registrant shall maintain a record of quality assurance checks required by R313-30-6(17) (a) and R313-30-6(17)(g) for three years. The record shall include the date of the quality assurance check, the manufacturer's name, model number, and serial number for the therapeutic radiation machine, the manufacturer's name, model number and serial number of the instruments used to measure the radiation output of the therapeutic radiation machine, and the signature of the individual who performed the periodic quality assurance check.

(18) Operating Procedures.

(a) The therapeutic radiation machine shall not be used for irradiation of patients unless the requirements of R313-30-6(16) and R313-30-6(17) have been met;

(b) Therapeutic radiation machines shall not be left unattended unless secured pursuant to R313-30- 6(9)(e);

(c) When a patient must be held in position for radiation therapy, mechanical supporting or restraining devices shall be used;

(d) The tube housing assembly shall not be held by an individual during operation unless the assembly is designed to require holding and the peak tube potential of the system does not exceed 50 kV. In these cases, the holder shall wear protective gloves and apron of not less than 0.5 millimeters lead equivalency at 100 kV;

(e) A copy of the current operating and emergency procedures shall be maintained at the therapeutic radiation machine control console; and

(f) No individual other than the patient shall be in the treatment room during exposures from therapeutic radiation machines operating above 150 kV. At energies less than or equal to 150 kV, individuals, other than the patient, in the treatment room shall be protected by a barrier sufficient to meet the requirements of R313-15-201 of these rules.

R313-30-7. Therapeutic Radiation Machines - Photon Therapy Systems (500 kV and Above) and Electron Therapy Systems (500 keV and Above).

(1) Leakage Radiation Outside the Maximum Useful Beam in Photon and Electron Modes.

(a) The absorbed dose rate due to leakage radiation (excluding neutrons) at any point outside the maximum sized useful beam, but within a circular plane of radius two meters which is perpendicular to and centered on the central axis of the useful beam at the nominal treatment distance, that is at the plane of the patient, shall not exceed a maximum of 0.2 percent and an average of 0.1 percent of the absorbed dose rate on the central axis of the beam at the nominal treatment distance. Measurements shall be averaged over an area not exceeding 100 square centimeters at a minimum of 16 points uniformly distributed in the plane;

(b) Except for the area defined in R313-30-7(1)(a), the absorbed dose rate, excluding that from neutrons, at one meter from the electron path between the electron source and the target or electron window shall not exceed 0.5 percent of the absorbed dose rate on the central axis of the beam at the nominal treatment distance. Measurements shall be averaged over an area not exceeding 100 square centimeters;

(c) For equipment manufactured after the effective date of these rules, the neutron absorbed dose outside the useful beam shall be in compliance with applicable acceptance criteria; and

(d) For therapeutic radiation machines, the registrant shall determine, or obtain from the manufacturer, the leakage radiation existing at the positions specified in R313-30-7(1)(a) through R313-30-7(1)(c) for the specified operating conditions. Records on leakage radiation measurements shall be maintained at the installation for inspection by representatives of the Executive Secretary.

(2) Leakage Radiation Through Beam Limiting Devices.

(a) Photon Radiation.

(i) Adjustable or interchangeable beam limiting devices, such as the collimating jaws or x-ray cones, shall attenuate the useful beam so that at the nominal treatment distance, the maximum absorbed dose anywhere in the area shielded by the beam limiting devices shall not exceed two percent of the maximum absorbed dose on the central axis of the useful beam measured in a ten centimeters by ten centimeters radiation field; and

(ii) Interchangeable beam limiting devices, such as auxiliary beam blocking material, shall attenuate the useful beam so that at the nominal treatment distance, the maximum absorbed dose anywhere in the area shielded by the interchangeable beam limiting device shall not exceed five percent of the maximum absorbed dose on the central axis of the useful beam measured in a ten centimeter by ten centimeter radiation field.

(b) Electron Radiation. Adjustable or interchangeable electron applicators shall attenuate the radiation, including but not limited to photon radiation generated by electrons incident on the beam limiting device and electron applicator and other parts of the radiation head, so that the absorbed dose in a plane perpendicular to the central axis of the useful beam at the nominal treatment distance shall not exceed:

(i) A maximum of two percent of the absorbed dose on the central axis of the useful beam at the nominal treatment distance. This limit shall apply beyond a line seven centimeters outside the periphery of the useful beam; and

(ii) A maximum of ten percent of the absorbed dose on the central axis of the useful beam at the nominal treatment distance. This limit shall apply beyond a line two centimeters outside the periphery of the useful beam.

(c) Measurement of Leakage Radiation.

(i) Photon Radiation. Measurements of leakage radiation through the beam limiting devices shall be made with the beam limiting devices closed and residual apertures blocked by at least two tenth value layers of suitable absorbing material. In the case of overlapping beam limiting devices, the leakage radiation through the sets of beam limiting devices shall be measured independently at the depth of maximum dose. Measurements shall be made using a radiation detector of area not exceeding ten square centimeters;

(ii) Electron Radiation. Measurements of leakage radiation through the electron applicators shall be made with an appropriate radiation detector suitably protected against radiation which has been scattered from material beyond the radiation detector. Measurements shall be made using an appropriate amount of water equivalent build up material for the energies being measured.

(3) Filters and Wedges.

(a) Filters and wedges which are removable from the system shall be clearly marked with an identification number;

(i) For removable wedge filters, the nominal wedge angle shall appear on the wedge, or on the wedge tray if the wedge filter is permanently mounted to the tray.

(ii) If the wedge or wedge tray is damaged, the Radiation Therapy Physicist will decide if the wedge transmission factor shall be redetermined;

(b) For equipment manufactured after the effective date of these rules which utilize a system of wedge filters:

(i) Irradiation shall not be possible until a selection of a wedge filter or a positive selection to use "no wedge filter" has been made at the treatment control panel;

(ii) An interlock system shall be provided to prevent irradiation if the wedge filter selected is not in the correct position;

(iii) A display shall be provided at the treatment control panel showing the wedge filters in use; and

(iv) An interlock shall be provided to prevent irradiation if a wedge filter selection operation, either manual or automatic, carried out in the treatment room does not agree with the wedge filter selection operation carried out at the treatment control panel.

(c) If the absorbed dose rate information required by R313-30-7(8) relates exclusively to operation with a field flattening filter or beam scattering foil in place, the filter or foil shall be removable only by the use of tools. If removable, the filter or foil shall be interlocked to prevent incorrect selection and incorrect positioning.

(d) For equipment manufactured after the effective date of these rules which utilize a system of interchangeable field flattening filters or interchangeable beam scattering foils:

(i) An interlock system shall be provided to prevent irradiation if the appropriate flattening filter for the x-ray energy selected is not in the correct position in the beam;

(ii) An interlock system shall be provided to prevent irradiation if the appropriate beam scattering foil for the electron energy selected is not in the correct position in the beam;

(iii) An interlock system shall be provided to prevent irradiation if no scattering foil is in place for the electron beams, or if no flattening filter is in place for the x-ray beams; and

(iv) A display shall be provided at the treatment control panel showing a fault indicator when the interlock system has prevented irradiation. The fault indicator will identify a filter or foil error.

(4) Stray Radiation in the Useful Beam. For equipment manufactured after the effective date of these rules, the registrant shall determine during acceptance testing, or obtain from the manufacturer, data sufficient to ensure that x-ray stray radiation in the useful electron beam, absorbed dose at the surface during x-ray irradiation and stray neutron radiation in the useful x-ray beam meet applicable acceptance criteria.

(5) Beam Monitors. Therapeutic radiation machines subject to R313-30-7 shall be provided with redundant beam monitoring systems. The sensors for these systems shall be fixed in the useful beam during treatment to indicate the dose monitor unit rate, and to monitor other beam parameters.

(a) Equipment manufactured after the effective date of these rules shall be provided with at least two independently powered integrating dose meters. Alternatively, common elements may be used if the production of radiation is terminated upon failure of a common element.

(b) Equipment manufactured on or before the effective date of these rules shall be provided with at least one radiation detector. This detector shall be incorporated into a useful beam monitoring system;

(c) The detector and the system into which that detector is incorporated shall meet the following

requirements:

(i) Detectors shall be removable only with tools and, if movable, shall be interlocked to prevent incorrect positioning;

(ii) Detectors shall form part of a beam monitoring system from whose readings in dose monitor units the absorbed dose at a reference point can be calculated;

(iii) The beam monitoring systems shall be capable of independently monitoring, interrupting, and terminating irradiation; and

(iv) For equipment manufactured after the effective date of these rules, the design of the beam monitoring systems shall ensure that the:

(A) Malfunctioning of one system shall not affect the correct functioning of the secondary system; and

(B) Failure of an element common to both systems which could affect the correct function of both systems shall terminate irradiation or prevent the initiation of radiation.

(v) Beam monitoring systems shall have a legible display at the treatment control panel. For equipment manufactured after the effective date of these rules, displays shall:

(A) Maintain a reading until intentionally reset;

(B) Have only one scale and no electrical or mechanical scale multiplying factors;

(C) Utilize a design so that increasing dose monitor units are displayed by increasing numbers; and

(D) In the event of power failure, the dose monitor units delivered up to the time of failure, or the beam monitoring information required in R313-30-7(5)(c)(v)(C) displayed at the control panel at the time of failure shall be retrievable in at least one system for a 20 minute period of time.

(6) Beam Symmetry.

(a) Bent-beam linear accelerators subject to R313-30-7 shall be provided with auxiliary devices to monitor beam symmetry;

(b) The devices referenced in R313-30-7(6)(a) shall be able to detect field asymmetry greater than ten percent; and

(c) The devices referenced in R313-30-7(6)(a) shall be configured to terminate irradiation if the specifications in R313-30-7(6)(b) can not be maintained.

(7) Selection and Display of Dose Monitor Units.

(a) Irradiation shall not be possible until a selection of a number of dose monitor units has been made at the treatment control panel;

(b) The preselected number of dose monitor units shall be displayed at the treatment control panel until reset manually for the next irradiation;

(c) After termination of irradiation, it shall be necessary to reset the dosimeter display before subsequent treatment can be initiated; and

(d) For equipment manufactured after the effective date of these rules, after termination of irradiation, it shall be necessary for the operator to reset the preselected dose monitor units before irradiation can be initiated.

(8) Air Kerma Rate and Absorbed Dose Rate. For equipment manufactured after the effective date of these rules, a system shall be provided from whose readings the air kerma rate or absorbed dose rate at a reference point can be calculated. The radiation detectors specified in R313-30-7 (5) may form part of this system. In addition:

(a) The dose monitor unit dose rate shall be displayed at the treatment control panel;

(b) If the equipment can deliver an air kerma rate or absorbed dose rate at the nominal treatment distance more than twice the maximum value specified by the manufacturer, a device shall be provided which terminates irradiation when the air kerma rate or absorbed dose rate exceeds a value twice the specified maximum. The dose rate at which the irradiation will be terminated shall be a record maintained by the registrant;

(c) If the equipment can deliver, under any fault condition, an air kerma rate or absorbed dose rate at the nominal treatment distance more than ten times the maximum value specified by the manufacturer, a device shall be provided to prevent the air kerma rate or absorbed dose rate anywhere in the radiation field from exceeding twice the specified maximum value and to terminate irradiation if the excess absorbed dose at the nominal treatment distance exceeds 4 Gy (400 rad); and

(d) For therapeutic radiation machines, the registrant shall determine, or obtain from the manufacturer, the maximum values specified in R313-30-7(8)(b) and R313-30-7(8)(c) for the specified operating conditions. Records of these maximum values shall be maintained at the installation for inspection by representatives of the Executive Secretary.

(9) Termination of Irradiation by the Beam Monitoring System or Systems During Stationary Beam Radiation Therapy.

(a) Primary systems shall terminate irradiation when the preselected number of dose monitor units has been detected by the system;

(b) If the original design of the equipment included a secondary dose monitoring system, that system shall be capable of terminating irradiation when not more than 15 percent or 40 dose monitor units above the preselected number of dose monitor units set at the control panel has been detected by the secondary dose monitoring system; and

(c) For equipment manufactured after the effective date of these rules, an indicator on the control panel shall show which monitoring system has terminated irradiation.

(10) Termination Switches. It shall be possible to terminate irradiation and equipment movement or go from an interruption condition to termination condition at any time from the operator's position at the treatment control panel.

(11) Interruption Switches. If a therapeutic radiation machine has an interrupt mode, it shall be possible to interrupt irradiation and equipment movements at any time from the treatment control panel. Following an interruption, it shall be possible to restart irradiation by operator

action without a reselection of operating conditions. If a change is made of a pre-selected value during an interruption, irradiation and equipment movements shall be automatically terminated.

(12) Timer. A suitable irradiation control device shall be provided to terminate the irradiation after a preset time interval.

(a) A timer shall be provided which has a display at the treatment control panel. The timer shall have a preset time selector and an elapsed time indicator;

(b) The timer shall be a cumulative timer which activates with an indication of "BEAM-ON" and retains its reading after irradiation is interrupted or terminated. After irradiation is terminated and before irradiation can be reinitiated, it shall be necessary to reset the elapsed time indicator;

(c) The timer shall terminate irradiation when a preselected time has elapsed, if the dose monitoring systems have not previously terminated irradiation.

(13) Selection of Radiation Type. Equipment capable of both x-ray therapy and electron therapy shall meet the following additional requirements:

(a) Irradiation shall not be possible until a selection of radiation type (x-rays or electrons) has been made at the treatment control panel;

(b) The radiation type selected shall be displayed at the treatment control panel before and during irradiation;

(c) An interlock system shall be provided to ensure that the equipment can principally emit only the radiation type which has been selected;

(d) An interlock system shall be provided to prevent irradiation with x-rays, except to obtain a verification film, when electron applicators are fitted;

(e) An interlock system shall be provided to prevent irradiation with electrons when accessories specific for x-ray therapy are fitted; and

(f) An interlock system shall be provided to prevent irradiation if selected operations carried out in the treatment room do not agree with the selected operations carried out at the treatment control panel.

(14) Selection of Energy. Equipment capable of generating radiation beams of different energies shall meet the following requirements:

(a) Irradiation shall not be possible until a selection of energy has been made at the treatment control panel;

(b) The nominal energy value selected shall be displayed at the treatment control panel before and during irradiation; and

(c) Irradiation shall not be possible until the appropriate flattening filter or scattering foil for the selected energy is in its proper location.

(15) Selection of Stationary Beam Radiation Therapy or Moving Beam Radiation Therapy. Therapeutic radiation machines capable of both stationary beam radiation therapy and moving

beam radiation therapy shall meet the following requirements:

(a) Irradiation shall not be possible until a selection of stationary beam radiation therapy or moving beam radiation therapy has been made at the treatment control panel;

(b) The mode of operation shall be displayed at the treatment control panel;

(c) An interlock system shall be provided to ensure that the equipment can operate only in the mode which has been selected;

(d) An interlock system shall be provided to prevent irradiation if a selected parameter in the treatment room does not agree with the selected parameter at the treatment control panel;

(e) Moving beam radiation therapy shall be controlled to obtain the selected relationships between incremental dose monitor units and incremental angle of movement. For equipment manufactured after the effective date of these rules:

(i) An interlock system shall be provided to terminate irradiation if the number of dose monitor units delivered in increments of ten degrees of rotation or one centimeter of motion differs by more than 20 percent from the selected value;

(ii) Where angle terminates the irradiation in moving beam radiation therapy, the dose monitor units shall differ by less than five percent from the dose monitor unit value selected;

(iii) An interlock shall be provided to prevent motion of more than five degrees or one centimeter beyond the selected limits during moving beam radiation therapy;

(iv) For equipment manufactured after the effective date of these rules, an interlock shall be provided to require that a selection of direction be made at the treatment control panel in units which are capable of both clockwise and counter-clockwise moving beam radiation therapy.

(v) Moving beam radiation therapy shall be controlled with both primary position sensors and secondary position sensors to obtain the selected relationships between incremental dose monitor units and incremental movement.

(f) Where the beam monitor system terminates the irradiation in moving beam radiation therapy, the termination of irradiation shall be as required by R313-30-7(9); and

(g) For equipment manufactured after the effective date of these rules, an interlock system shall be provided to terminate irradiation if movement:

(i) Occurs during stationary beam radiation therapy; or

(ii) Does not start or stops during moving beam radiation therapy unless the stoppage is a preplanned function.

(16) Facility Design Requirements for Therapeutic Radiation Machines Operating above 500 kV. In addition to shielding adequate to meet requirements of R313-30-9, the following design requirements are made:

(a) Protective Barriers. Protective barriers shall be fixed, except for access doors to the treatment room or movable beam interceptors;

(b) Control Panel. In addition to other requirements specified in R313-30, the control panel shall also:

(i) Be located outside the treatment room;

(ii) Provide an indication of whether electrical power is available at the control panel and if activation of the radiation is possible;

(iii) Provide an indication of whether radiation is being produced; and

(iv) Include an access control device which will prevent unauthorized use of the therapeutic radiation machine;

(c) Viewing Systems. Windows, mirrors, closed-circuit television or an equivalent viewing system shall be provided to permit continuous observation of the patient following positioning and during irradiation and shall be so located that the operator may observe the patient from the treatment control panel. The therapeutic radiation machine shall not be used for patient irradiation unless at least one viewing system is operational;

(d) Aural Communications. Provision shall be made for continuous two-way aural communication between the patient and the operator at the control panel. The therapeutic radiation machine shall not be used for irradiation of patients unless continuous two-way aural communication is possible;

(e) Room Entrances. Treatment room entrances shall be provided with warning lights in a readily observable position near the outside of access doors, which will indicate when the useful beam is "ON;"

(f) Entrance Interlocks. Interlocks shall be provided so that access controls are activated before treatment can be initiated or continued. If the radiation beam is interrupted by an access control, it shall not be possible to restore the machine to operation without closing the door and reinitiating irradiation by manual action at the control panel;

(g) Beam Interceptor Interlocks. If the shielding material in a protective barrier requires the presence of a beam interceptor to ensure compliance with R313-30-301(1), interlocks shall be provided to prevent the production of radiation, unless the beam interceptor is in place, whenever the useful beam is directed at the designated barriers;

(h) Emergency Cutoff Switches. At least one emergency power cutoff switch shall be located in the radiation therapy room and shall terminate equipment electrical power including radiation and mechanical motion. This switch is in addition to the termination switch required by R313-30-7 (11). Emergency power cutoff switches shall include a manual reset so that the therapeutic radiation machine cannot be restarted from the unit's control panel without resetting the emergency cutoff switch. Alternatively, power cannot be restarted without pressing a RESET button in the treatment room after resetting the power breaker, and the operator shall check the treatment room and patient prior to turning the power back on;

(i) Safety Interlocks. Safety interlocks shall be designed so that defects or component failures in the safety interlock system prevent or terminate operation of the therapeutic radiation machine; and

(j) Surveys for Residual Radiation. Surveys for residual activity shall be conducted on therapeutic radiation machines capable of generating photon and electron energies above 10 MV prior to

machining, removing, or working on therapeutic radiation machine components which may have become activated due to photo-neutron production.

(17) Radiation Therapy Physicist Support.

(a) The services of a Radiation Therapy Physicist shall be required in facilities having therapeutic radiation machines with energies of 500 kV and above. The Radiation Therapy Physicist shall be responsible for:

(i) Full calibrations required by R313-30-7(19) and protection surveys required by R313-30-4(1);

(ii) Supervision and review of dosimetry;

(iii) Beam data acquisition and transfer for computerized dosimetry, and supervision of its use;

(iv) Quality assurance, including quality assurance check review required by R313-30-7(20)(e) of these rules;

(v) Consultation with the authorized user in treatment planning, as needed; and

(vi) Perform calculations and assessments regarding misadministrations.

(b) If the Radiation Therapy Physicist is not a full-time employee of the registrant, the operating procedures required by R313-30-7(18) shall also specifically address how the Radiation Therapy Physicist is to be contacted for problems or emergencies, as well as the specific actions to be taken until the Radiation Therapy Physicist can be contacted.

(18) Operating Procedures.

(a) No individual, other than the patient, shall be in the treatment room during treatment or during an irradiation for testing or calibration purposes;

(b) Therapeutic radiation machines shall not be made available for medical use unless the requirements of R313-30-4(1), R313-30-7(19) and R313-30-7(20) have been met;

(c) Therapeutic radiation machines, when not in operation, shall be secured to prevent unauthorized use;

(d) If a patient must be held in position during treatment, mechanical supporting or restraining devices shall be used;

(e) A copy of the current operating and emergency procedures shall be maintained at the therapeutic radiation machine control console; and

(f) When adjustable beam limiting devices or beam limiting devices that do not contact the skin are used, the position and shape of the radiation field shall be indicated by a light field.

(19) Full Calibration Measurements.

(a) Full calibration of a therapeutic radiation machine subject to R313-30-7 shall be performed by, or under the direct supervision of, a Radiation Therapy Physicist:

(i) Before the first medical use following installation or reinstallation of the therapeutic radiation machine;

(ii) Annually. The intervals should not exceed 12 months and shall not exceed 13 months; and

(iii) Before medical use under the following conditions:

(A) Whenever quality assurance check measurements indicate that the radiation output differs by more than five percent from the value obtained at the last full calibration and the difference cannot be easily reconciled; and

(B) Following component replacement, major repair, or modification of components, if the appropriate Quality Assurance checks demonstrate that the characteristics of the radiation beam have been significantly affected as determined by a Radiation Therapy Physicist. The Quality Assurance checks shall be performed by, or under the direct supervision of a Radiation Therapy Physicist. The determination of the need for a full calibration shall be made by a Radiation Therapy Physicist.

(iv) Notwithstanding the requirements of R313-30-7(19)(a)(iii):

(A) Full calibration of therapeutic radiation machines with multi-energy and multi-mode capabilities is required only for those modes and energies that are not within their range and the difference cannot be easily reconciled; and

(B) If the repair, replacement or modification does not affect all modes and energies, full calibration shall be performed on the effected mode or energy if the Quality Assurance checks demonstrate that the characteristics of the radiation beam have been significantly affected as determined by a Radiation Therapy Physicist. The Quality Assurance checks shall be performed by, or under the direct supervision of, a Radiation Therapy Physicist. The determination of the need for a full calibration shall be made by a Radiation Therapy Physicist. The remaining energies or modes may be validated with quality assurance check procedures against the criteria in R313-30-7(19)(a)(iii)(A).

(b) To satisfy the requirement of R313-30-7(19)(a), full calibration shall include measurements required for annual calibration by American Association of Physicists in Medicine (AAPM) Report 46, "Comprehensive Quality Assurance for Radiation Oncology," 1994 ed., which is adopted and incorporated by reference;

(c) The registrant shall use the dosimetry system described in R313-30-8(6) to measure the radiation output for one set of exposure conditions. The remaining radiation measurements required in R313-30-7(19)(b) may then be made using a dosimetry system that indicates relative dose rates; and

(d) The registrant shall maintain a record of calibrations for the duration of the registration. The record shall include the date of the calibration, the manufacturer's name, model number, and serial number for the therapeutic radiation machine, the model numbers and serial numbers of the instruments used to calibrate the therapeutic radiation machine, and the signature of the Radiation Therapy Physicist responsible for performing the calibration.

(20) Periodic Quality Assurance Checks.

(a) Periodic quality assurance checks shall be performed on therapeutic radiation machines subject to R313-30-7. These checks should be performed at intervals not to exceed those

intervals recommended in American Association of Physicists in Medicine (AAPM) Report 46, "Comprehensive Quality Assurance for Radiation Oncology," 1994 ed., which is adopted and incorporated by reference.

(i) Determination of parameters for central axis radiation output shall be done at least weekly. The interval shall not exceed ten days.

(ii) The interval at which periodic quality assurance checks are to be performed shall be determined by the Radiation Therapy Physicist and shall be documented in the registrant's quality management program. The interval for a specific performance check may be based on the history of that performance check for a particular machine. The interval may be increased above the recommended limits only if the Radiation Therapy Physicist determines the increase is justified based on the history of the performance check for that machine or a machine of the same manufacturer and the same model.

(iii) If the performance check demonstrates a need to decrease the interval, the Radiation Therapy Physicist shall decide if the interval should be decreased. The decreased interval shall be continued until the performance check demonstrates that the decreased interval is not necessary.

(b) To satisfy the requirement of R313-30-7(20)(a), quality assurance checks shall include determination of central axis radiation output and shall include a representative sampling of periodic quality assurance checks contained in American Association of Physicists in Medicine (AAPM) Report 46, "Comprehensive Quality Assurance for Radiation Oncology," 1994 ed., which is adopted and incorporated by reference.

(i) A representative sampling shall include those referenced periodic quality assurance checks necessary to assure that the radiation beam and alignment parameters for all therapy machines and modes of operation are within limits prescribed by AAPM Report 46.

(ii) The intervals for a representative sampling of referenced periodic quality assurance checks should not exceed 12 consecutive months and shall not exceed 13 consecutive months.

(c) The registrant shall use a dosimetry system which has been inter-compared semi-annually. The intervals should not exceed six months and shall not exceed seven months, with a dosimetry system described in R313-30- 8(6)(a) to make the periodic quality assurance checks required in R313-30-7(20)(a)(i);

(d) The registrant shall perform periodic quality assurance checks required by R313-30-7(20)(a) in accordance with procedures established by the Radiation Therapy Physicist;

(e) The registrant shall review the results of periodic radiation output checks according to the following procedures:

(i) The authorized user and Radiation Therapy Physicist shall be immediately notified if a parameter is not within its acceptable range. The therapeutic radiation machine shall not be made available for subsequent medical use until the Radiation Therapy Physicist has determined that all parameters are within their acceptable range;

(ii) If periodic radiation output check parameters appear to be within their acceptable range, the periodic radiation output check shall be reviewed and signed by either the authorized user or Radiation Therapy Physicist within two weeks;

(iii) The Radiation Therapy Physicist shall review and sign the results of radiation output quality

assurance checks at intervals not to exceed one month; and

(iv) Other Quality Assurance checks shall be reviewed at intervals specified in the Quality Management Program, as required by R313-30-5.

(f) Therapeutic radiation machines subject to R313-30-7 shall have safety quality assurance checks of external beam radiation therapy facilities performed weekly at intervals not to exceed ten days;

(g) To satisfy the requirement of R313-30-7(20)(f), safety quality assurance checks shall ensure proper operation of:

(i) Electrical interlocks at external beam radiation therapy room entrances;

(ii) Proper operation of the "BEAM-ON", interrupt and termination switches;

(iii) Beam condition indicator lights on the access doors, control console, and in the radiation therapy room;

(iv) Viewing and aural communication systems;

(v) Electrically operated treatment room doors from inside and outside the treatment room;

(vi) At least one emergency power cutoff switch. If more than one emergency power cutoff switch is installed and not all switches are tested at once, switches shall be tested on a rotating basis. Safety quality assurance checks of the emergency power cutoff switches may be conducted at the end of the treatment day in order to minimize possible stability problems with the therapeutic radiation machine.

(h) The registrant shall promptly repair a system identified in R313-30-7(20)(g) that is not operating properly; and

(i) The registrant shall maintain a record of quality assurance checks required by R313-30-7(20)(a) and R313-30-7(20)(g) for three years. The record shall include the date of the quality assurance check, the manufacturer's name, model number, and serial number for the therapeutic radiation machine, the manufacturer's name, model number and serial number of the instruments used to measure the radiation output of the therapeutic radiation machine, and the signature of the individual who performed the periodic quality assurance check.

R313-30-8. Calibration and Check of Survey Instruments and Dosimetry Equipment.

(1) The registrant shall ensure that the survey instruments used to show compliance with R313-30 have been calibrated before first use, at intervals not to exceed 12 months, and following repair.

(2) To satisfy the requirements of R313-30-8(1), the registrant shall:

(a) Calibrate required scale readings up to 10 mSv (1000 mrem) per hour with an appropriate radiation source that is traceable to the National Institute of Standards and Technology (NIST);

(b) Calibrate at least two points on the scales to be calibrated. These points should be at approximately 1/3 and 2/3 of scale rating; and

(3) To satisfy the requirements of R313-30-8(2), the registrant shall:

(a) Consider a point as calibrated if the indicated dose rate differs from the calculated dose rate by not more than ten percent; and

(b) Consider a point as calibrated if the indicated dose rate differs from the calculated dose rate by not more than 20 percent if a correction factor or graph is conspicuously attached to the instrument.

(4) The registrant shall retain a record of calibrations required in R313-30-8(1) for three years. The record shall include:

(a) A description of the calibration procedure; and

(b) A description of the source used and the certified dose rates from the source, and the rates indicated by the instrument being calibrated, the correction factors deduced from the calibration data, the signature of the individual who performed the calibration, and the date of calibration.

(5) The registrant may obtain the services of individuals licensed by the Board, the U.S. Nuclear Regulatory Commission, an Agreement State, or a Licensing State to perform calibrations of survey instruments. Records of calibrations which contain information required by R313-30-8(4) shall be maintained by the registrant.

(6) Dosimetry Equipment.

(a) The registrant shall have a calibrated dosimetry system available for use. The system shall have been calibrated for by the National Institute for Standards and Technology (NIST) or by an American Association of Physicists in Medicine (AAPM) Accredited Dosimetry Calibration Laboratory (ADCL). The calibration shall have been performed within 24 months prior to use and after servicing that may have affected system calibration.

(i) For beams with energies greater than 1 MV (1 MeV), the dosimetry system shall have been calibrated for Cobalt-60;

(ii) For beams with energies equal to or less than 1 MV (1 MeV), the dosimetry system shall have been calibrated at an energy or energy range appropriate for the radiation being used.

(b) The registrant shall have available for use a dosimetry system for quality assurance check measurements. To meet this requirement, the system may be compared with a system that has been calibrated in accordance with R313-30-8(6)(a). This comparison shall have been performed within the previous 12 months (six months if the dosimetry system is an ionization chamber) and after servicing that may have affected system calibration. The quality assurance check system may be the same system used to meet the requirement in R313-30-8(6)(a);

(c) The registrant shall maintain a record of dosimetry system calibration, intercomparison, and comparison for the duration of the license and registration. For calibrations, intercomparisons, or comparisons, the record shall include the date, the model numbers and serial numbers of the instruments that were calibrated, intercompared, or compared as required by R313-30-8(6)(a) and R313-30-8(6)(b), the correction factors that were determined, the names of the individuals who performed the calibration, intercomparison, or comparison, and evidence that the calibration, intercomparison, or comparison was performed by, or under the direct supervision of, a Radiation Therapy Physicist.

R313-30-9. Shielding and Safety Design Requirements.

(1) Therapeutic radiation machines subject to R313-30-6 or R313-30-7 shall be provided with the primary and secondary barriers that are necessary to ensure compliance with R313-15-201 and R313-30-301 of these rules.

(2) Facility design information for new installations of a therapeutic radiation machine or installations of a therapeutic radiation machine of higher energy into a room not previously approved for that energy shall be submitted for approval by the Executive Secretary prior to actual installation of the therapeutic radiation machine. The minimum facility design information that must be submitted is contained in R313-30-10.

R313-30-10. Information on Radiation Shielding Required for Plan Reviews.

(1) Therapeutic Radiation Machines

(a) Basic facility information including: name, telephone number and Department registration number of the individual responsible for preparation of the shielding plan; name and telephone number of the facility supervisor; and the street address, including room number, of the external beam radiation therapy facility. The plan should also indicate whether this is a new structure or a modification to existing structures.

(b) Wall, floor, and ceiling areas struck by the useful beam shall have primary barriers. For an adjacent area that is normally unoccupied, barrier thicknesses may be less than the required thickness, if:

(i) That area where the exposure rates and exposures exceed the limits specified in R313-15-301 (1) is permanently fenced or walled to prevent access;

(ii) The appropriate warning signs are posted at appropriate intervals and locations on the fence or wall;

(iii) The exposure rates and exposures outside the fence or wall are less than the limits specified in R313-15-301(1);

(iv) Access to the area is controlled by the operator, and once access is gained, the therapeutic radiation machine cannot be operated until the area has been cleared and access is again controlled by the operator;

(v) The ceiling is of sufficient thickness to reduce exposure due to skyshine, so that the exposure rates and exposures surrounding the facility are less than the limits specified in R313-15-301(1); and

(vi) The primary barrier is of sufficient thickness to ensure that the exposure rates and exposures from the primary beam in spaces in adjacent buildings are less than the limits specified in R313-15-301(1).

(c) Secondary barriers shall be provided in wall, floor, and ceiling areas not having primary barriers.

(2) Therapeutic Radiation Machines up to 150 kV (photons only). In addition to the requirements listed in R313-30-10(1), therapeutic radiation machine facilities which produce only photons with a maximum energy less than or equal to 150 kV shall submit shielding plans which contain, as a

minimum, the following additional information:

(a) Equipment specifications, including the manufacturer and model number of the therapeutic radiation machine, as well as the maximum technique factors.

(b) Maximum design workload for the facility including total weekly radiation output, expressed in gray (rad) or air kerma at one meter, total beam-on time per day or week, the average treatment time per patient, along with the anticipated number of patients to be treated per day or week.

(c) A facility blueprint or drawing indicating: the scale of the blueprint or drawing; direction of North; normal location of the therapeutic radiation machine's radiation ports; the port's travel and traverse limits; general directions of the useful beam; locations of windows and doors; and the location of the therapeutic radiation machine control panel. If the control panel is located inside the external beam radiation therapy treatment room, the location of the operator's booth shall be noted on the plan and the operator's station at the control panel shall be behind a protective barrier sufficient to ensure compliance with R313-15-101 of these rules.

(d) The structural composition and thickness or the lead or concrete equivalent of walls, doors, partitions, floor, and ceiling of the rooms concerned.

(e) The type of occupancy of adjacent areas inclusive of space above and below the rooms concerned. If there is an exterior wall, show distance to the closest areas where it is likely that individuals may be present.

(f) At least one example calculation which shows the methodology used to determine the amount of shielding required for the physical conditions; that is the primary and secondary or leakage barriers, restricted and unrestricted areas, entry doors; and shielding material in the facility.

(i) If commercial software is used to generate shielding requirements, please also identify the software used and the version or revision date.

(ii) If the software used to generate shielding requirements is not in the open literature, please also submit quality control sample calculations to verify the result obtained with the software.

(3) Therapeutic Radiation Machines over 150 kV. In addition to the requirements listed in R313-30-10(1), therapeutic radiation machine facilities which produce photons with a maximum energy in excess of 150 kV and electrons and protons or other subatomic particles shall submit shielding plans which contain, as a minimum, the following additional information:

(a) Equipment specifications including the manufacturer and model number of the therapeutic radiation machine, and gray (rad) at the isocenter and the energies and types of radiation produced, that is photon and electron. The source to isocenter distance shall be specified.

(b) Maximum design workload for the facility including total weekly radiation output, expressed in gray (rad) at one meter, total beam-on time per day or week, the average treatment time per patient, along with the anticipated number of patients to be treated per day or week.

(c) Facility blueprint or drawing, including both floor plan and elevation views, indicating relative orientation of the therapeutic radiation machine; scale; types; thickness and minimum density of shielding materials; direction of North; the locations and size of penetrations through shielding barriers, ceiling, walls and floor; as well as details of the doors and maze.

(d) The structural composition and thickness or concrete equivalent of walls, doors, partitions,

floor, and ceiling of the rooms concerned.

(e) The type of occupancy of adjacent areas inclusive of space above and below the rooms concerned. If there is an exterior wall, show distance to the closest areas where it is likely that individuals may be present.

(f) Description of assumptions that were used in shielding calculations including, but not limited to; design energy, for example a room may be designed for 6 MV unit although only a 4 MV unit is currently proposed; workload; presence of integral beam-stop in unit; occupancy and uses of adjacent areas; fraction of time that useful beam will intercept permanent barriers, walls, floor and ceiling; and "allowed" radiation exposure in both restricted and unrestricted areas.

(g) At least one example calculation which shows the methodology used to determine the amount of shielding required for the physical conditions; that is the primary and secondary or leakage barriers, restricted and unrestricted areas, small angle scatter, entry doors and maze; and shielding material in the facility.

(i) If commercial software is used to generate shielding requirements, also identify the software used and the version or revision date.

(ii) If the software used to generate shielding requirements is not in the open literature, also submit quality control sample calculations to verify the result obtained with the software.

(4) Neutron Shielding. In addition to the requirements listed in R313-30-10(3), therapeutic radiation machine facilities which are capable of operating above 10 MV shall submit shielding plans which contain, as a minimum, the following additional information:

(a) The structural composition, thickness, minimum density and location of neutron shielding material.

(b) Description of assumptions that were used in neutron shielding calculations including, but not limited to, neutron spectra as a function of energy, neutron flux rate, absorbed dose and dose equivalent, due to neutrons, in both restricted and unrestricted areas.

(c) At least one example calculation which shows the methodology used to determine the amount of neutron shielding required for the physical conditions, that is, restricted and unrestricted areas, entry doors and maze and neutron shielding material utilized in the facility.

(i) If commercial software is used to generate shielding requirements, also identify the software used and the version or revision date.

(ii) If the software used to generate shielding requirements is not in the open literature, also submit quality control sample calculations to verify the result obtained with the software.

(d) The methods and instrumentation which will be used to verify the adequacy of neutron shielding installed in the facility.

KEY

x-rays, survey, radiation, radiation safety

Date of Enactment or Last Substantive Amendment

August 13, 1999

Notice of Continuation

January 25, 1999

Authorizing, Implemented, or Interpreted Law

19-3-104

Rule R313-32. Medical Use of Radioactive Material.

As in effect on September 1, 2002

Table of Contents

R313-32-1. Purpose and Authority.

(1) The purpose of this rule is to prescribe requirements and provisions for the medical use of radioactive material and for issuance of specific licenses authorizing the medical use of this material. These requirements and provisions provide for the protection of the public health and safety. The requirements and provisions of R313-32 are in addition to, and not in substitution for, other sections of R313.

(2) The rules set forth herein are adopted pursuant to the provisions of Sections 19-3-104(3) and 19-3-104(6).

R313-32-2. Definitions.

"Authorized nuclear pharmacist" means a pharmacist who is:

(a) board certified as a nuclear pharmacist by the Board of Pharmaceutical Specialties;

(b) identified as an authorized nuclear pharmacist on a Nuclear Regulatory Commission or Agreement State license that authorizes the use of radioactive material in the practice of nuclear pharmacy; or

(c) identified as an authorized nuclear pharmacist on a permit issued by a Nuclear Regulatory Commission or Agreement State specific licensee of broad scope that is authorized to permit the use of radioactive material in the practice of nuclear pharmacy.

"Authorized user" means a physician, dentist, or podiatrist who is:

(a) board certified by at least one of the boards listed in Paragraph (1) of R313-32-910, R313-32-920, R313-32-930, R313-32-940, R313-32-950, or R313-32-960;

(b) identified as an authorized user on a Nuclear Regulatory Commission or Agreement State license that authorizes the medical use of radioactive material; or

(c) identified as an authorized user on a permit issued by a Nuclear Regulatory Commission or Agreement State specific licensee of broad scope that is authorized to permit the medical use of radioactive material.

"Brachytherapy source" means an individual sealed source or a manufacturer-assembled source train that is not designed to be disassembled by the user.

"Dedicated check source" means a radioactive source that is used to assure the constant operation of a radiation detection or measurement device over several months or years.

"Dental use" means the intentional external administration of the radiation from radioactive material to human beings in the practice of dentistry in accordance with a license issued by this state.

"Dentist" means an individual licensed by this state to practice dentistry.

"Diagnostic clinical procedures manual" means a collection of written procedures that describes each method, other instructions, and precautions, by which the licensee performs diagnostic clinical procedures; where each diagnostic clinical procedure has been approved by the authorized user and includes the radiopharmaceutical, dosage, and route of administration.

"Management" means the chief executive officer or that person's delegate.

"Medical institution" means an organization in which several medical disciplines are practiced.

"Medical use" means the intentional internal or external administration of radioactive material, or the radiation therefrom, to patients or human research subjects under the supervision of an authorized user.

"Ministerial change" means a change that is made, after ascertaining the applicable requirements, by persons in authority in conformance with the requirements and without making a discretionary judgement about whether those requirements should apply in the case at hand.

"Misadministration" means the administration of:

(a) A radiopharmaceutical dosage greater than 1.11 MBq (30 uCi) of either sodium iodide I-125 or I- 131:

(i) involving the wrong individual, or wrong radiopharmaceutical; or

(ii) when both the administered dosage differs from the prescribed dosage by more than 20 percent of the prescribed dosage and the difference between the administrated dosage and prescribed dosage exceeds 1.11 MBq (30 uCi).

(b) A therapeutic radiopharmaceutical dosage, other than sodium iodide I-125 or I-131:

(i) involving the wrong individual, wrong radiopharmaceutical, or wrong route of administration; or

(ii) when the administered dosage differs from the prescribed dosage by more than 20 percent of the prescribed dosage.

(c) A gamma stereotactic radiosurgery radiation dose:

(i) involving the wrong individual or wrong treatment site; or

(ii) when the calculated total administered dose differs from the total prescribed dose by more than ten percent of the total prescribed dose.

(d) A teletherapy radiation dose:

(i) involving the wrong individual, wrong mode of treatment, or wrong treatment site;

(ii) when the treatment consists of three or fewer fractions and the calculated total administered dose differs from the total prescribed dose by more than ten percent of the total prescribed dose;

(iii) when the calculated weekly administered dose exceeds the weekly prescribed dose by 30 percent or more of the weekly prescribed dose; or

(iv) when the calculated total administered dose differs from the total prescribed dose by more than 20 percent of the total prescribed dose.

(e) A brachytherapy radiation dose:

(i) involving the wrong individual, wrong radionuclide, or wrong treatment site (excluding, for permanent implants, seeds that were implanted in the correct site but migrated outside the treatment site);

(ii) involving a sealed source that is leaking;

(iii) when, for a temporary implant, one or more sealed sources are not removed upon completion of the procedure; or

(iv) when the calculated administered dose differs from the prescribed dose by more than 20 percent of the prescribed dose.

(f) A diagnostic radiopharmaceutical dosage, other than quantities greater than 1.11 MBq (30 uCi) of either sodium iodide I-125 or I-131, or both:

(i) involving the wrong individual, wrong radiopharmaceutical, wrong route of administration, or when the administered dosage differs from the prescribed dosage; and

(ii) when the dose to the individual exceeds 0.05 Sv (five rems) effective dose equivalent or 0.5 Sv (50 rems) dose equivalent to any individual organ.

"Mobile nuclear medicine service" means the transportation and medical use of radioactive material.

"Output" means the exposure rate, dose rate, or a quantity related in a known manner to these rates from a teletherapy unit for a specified set of exposure conditions.

"Pharmacist" means an individual licensed by a State or Territory of the United States, the District of Columbia, or the Commonwealth of Puerto Rico to practice pharmacy.

"Podiatric use" means the intentional external administration of the radiation from radioactive material to human beings in the practice of podiatry in accordance with a license issued by this State.

"Podiatrist" means an individual licensed by this State to practice podiatry.

"Prescribed dosage" means the quantity of radiopharmaceutical activity as documented:

(a) in a written directive; or

(b) either in the diagnostic clinical procedures manual or in an appropriate record in accordance

with the directions of the authorized user for diagnostic procedures.

"Prescribed dose" means:

(a) for gamma stereotactic radiosurgery, the total dose as documented in the written directive;

(b) for teletherapy, the total dose and dose per fraction as documented in the written directive; or

(c) for brachytherapy, either the total source strength and exposure time or the total dose, as documented in the written directive.

"Radiation Safety Officer" means the individual identified as the Radiation Safety Officer on a license issued by the Executive Secretary.

"Recordable event" means the administration of:

(a) a radiopharmaceutical or radiation without a written directive where a written directive is required;

(b) a radiopharmaceutical or radiation where a written directive is required without daily recording of each administered radiopharmaceutical dosage or radiation dose in the appropriate record;

(c) a radiopharmaceutical dosage greater than 1.11 MBq (30 uCi) of either sodium iodide I-125 or I- 131 when both:

(i) the administered dosage differs from the prescribed dosage by more than ten percent of the prescribed dosage, and

(ii) the difference between the administered dosage and prescribed dosage exceed 555 kBq (15 uCi);

(d) A therapeutic radiopharmaceutical dosage, other than sodium iodide I-125 or I-131, when the administered dosage differs from the prescribed dosage by more than ten percent of the prescribed dosage;

(e) A teletherapy radiation dose when the calculated weekly administered dose exceeds the weekly prescribed dose by 15 percent or more of the weekly prescribed dose; or

(f) A brachytherapy radiation dose when the calculated administered dose differs from the prescribed dose by more than ten percent of the prescribed dose.

"Teletherapy" means therapeutic irradiation in which the source of radiation is at a distance from the body.

"Teletherapy physicist" means the individual identified as the teletherapy physicist on a license issued by the Executive Secretary.

"Visiting authorized user" means an authorized user who is not identified as an authorized user on the license of the licensee being visited.

"Written directive" means an order in writing for a specific patient or human research subject, dated and signed by an authorized user prior to the administration of a radiopharmaceutical or radiation, except as specified in paragraph (f) of this definition, containing the following information:

(a) for any administration of quantities greater than 1.11 MBq (30 uCi) of either sodium iodide I-125 or I-131: the dosage;

(b) for a therapeutic administration of a radiopharmaceutical other than sodium iodide I-125 or I-131: the radiopharmaceutical, dosage, and route of administration;

(c) for gamma stereotactic radiosurgery: target coordinates, collimator size, plug pattern, and total dose;

(d) for teletherapy: the total dose, dose per fraction, treatment site, and overall treatment period;

(e) for high-dose-rate remote afterloading brachytherapy: the radioisotope, treatment site, and total dose; or

(f) for all other brachytherapy:

(i) prior to implantation: the radionuclide, number of sources, and source strengths; and

(ii) after implantation but prior to completion of the procedure: the radionuclide, treatment site, and total source strength and exposure time, or equivalently, the total dose.

R313-32-6. Provisions for Research Involving Human Subjects.

A licensee may conduct research involving human subjects using radioactive material provided that the research is conducted, funded, supported, or regulated by a Federal Agency which has implemented the Federal Policy for the Protection of Human Subjects. Otherwise, a licensee shall apply for and receive approval of a specific amendment to its Utah license before conducting such research. Both types of licensees shall, at a minimum, obtain informed consent from the human subjects and obtain prior review and approval of the research activities by an "Institutional Review Board" in accordance with the meaning of these terms as defined and described in the Federal Policy for the Protection of Human Subjects.

R313-32-7. FDA, other Federal, and State Requirements.

Nothing in R313-32 relieves the licensee from complying with applicable FDA, other Federal, and State requirements governing radioactive drugs or devices.

R313-32-11. License Required.

(1) A person shall not manufacture, produce, acquire, receive, possess, use, or transfer radioactive material for medical use except in accordance with a specific license issued by the Executive Secretary, the Nuclear Regulatory Commission, or an Agreement State, or as allowed in R313-32-11(2) or (3).

(2) An individual shall receive, possess, use, or transfer radioactive material in accordance with the Utah Radiation Control Rules under the supervision of an authorized user as provided in R313-32-25, unless prohibited by license condition.

(3) An individual may prepare unsealed radioactive material for medical use in accordance with R313- 32 under the supervision of an authorized nuclear pharmacist or authorized user as provided in R313-32-25, unless prohibited by license condition.

R313-32-12. Application for License, Amendment, or Renewal.

(1) If the application is for medical use sited in a medical institution, only the institution's management may apply. If the application is for medical use not sited in a medical institution, any person may apply.

(2) An application for a license for medical use of radioactive material as described in R313-32-100, R313-32-200, R313-32-300, R313-32-400, and R313-32-500 must be made by filing of Form DRC-02, "Application for Materials License." For guidance in completing the form, refer to the instructions in the most current versions of the appropriate Regulatory Guides. A request for a license amendment or renewal may be submitted in a letter format.

(3) An applicant that satisfies the requirements specified in R313-22-50(2) may apply for a Type A specific license of broad scope.

R313-32-13. License Amendment.

A licensee shall apply for and receive a license amendment:

(1) before it receives or uses radioactive material for a clinical procedure permitted under R313-32 but not permitted by the license issued pursuant to R313-32;

(2) before it permits anyone to work as an authorized user or authorized nuclear pharmacist under the license, except an individual who is:

(a) an authorized user certified by the organizations specified in paragraph (1) of R313-32-910, R313-32-920, R313-32-930, R313-32-940, R313-32-950, or R313-32-960;

(b) an authorized nuclear pharmacist certified by the organization specified in paragraph (1) of R313-32-980;

(c) identified as an authorized user or an authorized nuclear pharmacist on a Nuclear Regulatory Commission or an Agreement State license that authorizes the use of radioactive material in medical use or in the practice of nuclear pharmacy, respectively, or

(d) identified as an authorized user or an authorized nuclear pharmacist on a permit issued by the Executive Secretary, the Nuclear Regulatory Commission or an Agreement State specific licensee of broad scope that is authorized to permit the use of radioactive material in medical use or in the practice of nuclear pharmacy, respectively.

(3) before it changes Radiation Safety Officers or Teletherapy Physicists;

(4) before it orders radioactive material in excess of the amount, or radionuclide or form different than authorized on the license; and

(5) before it adds to or changes the address or addresses of use identified on the license.

R313-32-14. Notifications.

(1) A licensee shall provide to the Executive Secretary a copy of the board certification, the Nuclear Regulatory Commission or Agreement State license, or the permit issued by a licensee of broad scope for each individual no later than 30 days after the date that the licensee permits the individual to work as an authorized user or an authorized nuclear pharmacist pursuant to R313-32-13(2)(a) through (2)(d).

(2) A licensee shall notify the Executive Secretary by letter no later than 30 days after:

(a) an authorized user, an authorized nuclear pharmacist, Radiation Safety Officer, or teletherapy physicist permanently discontinues performance of duties under the license or has a name change; or

(b) the licensee's mailing address changes.

(3) The licensee shall mail the documents required in R313-32-14 to the address identified in R313- 12-110.

R313-32-15. Exemptions Regarding Type A Specific Licenses of Broad Scope.

A licensee possessing a Type A specific license of broad scope for medical use is exempt from the following:

(1) The provisions of R313-32-13(2);

(2) The provisions of R313-32-13(5) regarding additions to or changes in the areas of use only at the addresses specified in the license;

(3) The provisions of R313-32-14(1); and

(4) The provisions of R313-32-14(2)(a) for an authorized user or an authorized nuclear pharmacist.

R313-32-18. License Issuance.

The Executive Secretary shall issue a license for the medical use of radioactive material for a term of five years provided the following requirements are met:

(1) The applicant has filed form DRC-02 "Application for Materials License - Medical" in accordance with the instructions in R313-22-32.

(2) The applicant has paid any applicable fee as provided in R313-70.

(3) The Executive Secretary finds the applicant equipped and committed to observe the safety standards established in R313-15 for the protection of the public health and safety.

(4) In addition to the requirements set forth in R313-22-33 a specific license for human use of radioactive material in institutions will be issued if:

(a) the applicant has appointed a radiation safety committee to coordinate the use of radioactive material throughout that institution and to maintain surveillance over the institution's radiation safety program; and

(b) if the application is for a license to use unspecified quantities or multiple types of radioactive material, the applicant's staff has training and experience in the use of a variety or radioactive materials for a variety of human uses, and meets the training and experience requirements of R313-32.

(5) A specific license for the human use of radioactive material will be issued to an individual physician if the following are complied with:

(a) The applicant has access to a hospital possessing adequate facilities to hospitalize and monitor the applicant's radioactive patients whenever it is advisable.

(b) The applicant has training and experience as required by R313-32, in the handling and administration of radioactive material and, where applicable, the clinical management of radioactive patients.

(c) The application is for use in the applicant's practice in an office outside a medical institution.

(d) The Executive Secretary shall not approve an application by an individual physician or group of physicians for a specific license to receive, possess or use radioactive material on the premises of a medical institution unless:

(i) the use of radioactive material is limited to:

(A) the administration of radiopharmaceuticals for diagnostic or therapeutic purposes;

(B) the performance of diagnostic studies on patients to whom a radiopharmaceutical has been administered;

(C) the performance of in vitro diagnostic studies;

(D) the calibration and quality control checks of radioactive assay instrumentation, radiation safety instrumentation and diagnostic instrumentation;

(ii) the physician brings the radioactive material with him and removes the radioactive material when he departs. The institution cannot receive, possess or store radioactive material other than the amount of material remaining in the patient; or

(iii) the medical institution does not hold a radioactive material license issued pursuant to the provisions of R313-32-18(4).

R313-32-19. Specific Exemptions.

The Board may, upon application of any interested person or upon its own initiative, grant exemptions from the rules in R313-32 as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest. The Board will review requests for exemptions from training and experience requirements with the assistance of the Executive Secretary.

R313-32-20. ALARA Program.

(1) The licensee shall develop and implement a written radiation protection program that includes provisions for keeping doses ALARA.

(2) To satisfy the requirement of R313-32-20(1) one of the following shall be implemented:

(a) At a medical institution, management, the Radiation Safety Officer, and authorized users shall participate in the program as requested by the Radiation Safety Committee.

(b) For licensees that are not medical institutions, management and authorized users shall participate in the program as requested by the Radiation Safety Officer.

(3) The program shall include notice to workers of the program's existence and workers' responsibility to help keep dose equivalents ALARA, a review of summaries of the types and amounts of radioactive material used, occupational doses, changes in radiation safety procedures and safety measures, and continuing education and training for personnel who work with or in the vicinity of radioactive material. The purpose of the review is to ensure that licensees make a reasonable effort to maintain individual and collective occupational doses ALARA.

R313-32-21. Radiation Safety Officer.

(1) A licensee shall appoint a Radiation Safety Officer responsible for implementing the radiation safety program. The licensee, through the Radiation Safety Officer, shall ensure that radiation safety activities are being performed in accordance with approved procedures and regulatory requirements in the daily operation of the licensee's radioactive material program.

(2) The Radiation Safety Officer shall:

(a) investigate overexposures, accidents, spills, losses, thefts, unauthorized receipts, uses, transfers, disposals, misadministrations, and other deviations from approved radiation safety practices and implement corrective actions as necessary;

(b) establish, collect in one binder or file, and implement written policy and procedures for:

(i) authorizing the purchase of radioactive material;

(ii) receiving and opening packages of radioactive material;

(iii) storing radioactive material;

(iv) keeping an inventory record of radioactive material;

(v) using radioactive material safely;

(vi) taking emergency action if control of radioactive material is lost;

(vii) performing periodic radiation surveys;

(viii) performing checks of survey instruments and other safety equipment;

(ix) disposing of radioactive material;

(x) training personnel who work in or frequent areas where radioactive material is used or stored;

(xi) keeping a copy of all records and reports required by the Utah Radiation Control Rules, a copy of these rules, a copy of each licensing request, license and amendment, and written policy

and procedures required by the rules;

(c) brief management once a year on the radioactive material program;

(d) establish personnel exposure investigational levels that, when exceeded, will initiate an investigation by the Radiation Safety Officer of the cause of the exposure;

(e) establish personnel exposure investigational levels that, when exceeded, will initiate a prompt investigation by the Radiation Safety Officer of the cause of the exposure and a consideration of actions that might be taken to reduce the probability of recurrence;

(f) for medical use not at a medical institution, approve or disapprove radiation safety program changes with the advice and consent of management; and

(g) for medical use at a medical institution, assist the Radiation Safety Committee in the performance of its duties.

R313-32-22. Radiation Safety Committee.

The medical institution licensee shall establish a Radiation Safety Committee to oversee the use of radioactive material.

(1) The Committee shall meet the following administrative requirements:

(a) Membership shall consist of at least three individuals and shall include an authorized user of each type of use permitted by the license, the Radiation Safety Officer, a representative of the nursing service, and a representative of management who is neither an authorized user nor a Radiation Safety Officer. Other members may be included as the licensee deems appropriate.

(b) The Committee shall meet at least quarterly.

(c) To establish a quorum and to conduct business, at least one-half of the Committee's membership shall be present, including the Radiation Safety Officer and the management's representative.

(d) The minutes of each Radiation Safety Committee meeting shall include:

(i) the date of the meeting;

(ii) members present;

(iii) members absent;

(iv) summary of deliberations and discussions;

(v) recommended actions and the numerical results of all ballots; and

(vi) ALARA program reviews described in R313-32-20.

(e) The Committee shall promptly provide the members with copies of the meeting minutes, and retain one copy for the duration of the license.

(2) To oversee the use of licensed material, the Committee shall:

(a) review recommendations on ways to maintain individual and collective doses ALARA;

(b)(i) review, on the basis of safety and with regard to the training and experience standards in R313-32-900 through R313-32-981, and approve or disapprove any individual who is to be listed as an authorized user, an authorized nuclear pharmacist, the Radiation Safety Officer, or a Teletherapy Physicist before submitting a license application or request for amendment or renewal; or

(ii) review, pursuant to R313-32-13(2)(a) through (2)(d), on the basis of the board certification, the license, or the permit identifying an individual, and approve or disapprove any individual prior to allowing that individual to work as an authorized user or authorized nuclear pharmacist;

(c) review on the basis of safety, and approve with the advice and consent of the Radiation Safety Officer and the management representative, or disapprove minor changes in radiation safety procedures that are not potentially important to safety and are permitted under R313-32-31;

(d) review quarterly, with the assistance of the Radiation Safety Officer, a summary of the occupational radiation dose records of personnel working with radioactive material;

(e) review quarterly, with the assistance of the Radiation Safety Officer, incidents involving radioactive material with respect to cause and subsequent actions taken; and

(f) review annually, with the assistance of the Radiation Safety Officer, the radiation safety program.

R313-32-23. Statements of Authority and Responsibilities.

(1) A licensee shall provide the Radiation Safety Officer, and at a medical institution the Radiation Safety Committee, sufficient authority, organizational freedom, and management prerogative, to:

(a) identify radiation safety problems;

(b) initiate, recommend, or provide corrective actions; and

(c) verify implementation of corrective actions.

(2) A licensee shall establish and state in writing the authorities, duties, responsibilities, and radiation safety activities of the Radiation Safety Officer, and at a medical institution the Radiation Safety Committee, and retain the current edition of these statements as a record until the Executive Secretary terminates the license.

R313-32-25. Supervision.

(1) A licensee that permits the receipt, possession, use or transfer of radioactive material by an individual under the supervision of an authorized user as allowed by R313-32-11(2) shall:

(a) instruct the supervised individual in the principles of radiation safety appropriate to that individual's use of radioactive material and in the licensee's written quality management program;

(b) require the supervised individual to follow the instructions of the supervising authorized user,

follow the written radiation safety and quality management procedures established by the licensee, and comply with the Utah Radiation Control Rules and the license conditions with respect to the use of radioactive material; and

(c) periodically review the supervised individual's use of radioactive material and the records kept to reflect this use.

(2) A licensee that permits the preparation of radioactive material for medical use by an individual under the supervision of an authorized nuclear pharmacist or physician who is an authorized user, as allowed by R313-32- 11(3), shall:

(a) instruct the supervised individual in the preparation of radioactive material for medical use and the principles of and procedures for radiation safety and in the licensee's written quality management program, as appropriate to that individual's use of radioactive material;

(b) require the supervised individual to follow the instructions given pursuant to R313-32-25(2)(a) and to comply with these rules and license conditions; and

(c) require the supervising authorized nuclear pharmacist or physician who is an authorized user to periodically review the work of the supervised individual as it pertains to preparing radioactive material for medical use and the records kept to reflect that work.

(3) A licensee that supervises an individual is responsible for the acts and omissions of the supervised individual.

R313-32-29. Administrative Requirements that Apply to the Providers of Mobile Nuclear Medicine Service.

(1) The Executive Secretary will license mobile nuclear medicine service only in accordance with R313-32-100, R313-32-200, and R313-32-500.

(2) Mobile nuclear medicine service licensees shall obtain a letter signed by the management of each client for which services are rendered that authorizes use of radioactive material at the client's address of use. The mobile nuclear medicine service licensee shall retain the letter for three years after the last provision of service.

(3) If a mobile nuclear medicine service provides services that the client is also authorized to provide, the client is responsible for assuring that services are conducted in accordance with the rules while the mobile nuclear medicine service is under the client's direction.

(4) A mobile nuclear medicine service shall not order radioactive material to be delivered directly from the manufacturer or distributor to the client's address of use.

R313-32-31. Radiation Safety Program Changes.

(1) A licensee may make minor changes in radiation safety procedures that are not potentially important to safety, i.e., ministerial changes, that were described in the application for license, renewal, or amendment except for those changes in R313-32-13 and R313-32-606. A licensee is responsible for assuring that any change made is in compliance with the requirements of the rules and the license.

(2) A licensee shall retain a record of each change until the license has been renewed or terminated. The record shall include the effective date of the change, a copy of the old and new

radiation safety procedures, the reason for the change, a summary of radiation safety matters that were considered before making the change, the signature of the Radiation Safety Officer, and the signatures of the affected authorized users and of management or, in a medical institution, the Radiation Safety Committee's chairman and the management representative.

R313-32-32. Quality Management Program.

(1) The applicant or licensee shall establish and maintain a written quality management program to provide high confidence that radioactive material or radiation from radioactive material will be administered as directed by the authorized user. The quality management program shall include written policies and procedures to meet the following specific objectives:

(a) that, prior to administration, a written directive is prepared for:

(i) teletherapy radiation doses;

(ii) gamma stereotactic radiosurgery radiation doses;

(iii) brachytherapy radiation doses;

(iv) administration of quantities greater than 1.11 MBq (30 uCi) of either sodium iodide I-125 or I-131;

(v) therapeutic administration of a radiopharmaceutical, other than sodium iodide I-125 or I-131;

(b) that the following are exceptions to the written directive:

(i) if, because of the patient's condition, a delay in order to provide a written revision to an existing written directive would jeopardize the patient's health, an oral revision to an existing written directive will be acceptable, provided that the oral revision is documented immediately in the patient's record and a revised written directive is signed by the authorized user within 48 hours of the oral revision;

(ii) also, a written revision to an existing written directive may be made for a diagnostic or therapeutic procedure provided that the revision is dated and signed by an authorized user prior to the administration of the radiopharmaceutical dosage, the brachytherapy dose, the gamma stereotactic radiosurgery dose, the teletherapy dose, or the next teletherapy fractional dose; or

(iii) if, because of the emergent nature of the patient's condition, a delay in order to provide a written directive would jeopardize the patient's health, an oral directive will be acceptable, provided that the information contained in the oral directive is documented immediately in the patient's record and a written directive is prepared within 24 hours of the oral directive;

(c) that, prior to each administration, the patient's or human research subject's identity is verified by more than one method as the individual named in the written directive;

(d) that final plans of treatment and related calculations for brachytherapy, teletherapy, and gamma stereotactic radiosurgery are in accordance with the respective written directives;

(e) that each administration is in accordance with the written directive; and

(f) that each unintended deviation from the written directive is identified and evaluated, and

appropriate action is taken.

(2) The licensee shall:

(a) develop procedures for and conduct a review of the quality management program including, since the last review, an evaluation of:

(i) a representative sample of patient and human research subject administrations,

(ii) all recordable events, and

(iii) all misadministrations to verify compliance with each aspect of the quality management program; these reviews shall be conducted at intervals no greater than 12 months;

(b) evaluate these reviews to determine the effectiveness of the quality management program and, if required, make modifications to meet the objectives of R313-32-32(1); and

(c) retain records of the review, including the evaluations and findings of the review, in an auditable form for three years.

(3) The licensee shall evaluate and respond, within 30 days after discovery of the recordable event, to each recordable event by:

(a) assembling the relevant facts including the cause;

(b) identifying what, if applicable, corrective action is required to prevent recurrence; and

(c) retaining a record, in an auditable form, for three years, of the relevant facts and what corrective action, if applicable, was taken.

(4) The licensee shall retain:

(a) a written directive; and

(b) a record of each administered radiation dose or radiopharmaceutical dosage where a written directive is required in R313-32-32(1)(a), in an auditable form, for three years after the date of administration.

(5) The licensee may make modifications to the quality management program to increase the program's efficiency provided the program's effectiveness is not decreased. The licensee shall furnish the modification to the Executive Secretary within 30 days after the modification has been made.

(6)(a) Applicants for a new license, as applicable, shall submit to the Executive Secretary in accordance with R313-12-110 a quality management program as part of the application for a license and implement the program upon issuance of the license by the Executive Secretary.

(b) Existing licensees, as applicable, shall submit to the Executive Secretary in accordance with R313-12-110, prior to March 1, 1995, a written certification that the quality management program has been implemented along with a copy of the program.

R313-32-33. Notifications, Reports and Records of Misadministrations.

(1) For a misadministration:

(a) the licensee shall notify the Executive Secretary by telephone no later than the next calendar day after discovery of the misadministration.

(b) the licensee shall submit a written report to the Executive Secretary within 15 days after discovery of the misadministration. The written report shall include the licensee's name; the prescribing physician's name; a brief description of the event; why the event occurred; the effect on the individual who received the misadministration; what improvements are needed to prevent recurrence; actions taken to prevent recurrence; whether the licensee notified the individual (or the individual's responsible relative or guardian), and if not, why not; and if there was notification, what information was provided. The report must not include the individual's name or any other information that could lead to identification of the individual. To meet the requirements of R313-32-33, the notification of the individual receiving the misadministration may be made instead to that individual's responsible relative or guardian, when appropriate.

(c) the licensee shall notify the referring physician and also notify the individual receiving the misadministration of the misadministration no later than 24 hours after its discovery, unless the referring physician personally informs the licensee either that he will inform the individual or that, based on medical judgment, telling the individual would be harmful. The licensee is not required to notify the individual without first consulting the referring physician. If the referring physician or the individual receiving the misadministration cannot be reached within 24 hours, the licensee shall notify the individual as soon as possible thereafter. The licensee may not delay any appropriate medical care for the individual, including any necessary remedial care as a result of the misadministration, because of any delay in notification.

(d) if the individual was notified, the licensee shall also furnish, within 15 days after discovery of the misadministration, a written report to the individual by sending either:

(i) a copy of the report that was submitted to the Executive Secretary; or

(ii) a brief description of both the event and the consequences as they may affect the individual, provided a statement is included that the report submitted to the Executive Secretary can be obtained from the licensee.

(2) The licensee shall retain a record of each misadministration for five years. The record shall contain the names of all individuals involved (including the prescribing physician, allied health personnel, the individual who received the misadministration, and that individual's referring physician, if applicable), the individual's social security number or other identification number if one has been assigned, a brief description of the misadministration, why it occurred, the effect on the individual, improvements needed to prevent recurrence, and the actions taken to prevent recurrence.

(3) Aside from the notification requirement, nothing in R313-32-33 affects any rights or duties of licensees and physicians in relation to each other, to individuals receiving misadministrations, or to that individual's responsible relative or guardian.

R313-32-49. Suppliers for Sealed Sources or Devices for Medical Use.

A licensee may use for medical use only:

(1) Sealed sources or devices manufactured, labeled, packaged, and distributed in accordance with a license issued pursuant to the rules in R313-22 and R313-22-75(10) or the equivalent

requirements of the Nuclear Regulatory Commission or an Agreement State; or

(2) Teletherapy sources manufactured and distributed in accordance with a license issued pursuant to R313-22 or the equivalent requirements of the Nuclear Regulatory Commission or an Agreement State.

R313-32-50. Possession, Use, Calibration, and Check of Dose Calibrators.

(1) A licensee shall possess and use a dose calibrator to measure the activity of dosages of photon- emitting radionuclides prior to administration to each patient or human research subject.

(2) A licensee shall:

(a) check each dose calibrator for constancy with a dedicated check source at the beginning of each day of use. To satisfy this requirement, the check shall be done on a frequently used setting with a sealed source of not less than 370 kBq (ten uCi) of radium-226 or 1.85 MBq (50 uCi) for a photon-emitting radionuclide;

(b) test each dose calibrator for accuracy upon installation and at least annually thereafter by assaying at least two sealed sources containing different radionuclides whose activity the manufacturer has determined within five percent of its stated activity, whose activity is at least 370 kBq (ten uCi) for radium-226 and 1.85 MBq (50 uCi) for a photon-emitting radionuclide, and at least one of which has a principal photon energy between 100 keV and 500 keV;

(c) test each dose calibrator for linearity upon installation and at least quarterly thereafter over a range from the highest dosage that will be administered to a patient or human research subject to 1.1 MBq (30 uCi); and

(d) test each dose calibrator for geometry dependence upon installation over the range of volumes and volume configurations for which it will be used. The licensee shall keep a record of this test for the duration of the use of the dose calibrator.

(3) A licensee shall also perform appropriate checks and tests required by R313-32-50 following adjustment or repair of the dose calibrator.

(4) A licensee shall mathematically correct dosage readings for geometry or linearity errors that exceed ten percent if the dosage is greater than 370 kBq (ten uCi) and shall repair or replace the dose calibrator if the accuracy or constancy error exceeds ten percent.

(5) A licensee shall retain a record of each check and test required by R313-32-50 for three years unless directed otherwise. The records required in R313-32-50(2)(a) through (2)(d) shall include:

(a) for R313-32-50(2)(a), the model and serial number of the dose calibrator, the identity of the radionuclide contained in the check source, the date of the check, the activity measured, and the initials of the individual who performed the check;

(b) for R313-32-50(2)(b), the model and serial number of the dose calibrator, the model and serial number of each source used, the identity of the radionuclide contained in the source and its activity, the date of the test, the results of the test, and the identity of the individual performing the test;

(c) for R313-32-50(2)(c), the model and serial number of the dose calibrator, the calculated activities, the measured activities, the date of the test, and the identity of the individual

performing the test; and

(d) for R313-32-50(2)(d), the model and serial number of the dose calibrator, the configuration of the source measured, the activity measured for each volume measured, the date of the test, and the identity of the individual performing the test.

R313-32-51. Calibration and Check of Survey Instruments.

(1) A licensee shall calibrate the survey instruments used to show compliance with R313-32 before first use, annually, and following repair. The licensee shall:

(a) calibrate all scales with readings up to ten mSv (1000 mrem) per hour with a radiation source;

(b) calibrate two separated readings on each scale that shall be calibrated. The readings shall be separated by 50 percent of the scale reading; and

(c) conspicuously note on the instrument the apparent exposure rate from a dedicated check source as determined at the time of calibration, and the date of calibration.

(2) When calibrating a survey instrument, the licensee shall consider a point as calibrated if the indicated exposure rate differs from the calculated exposure rate by not more than 20 percent, and shall conspicuously attach a correction chart or graph to the instrument.

(3) A licensee shall check each survey instrument for proper operation with the dedicated check source each day of use. A licensee is not required to keep records of these checks.

(4) A licensee shall retain a record of each survey instrument calibration for three years. The record shall include:

(a) a description of the calibration procedure; and

(b) the date of the calibration, a description of the source used and the certified exposure rates from the source, and the rates indicated by the instrument being calibrated, the correction factors deduced from the calibration data, and the signature of the individual who performed the calibration.

R313-32-52. Possession, Use, Calibration, and Check of Instruments to Measure Dosages or Alpha- or Beta-emitting Radionuclides.

(1) R313-32-52 does not apply to unit dosages of alpha- or beta-emitting radionuclides that are obtained from a manufacturer or preparer licensed pursuant to R313-22-75(9) or equivalent requirements of the Nuclear Regulatory Commission or an Agreement State.

(2) For other than unit dosages obtained pursuant to R313-32-52(1), a licensee shall possess and use instrumentation to measure the radioactivity of alpha- or beta-emitting radionuclides. The licensee shall have procedures for use of the instrumentation. The licensee shall measure, by direct measurement or by combination of measurements and calculations, the amount of radioactivity in dosages of alpha- or beta-emitting radionuclides prior to administration to each patient or human research subject. In addition, the licensee shall:

(a) perform tests before initial use, periodically, and following repair, on each instrument for accuracy, linearity, and geometry dependence, as appropriate for the use of the instrument; and

make adjustments when necessary; and

(b) check each instrument for constancy and proper operation at the beginning of each day of use.

R313-32-53. Measurement of Dosages of Unsealed Radioactive Material for Medical Use.

A licensee shall:

(1) measure the activity of each dosage of a photon-emitting radionuclide prior to medical use;

(2) measure, by direct measurement or by combination of measurements and calculations, the activity of each dosage of an alpha- or beta-emitting radionuclide prior to medical use, except for unit dosages obtained from a manufacturer or preparer licensed pursuant to R313-22-75(9) or equivalent requirements of the Nuclear Regulatory Commission or an Agreement State; and

(3) retain a record of the measurements required by R313-32-53 for three years. To satisfy this requirement, the record shall contain the following:

(a) generic name, trade name, or abbreviation of the radiopharmaceutical, its lot number, and expiration dates and the radionuclide;

(b) patient's or human research subject's name, and identification number if one has been assigned;

(c) prescribed dosage and activity of the dosage at the time of measurement, or a notation that the total activity is less than 1.1 MBq (30 uCi);

(d) date and time of the measurement; and

(e) initials of the individual who made the record.

R313-32-57. Authorization for Calibration and Reference Sources.

Persons authorized by R313-32-11 for medical use of radioactive material may receive, possess, and use the following radioactive material for check, calibration, and reference use:

(1) sealed sources manufactured and distributed by a person licensed pursuant to R313-22-75 (10) or equivalent Nuclear Regulatory Commission or Agreement State regulations and that do not exceed 555 MBq (15 mCi) each;

(2) radioactive material listed in R313-32-100 or R313-32-200 with a half-life not longer than 100 days in individual amounts not to exceed 555 MBq (15 mCi);

(3) radioactive material listed in R313-32-100 or R313-32-200 with a half-life longer than 100 days in individual amounts not to exceed 7.4 MBq (200 uCi); and

(4) technetium-99m in individual amounts not to exceed 1.85 GBq (50 mCi).

R313-32-59. Requirements for Possession of Sealed Sources and Brachytherapy Sources.

(1) A licensee in possession of sealed sources or brachytherapy sources shall follow the radiation safety and handling instructions supplied by the manufacturer, and shall maintain the instructions for the duration of source use in a legible form convenient to users.

(2) A licensee in possession of a sealed source shall:

(a) test the source for leakage before its first use unless the licensee has a certificate from the supplier indicating that the source was tested within six months before transfer to the licensee; and

(b) test the source for leakage at intervals not to exceed six months or at other intervals approved by the Executive Secretary, the Nuclear Regulatory Commission or an Agreement State and described in the label or brochure that accompanies the source.

(3) To satisfy the leak test requirements of R313-32-59, the licensee must:

(a) take a wipe sample from the sealed source or from the surfaces of the device in which the sealed source is mounted or stored on which radioactive contamination might be expected to accumulate or wash the source in a small volume of detergent solution and treat the entire volume as the sample;

(b) take teletherapy and other device source test samples when the source is in the "off" position; and

(c) measure the sample so that the leakage test can detect the presence of 185 Bq (0.005 uCi) of radioactive material on the sample.

(4) A licensee shall retain leakage test records for five years. The records shall contain the model number, the serial number if assigned, of each source tested, the identity of each source radionuclide and its estimated activity, the measured activity of each test sample expressed in becquerels or microcuries, a description of the method used to measure each test sample, the date of the test, and the signature of the Radiation Safety Officer.

(5) If the leakage test reveals the presence of 185 Bq (0.005 uCi) or more of removable contamination, the licensee shall:

(a) immediately withdraw the sealed source from use and store it in accordance with the requirements in R313-15; and

(b) file a report within five days of the leakage test with the Executive Secretary describing the equipment involved, the test results, and the action taken.

(6) A licensee need not perform a leakage test on the following sources:

(a) sources containing only radioactive material with a half-life of less than 30 days;

(b) sources containing only radioactive material as a gas;

(c) sources containing 3.7 MBq (100 uCi) or less of beta or gamma-emitting material or 370 kBq (ten uCi) or less of alpha-emitting material;

(d) sources stored and not being used. The licensee shall, however, test each source for leakage

before use or transfer unless it has been leakage-tested within six months before the date of use or transfer; and

(e) seeds of iridium-192 encased in nylon ribbon.

(7) A licensee in possession of a sealed source or brachytherapy source shall conduct a quarterly physical inventory of all sources in its possession. The licensee shall retain inventory records for five years. The inventory records shall contain the model number of each source, and serial number if one has been assigned, the identity of each source radionuclide and its nominal activity, the location of each source, and the signature of the Radiation Safety Officer.

(8) A licensee in possession of a sealed source or brachytherapy source shall measure the ambient dose rates quarterly in all areas where sources are stored. This does not apply to teletherapy sources in teletherapy units or sealed sources in diagnostic devices.

(9) A licensee shall retain a record of each survey required in R313-32-59(8) for three years. The record shall include the date of the survey, a plan of each area that was surveyed, the measured dose rate at several points in each area expressed in microsieverts or millirem per hour, the survey instrument used, and the signature of the Radiation Safety Officer.

R313-32-60. Syringe Shields and Labels.

(1) A licensee shall keep syringes that contain radioactive material to be administered in a radiation shield.

(2) To identify its contents, a licensee shall conspicuously label each syringe or syringe radiation shield that contains a syringe with a radiopharmaceutical. The label shall show the radiopharmaceutical name or its abbreviation, the clinical procedure to be performed, or the patient's or the human research subject's name.

(3) A licensee shall require each individual who prepares a radiopharmaceutical kit to use a syringe radiation shield when preparing the kit and shall require each individual to use a syringe radiation shield when administering a radiopharmaceutical by injection unless the use of the shield is contraindicated for that patient or human research subject.

R313-32-61. Vial Shields and Labels.

(1) A licensee shall require each individual preparing or handling a vial that contains a radiopharmaceutical to keep the vial in a vial radiation shield.

(2) To identify its contents, a licensee shall conspicuously label each vial radiation shield that contains a vial of a radiopharmaceutical. The label shall show the radiopharmaceutical name or its abbreviation.

R313-32-70. Surveys for Contamination and Ambient Radiation Exposure Rate.

(1) A licensee shall survey with a radiation detection survey instrument at the end of each day of use all areas where radiopharmaceuticals are routinely prepared for use or administered.

(2) A licensee shall survey with a radiation detection survey instrument at least once each week all areas where radiopharmaceuticals or radiopharmaceutical waste is stored.

(3) A licensee shall conduct the surveys required by R313-32-70(1) and (2) so as to be able to

detect dose rates as low as one uSv (0.1 mrem) per hour.

(4) A licensee shall establish radiation dose rate trigger levels for the surveys required by R313-32-70(1) and (2). A licensee shall require that the individual performing the survey immediately notify the Radiation Safety Officer if a dose rate exceeds a trigger level.

(5) A licensee shall survey for removable contamination once each week all areas where radiopharmaceuticals are routinely prepared for use, administered, or stored.

(6) A licensee shall conduct the survey required by R313-32-70(5) so as to be able to detect contamination on each wipe sample of 2200 disintegrations per minute, (0.001 uCi or 37 Bq).

(7) A licensee shall establish removable contamination trigger levels for the surveys required by R313-32-70(5). A licensee shall require that the individual performing the survey immediately notify the Radiation Safety Officer if contamination exceeds the trigger level.

(8) A licensee shall retain a record of each survey for three years. The record shall include the date of the survey, a plan of each area surveyed, the trigger level established for each area, the detected dose rate at several points in each area expressed in microsieverts or millirem per hour or the removable contamination in each area expressed in disintegrations per minute (becquerels or curies) per 100 square centimeters, the instrument used to make the survey or analyze the samples, and the initials of the individual who performed the survey.

R313-32-75. Release of Individuals Containing Radiopharmaceuticals or Permanent Implants.

(1) The licensee may authorize the release from its control of any individual who has been administered radiopharmaceuticals or permanent implants containing radioactive material if the total effective dose equivalent to any other individual from exposure to the released individual is not likely to exceed 5 mSv (0.5 rem).

NOTE: The Nuclear Regulatory Commission Regulatory Guide 8.39, "Release of Patients Administered Radioactive Materials," describes methods for calculating doses to other individuals and contains tables of activities not likely to cause doses exceeding 5 mSv (0.5 rem).

(2) The licensee shall provide the released individual with instructions, including written instructions, on actions recommended to maintain doses to other individuals as low as is reasonably achievable if the total effective dose equivalent to any other individual is likely to exceed 1 mSv (0.1 rem). If the dose to a breast-feeding infant or child could exceed 1 mSv (0.1 rem) assuming there were no interruption of breast-feeding, the instructions shall also include:

(a) guidance on the interruption or discontinuation of breast-feeding, and

(b) information on the consequences of failure to follow the guidance.

(3) The licensee shall maintain a record of the basis for authorizing the release of an individual, for three years after the date of release, if the total effective dose equivalent is calculated by:

(a) using the retained activity rather than the activity administered,

(b) using an occupancy factor less than 0.25 at 1 meter,

(c) using the biological or effective half-life, or

(d) considering the shielding by tissue.

(4) The licensee shall maintain a record, for three years after the date of release, that instructions were provided to a breast-feeding woman if the radiation dose to the infant or child from continued breast- feeding could result in a total effective dose equivalent exceeding 5 mSv (0.5 rem).

R313-32-80. Technical Requirements that Apply to the Providers of Mobile Nuclear Medicine Service.

A licensee providing mobile nuclear medicine service shall:

(1) transport to each address of use only syringes or vials containing prepared radiopharmaceuticals or radiopharmaceuticals that are intended for reconstitution of radiopharmaceutical kits;

(2) bring into each address of use all radioactive material to be used and, before leaving, remove all unused radioactive material and all associated waste;

(3) secure or keep under constant surveillance and immediate control all radioactive material when in transit or at an address of use;

(4) check survey instruments and dose calibrators as described in R313-32-50 and R313-32-51 and check all other transported equipment for proper function before medical use at each address of use;

(5) carry a radiation detection survey meter in each vehicle that is being used to transport radioactive material, and, before leaving a client address of use, survey all radiopharmaceutical areas of use with a radiation detection survey meter to ensure that all radiopharmaceuticals and all associated waste have been removed; and

(6) retain a record of each survey required in R313-32-80(5) for three years. The record shall include the date of the survey, a plan of each area that was surveyed, the measured dose rate at several points in each area of use expressed in microsieverts or millirems per hour, the instrument used to make the survey, and the initials of the individual who performed the survey.

R313-32-90. Storage of Volatiles and Gases.

A licensee shall store volatile radiopharmaceuticals and radioactive gases in the shipper's radiation shield and container. A licensee shall store a multi-dose container in a fume hood after drawing the first dosage from it.

R313-32-92. Decay-In-Storage.

(1) A licensee may hold radioactive material with a physical half-life of less than 65 days for decay-in-storage before disposal in ordinary trash and is exempt from the requirements of R313-15-1001 if it:

(a) holds radioactive material for decay a minimum of ten half-lives;

(b) monitors radioactive material at the container surface before disposal as ordinary trash and determines that its radioactivity cannot be distinguished from the background radiation level with a radiation detection survey meter set on its most sensitive scale and with no interposed

shielding;

(c) removes or obliterates all radiation labels; and

(d) separates and monitors each generator column individually with radiation shielding removed to ensure that it has decayed to background radiation level before disposal.

(2) A licensee shall retain a record of each disposal permitted under R313-32-92(1) for three years. The record shall include the date of the disposal, the date on which the radioactive material was placed in storage, the radionuclides disposed, the survey instrument used, the background dose rate, the dose rate measured at the surface of each waste container, and the name of the individual who performed the disposal.

R313-32-100. Use of Unsealed Radioactive Material for Uptake, Dilution, and Excretion Studies.

A licensee may use for uptake, dilution, or excretion studies any unsealed radioactive material prepared for medical use that is either:

(1) obtained from a manufacturer or preparer licensed pursuant to R313-22-75(9) or equivalent requirements of the Nuclear Regulatory Commission or an Agreement State; or

(2) prepared by an authorized nuclear pharmacist, a physician who is an authorized user and who meets the requirements specified in R313-32-920, or an individual under the supervision of either as specified in R313-32-25.

R313-32-120. Possession of Survey Instrument.

A licensee authorized to use radioactive material for uptake, dilution, and excretion studies shall have in its possession a portable radiation detection survey instrument capable of detecting dose rates over the range one uSv (0.1 mrem) per hour to one mSv (100 mrem) per hour.

R313-32-200. Use of Unsealed Radioactive Material for Imaging and Localization Studies.

A licensee may use for imaging and localization studies any unsealed radioactive material prepared for medical use that is either:

(1) obtained from a manufacturer or preparer licensed pursuant to R313-22-75(9) or equivalent requirements of the Nuclear Regulatory Commission or an Agreement State; or

(2) prepared by an authorized nuclear pharmacist, a physician who is an authorized user and who meets the requirements specified in R313-32-920, or an individual under the supervision of either as specified in R313-32-25.

R313-32-204. Permissible Molybdenum-99 Concentration.

(1) A licensee shall not administer to humans a radiopharmaceutical containing more than 5.55 kBq (0.15 uCi) of molybdenum-99 per 37.0 MBq (one mCi) of technetium-99m.

(2) A licensee that uses molybdenum-99/technetium-99m generators for preparing a technetium-99m radiopharmaceutical shall measure the molybdenum-99 concentration in each elute or

extract.

(3) A licensee that is required to measure molybdenum concentration shall retain a record of each measurement for three years. The record shall include, for each elution or extraction of technetium-99m, the measured activity of the technetium expressed in megabecquerels or millicuries, the measured activity of the molybdenum expressed in kilobecquerels or microcuries, the ratio of the measures expressed as kilobecquerels or microcuries of molybdenum per megabecquerels or millicuries of technetium, the time and date of the measurement, and the initials of the individual who made the measurement.

R313-32-205. Control of Aerosols and Gases.

(1) A licensee that administers radioactive aerosols or gases shall do so in a room with a system that will keep airborne concentrations within the limits prescribed in R313-15-201(4) and R313-15-301. The system shall either be directly vented to the atmosphere through an air exhaust or provide for collection and decay or disposal of the aerosol or gas in a shielded container.

(2) A licensee shall administer radioactive gases in rooms that are at negative pressure compared to surrounding rooms.

(3) Before receiving, using, or storing a radioactive gas, the licensee shall calculate the amount of time needed after a spill to reduce the concentration in the room to the occupational limit as specified in R313-15-201. The calculation shall be based on the highest activity of gas handled in a single container, the air volume of the room, and the measured available air exhaust rate.

(4) A licensee shall make a record of the calculations required in R313-32-205(3) that includes the assumptions, measurements, and calculations made and shall retain the record for the duration of use of the area. A licensee shall also post the calculated time and safety measures to be instituted in case of a spill at the area of use.

(5) A licensee shall check the operation of reusable collection systems each month, and measure the ventilation rates available in areas of radioactive gas use each six months. Records of the measurement shall be kept for three years.

R313-32-220. Possession of Survey Instruments.

A licensee authorized to use radioactive material for imaging and localization studies shall have in its possession a portable radiation detection survey instrument capable of detecting dose rates over the range of one uSv (0.1 mrem) per hour to one mSv (100 mrem) per hour, and a portable radiation measurement survey instrument capable of measuring dose rates over the range ten uSv (one mrem) per hour to ten mSv (1000 mrem) per hour.

R313-32-300. Use of Unsealed Radioactive Material for Therapeutic Administration.

A licensee may use for therapeutic administration any unsealed radioactive material prepared for medical use that is either:

(1) obtained from a manufacturer or preparer licensed pursuant to R313-22-75(9) or equivalent requirements of the Nuclear Regulatory Commission or an Agreement State; or

(2) prepared by an authorized nuclear pharmacist, a physician who is an authorized user and who meets the requirements specified in R313-32-920, or an individual under the supervision of either as specified in R313-32-25.

R313-32-310. Safety Instruction.

(1) A licensee shall provide radiation safety instruction for all personnel caring for the patient or the human research subject receiving radiopharmaceutical therapy and hospitalized for compliance with R313-32-75. To satisfy this requirement, the instruction shall describe the licensee's procedures for:

(a) patient or human research subject control;

(b) visitor control;

(c) contamination control;

(d) waste control; and

(e) notification of the Radiation Safety Officer in case of the patient's or the human research subjects's death or medical emergency.

(2) A licensee shall keep for three years a list of individuals receiving instruction required by R313-32-310(1), a description of the instruction, the date of instruction, and the name of the individual who gave the instruction.

R313-32-315. Safety Precautions.

(1) For each patient or human research subject receiving radiopharmaceutical therapy and hospitalized for compliance with R313-32-75, a licensee shall:

(a) provide a private room with a private sanitary facility;

(b) post the patient's or the human research subject's door with a "Radioactive Materials" sign and note on the door or in the patient's or the human research subject's chart where and how long visitors may stay in the patient's or the human research subject's room;

(c) authorize visits by individuals under age 18 only on a case-by-case basis with the approval of the authorized user after consultation with the Radiation Safety Officer;

(d) promptly after administration of the dosage, measure the dose rates in contiguous restricted and unrestricted areas with a radiation measurement survey instrument to demonstrate compliance with the requirements of R313- 15, and retain for three years a record of each survey that includes the time and date of the survey, a plan of the area or list of points surveyed, the measured dose rate at several points expressed in microsieverts or millirem per hour, the instrument used to make the survey, and the initials of the individual who made the survey;

(e) either monitor material and items removed from the patient's or the human research subject's room to determine that their radioactivity cannot be distinguished from the natural background radiation level with a radiation detection survey instrument set on its most sensitive scale and with no interposed shielding, or handle them as radioactive waste;

(f) survey the patient's or the human research subject's room and private sanitary facility for removable contamination with a radiation detection survey instrument before assigning another patient or human research subject to the room. The room shall not be reassigned until removable contamination is less than 200 disintegrations per minute per 100 square centimeters; and

(g) measure the thyroid burden of each individual who helped prepare or administer a dosage of iodine-131 within three days after administering the dosage, and retain for the period required by R313-15-1107 a record of each thyroid burden measurement, its date, the name of the individual whose thyroid burden was measured, and the initials of the individual who made the measurements.

(2) A licensee shall notify the Radiation Safety Officer immediately if the patient or the human research subject dies or has a medical emergency.

R313-32-320. Possession of Survey Instruments.

A licensee authorized to use radioactive material for radiopharmaceutical therapy shall have in its possession a portable radiation detection survey instrument capable of detecting dose rates over the range one uSv (0.1 mrem) per hour to one mSv (100 mrem) per hour, and a portable radiation measurement survey instrument capable of measuring dose rates over the range ten uSv (one mrem) per hour to ten mSv (1000 mrem) per hour.

R313-32-400. Use of Sources for Brachytherapy.

A licensee shall use the following sources in accordance with the manufacturer's radiation safety and handling instructions:

(1) Cesium-137 as a sealed source in needles and applicator cells for topical, interstitial, and intracavitary treatment of cancer;

(2) Cobalt-60 as a sealed source in needles and applicator cells for topical, interstitial, and intracavitary treatment of cancer;

(3) Gold-198 as a sealed source in seeds for interstitial treatment of cancer;

(4) Iridium-192 as seeds encased in nylon ribbon for interstitial and intracavitary treatment of cancer and as seeds for topical treatment of cancer;

(5) Strontium-90 as a sealed source in an applicator for treatment of superficial eye conditions;

(6) Iodine-125 as a sealed source in seeds for topical, interstitial and intracavitary treatment of cancer;

(7) Palladium-103 as a sealed source in seeds for interstitial treatment of cancer.

R313-32-404. Release of Patients or Human Research Subjects Treated With Temporary Implants.

(1) Immediately after removing the last temporary implant source from a patient or a human research subject, the licensee shall make a radiation survey of the patient or the human research subject with a radiation detection survey instrument to confirm that all sources have been removed. The licensee shall not release from confinement for medical care a patient or a human research subject treated by temporary implant until all sources have been removed.

(2) A licensee shall retain a record of patient or human research subject surveys for three years. Each record shall include the date of the survey, the name of the patient or the human research subject, the dose rate from the patient or the human research subject expressed as microsieverts per hour or millirem per hour and measured at one meter from the patient or the human research

subject, the survey instrument used, and the initials of the individual who made the survey.

R313-32-406. Brachytherapy Sources Inventory.

(1) Promptly after removing them from a patient or a human research subject, a licensee shall return brachytherapy sources to the storage area, and count the number returned to ensure that all sources taken from the storage area have been returned.

(2) A licensee shall make a record of brachytherapy source use which shall include:

(a) the names of the individuals permitted to handle the sources;

(b) the number and activity of sources removed from storage, the patient's or the human research subject's name and room number, the time and date they were removed from storage, the number and activity of the sources in storage after the removal, and the initials of the individual who removed the sources from storage; and

(c) the number and activity of sources returned to storage, the patient's or the human research subject's name and room number, the time and date they were returned to storage, the number and activity of sources in storage after the return, and the initials of the individual who returned the sources to storage.

(3) Immediately after implanting sources in a patient or a human research subject the licensee shall make a radiation survey of the patient or the human research subject and the area of use to confirm that no sources have been misplaced. The licensee shall make a record of each survey.

(4) A licensee shall retain the records required in R313-32-406(2) and (3) for three years.

R313-32-410. Safety Instruction.

(1) The licensee shall provide radiation safety instruction to all personnel caring for the patient or the human research subject undergoing implant therapy. To satisfy this requirement, the instruction shall describe:

(a) size and appearance of the brachytherapy sources;

(b) safe handling and shielding instructions in case of a dislodged source;

(c) procedures for patient or human research subject control;

(d) procedures for visitor control; and

(e) procedures for notification of the Radiation Safety Officer if the patient or the human research subject dies or has a medical emergency.

(2) A licensee shall retain for three years a record of individuals receiving instruction required by R313-32-410(1), a description of the instruction, the date of instruction, and the name of the individual who gave the instruction.

R313-32-415. Safety Precautions.

(1) For each patient or human research subject receiving implant therapy and not released from

licensee control pursuant to R313-32-75, a licensee shall:

(a) not quarter the patient or the human research subject in the same room with an individual who is not receiving radiation therapy;

(b) post the patient's or human research subject's door with a "Radioactive Materials" sign and note on the door or in the patient's or human research subject's chart where and how long visitors may stay in the patient's or human research subject's room;

(c) authorize visits by individuals under age 18 only on a case-by-case basis with the approval of the authorized user after consultation with the Radiation Safety Officer;

(d) promptly after implanting the material, survey the dose rates in contiguous restricted and unrestricted areas with a radiation measurement survey instrument to demonstrate compliance with the requirements of R313- 15, and retain for three years a record of each survey that includes the time and date of the survey, a plan of the area or list of points surveyed, the measured dose rate at several points expressed in microsieverts or millirem per hour, the instrument used to make the survey, and the initials of the individual who made the survey; and

(e) provide the patient or the human research subject with radiation safety guidance that will help to keep radiation dose to household members and the public as low as reasonably achievable before releasing the individual if the individual was administered a permanent implant.

(2) A licensee shall notify the Radiation Safety Officer immediately if the patient or the human research subject dies or has a medical emergency.

R313-32-420. Possession of Survey Instrument.

A licensee authorized to use radioactive material for implant therapy shall have in its possession a portable radiation detection survey instrument capable of detecting dose rates over the range one uSv (0.1 mrem) per hour to one mSv (100 mrem) per hour, and a portable radiation measurement survey instrument capable of measuring dose rates over the range ten uSv (one mrem) per hour to ten mSv (1000 mrem) per hour.

R313-32-500. Use of Sealed Sources for Diagnosis.

A licensee shall use the following sealed sources in accordance with the manufacturer's radiation safety and handling instructions:

(1) iodine-125, americium-241, or gadolinium-153 as a sealed source in a device for bone mineral analysis; and

(2) iodine-125 as a sealed source in a portable imaging device.

R313-32-520. Availability of Survey Instrument.

A licensee authorized to use radioactive material as a sealed source for diagnostic purposes shall have available for use a portable radiation detection survey instrument capable of detecting dose rates over the range one uSv (0.1 mrem) per hour to one mSv per hour to (100 mrem) per hour or a portable radiation measurement survey instrument capable of measuring dose rates over the range ten uSv (one mrem) per hour to ten mSv (1000 mrem) per hour. The instrument shall be calibrated in accordance with R313-32-51.

R313-32-600. Use of a Sealed Source in a Teletherapy Unit.

The rules and provisions of R313-32-600 through R313-32-647 govern the use of teletherapy units for medical use that contain a sealed source of cobalt-60 or cesium-137.

R313-32-605. Maintenance and Repair Restrictions.

Only a person specifically licensed by the Executive Secretary, the Nuclear Regulatory Commission, or an Agreement State to perform teletherapy unit maintenance and repair shall:

(1) install, relocate, or remove a teletherapy sealed source or a teletherapy unit that contains a sealed source; or

(2) maintain, adjust, or repair the source drawer, the shutter or other mechanism of a teletherapy unit that could expose the source, reduce the shielding around the source, or result in increased radiation levels.

R313-32-606. License Amendments.

In addition to the changes specified in R313-32-13, a licensee shall apply for and shall receive a license amendment before:

(1) making any change in the treatment room shielding;

(2) making any change in the location of the teletherapy unit within the treatment room;

(3) using the teletherapy unit in a manner that could result in increased radiation levels in areas outside the teletherapy treatment room;

(4) relocating the teletherapy unit; or

(5) allowing an individual not listed on the licensee's license to perform the duties of the teletherapy physicist.

R313-32-610. Safety Instruction.

(1) A licensee shall post instructions at the teletherapy unit console. To satisfy this requirement, these instructions shall inform the operator of:

(a) the procedure to be followed to ensure that only the patient or the human research subject is in the treatment room before turning the primary beam of radiation on to begin a treatment or after a door interlock interruption; and

(b) the procedure to be followed if:

(i) the operator is unable to turn the primary beam of radiation off with controls outside the treatment room or any other abnormal operation occurs; and

(ii) the names and telephone numbers of the authorized users and Radiation Safety Officer to be immediately contacted if the teletherapy unit or console operates abnormally.

(2) A licensee shall provide instruction in the topics identified in R313-32-610(1) to individuals

who operate a teletherapy unit.

(3) A licensee shall retain for three years a record of individuals receiving instruction required by R313-32-610(2), a description of the instruction, the date of instruction, and the name of the individual who gave the instruction.

R313-32-615. Safety Precautions.

(1) A licensee shall control access to the teletherapy room by a door at each entrance.

(2) A licensee shall equip each entrance to the teletherapy room with an electrical interlock system that will:

(a) prevent the operator from turning the primary beam of radiation on unless each treatment room entrance door is closed;

(b) turn the primary beam of radiation off immediately when an entrance door is opened; and

(c) prevent the primary beam of radiation from being turned on following an interlock interruption until all treatment room entrance doors are closed and the beam on-off control is reset at the console.

(3) A licensee shall equip each entrance to the teletherapy room with a beam condition indicator light.

(4) A licensee shall install in each teletherapy room a permanent radiation monitor capable of continuously monitoring beam status.

(a) A radiation monitor shall provide visible notice of a teletherapy unit malfunction that results in an exposed or partially exposed source, and shall be observable by an individual entering the teletherapy room.

(b) A radiation monitor shall be equipped with a backup power supply separate from the power supply to the teletherapy unit. This backup power supply may be a battery system.

(c) A radiation monitor shall be checked with a dedicated check source for proper operation each day before the teletherapy unit is used for treatment of patients or human research subjects.

(d) A licensee shall maintain a record of the check required by R313-32-615(4)(c) for three years. The record shall include the date of the check, notation that the monitor indicates when its detector is and is not exposed, and the initials of the individual who performed the check.

(e) If a radiation monitor is inoperable, the licensee shall require individuals entering the teletherapy room to use a survey instrument or audible alarm personal dosimeter to monitor for malfunction of the source exposure mechanism that may result in an exposed or partially exposed source. The instrument or dosimeter shall be checked with a dedicated check source for proper operation at the beginning of each day of use. The licensee shall keep a record as described in R313-32-615(4)(d).

(f) A licensee shall promptly repair or replace the radiation monitor if it is inoperable.

(5) A licensee shall construct or equip each teletherapy room to permit continuous observation of

the patient or the human research subject from the teletherapy unit console during irradiation.

R313-32-620. Possession of Survey Instrument.

A licensee authorized to use radioactive material in a teletherapy unit shall have in its possession either a portable radiation detection survey instrument capable of detecting dose rates over the range one uSv (0.1 mrem) per hour to one mSv (100 mrem) per hour or a portable radiation measurement survey instrument capable of measuring dose rates over the range ten uSv (one mrem) per hour to ten mSv (1000 mrem) per hour.

R313-32-630. Dosimetry Equipment.

(1) A licensee shall have a calibrated dosimetry system available for use. To satisfy this requirement, one of the following two conditions shall be met:

(a) The system shall be calibrated by the National Institute of Standards and Technology or by a calibration laboratory accredited by the American Association of Physicists in Medicine (AAPM). The calibration shall have been performed within the previous two years and after any servicing that may have affected system calibration.

(b) The system shall have been calibrated within the previous four years; eighteen to thirty months after that calibration, the system shall have been intercompared at an intercomparison meeting with another dosimetry system that was calibrated within the past twenty-four months by the National Bureau of Standards or by a calibration laboratory accredited by the AAPM. The intercomparison meeting shall be sanctioned by a calibration laboratory or radiologic physics center accredited by the AAPM. The results of the intercomparison meeting shall have indicated that the calibration factor of the licensee's system had not changed by more than two percent. The licensee shall not use the intercomparison result to change the calibration factor. When intercomparing dosimetry systems to be used for calibrating cobalt-60 teletherapy units, the licensee shall use a teletherapy unit with a cobalt-60 source. When intercomparing dosimetry systems to be used for calibrating cesium-137 teletherapy units, the licensee shall use a teletherapy unit with a cesium-137 source.

(2) The licensee shall have available for use a dosimetry system for spot-check measurements. To satisfy this requirement, the system may be compared with a system that has been calibrated in accordance with R313-32- 630(1). This comparison shall have been performed within the previous year and after each servicing that may have affected system calibration. The spot-check system may be the same system used to meet the requirement in R313-32-630(1).

(3) The licensee shall retain a record of each calibration, intercomparison, and comparison for the duration of the license. For each calibration, intercomparison, or comparison, the record shall include the date, the model numbers and serial numbers of the instruments that were calibrated, intercompared, or compared as required by R313-32-630(1) and (2), the correction factor that was determined from the calibration or comparison or the apparent correction factor that was determined from an intercomparison, the names of the individuals who performed the calibration, intercomparison, or comparison, and evidence that the intercomparison meeting was sanctioned by a calibration laboratory or radiologic physics center accredited by AAPM.

R313-32-632. Full Calibration Measurements.

(1) A licensee authorized to use a teletherapy unit for medical use shall perform full calibration measurements on each teletherapy unit:

(a) before the first medical use of the unit; and

(b) before medical use under the following conditions:

(i) whenever spot-check measurements indicate that the output differs by more than five percent from the output obtained at the last full calibration corrected mathematically for radioactive decay;

(ii) following replacement of the source or following reinstallation of the teletherapy unit in a new location; or

(iii) following any repair of the teletherapy unit that includes removal of the source or major repair of the components associated with the source exposure assembly; and

(c) at intervals not exceeding one year.

(2) To satisfy the requirement of R313-32-632(1), full calibration measurements shall include determination of:

(a) the output within plus or minus three percent for the range of field sizes and for the distance or range of distances used for medical use;

(b) the coincidence of the radiation field and the field indicated by the light beam localizing device;

(c) the uniformity of the radiation field and its dependence on the orientation of the useful beam;

(d) timer constancy and linearity over the range of use;

(e) on-off error; and

(f) the accuracy of all distance measuring and localization devices in medical use.

(3) A licensee shall use the dosimetry system described in R313-32-630(1) to measure the output for one set of exposure conditions. The remaining radiation measurements required in R313-32-632(2)(a) may be made using a dosimetry system that indicates relative dose rates.

(4) A licensee shall make full calibration measurements required by R313-32-632(1) in accordance with either the procedures recommended by the Scientific Committee on Radiation Dosimetry of the American Association of Physicists in Medicine that are described in Physics in Medicine and Biology Vol. 16, No. 3, 1971, pp. 379-396, or by Task Group 21 of the Radiation Therapy Committee of the American Association of Physicists in Medicine that are described in Medical Physics Vol. 10, No. 6, 1983, pp. 741-711, and Vol. 11, No. 2, 1984, p. 213.

(5) A licensee shall correct mathematically the outputs determined in R313-32-632(2)(a) for physical decay for intervals not exceeding one month for cobalt-60 or six months for cesium-137.

(6) Full calibration measurement required in R313-32-632(1) and physical decay corrections required by R313-32-632(5) shall be performed by the licensee teletherapy physicist.

(7) A licensee shall retain a record of each calibration for the duration of the teletherapy unit source. The record shall include the date of the calibration, the manufacturer's name, model

number, and serial number for both the teletherapy unit and the source, the model numbers and serial numbers of the instruments used to calibrate the teletherapy unit, tables that describe the output of the unit over the range of field sizes and for the range of distances used in radiation therapy, a determination of the coincidence of the radiation field and the field indicated by the light beam localizing device, an assessment of timer linearity and constancy, the calculated on-off error, the estimated accuracy of each distance measuring or localization device, and the signature of the teletherapy physicist.

R313-32-634. Periodic Spot-Checks.

(1) A licensee authorized to use teletherapy units for medical use shall perform output spot-checks on each teletherapy unit once in each calendar month that include determination of:

(a) timer constancy, and timer linearity over the range of use;

(b) on-off error;

(c) the coincidence of the radiation field and the field indicated by the light beam localizing device;

(d) the accuracy of all distance measuring and localization devices used for medical use;

(e) the output for one typical set of operating conditions measured with the dosimetry system described in R313-32-630(2); and

(f) the difference between the measurement made in R313-32-634(2)(e) and the anticipated output, expressed as a percentage of the anticipated output (the value obtained at last full calibration corrected mathematically for physical decay).

(2) A licensee shall perform measurements required by R313-32-634(1) in accordance with procedures established by the teletherapy physicist. That individual need not actually perform the spot-check measurements.

(3) A licensee shall have the teletherapy physicist review the results of each spot-check within 15 days. The teletherapy physicist shall promptly notify the licensee in writing of the results of each spot-check. The licensee shall keep a copy of each written notification for three years.

(4) A licensee authorized to use a teletherapy unit for medical use shall perform safety spot-checks for each teletherapy facility once in each calendar month that assure proper operation of:

(a) electrical interlocks at each teletherapy room entrance;

(b) electrical or mechanical stops installed for the purpose of limiting use of the primary beam of radiation (restriction of source housing angulation or elevation, carriage or stand travel and operation of the beam on-off mechanism);

(c) beam condition indicator lights on the teletherapy unit, on the control console, and in the facility;

(d) viewing systems;

(e) treatment room doors from inside and outside the treatment room; and

(f) electrically assisted treatment room doors with the teletherapy unit electrical power turned off.

(5) A licensee shall arrange for prompt repair of any system identified in R313-32-634(4) that is not operating properly, and shall not use the teletherapy unit following door interlock malfunction until the interlock system has been repaired.

(6) A licensee shall retain a record of each spot-check required by R313-32-634(1) and (4) for three years. The record shall include the date of the spot-check, the manufacturer's name, model number, and serial number for both the teletherapy unit and source, the manufacturer's name, model number and serial number of the instrument used to measure the output of the teletherapy unit, an assessment of linearity and constancy, the calculated on-off error, a determination of the coincidence of the radiation field and the field indicated by the light beam localizing device, the calculated on-off error, the determined accuracy of each distance measuring or localization device, the difference between the anticipated output and the measured output, notations indicating the operability of each entrance door electrical interlock, each electrical or mechanical stop, each beam condition indicator light, the viewing system and doors, and the signature of the individual who performed the periodic spot check.

R313-32-636. Safety Checks for Teletherapy Facilities.

(1) A licensee shall promptly check all systems listed in R313-32-634(4) for proper function after each installation of a teletherapy source and after making any change for which an amendment is required by R313-32-606(1) through (4).

(2) If the results of the checks required in R313-32-636(1) indicate the malfunction of a system specified in R313-32-634(4), the licensee shall lock the control console in the off position and not use the unit except as may be necessary to repair, replace, or check the malfunctioning system.

(3) A licensee shall retain for three years a record of the facility checks following installation of a source. The record shall include notations indicating the operability of each entrance door interlock, each electrical or mechanical stop, each beam condition indicator light, the viewing system, and doors, and the signature of the Radiation Safety Officer.

R313-32-641. Radiation Surveys for Teletherapy Facilities.

(1) Before medical use, after each installation of a teletherapy source, and after making any change for which an amendment is required by R313-32-606(1) through (4), the licensee shall perform radiation surveys with a portable radiation measurement survey instrument calibrated in accordance with R313-32-51 to verify that:

(a) the maximum and average dose rates at one meter from the teletherapy source with the source in the off position and the collimators set for a normal treatment field do not exceed 100 uSv (ten mrem) per hour and 20 uSv (two mrem) per hour, respectively;

(b) with the teletherapy source in the on position with the largest clinically available treatment field and with a scattering phantom in the primary beam of the radiation, that:

(i) radiation dose rates in restricted areas are not likely to cause any occupationally exposed individual to receive a dose in excess of the limits specified in R313-15-201; and

(ii) radiation dose rates in controlled or unrestricted areas are not likely to cause any individual member of the public to receive a dose in excess of the limits specified in R313-15-301.

(2) If the results of the surveys required in R313-32-641(1) indicate any radiation dose quantity per unit time in excess of the respective limit specified in R313-32-641(1), the licensee shall lock the control in the off position and not use the unit:

(a) except as may be necessary to repair, replace, or test the teletherapy unit shielding or the treatment room shielding; or

(b) until the licensee has received a specific exemption pursuant to R313-12-54.

(3) A licensee shall retain a record of the radiation measurements made following installation of a source for the duration of the license. The record shall include the date of the measurements, the reason the survey is required, the manufacturer's name, model number and serial number of the teletherapy unit, the source, the instrument used to measure radiation levels, each dose rate measured around the teletherapy source while in the off position and the average of all measurements, a plan of the areas surrounding the treatment room that were surveyed, the measured dose rate at several points in each area expressed in microseverts or millirem per hour, the calculated maximum quantity of radiation over a period of one week for each restricted and unrestricted area, and the signature of the Radiation Safety Officer.

R313-32-643. Modification of Teletherapy Unit or Room Before Beginning a Treatment Program.

(1) If the survey required by R313-32-641 indicates that an individual member of the public is likely to receive a dose in excess of the limits specified in R313-15-301, the licensee shall, before beginning the treatment program:

(a) either equip the unit with stops or add additional radiation shielding to ensure compliance with R313-15-301(3);

(b) perform the survey required by R313-32-641 again; and

(c) include in the report required by R313-32-645 the results of the initial survey, a description of the modification made to comply with R313-32-643(1)(a), and the results of the second survey.

(2) As an alternative to the requirements set out in R313-32-643(1), a licensee may request a license amendment under R313-15-301(3) that authorizes radiation levels in unrestricted areas greater than those permitted by R313- 15-301(1). A licensee shall not begin the treatment program until the license amendment has been issued.

R313-32-645. Reports of Teletherapy Surveys, Checks, Tests and Measurements.

A licensee shall mail a copy of the records required in R313-32-636, R313-32-641, R313-32-643, and the output from the teletherapy source expressed as coulombs/kilogram (roentgens) or gray (rad) per hour at one meter from the source and determined during the full calibration required in R313-32-632 to the Executive Secretary within thirty days following completion of the action that initiated the record requirement.

R313-32-647. Five-Year Inspection.

(1) A licensee shall have each teletherapy unit fully inspected and serviced during teletherapy source replacement or at intervals not to exceed five years, whichever comes first, to assure proper functioning of the source exposure mechanism.

(2) This inspection and servicing shall only be performed by persons specifically licensed to do so by the Executive Secretary, the Nuclear Regulatory Commission, or an Agreement State.

(3) A licensee shall keep a record of the inspection and servicing for the duration of the license. The record shall contain the inspector's name, the inspector's license number, the date of inspection, the manufacturer's name and model number and serial number for both the teletherapy unit and source, a list of components inspected, a list of components serviced and the type of service, a list of components replaced, and the signature of the inspector.

R313-32-900. Radiation Safety Officer.

Except as provided in R313-32-901, the licensee shall require an individual fulfilling the responsibilities of the Radiation Safety Officer as provided in R313-32-21 to be an individual who:

(1) is certified by:

(a) American Board of Health Physics in comprehensive health physics;

(b) American Board of Radiology;

(c) American Board of Nuclear Medicine;

(d) American Board of Science in nuclear medicine;

(e) Board of Pharmaceutical Specialties in nuclear pharmacy;

(f) American Board of Medical Physics in radiation oncology physics;

(g) Royal College of Physicians and Surgeons of Canada in nuclear medicine;

(h) American Osteopathic Board of Radiology; or

(i) American Osteopathic Board of Nuclear Medicine; or

(2) has had classroom and laboratory training and experience as follows:

(a) 200 hours of classroom and laboratory training that includes:

(i) radiation physics and instrumentation;

(ii) radiation protection;

(iii) mathematics pertaining to the use and measurement of radioactivity;

(iv) radiation biology; and

(v) radiopharmaceutical chemistry; and

(b) one year of full time experience as a radiation safety technologist at a medical institution under the supervision of the individual identified as the Radiation Safety Officer on a license issued by the Executive Secretary, Nuclear Regulatory Commission or Agreement State license that authorizes the medical use of radioactive material; or

(3) be an authorized user identified on the licensee's license.

R313-32-901. Training for Experienced Radiation Safety Officer.

An individual identified as a Radiation Safety Officer on a license issued by the Executive Secretary, Nuclear Regulatory Commission or Agreement State before January 1, 1989, need not comply with the training requirements of R313-32-900.

R313-32-910. Training for Uptake, Dilution, and Excretion Studies.

Except as provided in R313-32-970 and R313-32-971, the licensee shall require the authorized user of a radiopharmaceutical in R313-32-100(1) to be a physician who:

(1) is certified in:

(a) nuclear medicine by the American Board of Nuclear Medicine;

(b) diagnostic radiology by the American Board of Radiology;

(c) diagnostic radiology or radiology by the American Osteopathic Board of Radiology;

(d) nuclear medicine by the Royal College of Physicians and Surgeons of Canada; or

(e) American Osteopathic Board of Nuclear Medicine in nuclear medicine; or

(2) has had classroom and laboratory training in basic radioisotope handling techniques applicable to the use of prepared radiopharmaceuticals, and supervised clinical experience as follows:

(a) 40 hours of classroom and laboratory training that includes:

(i) radiation physics and instrumentation;

(ii) radiation protection;

(iii) mathematics pertaining to the use and measurement of radioactivity;

(iv) radiation biology; and

(v) radiopharmaceutical chemistry; and

(b) 20 hours of supervised clinical experience under the supervision of an authorized user and that includes:

(i) examining patients or human research subjects and reviewing their case histories to determine their suitability for radioisotope diagnosis, limitations, or contraindications;

(ii) selecting the suitable radiopharmaceuticals and calculating and measuring the dosages;

(iii) administering dosages to patients or human research subjects and using syringe radiation shields;

(iv) collaborating with the authorized user in the interpretation of radionuclide test results; and

(v) patient or human research subject follow-up; or

(3) has successfully completed a six-month training program in nuclear medicine as part of a training program that has been approved by the Accreditation Council for Graduate Medical Education and that included classroom and laboratory training, work experience, and supervised clinical experience in the topics identified in R313-32-910(2).

R313-32-920. Training for Imaging and Localization Studies.

Except as provided in R313-32-970 or R313-32-971, the licensee shall require the authorized user of a radiopharmaceutical, generator, or reagent kit in R313-32-200(1) to be a physician who:

(1) is certified in:

(a) nuclear medicine by the American Board of Nuclear Medicine;

(b) diagnostic radiology by the American Board of Radiology;

(c) diagnostic radiology or radiology by the American Osteopathic Board of Radiology;

(d) nuclear medicine by the Royal College of Physicians and Surgeons of Canada; or

(e) American Osteopathic Board of Nuclear Medicine in nuclear medicine; or

(2) has had classroom and laboratory training in basic radioisotope handling techniques applicable to the use of prepared radiopharmaceuticals, generators, and reagent kits, supervised work experience, and supervised clinical experience as follows:

(a) 200 hours of classroom and laboratory training that includes:

(i) radiation physics and instrumentation;

(ii) radiation protection;

(iii) mathematics pertaining to the use and measurement of radioactivity;

(iv) radiopharmaceutical chemistry; and

(v) radiation biology; and

(b) 500 hours of supervised work experience under the supervision of an authorized user that includes:

(i) ordering, receiving, and unpacking radioactive materials safely and performing the related radiation surveys;

(ii) calibrating dose calibrators and diagnostic instruments and performing checks for proper operation of survey meters;

(iii) calculating and safely preparing patient or human research subject dosages;

(iv) using administrative controls to prevent the misadministration of radioactive material;

(v) using procedures to contain spilled radioactive material safely and using proper decontamination procedures; and

(vi) eluting technetium-99m from generator systems, measuring and testing the elute for molybdenum-99 and alumina contamination, and processing the elute with reagent kits to prepare technetium-99m labeled radiopharmaceuticals; and

(c) 500 hours of supervised clinical experience under the supervision of the authorized user that includes:

(i) examining patients or human research subjects and reviewing their case histories to determine their suitability for radioisotope diagnosis, limitations, or contraindications;

(ii) selecting the suitable radiopharmaceuticals and calculating and measuring the dosages;

(iii) administering dosages to patients or human research subjects and using syringe radiation shields;

(iv) collaborating with the authorized user in the interpretation of radioisotope test results; and

(v) patient or human research subject follow-up; or

(3) has successfully completed a six-month training program in nuclear medicine that has been approved by the Accreditation Council for Graduate Medical Education and that included classroom and laboratory training, work experience, and supervised clinical experience in the topics identified in R313-32-920(2).

R313-32-930. Training for Therapeutic Use of Unsealed Radioactive Material.

Except as provided in R313-32-970, the licensee shall require the authorized user of radiopharmaceuticals in R313-32-300 to be a physician who:

(1) is certified by:

(a) the American Board of Nuclear Medicine;

(b) the American Board of Radiology in radiology, therapeutic radiology, or radiation oncology;

(c) nuclear medicine by the Royal College of Physicians and Surgeons of Canada; or

(d) the American Osteopathic Board of Radiology after 1984; or

(2) has had classroom and laboratory training in basic radioisotope handling techniques applicable to the use of therapeutic radiopharmaceuticals, and supervised clinical experience as follows:

(a) 80 hours of classroom and laboratory training that includes:

(i) radiation physics and instrumentation;

(ii) radiation protection;

(iii) mathematics pertaining to the use and measurement of radioactivity; and

(iv) radiation biology; and

(b) supervised clinical experience under the supervision of an authorized user at a medical institution that includes:

(i) use of iodine-131 for diagnosis of thyroid function and the treatment of hyperthyroidism or cardiac dysfunction in ten individuals; and

(ii) use of iodine-131 for treatment of thyroid carcinoma in three individuals.

R313-32-932. Training for Treatment of Hyperthyroidism.

Except as provided in R313-32-970, the licensee shall require the authorized user of only iodine-131 for the treatment of hyperthyroidism to be a physician with special experience in thyroid disease who has had classroom and laboratory training in basic radioisotope handling techniques applicable to the use of iodine-131 for treating hyperthyroidism, and supervised clinical experience as follows:

(1) 80 hours of classroom and laboratory training that includes:

(a) radiation physics and instrumentation;

(b) radiation protection;

(c) mathematics pertaining to the use and measurement of radioactivity; and

(d) radiation biology; and

(2) Supervised clinical experience under the supervision of an authorized user that includes the use of iodine-131 for diagnosis of thyroid function, and the treatment of hyperthyroidism in ten individuals.

R313-32-934. Training for Treatment of Thyroid Carcinoma.

Except as provided in R313-32-970, the licensee shall require the authorized user of only iodine-131 for the treatment of thyroid carcinoma to be a physician with special experience in thyroid disease who has had classroom and laboratory training in basic radioisotope handling techniques applicable to the use of iodine-131 for treating thyroid carcinoma, and supervised clinical experience as follows:

(1) 80 hours of classroom and laboratory training that includes:

(a) radiation physics and instrumentation;

(b) radiation protection;

(c) mathematics pertaining to the use and measurement of radioactivity; and

(d) radiation biology; and

(2) Supervised clinical experience under the supervision of an authorized user that includes the use of iodine-131 for the treatment of thyroid carcinoma in three individuals.

R313-32-940. Training for Use of Brachytherapy Sources.

Except as provided in R313-32-970 the licensee shall require the authorized user of a brachytherapy source listed in R313-32-400 for therapy to be a physician who:

(1) is certified in:

(a) radiology, therapeutic radiology, or radiation oncology by the American Board of Radiology;

(b) radiation oncology by the American Osteopathic Board of Radiology;

(c) radiology, with specialization in radiotherapy, as a British "Fellow of the Faculty of Radiology" or "Fellow of the Royal College of Radiology"; or

(d) therapeutic radiology by the Canadian Royal College of Physicians and Surgeons; or

(2) is in the active practice of therapeutic radiology, has had classroom and laboratory training in radioisotope handling techniques applicable to the therapeutic use of brachytherapy sources, supervised work experience, and supervised clinical experience as follows:

(a) 200 hours of classroom and laboratory training that includes:

(i) radiation physics and instrumentation;

(ii) radiation protection;

(iii) mathematics pertaining to the use and measurement of radioactivity; and

(iv) radiation biology;

(b) 500 hours of supervised work experience under the supervision of an authorized user at a medical institution that includes:

(i) ordering, receiving, and unpacking radioactive materials safely and performing the related radiation surveys;

(ii) checking survey meters for proper operation;

(iii) preparing, implanting, and removing sealed sources;

(iv) maintaining running inventories of material on hand;

(v) using administrative controls to prevent the misadministration of radioactive material; and

(vi) using emergency procedures to control radioactive material; and

(c) three years of supervised clinical experience that includes one year in a formal training program approved by the Residency Review Committee for Radiology of the Accreditation Council for Graduate Medical Education or the Committee on Postdoctoral Training of the American Osteopathic Association, and an additional two years of clinical experience in therapeutic radiology under the supervision of an authorized user at a medical institution that includes:

(i) examining individuals and reviewing their case histories to determine their suitability for brachytherapy treatment, and any limitations or contraindications;

(ii) selecting the proper brachytherapy sources and dose and method of administration;

(iii) calculating the dose; and

(iv) post-administration follow-up and review of case histories in collaboration with the authorized user.

R313-32-941. Training for Ophthalmic Use of Strontium-90.

Except as provided in R313-32-970, the licensee shall require the authorized user of only strontium-90 for ophthalmic radiotherapy to be a physician who is in the active practice of therapeutic radiology or ophthalmology, and has had classroom and laboratory training in basic radioisotope handling techniques applicable to the use of strontium-90 for ophthalmic radiotherapy, and a period of supervised clinical training in ophthalmic radiotherapy as follows:

(1) 24 hours of classroom and laboratory training that includes:

(a) radiation physics and instrumentation;

(b) radiation protection;

(c) mathematics pertaining to the use and measurement of radioactivity; and

(d) radiation biology.

(2) Supervised clinical training in ophthalmic radiotherapy under the supervision of an authorized user at a medical institution that includes the use of strontium-90 for the ophthalmic treatment of five individuals that includes:

(a) examination of each individual to be treated;

(b) calculation of the dose to be administered;

(c) administration of the dose; and

(d) follow-up and review of each individual's case history.

R313-32-950. Training for Use of Sealed Sources for Diagnosis.

Except as provided in R313-32-970, the licensee shall require the authorized user of a sealed source in a device listed in R313-32-500 to be a physician, dentist, or podiatrist who:

(1) is certified in

(a) radiology, diagnostic radiology, therapeutic radiology, or radiation oncology by the American Board of Radiology;

(b) nuclear medicine by the American Board of Nuclear Medicine;

(c) diagnostic radiology or radiology by the American Osteopathic Board of Radiology; or

(d) nuclear medicine by the Royal College of Physicians and Surgeons of Canada; or

(2) has had eight hours of classroom and laboratory training in basic radioisotope handling techniques specifically applicable to the use of the device that includes:

(a) radiation physics, mathematics pertaining to the use and measurement of radioactivity, and instrumentation;

(b) radiation biology;

(c) radiation protection; and

(d) training in the use of the device for the uses requested.

R313-32-960. Training for Teletherapy.

Except as provided in R313-32-970, the licensee shall require the authorized user of a sealed source listed in R313-32-600 in a teletherapy unit to be a physician who:

(1) is certified in:

(a) radiology, therapeutic radiology, or radiation oncology by the American Board of Radiology;

(b) radiation oncology by the American Osteopathic Board of Radiology;

(c) radiology, with specialization in radiotherapy, as a British "Fellow of the Faculty of Radiology" or "Fellow of the Royal College of Radiology"; or

(d) therapeutic radiology by the Canadian Royal College of Physicians and Surgeons; or

(2) is in the active practice of therapeutic radiology, and has had classroom and laboratory training in basic radioisotope techniques applicable to the use of a sealed source in a teletherapy unit, supervised work experience, and supervised clinical experience as follows:

(a) 200 hours of classroom and laboratory training that includes:

(i) radiation physics and instrumentation;

(ii) radiation protection;

(iii) mathematics pertaining to the use and measurement of radioactivity; and

(iv) radiation biology;

(b) 500 hours of supervised work experience under the supervision of an authorized user at a medical institution that includes:

(i) review of the full calibration measurements and periodic spot checks;

(ii) preparing treatment plans and calculating treatment times;

(iii) using administrative controls to prevent misadministrations;

(iv) implementing emergency procedures to be followed in the event of the abnormal operation of a teletherapy unit or console; and

(v) checking and using survey meters; and

(c) three years of supervised clinical experience that includes one year in a formal training program approved by the Residency Review Committee for Radiology of the Accreditation Council for Graduate Medical Education or the Committee on Postdoctoral Training of the American Osteopathic Association and an additional two years of clinical experience in therapeutic radiology under the supervision of an authorized user at a medical institution that includes:

(i) examining individuals and reviewing their case histories to determine their suitability for teletherapy treatment, and any limitations or contraindications;

(ii) selecting the proper dose and how it is to be administered;

(iii) calculating the teletherapy doses and collaborating with the authorized user in the review of patients' or human research subjects' progress and consideration of the need to modify originally prescribed doses as warranted by patients' or human research subjects' reaction to radiation; and

(iv) post-administration follow-up and review of case histories.

R313-32-961. Training for Teletherapy Physicist.

The licensee shall require the teletherapy physicist to be an individual who:

(1) is certified by the American Board of Radiology in:

(a) therapeutic radiological physics;

(b) roentgen ray and gamma ray physics;

(c) x-ray and radium physics; or

(d) radiological physics; or

(2) is certified by the American Board of Medical Physics in radiation oncology physics; or

(3) holds a master's or doctor's degree in physics, biophysics, radiological physics, or health physics, and has completed one year of full time training in therapeutic radiological physics and an additional year of full time work experience under the supervision of a teletherapy physicist at a medical institution that includes the tasks listed in R313-32-59, R313-32-632, R313-32-634 and R313-32-641.

R313-32-970. Training for Experienced Authorized Users.

Physicians, dentists, or podiatrists identified as authorized users for the medical, dental, or podiatric use of radioactive material on a license issued by the Executive Secretary, Nuclear Regulatory Commission, or Agreement State license issued before January 1, 1989, who perform only those methods of use for which they were authorized on that date need not comply with the training requirements of R313-32-900 to R313-32-961.

R313-32-971. Physician Training in a Three Month Program.

A physician who, before October 1, 1988, began a three month nuclear medicine training program approved by the Accreditation Council for Graduate Medical Education and has successfully completed the program need not comply with the requirements of R313-32-910 or R313-32-920.

R313-32-972. Recentness of Training.

The training and experience specified in R313-32-900 through R313-32-981 shall have been obtained within the seven years preceding the date of application or the individual shall have had related continuing education and experience since the required training and experience was completed.

R313-32-980. Training for an Authorized Nuclear Pharmacist.

The licensee shall require the authorized nuclear pharmacist to be a pharmacist who:

(1) has current board certification as a nuclear pharmacist by the Board of Pharmaceutical Specialties, or

(2)(a) has completed 700 hours in a structured educational program consisting of both:

(i) didactic training in the following areas:

(A) radiation physics and instrumentation;

(B) radiation protection;

(C) mathematics pertaining to the use and measurement of radioactivity;

(D) chemistry of radioactive material for medical use; and

(E) radiation biology; and

(ii) supervised experience in a nuclear pharmacy involving the following:

(A) shipping, receiving, and performing related radiation surveys;

(B) using and performing checks for proper operation of dose calibrators, survey meters, and, if appropriate, instruments used to measure alpha- or beta-emitting radionuclides;

(C) calculating, assaying, and safely preparing dosages for patients or human research subjects;

(D) using administrative controls to avoid mistakes in the administration of radioactive material;

(E) using procedures to prevent or minimize contamination and using proper decontamination procedures; and

(b) has obtained written certification, signed by a preceptor authorized nuclear pharmacist, that the above training has been satisfactorily completed and that the individual has achieved a level of competency sufficient to independently operate a nuclear pharmacy.

R313-32-981. Training for Experienced Nuclear Pharmacists.

A licensee may apply for and must receive a license amendment identifying an experienced nuclear pharmacist as an authorized nuclear pharmacist before it allows this individual to work as an authorized nuclear pharmacist. A pharmacist who has completed a structured educational program as specified in R313-32-980(2)(a) before January 1, 1998 and who is working in a nuclear pharmacy would qualify as an experienced nuclear pharmacist. An experienced nuclear pharmacist need not comply with the requirements on preceptor statement (See R313-32-980(2)(b)) and recentness of training (See R313-32-972) to qualify as an authorized nuclear pharmacist.

R313-32-999. Resolution of Conflicting Requirements During Transition Period.

If the rules in R313-32 conflict with the licensee's radiation safety program as identified in its license, and if that license was approved by the Bureau of Radiation Control, Department of Health, before January 1, 1989, and has not been renewed since January 1, 1989, then the requirements in the license will apply. However, if the licensee exercises its privilege to make minor changes in its radiation safety procedures that are not potentially important to safety under R313-32-31, the portion changed shall comply with the requirements of R313-32. At the time of license renewal and thereafter, these amendments to R313-32 shall apply.

KEY

radioactive material, radiopharmaceutical, brachytherapy, nuclear medicine

Date of Enactment or Last Substantive Amendment

September 14, 2001

Notice of Continuation

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Authorizing, Implemented, or Interpreted Law

19-3-104; 19-3-108

For questions about the *rulemaking process*, please contact **the Division of Administrative Rules.** *Please Note:* The Division of Administrative Rules is ***not able*** to answer questions about the content or application of these rules.

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Rule R313-34. Requirements for Irradiators.

As in effect on September 1, 2002

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R313-34-1. Purpose and Authority.

(1) Rule R313-34 prescribes requirements for the issuance of licenses authorizing the use of sealed sources containing radioactive materials in irradiators used to irradiate objects or materials using gamma radiation.

(2) The rules set forth herein are adopted pursuant to the provisions of Subsections 19-3-104(3) and 19-3-104(6).

(3) The requirements of Rule R313-34 are in addition to, and not in substitution for, the other requirements of these rules.

R313-34-2. Scope.

(1) Rule R313-34 shall apply to panoramic irradiators that have either dry or wet storage of the radioactive sealed sources; underwater irradiators in which both the source and the product being irradiated are under water; and irradiators whose dose rates exceed 5 grays (500 rads) per hour at 1 meter from the radioactive sealed sources in air or in water, as applicable for the irradiator type.

(2) The requirements of Rule R313-34 shall not apply to self-contained dry-source-storage irradiators in which both the source and the area subject to irradiation are contained within a device and are not accessible by personnel, medical radiology or teletherapy, the irradiation of materials for nondestructive testing purposes, gauging, or open-field agricultural irradiations.

R313-34-3. Clarifications or Exemptions.

For purposes of Rule R313-34, 10 CFR 36, 2001 ed., is incorporated by reference with the following clarifications or exceptions:

(1) The exclusion of the following 10 CFR sections: 36.1, 36.5, 36.8, 36.11, 36.17, 36.19(a), 36.91, and 36.93;

(2) The substitution of the following:

(a) Radiation Control Act for Atomic Energy Act of 1954;

(b) Utah Radiation Control Rules for the reference to NRC regulations and the Commission's regulations;

(c) The Executive Secretary or the Executive Secretary's for the Commission or the Commission's, and NRC in the following 10 CFR sections: 36.13, 36.13(f), 36.15, 36.19(b), 36.53(c), 36.69, and 36.81(a), 36.81(d) and 36.81(e); and

(d) In 10 CFR 36.51(a)(1), Rule R313-15 for NRC;

(3) Appendix B of 10 CFR Part 20 refers to the 2001 ed. of 10 CFR; and

(4) The substitution of Title R313 references for the following 10 CFR references:

(a) Section R313-12-51 for reference to 10 CFR 30.51;

(b) Rule R313-15 for the reference to 10 CFR 20;

(c) Subsection R313-15-501(3) for the reference to 10 CFR 20.1501(c);

(d) Section R313-15-902 for the reference to 10 CFR 20.1902;

(e) Rule R313-18 for the reference to 10 CFR 19;

(f) Section R313-19-41 for the reference to 10 CFR 30.41;

(g) Section R313-19-50 for the reference to 10 CFR 30.50;

(h) Section R313-22-33 for the reference to 10 CFR 30.33;

(i) Section R313-22-210 for the reference to 10 CFR 32.210;

(j) Section R313-22-35 for the reference to 10 CFR 30.35; and

(k) Rule R313-70 for the reference to 10 CFR 170.31.

KEY

irradiator, survey, radiation, radiation safety

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Rule converted into HTML by the Division of Administrative Rules.

For questions regarding the *content* or *application* of rules under Title R313, please contact the promulgating agency (Environmental Quality, Radiation Control). A list of agencies with links to their homepages is available at **http://www.utah.gov/government/agencylist.html.**

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Rule R313-35. Requirements for X-Ray Equipment Used for Non-Medical Applications.

As in effect on September 1, 2002

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R313-35-1. Purpose and Scope.

(1) R313-35 establishes radiation safety requirements for registrants who use electronic sources of radiation for industrial radiographic applications, analytical applications or other non-medical applications. Registrants engaged in the production of radioactive material are also subject to the requirements of R313-19 and R313-22. The requirements of R313-35 are an addition to, and not a substitution for, the requirements of R313-15, R313-16, R313-18 and R313-70.

(2) The rules set forth herein are adopted pursuant to the provisions of Sections 19-3-104(3) and 19-3-104(6).

R313-35-2. Definitions.

As used in R313-35:

"Analytical x-ray system" means a group of components utilizing x-rays to determine the elemental composition or to examine the microstructure of materials by either x-ray fluorescence or diffraction analysis.

"Cabinet x-ray system" means an x-ray system with the x-ray tube installed in an enclosure, hereinafter termed "cabinet," which, independent of existing architectural structure except the floor on which it may be placed, is intended to contain at least that portion of a material being irradiated, provide radiation attenuation, and exclude personnel from its interior during generation of x-radiation. Included are all x-ray systems designed primarily for the inspection of carry-on baggage at airline, railroad and bus terminals, and similar facilities. An x-ray tube used within a shielded part of a building, or x-ray equipment which may temporarily or occasionally incorporate portable shielding is not considered a cabinet x-ray system.

"Collimator" means a device used to limit the size, shape and direction of the primary radiation beam.

"Direct reading dosimeter" means an ion-chamber pocket dosimeter or an electronic personal dosimeter.

"External surface" means the outside surfaces of cabinet x-ray systems, including the high-voltage generator, doors, access panels, latches, control knobs, and other permanently mounted hardware and including the plane across an aperture or port.

"Fail-safe characteristics" means design features which cause beam port shutters to close, or otherwise prevent emergence of the primary beam, upon the failure of a safety or warning device.

"Nondestructive testing" means the examination of the macroscopic structure of materials by nondestructive methods utilizing x-ray sources of radiation.

"Non-medical applications" means uses of x-ray systems except those used for providing diagnostic information or therapy on human patients.

"Normal operating procedures" means instructions necessary to accomplish the x-ray procedure being performed. These procedures shall include positioning of the equipment and the object being examined, equipment alignment, routine maintenance by the registrant, and data recording procedures which are related to radiation safety.

"Open-beam configuration" means a mode of operation of an analytical x-ray system in which individuals could accidentally place some part of the body into the primary beam during normal operation if no further safety devices are incorporated.

"Portable package inspection system" means a portable x-ray system designed and used for determining the presence of explosives in a package.

"Primary beam" means ionizing radiation which passes through an aperture of the source housing via a direct path from the x-ray tube located in the radiation source housing.

"Very high radiation area" means an area, accessible to individuals, in which radiation levels could

result in individuals receiving an absorbed dose in excess of five Gy (500 rad) in one hour at one meter from a source of radiation or from any surface that the radiation penetrates. At very high doses received at high dose rates, units of absorbed dose, gray and rad, are appropriate, rather than units of dose equivalent, sievert and rem.

"X-ray system" means an assemblage of components for the controlled production of x-rays. It includes, minimally, an x-ray high-voltage generator, an x-ray control, a tube housing assembly, and the necessary supporting structures. Additional components which function with the system are considered integral parts of the system.

R313-35-20. Personnel Monitoring.

Registrants using x-ray systems in non-medical applications shall meet the requirements of R313-15- 502.

R313-35-30. Locking of X-ray Systems Other Than Veterinary X-Ray Systems.

The control panel of x-ray systems located in uncontrolled areas shall be equipped with a locking device that will prevent the unauthorized use of a x-ray system or the accidental production of radiation. Non-cabinet x- ray systems shall be kept locked with the key removed when not in use.

R313-35-40. Storage Precautions.

X-ray systems shall be secured to prevent tampering or removal by unauthorized personnel.

R313-35-50. Training Requirements.

In addition to the requirements of R313-18-12, an individual operating x-ray systems for non-medical applications shall be trained in the operating procedures for the x-ray system and the emergency procedures related to radiation safety for the facility. Records of training shall be made and maintained for three years after the termination date of the individual.

R313-35-60. Surveys.

In addition to the requirements of R313-15-501, radiation surveys of x-ray systems shall be performed:

(1) upon installation of the x-ray system; and

(2) following change to or maintenance of components of an x-ray system which effect the output, collimation, or shielding effectiveness.

R313-35-70. Radiation Survey Instruments.

Survey instruments used in determining compliance with R313-15 and R313-35 shall meet the following requirements:

(1) Instrumentation shall be capable of measuring a range from 0.02 millisieverts (2 millirem) per hour through 0.01 sievert (1 rem) per hour.

(2) Instrumentation shall be calibrated at intervals not to exceed 12 months and after instrument servicing, except for battery changes.

(3) For linear scale instruments, calibration shall be shown at two points located approximately one- third and two-thirds of full-scale on each scale. For logarithmic scale instruments, calibration shall be shown at mid- range of each decade, and at two points of at least one decade. For digital instruments, calibration shall be shown at three points between 0.02 and 10 millisieverts (2 and 1000 millirems) per hour.

(4) An accuracy of plus or minus 20 percent of the calibration source shall be demonstrated for each point checked pursuant to R313-35-70(3).

(5) The registrant shall perform visual and operability checks of survey instruments before use on each day the survey instrument is to be used to ensure that the equipment is in good working condition. If survey instrument problems are found, the equipment shall be removed from service until repaired.

(6) Results of the instrument calibrations showing compliance with R313-35-70(3) and R313-35-70(4) shall be recorded and maintained for a period of three years from the date the record is made.

(7) Records demonstrating compliance with R313-35-70(5) shall be made when a problem is found. The records shall be maintained for a period of three years from the date the record is made.

R313-35-80. Cabinet X-ray Systems.

(1) The requirements as found in 21 CFR 1020.40, 1996 ed., are adopted and incorporated by reference.

(2) Individuals operating cabinet x-ray systems with conveyor belts shall be able to observe the entry port from the operator's position.

R313-35-90. Portable Package Inspection Systems.

Portable package inspection systems shall be registered in accordance with R313-16 and shall be exempt from inspection by representatives of the Executive Secretary.

R313-35-100. Analytical X-Ray Systems Excluding Cabinet X-Ray Systems.

(1) Equipment. Analytical x-ray systems not contained in cabinet x-ray systems shall meet all the following requirements.

(a) A device which prevents the entry of portions of an individual's body into the primary x-ray beam path, or which causes the beam to be shut off upon entry into its path, shall be provided for open-beam configurations.

(i) Pursuant to R313-12-55(1), an application for an exemption from R313-35-100(1)(a) shall contain the following information:

(A) a description of the various safety devices that have been evaluated;

(B) the reason that these devices cannot be used; and

(C) a description of the alternative methods that will be employed to minimize the possibility of

an accidental exposure, including procedures to assure that operators and others in the area will be informed of the absence of safety devices.

(ii) applications for exemptions to R313-35-100(1)(a) shall be submitted to the Executive Secretary of the Board.

(b) Open-beam configurations shall be provided with a readily discernible indication of:

(i) the "on" or "off" status of the x-ray tube which shall be located near the radiation source housing if the primary beam is controlled in this manner; or

(ii) the "open" or "closed" status of the shutters which shall be located near ports on the radiation source housing, if the primary beam is controlled in this manner.

(c) Warning devices shall be labeled so that their purpose is easily identified and the devices shall be conspicuous at the beam port. On equipment installed after July 1, 1989, warning devices shall have fail-safe characteristics.

(d) Unused ports on radiation source housings shall be secured in the closed position in a manner which will prevent casual opening. Security requirements will be deemed met if the beam port cannot be opened without the use of tools that are not part of the closure.

(e) Analytical x-ray systems shall be labeled with a readily discernable sign or signs bearing a radiation symbol which meets the requirements of R313-15-901 and the words:

(i) "CAUTION-HIGH INTENSITY X-RAY BEAM," or words having a similar intent, on the x-ray tube housing; and

(ii) "CAUTION RADIATION - THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED," or words having a similar intent, near switches that energize an x-ray tube.

(f) On analytical x-ray systems with open-beam configurations which are installed after July 1, 1989, ports on the radiation source housing shall be equipped with a shutter that cannot be opened unless a collimator or a coupling has been connected to the port.

(g) An easily visible warning light labeled with the words "X-RAY ON," or words having a similar intent, shall be located near switches that energize an x-ray tube and near x-ray ports. They shall be illuminated only when the tube is energized.

(h) On analytical x-ray systems installed after July 1, 1989, warning lights shall have fail-safe characteristics.

(i) X-ray generators shall be supplied with a protective cabinet which limits leakage radiation measured at a distance of five centimeters from its surface so that they are not capable of producing a dose equivalent in excess of 2.5 microsieverts (0.25 millirem) in one hour.

(j) The components of an analytical x-ray system located in an uncontrolled area shall be arranged and include sufficient shielding or access control so that no radiation levels exist in areas surrounding the component group which could result in a dose to an individual present therein in excess of the dose limits given in R313-15-301.

(2) Personnel Requirements.

(a) An individual shall not be permitted to operate or maintain an analytical x-ray system unless the individual has received instruction which satisfies the requirements of R313-18-12(1). The instruction shall include:

(i) identification of radiation hazards associated with the use of the analytical x-ray system;

(ii) the significance of the various radiation warnings and safety devices incorporated into the analytical x-ray system, or the reasons they have not been installed on certain pieces of equipment and the extra precautions required in these cases;

(iii) proper operating procedures for the analytical x-ray system;

(iv) symptoms of an acute localized exposure; and

(v) proper procedures for reporting an actual or suspected exposure.

(b) Registrants shall maintain records which demonstrate compliance with the requirements of R313-35- 100(2)(a) for a period of three years after the termination of the individual.

(c) Normal operating procedures shall be written and available to analytical x-ray system workers. An individual shall not be permitted to operate analytical x-ray systems using procedures other than those specified in the normal operating procedures unless the individual has obtained written approval of the registrant or the registrant's designee.

(d) An individual shall not bypass a safety device unless the individual has obtained the written approval of the registrant or the registrant's designee. Approval shall be for a specified period of time. When a safety device has been bypassed, a readily discernible sign bearing the words "SAFETY DEVICE NOT WORKING," or words having a similar intent, shall be placed on the radiation source housing.

(3) Personnel Monitoring. In addition to the requirements of R313-15-502, finger or wrist dosimetric devices shall be provided to and shall be used by:

(a) analytical x-ray system workers using equipment having an open-beam configuration and not equipped with a safety device; and

(b) personnel maintaining analytical x-ray systems if the maintenance procedures require the presence of a primary x-ray beam when local components in the analytical x-ray system are disassembled or removed.

(4) Posting. Areas or rooms containing analytical x-ray systems not considered to be cabinet x-ray systems shall be conspicuously posted to satisfy the requirements in R313-15-902.

R313-35-110. Veterinary X-Ray Systems.

(1) Equipment. X-ray systems shall meet the following standards to be used for veterinary radiographic examinations.

(a) The leakage radiation from the diagnostic source assembly measured at a distance of one meter shall not exceed 25.8 uC/kg (100 milliroentgens) in one hour when the x-ray tube is operated at its leakage technique factors.

(b) Diaphragms, cones, or a stepless adjustable collimator shall be provided for collimating the useful beam to the area of clinical interest and shall provide the same degree of protection as is required of the diagnostic source housing.

(c) A device shall be provided to terminate the exposure after a preset time or exposure.

(d) A "dead-man type" exposure switch shall be provided, together with an electrical cord of sufficient length, so that the operator may stand out of the useful beam and at least six feet from the animal during x-ray exposures.

(e) For stationary or mobile x-ray systems, a method shall be provided for visually defining the perimeter of the x-ray field. The total misalignment of the edges of the visually defined field with the respective edges of the x-ray field along either the length or width of the visually defined field shall not exceed six percent of the distance from the source to the center of the visually defined field when the surface upon which it appears is perpendicular to the axis of the x-ray beam.

(f) For portable x-ray systems, a method shall be provided to align the center of the x-ray field with respect to the center of the image receptor to within six percent of the source to image receptor distance, and to indicate the source to image receptor distance to within six percent.

(2) Structural shielding. For stationary x-ray systems, the wall, ceiling, and floor areas shall provide enough shielding to meet the requirements of R313-15-301.

(3) Operating procedures.

(a) Where feasible, the operator shall stand well away from the useful beam and the animal during radiographic exposures.

(b) In applications in which the operator is not located beyond a protective barrier, clothing consisting of a protective apron having a lead equivalent of not less than 0.5 millimeters shall be worn by the operator and other individuals in the room during exposures.

(c) An individual other than the operator shall not be in the x-ray room while exposures are being made unless the individual's assistance is required.

(d) If the animal must be held by an individual, that individual shall be protected with appropriate shielding devices, for example, protective gloves and apron. The individual shall be so positioned that no unshielded part of that individual's body will be struck by the useful beam.

R313-35-120. X-Ray Systems Less than 1 MeV used for Non-Destructive Testing.

(1) Cabinet x-ray systems.

Cabinet x-ray systems shall meet the requirements of R313-35-80.

(2) Fixed Gauges.

(a) Warning Devices. A light, which is clearly visible from all accessible areas around the x-ray system, shall indicate when the x-ray system is operating.

(b) Personnel Monitoring. Notwithstanding R313-15-502(1)(a), individuals conducting x-ray system maintenance requiring the x-ray beam to be on shall be provided with and required to

wear personnel monitoring devices.

(3) Industrial and Other X-ray Systems.

(a) Equipment.

(i) The registrant shall perform visual and operability checks of indication lights and warning lights before use on each day the equipment is to be used to ensure that the equipment is in good working condition. If equipment problems are found, the equipment shall be removed from service until repaired.

(ii) Inspection and routine maintenance of x-ray systems, interlocks, indication lights, exposure switches, and cables shall be made at intervals not to exceed six months or before the first use thereafter to ensure the proper functioning of components important to safety. If equipment problems are found, the equipment shall be removed from service until repaired.

(iii) Records demonstrating compliance with R313-35-120(3)(a)(i) shall be made when problems with the equipment are found. These records shall be maintained for a period of three years.

(iv) Records demonstrating compliance with R313-35-120(3)(a)(ii) shall be made. These records shall be maintained for a period of three years.

(b) Controls. X-ray systems which produce a high radiation area shall be controlled to meet the requirements of R313-15-601.

(c) Personnel Monitoring Requirements.

(i) Registrants shall not permit individuals to conduct x-ray operations unless all of the following conditions are met.

(A) Individuals shall wear a thermoluminescent dosimeter or film badge.

(I) Each film badge or thermoluminescent dosimeter shall be assigned to and worn by only one individual.

(II) Film badges shall be replaced at periods not to exceed one month and thermoluminescent dosimeters shall be replaced at periods not to exceed three months.

(B) Individuals shall wear a direct reading dosimeter if conducting non-destructive testing at a temporary job site or in a room or building not meeting the requirements of R313-15-301.

(I) Pocket dosimeters shall have a range from zero to two millisieverts (200 millirem) and must be recharged at the beginning of each shift.

(II) Direct reading dosimeters shall be read and the exposures recorded at the beginning and end of each shift. Records shall be maintained for three years after the record is made.

(III) Direct reading dosimeters shall be checked at intervals not to exceed 12 months for correct response to radiation and the results shall be recorded. Records shall be maintained for a period three years from the date the record is made. Acceptable dosimeters shall read within plus or minus 20 percent of the true radiation exposure.

(IV) If an individual's ion-chamber pocket dosimeter is found to be off scale or if the individual's electronic personnel dosimeter reads greater than 2 millisieverts (200 millirems), and the possibility of radiation exposure cannot be ruled out as the cause, the individual's film badge or thermoluminescent dosimeter shall be sent for processing within 24 hours. In addition, the individual shall not resume work with sources of radiation until a determination of the individual's radiation exposure has been made.

(d) Controls. In addition to the requirements of R313-15-601, barriers, temporary or otherwise, and pathways leading to high radiation areas shall be identified in accordance with R313-15-902.

(e) Surveillance. During non-destructive testing applications conducted at a temporary job site or in a room or building not meeting the requirements of R313-15-301, the operator shall maintain continuous direct visual surveillance of the operation to protect against unauthorized entry into a high radiation area.

R313-35-130. X-Ray Systems Greater than 1 MeV used for Non-Destructive Testing.

(1) Equipment.

(a) Individuals shall not receive, possess, use, transfer, own, or acquire a particle accelerator unless it is registered pursuant to R313-16-231.

(b) The registrant shall perform visual and operability checks of indication lights and warning lights before use on each day the equipment is to be used to ensure that the equipment is in good working condition. If equipment problems are found, the equipment shall be removed from service until repaired.

(c) Inspection and routine maintenance of x-ray systems, interlocks, indication lights, exposure switches, and cables shall be made at intervals not to exceed three months or before the first use thereafter to ensure the proper functioning of components important to safety. If equipment problems are found, the equipment shall be removed from service until repaired.

(d) Records demonstrating compliance with R313-35-130(1)(b) shall be made when problems with the equipment are found. These records shall be maintained for a period of three years.

(e) Records demonstrating compliance with R313-35-130(1)(c) shall be made. These records shall be maintained for a period of three years.

(f) Maintenance performed on x-ray systems shall be in accordance with the manufacturer's specifications.

(g) Instrumentation, readouts and controls on the particle accelerator control console shall be clearly identified and easily discernible.

(h) A switch on the accelerator control console shall be routinely used to turn the accelerator beam off and on. The safety interlock system shall not be used to turn off the accelerator beam, except in an emergency.

(2) Shielding and Safety Design Requirements.

(a) An individual who has satisfied a criterion listed in R313-16-400, shall be consulted in the design of a particle accelerator's installation and called upon to perform a radiation survey when the accelerator is first capable of producing radiation.

(b) Particle accelerator installations shall be provided with primary or secondary barriers which are sufficient to assure compliance with R313-15-201 and R313-15-301.

(c) Entrances into high radiation areas or very high radiation areas shall be provided with interlocks that shut down the machine under conditions of barrier penetration.

(d) When a radiation safety interlock system has been tripped, it shall only be possible to resume operation of the accelerator by manually resetting controls first at the position where the interlock has been tripped, and then at the main control console.

(e) Safety interlocks shall be on separate electrical circuits which shall allow their operation independently of other safety interlocks.

(f) Safety interlocks shall be fail-safe. This means that they must be designed so that defects or component failures in the interlock system prevent operation of the accelerator.

(g) The registrant may apply to the Executive Secretary for approval of alternate methods for controlling access to high or very high radiation areas. The Executive Secretary may approve the proposed alternatives if the registrant demonstrates that the alternative methods of control will prevent unauthorized entry into a high or very high radiation area, and the alternative method does not prevent individuals from leaving a high or very high radiation area.

(h) A "scram" button or other emergency power cutoff switch shall be located and easily identifiable in high radiation areas or in very high radiation areas. The cutoff switch shall include a manual reset so that the accelerator cannot be restarted from the accelerator control console without resetting the cutoff switch.

(i) Safety and warning devices, including interlocks, shall be checked for proper operation at intervals not to exceed three months, and after maintenance on the safety and warning devices. Results of these tests shall be maintained for inspection at the accelerator facility for three years.

(j) A copy of the current operating and emergency procedures shall be maintained at the accelerator control panel.

(k) Locations designated as high radiation areas or very high radiation areas and entrances to locations designated as high radiation areas or very high radiation areas shall be equipped with easily observable flashing or rotating warning lights that operate when radiation is being produced.

(l) High radiation areas or very high radiation areas shall have an audible warning device which shall be activated for 15 seconds prior to the possible creation of the high radiation area or the very high radiation area. Warning devices shall be clearly discernible in high radiation areas or in very high radiation areas. The registrant shall instruct personnel in the vicinity of the particle accelerator as to the meaning of this audible warning signal.

(m) Barriers, temporary or otherwise, and pathways leading to high radiation areas or very high radiation areas shall be identified in accordance with R313-15-902.

(3) Personnel Requirements.

(a) Registrants shall not permit individuals to act as particle accelerator operators until the individuals have complied with the following:

(i) been instructed in radiation safety; and

(ii) been instructed pursuant to R313-35-50 and the applicable requirements of R313-15.

(iii) Records demonstrating compliance with R313-35-130(3)(a)(i) and R313-35-130(3)(a)(ii) shall be maintained for a period of three years from the termination date of the individual.

(b) Registrants shall not permit an individual to conduct x-ray operations unless the individual meets the personnel monitoring requirements of R313-35-120(3)(c).

(4) Radiation Monitoring Requirements.

(a) At particle accelerator facilities, there shall be available appropriate portable monitoring equipment which is operable and has been calibrated for the radiations being produced at the facility. On each day the particle accelerator is to be used, the portable monitoring equipment shall be tested for proper operation.

(b) When changes have been made in shielding, operation, equipment, or occupancy of adjacent areas, a radiation protection survey shall be performed and documented by an individual who has satisfied a criterion listed in R313-16-400 or the individual designated as being responsible for radiation safety.

(c) Records of radiation protection surveys, calibrations, and instrumentation tests shall be maintained at the accelerator facility for inspection by representatives of the Board or the Executive Secretary for a period of three years.

R313-35-140. Duties and Authorities of a Radiation Safety Officer.

Facilities operating x-ray systems under R313-35-130 shall appoint a Radiation Safety Officer. The specific duties and authorities of the Radiation Safety Officer include, but are not limited to:

(1) establishing and overseeing all operating, emergency, and ALARA procedures as required by R313- 15;

(2) ensuring that radiation safety activities are being performed in accordance with approved procedures and regulatory requirements in the daily operation of the registrant's program;

(3) overseeing and approving the training program for radiographic personnel, ensuring that appropriate and effective radiation protection practices are taught;

(4) ensuring that required radiation surveys are performed and documented in accordance with the R313-35-130(4);

(5) ensuring that personnel monitoring devices are calibrated and used properly by occupationally exposed personnel, that records are kept of the monitoring results, and that timely notifications are made as required by R313-15-1203; and

(6) ensuring that operations are conducted safely and to assume control for instituting corrective actions including stopping of operations when necessary.

KEY

industry, x-ray, veterinarians, surveys

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19-3-104; 19-3-108

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Rule R313-36. Special Requirements for Industrial Radiographic Operations.

As in effect on September 1, 2002

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R313-36-1. Purpose and Authority.

(1) The rules in R313-36 prescribe requirements for the issuance of licenses and establish radiation safety requirements for persons utilizing sources of radiation for industrial radiography.

(2) The rules set forth herein are adopted pursuant to the provisions of Sections 19-3-104(3) and 19-3-104(6).

(3) The requirements of R313-36 are in addition to, and not in substitution for, the other requirements of these rules.

R313-36-2. Scope.

(1) The requirements of R313-36 shall apply to licensees using radioactive materials to perform industrial radiography.

(2) The requirements of R313-36 shall not apply to persons using electronic sources of radiation to conduct industrial radiography.

R313-36-3. Clarifications or Exceptions.

For purposes of R313-36, 10 CFR 34 (2001), is incorporated by reference with the following clarifications or exceptions:

(1) The exclusion of the following 10 CFR sections: "34.1", "34.5", "34.8", "34.11", "34.121", and "34.123";

(2) The exclusion of "10 CFR 34.45(a)(9)";

(3) The exclusion of the following 10 CFR references within 10 CFR 34: "21", "30.7", "30.9", and "30.10";

(4) The exclusion of "offshore" in 10 CFR 34.3 definition for "offshore platform radiography";

(5) The substitution of the following wording:

(a) "Utah Radiation Control Rules" for the reference to:

(i) "Commission's regulations", except as stated in R313-36-3(5)(f);

(ii) "Federal regulations"; and

(iii) "NRC regulations";

(b) "Executive Secretary" for the reference to "Commission", except as stated in 10 CFR 34.20 and R313-36-3(5)(c)(iv);

(c) "Executive Secretary, U.S. Nuclear Regulatory Commission, or an Agreement State" for references to:

(i) "NRC or an Agreement State";

(ii) "Commission or by an Agreement State";

(iii) "Commission or an Agreement State"; and

(iv) "Commission" in 10 CFR 34.43(a)(2);

(d) "License" for reference to "NRC license(s)";

(e) In 10 CFR 34.27(d), "reports of test results for leaking or contaminated sealed sources shall be made pursuant to R313-15-1208.", for reference to the following statements:

(i) "A report must be filed with the Director of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, within 5 days of any test with results that exceed the threshold in this subsection, describing the equipment involved, the test results, and the corrective action taken."; and

(ii) "A copy of the report must be sent to the Administrator of the appropriate Nuclear Regulatory Commission's Regional Office listed in appendix D of 10 CFR part 20 of this chapter "Standards for Protection Against Radiation.";

(f) In 10 CFR 34.27(d), "R313-15-401(6)" for the reference to "Commission regulations";

(g) In 10 CFR 34.89, "a U.S. Nuclear Regulatory Commission or an Agreement State" for the reference to "the Agreement State";

(h) In 10 CFR 34.101(a), "Executive Secretary" for the following wording:

(i) "U.S. Nuclear Regulatory Commission, Division of Industrial and Medical Nuclear Safety, Washington, D.C. 20555-0001, with a copy to the Director, Office for Analysis and Evaluation of Operational Data, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001";

(i) In 10 CFR 34.101(c), "Executive Secretary" for the reference to "appropriate NRC regional office listed in 10 CFR 30.6(a)(2) of this chapter";

(j) In Item 12, Section I of Appendix A to 10 CFR 34, "Executive Secretary, the U.S. Nuclear Regulatory Commission and other independent certifying organizations and/or Agreements States" for the reference to "Commission and other independent certifying organizations and/or Agreement States";

(k) In Item 1, Section II of Appendix A to 10 CFR 34, "equivalent U.S. Nuclear Regulatory Commission or Agreement State regulations" for the reference to "equivalent Agreement State regulations"; and

(l) In Item 2(c), Section II of Appendix A to 10 CFR, "a Utah, U.S. Nuclear Regulatory Commission, or an Agreement State licensee" for the reference to "an Agreement State or a NRC licensee"; and

(6) The substitution of the following R313 references for specific 10 CFR references:

(a) "R313-12-55(1)" for reference to "10 CFR 34.111";

(b) "R313-15" for the reference to "10 CFR 20";

(c) "R313-15-601(1)(a)" for the reference to "10 CFR 20.1601(a)(1)";

(d) "R313-15-902" for the reference to "10 CFR 20.1902";

(e) "R313-15-903" for the reference to "10 CFR 20.1903";

(f) "R313-15-1203" for the reference to "10 CFR 20.2203";

(g) "R313-18" for the reference to "10 CFR 19";

(h) "R313-19-30" for the reference to "10 CFR 150.20";

(i) "R313-19-50" for the reference to "10 CFR 30.50";

(j) "R313-19-100" for the reference to "10 CFR 71", "10 CFR 71.5", and "49 CFR 171 to 173";

(k) "R313-22-33" for the reference to "10 CFR 30.33"; and

(l) "R313-36" for the reference to "10 CFR 34."

KEY

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Rule converted into HTML by the Division of Administrative Rules.

For questions regarding the *content* or *application* of rules under Title R313, please contact the promulgating agency (Environmental Quality, Radiation Control). A list of agencies with links to their homepages is available at **http://www.utah.gov/government/agencylist.html.**

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Rule R313-38. Licenses and Radiation Safety Requirements for Well Logging.

As in effect on September 1, 2002

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R313-38-1. Purpose and Authority.

(1) Rule R313-38 prescribes requirements for the issuance of a license authorizing the use of licensed materials including sealed sources, radioactive tracers, radioactive markers, and uranium sinker bars in well logging in a single well. This rule also prescribes radiation safety requirements for persons using licensed materials in these operations.

(2) The rules set forth herein are adopted pursuant to the provisions of Subsections 19-3-104(3) and 19-3-104(6).

(3) The provisions and requirements of Rule R313-38 are in addition to, and not in substitution for, the other requirements of these rules. In particular, the provisions of Rules R313-15, R313-18, R313-19, and R313-22 apply to applicants and licensees subject to these rules.

R313-38-2. Scope.

(1) The requirements of Rule R313-38 do not apply to the issuance of a license authorizing the use of licensed material in tracer studies involving multiple wells, such as field flooding studies, or to the use of sealed sources auxiliary to well logging but not lowered into wells.

R313-38-3. Clarifications or Exceptions.

For purposes of Rule R313-38, 10 CFR 39 (2001), is incorporated by reference with the following

clarifications or exceptions:

(1) The exclusion of the following 10 CFR sections: 39.1, 39.5, 39.8, 39.11, 39.101, and 39.103;

(2) The exclusion of the following 10 CFR references within 10 CFR 39: Sec. 40.32, and Sec. 70.33;

(3) The exclusion of "licensed material" in 10 CFR 39.2 definitions;

(4) The substitution of the following wording:

(a) License for reference to NRC license;

(b) Utah Radiation Control Rules for the references to:

(i) The Commission's regulations;

(ii) The NRC regulations;

(iii) NRC regulations; and

(iv) Pertinent Federal regulations;

(c) Executive Secretary for reference to Commission, except as stated in Subsection R313-38- 3 (4)(d);

(d) Representatives of the Executive Secretary for the references to the Commission in:

(i) 10 CFR 39.33(d);

(ii) 10 CFR 39.35(a);

(iii) 10 CFR 39.37;

(iv) 10 CFR 39.39(b); and

(v) 10 CFR 39.67(f);

(e) Executive Secretary or the Executive Secretary for references to:

(i) NRC in:

(A) 10 CFR 39.63(l);

(B) 10 CFR 39.77(c)(1)(i) and (ii); and

(C) 10 CFR 39.77(d)(9); and

(ii) Appropriate NRC Regional Office in:

(A) 10 CFR 39.77(a);

(B) 10 CFR 39.77(c)(1); and

(C) 10 CFR 39.77(d);

(f) Executive Secretary, the U.S. Nuclear Regulatory Commission or an Agreement State for the references to:

(i) Commission or an Agreement State in:

(A) 10 CFR 39.35(b); and

(B) 10 CFR 39.43(d) and (e); and

(ii) Commission pursuant to Sec. 39.13(c) or by an Agreement State in:

(A) 10 CFR 39.43(c); and

(B) 10 CFR 39.51;

(g) In 10 CFR 39.35(d)(1), persons specifically licensed by the Executive Secretary, the U.S. Nuclear Regulatory Commission, or an Agreement State for the reference to an NRC or Agreement State licensee that is authorized; and

(h) In 10 CFR 39.35(d)(2), reports of test results for leaking or contaminated sealed sources shall be made pursuant to Section R313-15-1208, for the reference to the following statement:

(i) The licensee shall submit a report to the appropriate NRC Regional Office listed in appendix D of part 20 of this chapter, within 5 days of receiving the test results. The report must describe the equipment involved in the leak, the test results, any contamination which resulted from the leaking source, and the corrective actions taken up to the time the report is made; and

(i) In 10 CFR 39.75(e), a U.S. Nuclear Regulatory Commission or an Agreement State for the reference to the Agreement State;

(5) The substitution of the following Title R313 references for specific 10 CFR references:

(a) Section R313-12-3 for the reference to Sec. 20.1003 of this chapter;

(b) Section R313-12-54 for the reference to 10 CFR 39.17;

(c) Subsection R313-12-55(1) for the reference to 10 CFR 39.91;

(d) Rule R313-15 for references to:

(i) Part 20; and

(ii) Part 20 of this chapter;

(e) Subsection R313-15-901(1) for the reference to Sec. 20.1901(a);

(f) Section R313-15-906 for the reference to Sec. 20.205 of this chapter;

(g) Sections R313-15-1201 through R313-15-1203 for the references to:

(i) Secs. 20.2201-20.2202; and

(ii) Sec. 20.2203;

(h) Rule R313-18 for the reference to part 19;

(i) Section R313-19-30 for the reference to Sec. 150.20 of this chapter;

(j) Section R313-19-50 for the references to:

(i) Sec. 30.50; and

(ii) Part 21 of this chapter;

(k) Section R313-19-71 for the reference to Sec. 30.71;

(l) Section R313-19-100 for the references to:

(i) 10 CFR Part 71; and

(ii) Sec. 71.5 of this chapter; and

(m) Section R313-22-33 for the reference to 10 CFR 30.33;

KEY

radioactive material, well logging, surveys, subsurface tracer studies

Date of Enactment or Last Substantive Amendment

September 14, 2001

Notice of Continuation

January 25, 1999

Authorizing, Implemented, or Interpreted Law

19-3-104; 19-3-108

Rules. *Please Note:* The Division of Administrative Rules is ***not able*** to answer questions about the content or application of these rules.

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Rule R313-70. Payments, Categories and Types of Fees.

As in effect on September 1, 2002

Table of Contents

R313-70-1. General.

R313-70 applies to persons who receive, possess, or use sources of radiation provided, however, that nothing in these rules shall apply to the extent a person is subject to regulations by the U.S. Nuclear Regulatory Commission. The fees charged are authorized by subsection 19-3-104(4) of the Environmental Quality Code.

R313-70-3. Communications.

Communications concerning the rules in R313-70 should be addressed to the Executive Secretary, and may be sent to the Division of Radiation Control, Department of Environmental Quality. Communications may be delivered in person at the Division of Radiation Control offices.

R313-70-5. Payment of Fees.

(1) New Application Fee: Applications for machine registration or radioactive material licensing for which a fee is prescribed, shall be accompanied by a remittance in the full amount of the fee. Applications will not be accepted for filing or processing prior to payment of the full amount specified. Applications for which no remittance is received will be returned to the applicant. Application fees will be charged irrespective of the Executive Secretary's disposition of the application or a withdrawal of the application.

(2) Annual Fee: Persons and individuals who are subject to licensing or registration of radioactive material or radiation machine registration with the Department of Environmental Quality under provisions of the Utah Radiation Control Rules, are assessed an annual fee in accordance with categories of R313-70-7 and R313-70-8. The appropriate fee shall be filed annually with the Executive Secretary, by July 30 for registrants or by the anniversary date for licensees. Fees for radiation machine registration will be considered late if not received annually by the last day of August. Licensees may be assessed late fees if license fees are not received within 30 days after the license anniversary date. Late fees may also be assessed for successive 30 day periods during which the annual fee or registration fee remains unpaid.

(3) Inspection Fee: Persons and entities who, under provisions of the Utah Radiation Control Rules, are subject to radiation machine registration with the Department of Environmental Quality are assessed an inspection fee in accordance with R313-70-8. Fees for inspection of a radiation machine are due within 30 days of receipt of an invoice from the Agency. Registrants may be assessed late fees if inspection fees are not received in a timely manner.

(4) Failure to pay the prescribed fee: the Executive Secretary will not process applications and may suspend or revoke licenses or registrations or may issue an order with respect to the activities as the Executive Secretary determines to be appropriate or necessary in order to carry out the provisions of this part of R313-70, and of the Act.

(a) General license certificates of registration and specific licenses issued pursuant to the provisions in R313-21 or R313-22, will be valid for a period of five years unless failure to submit appropriate fee occurs. Machine registrations will be valid for one year during the interval outlined in R313-16-230. Failure to submit appropriate fees will render the license, certificate or registration invalid, at which time a new application with appropriate fees shall be submitted.

(b) Renewal applications shall be filed in a timely manner in accordance with R313-22-37 or R313-16- 230. The radioactive material license will expire on the date specified on the license. Machine registration will expire as outlined in R313-16-230. An expired license cannot be renewed, rather the licensee will be required to submit an application for a new license and submit the appropriate application and new license fee.

(4) Method of Payment: Fees shall be made payable to: Division of Radiation Control, Department of Environmental Quality.

R313-70-7. License Categories and Types of Fees for Radioactive Materials Licenses.

Fees shall be established in accordance with the Legislative Appropriations Act. Copies of established fee schedules may be obtained from the Executive Secretary.

TABLE

LICENSE CATEGORY	TYPE OF FEE
(1) Special Nuclear Material	
(a) Licenses for possession and use of special nuclear material in sealed sources contained in devices used in industrial measuring systems,	New License or Renewal Annual Fee

including x-ray fluorescence analyzers and neutron generators.	
(b) Licenses for possession and use of less than 15 g special nuclear material in unsealed form for research and development.	New License or Renewal Annual Fee
(c) All other special nuclear material licenses.	New License or Renewal Annual Fee
(d) Special nuclear material to be used as calibration and reference sources.	New License or Renewal Annual Fee
(2) Source Material.	
(a) Licenses for concentrations of uranium from other areas like copper or phosphates for the production of moist, solid, uranium yellow cake.	New License or Renewal Annual Fee
(b) Licenses for possession and use of source material in recovery operations such as milling, in-situ leaching, heap-leaching, ore buying stations, and ion exchange facilities, and in processing of ores containing source material for extraction of metals other than uranium or thorium, including licenses authorizing the possession of byproduct waste material (tailings) from source material recovery operations, as well as licenses authorizing the possession and maintenance of a facility in a standby mode.	Annual Fee
(c) Licenses that authorize the receipt of byproduct material, as [illegible] 19-3-102, from other persons for possession and disposal.	Annual Fee

(d) Licenses that authorize the receipt of byproduct material, as defined in Section 19-3-102, from other persons for possession and disposal incidental to the disposal of the uranium waste tailings generated by the licensee's milling operations.	Annual Fee
(e) Licenses for possession and use of source material for shielding.	New License or Renewal Annual Fee
(f) All other source material licenses.	New License or Renewal Annual Fee
(3) Radioactive Material Other than Source Material and Special Nuclear Material.	
(a)(i) Licenses of broad scope for possession and use of radioactive material for processing or manufacturing of items containing radioactive material for commercial distribution.	New License or Renewal Annual Fee
(a)(ii) Other licenses for possession and use of radioactive material for processing or manufacturing of items containing radioactive material for commercial distribution.	New License or Renewal Annual Fee
(b) Licenses authorizing the processing or manufacturing and distribution or redistribution of radio-pharmaceuticals, generators, reagent kits, or sources or devices containing radioactive material.	New License or Renewal Annual Fee
(c) Licenses authorizing distribution or	New License or Renewal Annual Fee

redistribution of radiopharmaceuticals, generators, reagent kits, or sources or devices not involving processing of radioactive material.	
(d) Licenses for possession and use of radioactive material for industrial radiography operations.	New License or Renewal Annual Fee
(e) Licenses for possession and use of sealed sources for irradiation of materials in which the source is not removed from its shield (self-shielded units).	New License or Renewal Annual Fee
(f)(i) Licenses for possession and use of less than 10,000 curies of radioactive material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes.	New License or Renewal Annual Fee
(f)(ii) Licenses for possession and use of 10,000 curies or more of radioactive material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes.	New License or Renewal Annual Fee
(g) Licenses to distribute items containing radioactive material that require device review to persons exempt from the	New License or Renewal Annual Fee

licensing requirements of R313-19, except specific licenses authorizing redistribution of items that have have been authorized for distribution to persons exempt from the licensing requirements of R313-19.	
(h) Licenses to distribute items containing radioactive material or quantities of radioactive material that do not require device evaluation to persons exempt from the licensing requirements of R313-19, except for specific licenses authorizing redistribution of items that have been authorized for distribution to persons exempt from the licensing requirements of R313-19.	New License or Renewal Annual Fee
(i) Licenses to distribute items containing radio-active material that require sealed source or device review to persons generally licensed under R313-21, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons generally licensed under R313-21.	New License or Renewal Annual Fee
(j) Licenses to distribute items containing radioactive material or quantities of	New License or Renewal Annual Fee

radioactive material that do not require sealed source or device review to persons generally licensed under R313-21, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons generally licensed under R313-21.	
(k) Licenses for possession and use of radioactive material for research and development, which do not authorize commercial distribution.	New License or Renewal Annual Fee
(l) All other specific radioactive material licenses.	New License or Renewal Annual Fee
(m) Licenses of broad scope for possession and use of radioactive material for research and development which do not authorize commercial distribution.	New License or Renewal
(n) Licenses that authorize services for other licensees, except licenses that authorize leak testing or waste disposal services which are subject to the fees specified for the listed services.	New License or Renewal Annual Fee
(o) Licenses that authorize services for leak testing only.	New License or Renewal Annual Fee
(4) Radioactive Waste Disposal:	
(a) Licenses specifically authorizing the receipt of	Application Fee New License or Renewal

waste radioactive material from other persons for the purpose of commercial disposal by land by the licensee.	
(b) Licenses specifically authorizing the receipt of waste radioactive material from other persons for the purpose of packaging or repackaging the material. The licensee will dispose of the material by transfer to another person authorized to receive or dispose of the material.	New License or Renewal Annual Fee
(c) Licenses specifically authorizing the receipt of prepackaged waste radioactive material from other persons. The licensee will dispose of the material by transfer to another person authorized to receive or dispose of the material.	New License or Renewal Annual Fee
(d) Licenses authorizing packaging of radioactive waste for shipment to waste disposal site where licensee does not take possession of waste material.	New License or Renewal Annual Fee
(5) Well logging, well surveys and tracer studies.	
(a) Licenses for possession and use of radioactive material	New License or Renewal Annual Fee

for well logging, well surveys and tracer studies other than field flooding tracer studies.	
(b) Licenses for possession and use of radioactive material for field flooding tracer studies.	New License or Renewal Annual Fee
(6) Nuclear laundries.	
(a) Licenses for commercial collection and laundry of items contaminated with radioactive material.	New License or Renewal Annual Fee
(7) Human use of radioactive material.	
(a) Licenses for human use of radioactive material in sealed sources contained in teletherapy devices.	New License or Renewal Annual Fee
(b) Other licenses issued for human use of radioactive material, except licenses for use of radioactive material contained in teletherapy devices.	New License or Renewal Annual Fee
(c) Licenses of broad scope issued to medical institutions or two or more physicians authorizing research and development, including human use of radioactive material, except licenses for radio-active material in sealed sources contained in teletherapy devices.	New License or Renewal Annual Fee
(8) Civil Defense.	
(a) Licenses for possession and use of radioactive material for civil	New License or Renewal Annual Fee

defense activities.	
(9) Power Source.	
(a) Licenses for the manufacture and distribution of encapsulated radioactive material wherein the decay energy of the material is used as a source for power.	New License or Renewal Annual Fee
(10) General License.	
(a) Measuring, gauging and control devices as described in R313-21-22(4), other than hydrogen-3 (tritium) devices and polonium-210 devices containing no more than 10 millicuries used for producing light or an ionized atmosphere.	Fee per registration certificate
(b) In Vitro testing	Fee per registration certificate
(c) Depleted uranium	Fee per registration certificate
(d) Reciprocal recognition, as provided for in R313-19-30, of a license issued by the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State.	Annual fee for license category listed in R313-70-7(1) through (10), per 180 days in one calendar year

R313-70-8. Registration and Inspection Categories and Types of Fees for Registration of Radiation Machines.

(1) For machines registered under R313-16-230, registrants will pay an annual registration fee and an inspection fee that shall be established in accordance with the Legislative Appropriations Act. Copies of established fee schedules may be obtained from the Executive Secretary.

TABLE

FACILITY TYPE	TYPE OF FEE	
Hospital/Therapy	Registration	Annual per control unit and first tube plus annual per each additional tube

		connected to a control unit.
	State Inspection	Per tube.
Medical	Registration	Annual per control unit and first tube plus annual per each additional tube connected to a control unit.
	State Inspection	Per tube.
Podiatry	Registration	Annual per control unit and first tube plus annual per each additional tube connected to a control unit.
	State Inspection	Per tube.
Veterinary	Registration	Annual per control unit and first tube plus annual per each additional tube connected to a control unit.
	State Inspection	Per tube.
Chiropractic	Registration	Annual per control unit and first tube plus annual per each additional tube connected to a control unit.
	State Inspection	Per tube.
Dental	Registration	Annual per control unit and first tube plus annual per each additional tube connected to a control unit.
	State Inspection	Per control unit and first tube plus each additional tube connected to a control unit.
Industrial Facility with High or Very High Radiation Areas Accessible to Individuals	Registration	Annual per control unit and first tube plus annual per each additional tube connected to a control unit.
	State Inspection	Per tube.
Industrial Facility with Cabinet X-ray or Units Designed	Registration	Annual per control unit and first tube plus annual

for Other Industrial Purposes		per each additional tube connected to a control unit.
	State Inspection	Per tube.
Other	Registration	Annual per control unit and first tube plus annual per each additional tube connected to a control unit.
	State Inspection	Per tube.
Acceptance of work, performed by a person meeting the qualifications in R313-16-400, that demonstrates compliance with these rules.		Per tube reviewed.

R313-70-9. Other Fees for Services.

TABLE

(1) Expedited application review. Applicable when, by mutual consent of the applicant and affected staff, an application request is taken out of date order and processed by staff during non-work hours.	Hourly
(2) Review of plans for decommissioning, decontamination, reclamation, or site restoration activities.	Plan Review Plus Hourly
(3) Management and oversight of impounded radioactive material.	Actual Cost
(4) License amendment, for greater than three applications in a calendar year.	Amendment Fee

KEY

radioactive material, x-rays, registration, fees

Date of Enactment or Last Substantive Amendment

August 28, 2002

Notice of Continuation

October 10, 2001

Authorizing, Implemented, or Interpreted Law

19-3-104(6)

TITLE 19
ENVIRONMENTAL QUALITY CODE
[Current through 2002 Fourth Special Session]

CHAPTER 1
GENERAL PROVISIONS

Part 1
Organization.

Part 2
Powers.

Part 3
Administration.

19-1-101 Short Title.
The title is known as the "Environmental Quality Code."

19-1-102 Purposes.
The purpose of this title is to:
(1) clarify the powers and duties of the Department of Environmental Quality in relationship to local health departments;
(2) provide effective, coordinated management of state environmental concerns;
(3) safeguard public health and quality of life by protecting and improving environmental quality while considering the benefits to public health, the impacts on economic development, property, wildlife, tourism, business, agriculture, forests, and other interests, and the costs to the public and to industry; and
(4)(a) strengthen local health departments' environmental programs;
(b) build consensus among the public, industry, and local governments in developing environmental protection goals; and
(c) appropriately balance the need for environmental protection with the need for economic and industrial development.

19-1-103 Definitions.
As used in this title:
(1) "Department" means the Department of Environmental Quality.
(2) "Executive director" means the executive director of the department appointed pursuant to Section 19-1-104.
(3) "Local health department" means a local health department as defined in Title 26A, Chapter 1,

Part 1.

(4) "Person" means an individual, trust, firm, estate. company, corporation, partnership, association, state, state or federal agency or entity, municipality, commission, or political subdivision of a state.

19-1-104 Creation of department -- Appointment of executive director.

(1) There is created within state government the Department of Environmental Quality. The department shall be administered by an executive director.

(2) The executive director shall be appointed by the governor with the consent of the Senate and shall serve at the pleasure of the governor.

(3) The executive director shall have demonstrated the necessary administrative and professional ability through education and experience to efficiently and effectively manage the department's affairs.

(4) The Legislature shall fix the compensation of the executive director in accordance with Title 67, Chapter 22, State Officer Compensation.

Amended by ch 176 , § 20, 2002 General Session (S B. 10)

19-1-105 Divisions of department --Control by division directors.

(1) The following divisions are created within the department:

(a) the Division of Air Quality, to administer Title 19, Chapter 2;

(b) the Division of Drinking Water, to administer Title 19, Chapter 4;

(c) the Division of Environmental Response and Remediation, to administer Title 19, Chapter 6, Parts 3 and 4;

(d) the Division of Radiation, to administer Title 19, Chapter 3;

(e) the Division of Solid and Hazardous Waste, to administer Title 19, Chapter 6, Parts 1, 2, and 5; and

(f) the Division of Water Quality, to administer Title 19, Chapter 5.

(2) Each division is under the immediate direction and control of a division director appointed by the executive director.

(3) Each division director shall possess the necessary administrative skills and training to adequately qualify him for his position. He shall have graduated from an accredited college or university with:

(a) a four-year degree in physical or biological science or engineering;

(b) a related degree; or

(c) a degree in law.

(4) Each director may be removed at the will of the executive director.

19-1-106 Boards within department.

(1) The following policymaking boards are created within the department:

(a) the Air Quality Board, appointed under Section 19-2-103;

(b) the Radiation Control Board, appointed under Section 19-3-103;

(c) the Drinking Water Board, appointed under Section 19-4-103;

(d) the Water Quality Board, appointed under Section 19-5-103; and

(e) the Solid and Hazardous Waste Control Board, appointed under Section 19-6-103.

(2) The authority of the boards created in Subsection (1) is limited to the specific authority granted them under this title

Decisions

Hearings

The authority of the Utah Drinking Water Board is limited to the specific authority granted it under Title 19, which does not specifically authorize the Board to hold adjudicative hearings Department of Envtl Quality v Golden Gardens Water Co , 2001 UT App. 173, 27 P.3d 579 (decided before 2002 amendments authorized hearings under Section 19-4-104(b) and (c)).

19-1-107. Environmental Quality Coordinating Committee created -- Chair -- Function -- Meetings -- Per diem and expenses.

Repealed. by ch. 105, § 1, 2002 General Session (H. B. 15).

19-1-108 Creation of environmental quality restricted account -- Purpose of restricted account -- Sources of funds -- Uses of funds.

(1) There is created the Environmental Quality Restricted Account.

(2) The sources of monies for the restricted account are:

(a) radioactive waste disposal fees collected under Sections 19-3-106 and 19-3-106.4 and other fees collected under Subsection 19-3-104(5);

(b) hazardous waste disposal fees collected under Section 19-6-118;

(c) PCB waste disposal fees collected under Section 19-6-118.5;

(d) nonhazardous solid waste disposal fees collected under Section 19-6-119; and

(e) all investment income derived from money in the restricted account created in this section.

(3) In each fiscal year, the first $500,000 collected from all waste disposal fees listed in Subsection (2), collectively, shall be deposited in the General Fund as free revenue. The balance shall be deposited in the restricted account created in this section.

(4) The Legislature may annually appropriate monies from the Environmental Quality Restricted Account to:
(a) the department for the costs of administering radiation control programs;
(b) the department for the costs of administering solid and hazardous waste programs; and
(c) the Hazardous Substances Mitigation Fund, up to $400,000, for purposes set forth in Title 19, Chapter 6, Part 3, Hazardous Substances Mitigation Act.

(5) In order to stabilize funding for the radiation control program and the solid and hazardous waste program, the Legislature shall in years of excess revenues reserve in the restricted account sufficient monies to meet departmental needs in years of projected shortages.

(6) The Legislature may not appropriate money from the General Fund to the department as a supplemental appropriation to cover the costs of the radiation control program and the solid and hazardous waste program in an amount exceeding 25% of the amount of waste disposal fees collected during the most recent prior fiscal year.

(7) The Legislature may annually appropriate not more than $200,000 from this account to the Department of Public Safety, created in Section 53-1-103, to be used by that department solely for hazardous materials:
(a) management training; and
(b) response preparation and emergency response training.

(8) All funds appropriated under this part that are not expended at the end of the fiscal year lapse into the account created in Subsection (1).

(9) For fiscal year 1998-99, up to $537,000 in the Environmental Quality Restricted Account may be appropriated by the Legislature to fund legislative priorities.

Amended by ch. 417, § 1, 1998 General Session
Amended by ch. 314, § 1, 2001 General Session (H.B. 370)
Amended by ch. 297, § 1, 2002 General Session (S.B. 96)

POWERS

19-1-201 Powers of department.

(1) The department shall:
(a) enter into cooperative agreements with the Department of Health to delineate specific responsibilities to assure that assessment and management of risk to human health from the environment are properly administered;
(b) consult with the Department of Health and enter into cooperative agreements, as needed, to ensure efficient use of resources and effective response to potential health and safety threats from the environment, and to prevent gaps in protection from potential risks from the environment to specific individuals or population groups; and
(c) coordinate implementation of environmental programs to maximize efficient use of resources by developing, with local health departments, a Comprehensive Environmental Service Delivery Plan that:
(i) recognizes that the department and local health departments are the foundation for providing environmental health programs in the state;
(ii) delineates the responsibilities of the department and each local health department for the efficient delivery of environmental programs using federal, state, and local authorities, responsibilities, and resources;
(iii) provides for the delegation of authority and pass through of funding to local health departments for environmental programs, to the extent allowed by applicable law, identified in the plan, and requested by the local health department; and
(iv) is reviewed and updated annually.

(2) The department may:
(a) investigate matters affecting the environment;
(b) investigate and control matters affecting the public health when caused by environmental hazards;
(c) prepare, publish, and disseminate information to inform the public concerning issues involving environmental quality;
(d) establish and operate programs, as authorized by this title, necessary for protection of the environment and public health from environmental hazards;
(e) use local health departments in the delivery of environmental health programs to the extent provided by law;
(f) enter into contracts with local health departments or others to meet responsibilities

established under this title;
(g) acquire real and personal property by purchase, gift, devise, and other lawful means,
(h) prepare and submit to the governor a proposed budget to be included in the budget submitted by the governor to the Legislature;
(i)(i) establish a schedule of fees that may be assessed for actions and services of the department according to the procedures and requirements of Section 63-38-3.2; and
(ii) in accordance with Section 63-38-3.2, all fees shall be reasonable, fair, and reflect the cost of services provided;
(j) prescribe by rule reasonable requirements not inconsistent with law relating to environmental quality for local health departments;
(k) perform the administrative functions of the boards established by Section 19-1-106, including the acceptance and administration of grants from the federal government and from other sources, public or private, to carry out the board's functions; and
(l) upon the request of any board or the executive secretary, provide professional, technical, and clerical staff and field and laboratory services, the extent of which are limited by the funds available to the department for the staff and services.

19-1-202 Duties and powers of the executive director.
(1) The executive director shall:
(a) administer and supervise the department;
(b) coordinate policies and program activities conducted through boards, divisions, and offices of the department;
(c) approve the proposed budget of each board, division, and office within the department;
(d) approve all applications for federal grants or assistance in support of any department program; and
(e) with the governor's specific, prior approval, expend funds appropriated by the Legislature necessary for participation by the state in any fund, property, or service provided by the federal government.
(2) The executive director may:
(a) issue orders to enforce state laws and rules established by the department except where the enforcement power is given to a board created under Section 19-1-106, unless the executive director finds that a condition exists which creates a clear and present hazard to the public health or the environment and which requires immediate action, and if the enforcement power is vested with a board created under Section 19-1-106, the executive director may with the concurrence of the governor order any person causing or contributing to the condition to reduce, mitigate, or eliminate the condition;
(b) with the approval of the governor, participate in the distribution, disbursement, or administration of any fund or service, advanced, offered, or contributed by the federal government for purposes consistent with the powers and duties of the department;
(c) accept and receive funds and gifts available from private and public groups for the purposes of promoting and protecting the public health and the environment and expend the funds as appropriated by the Legislature;
(d) make policies not inconsistent with law for the internal administration and government of the department, the conduct of its employees, and the custody, use, and preservation of the records, papers, books, documents, and property of the department;
(e) create advisory committees as necessary to assist in carrying out the provisions of this title;
(f) appoint division directors who may be removed at the will of the executive director, and who shall be compensated in an amount fixed by the executive director;
(g) advise, consult, and cooperate with other agencies of the state, the federal government, other states and interstate agencies, affected groups, political subdivisions, and industries in carrying out the purposes of this title;
(h) consistent with Title 67, Chapter 19, Utah State Personnel Management Act, employ employees necessary to meet the requirements of this title;
(i) authorize any employee or representative of the division to conduct inspections as permitted in this title;
(j) encourage, participate in, or conduct any studies, investigations, research, and demonstrations relating to hazardous materials or substances releases necessary to meet the requirements of this title;
(k) collect and disseminate information about hazardous materials or substances releases; and
(l) review plans, specifications, or other data relating to hazardous substances releases as provided in this title.

19-1-203 Representatives of department authorized to enter regulated premises

(1) Authorized representatives of the department, upon presentation of appropriate credentials, may enter at reasonable times upon the premises of properties regulated under this title to perform inspections to insure compliance with rules made by the department

(2) The inspection authority provided in this section does not apply to chapters in this title which provide for specific inspection procedures and authority.

19-1-204 Legal advice and representation for department.

(1) The attorney general is the legal adviser for the department and the executive director and shall defend them in all actions and proceedings brought against either of them.

(2) The attorney general or the county attorney of the county in which a cause of action arises or a public offense occurs shall bring any civil or criminal action requested by the executive director or any board created in Section 19-1-106 to abate a condition which exists in violation of, or to prosecute for the violation of or for the enforcement of, the laws or standards, orders, and rules of the department.

19-1-205 Assumption of responsibilities.

The department assumes all the policymaking functions, regulatory and enforcement powers, rights, duties, and responsibilities of the Division of Environmental Health, the Air Conservation Committee, the Solid and Hazardous Waste Committee, the Utah Safe Drinking Water Committee, and the Water Pollution Control Committee previously vested in the Department of Health and its executive director:

(1) including programs for individual wastewater disposal systems, liquid scavenger operations, and vault and earthen pit privies; but

(2) excluding all other sanitation programs, which shall be administered by the Department of Health

PART 3
ADMINISTRATION

19-1-301 Adjudicative proceedings.

The department and its boards shall comply with the procedures and requirements of Title 63, Chapter 46b, Administrative Procedures Act.

19-1-302 Violation of laws and orders unlawful

It is unlawful for any person:

(1) to violate the provisions of the laws of this title or the terms of any order or rule issued under it; or

(2) to fail to remove or abate from private property under the person's control at his own expense within 48 hours, or such other reasonable time as the department determines, after being ordered to do so, any nuisance, source of filth, or other sanitation violation.

19-1-303 Criminal and civil penalties -- Liability for violations.

(1)(a) Any person who violates any provision of this title or lawful orders or rules adopted under this title by the department shall:

(i) in a civil proceeding be assessed a penalty not to exceed the sum of $5,000; or

(ii) in a criminal proceeding:

(A) for the first violation, be guilty of a class B misdemeanor; and

(B) for a subsequent similar violation within two years, be guilty of a class A misdemeanor.

(b) In addition, a person is liable for any expense incurred by the department in removing or abating any violation.

(2) Assessment or conviction under this title does not relieve the person assessed or convicted from civil liability for any act which was also a violation of the public health laws.

(3) Each day of violation of this title or rules made by the department under it may be considered a separate violation

(4) The enforcement procedures and penalties provided in Subsections (1) through (3) do not apply to chapters in this title which provide for other specific enforcement procedures and penalties.

(5) Unless otherwise specified in statute, the department shall deposit all civil penalties and fines imposed and collected under this title into the General Fund.

19-1-304 Principal and branch offices of department.

(1) The principal office of the department shall be in Salt Lake County.

(2) The department may establish branch offices at other places in the state to furnish comprehensive and effective environmental programs and to coordinate with and assist local health officers.

19-1-305 Administrative enforcement proceedings - Tolling of limitation period.
The issuance of an administrative enforcement notice of a violation or an order under Section 19-1-202, 19-2-110, 19-4-107, 19-6-404, 19-5-111, or 19-6-112, or issuance of a notice of agency action under Section 19-3-109 or 19-6-407 tolls the running of the period of limitation for commencement of a civil action brought to assess or collect a penalty until the date the notice of violation, order, or agency action becomes final under Title 63, Chapter 46b, Administrative Procedures Act, or for a period of three years, whichever occurs first.

19-1-306 Records of the department.
(1) Except as provided in this section, records of the department shall be subject to Title 63, Chapter 2, Government Records Access and Management Act.
(2)(a) The standards of the federal Freedom of Information Act, 5 U.S.C. Sec. 552, and not the standards of Subsections 63-2-304(1) and (2), shall govern access to records of the department for which business confidentiality has been claimed under Section 63-2-308, to the extent those records relate to a program:
(i) that is delegated, authorized, or for which primacy has been granted to the state,
(ii) for which the state is seeking delegation, authorization, or primacy; or
(iii) under the federal Comprehensive Environmental Response, Compensation, and Liability Act.
(b) The regulation of the United States Environmental Protection Agency interpreting the federal Freedom of Information Act, as it appeared at 40 C.F.R. Part 2 on January 1, 1992, shall also apply to the records described in Subsection (1).
(3)(a) The department may, upon request, make trade secret and confidential business records available to the United States Environmental Protection Agency insofar as they relate to a delegated program, to a program for which the state is seeking delegation, or to a program under the federal Comprehensive Environmental Response, Compensation and Liability Act.
(b) In the event a record is released to the United States Environmental Protection Agency under Subsection (3)(a), the department shall convey any claim of confidentiality to the United States Environmental Protection Agency and shall notify the person who submitted the information of its release.
(4) Trade secret and confidential business records under Subsection (2) shall be managed as protected records under the Government Records Access and Management Act, and all provisions of that act shall apply except Subsections 63-2-304(1) and (2).
(5) Records obtained from the United States Environmental Protection Agency and requested by that agency to be kept confidential shall be managed as protected records under the Government Records Access and Management Act, and all provisions of that act shall apply except to the extent they conflict with this subsection.

CHAPTER 3
RADIATION CONTROL ACT

Part 1
General Provisions.

Part 2
Interstate Compact on Low-level Radioactive Waste.

Part 3
Placement of High Level Nuclear Waste.

PART 1
GENERAL PROVISIONS

19-3-101 Short title.
This chapter is known as the "Radiation Control Act."

19-3-102 Definitions.
As used in this chapter:
(1) "Board" means the Radiation Control Board created under Section 19-1-106.
(2)(a) "Broker" means a person who performs one or more of the following functions for a generator:
(i) arranges for transportation of the radioactive waste;
(ii) collects or consolidates shipments of radioactive waste; or
(iii) processes radioactive waste in some manner.
(b) "Broker" does not include a carrier whose sole function is to transport the radioactive waste.
(3) "By-product material" has the same meaning as in 42 U.S.C. Sec. 2014(e)(2).
(4) "Class B and class C low-level radioactive waste" has the same meaning as in 10 CFR 61.55.
(5) Executive secretary" means the executive secretary of the board.
(6) "Generator" means a person who:
(a) possesses any material or component:
(i) that contains radioactivity or is radioactively contaminated; and
(ii) for which the person foresees no further use; and
(b) transfers the material or component to:
(i) a commercial radioactive waste treatment or disposal facility; or
(ii) a broker.
(7)(a) "High-level nuclear waste" means spent reactor fuel assemblies, dismantled nuclear reactor components, and solid and liquid wastes from fuel reprocessing and defense-related wastes.
(a) "High-level nuclear waste" does not include medical or institutional wastes, naturally-occurring radioactive materials, or uranium mill tailings.
(8)(a) "Low-level radioactive waste" means waste material which contains radioactive nuclides emitting primarily beta or gamma radiation, or both, in concentrations or quantities which exceed applicable federal or state standards for unrestricted release.
(b) low level radioactive waste" does not include waste containing more than 100 nanocuries of transuranic contaminants per gram of material, nor spent reactor fuel, nor material classified as either high-level waste or waste which is unsuited for disposal by near-surface burial under any applicable federal regulations.
(9) "Radiation" means ionizing and nonionizing radiation, including gamma rays, X-rays, alpha and beta particles, high speed electrons, and other nuclear particles.
(10) "Radioactive" means any solid, liquid, or gas which emits radiation spontaneously from decay of unstable nuclei.

Amended by ch. 314, § 2, 2001 General Session (H.B. 370)

19-3-103 Radiation Control Board -- Members -- Organization -- Meetings -- Per diem and expenses.

(1) The board created under Section 19-1-106 comprises 13 members, one of whom shall be the executive director, or his designee, and the remainder of whom shall be appointed by the governor with the consent of the Senate.
(2) No more than six appointed members shall be from the same political party.
(3) The appointed members shall be knowledgeable about radiation protection and shall be as follows:
(a) one physician;
(b) one dentist;
(c) one health physicist or other professional employed in the field of radiation safety;
(d) three representatives of regulated industry, at least one of whom represents the radioactive

waste management industry, and at least one of whom represents the uranium milling industry;

(e) one registrant or licensee representative from academia;

(f) one representative of a local health department;

(g) one elected county official; and

(h) three members of the general public, at least one of whom represents organized environmental interests.

(4)(a) Except as required by Subsection (4)(b), as terms of current board members expire, the governor shall appoint each new member or reappointed member to a four-year term.

(b) Notwithstanding the requirements of Subsection (4)(a), the governor shall, at the time of appointment or reappointment, adjust the length of terms to ensure that the terms of board members are staggered so that approximately half of the board is appointed every two years.

(5) Each board member is eligible for reappointment to more than one term.

(6) Each board member shall continue in office until the expiration of his term and until a successor is appointed, but not more than 90 days after the expiration of his term.

(7) When a vacancy occurs in the membership for any reason, the replacement shall be appointed for the unexpired term by the governor, after considering recommendations by the department and with the consent of the Senate.

(8) The board shall annually elect a chair and vice chair from its members.

(9) The board shall meet at least quarterly. Other meetings may be called by the chair, by the executive secretary, or upon the request of three members of the board.

(10) Reasonable notice shall be given each member of the board prior to any meeting.

(11) Seven members constitute a quorum. The action of a majority of the members present is the action of the board.

(12)(a)(i) Members who are not government employees receive no compensation or benefits for their services, but may receive per diem and expenses incurred in the performance of the member's official duties at the rates established by the Division of Finance under Sections 63A-3-106 and 63A-3-107.

(ii) Members may decline to receive per diem and expenses for their service.

(b)(i) State government officer and employee members who do not receive salary, per diem, or expenses from their agency for their service may receive per diem and expenses incurred in the performance of their official duties from the board at the rates established by the Division of Finance under Sections 63A-3-106 and 63A-3-107.

(ii) State government officer and employee members may decline to receive per diem and expenses for their service.

(c)(i) Local government members who do not receive salary, per diem, or expenses from the entity that they represent for their service may receive per diem and expenses incurred in the performance of their official duties at the rates established by the Division of Finance under Sections 63A-3-106 and 63A-3-107.

(ii) Local government members may decline to receive per diem and expenses for their service.

Amended by ch 297, §2, 2002 General Sessions (S B. 96).
Amended by ch.176, § 22, 2002 General Session (S. B. 10).

19-3-103.5 Board authority and duties.

(1) The board may:

(a) require submittal of specifications or other information relating to licensing applications for radioactive materials or registration of radiation sources for review, approval, disapproval, or termination;

(b) issue orders necessary to enforce the provisions of this part, enforce the orders by appropriate administrative and judicial proceedings, and institute judicial proceedings to secure compliance with this part;

(c) hold hearings and compel the attendance of witnesses, the production of documents, and other evidence, administer oaths and take testimony, and receive evidence it finds proper, or appoint hearing officers and authorize them to exercise the powers under this subsection;

(d) settle or compromise any administrative or civil action initiated to compel compliance with this part or any rules adopted under this part;

(e) advise, consult, cooperate with, and provide technical assistance to other agencies of the state and federal government, other states, interstate agencies, and affected groups, political subdivisions, industries, and other persons in carrying out the provisions of this part;

(f) promote the planning and application of pollution prevention and radioactive waste minimization measures to prevent the unnecessary waste and depletion of natural resources;

(g) cooperate with any persons in studies, research, or demonstration projects regarding radioactive waste management or control of radiation sources;
(h) accept, receive, and administer grants or other funds or gifts from public and private agencies, including the federal government, for the purpose of carrying out any of the functions of this part;
(i) exercise all incidental powers necessary to carry out the purposes of this part;
(j) submit an application to the U.S. Food and Drug Administration for approval as an accrediting body in accordance with 42 U.S.C. 263b, Mammography Quality Standards Act of 1992;
(k) accredit mammography facilities, pursuant to approval as an accrediting body from the U.S Food and Drug Administration, in accordance with 42 U.S.C. 263b, Mammography Quality Standards Act of 1992; and
(l) review the qualifications of and issue certificates of approval to individuals who survey mammography equipment and oversee quality assurance practices at mammography facilities.

(2) The board shall:
(a) hear appeals of final decisions made by the executive secretary or appoint a hearing officer to hear the appeal and make recommendations to the board;
(b) prepare a radioactive waste management plan in compliance with Section 19-3-107 as soon as practicable; and
(c) impound radioactive material as authorized in Section 19-3-111.

(3) Representatives of the board upon presentation of appropriate credentials may enter at reasonable times upon the premises of public and private properties subject to regulation under this part to perform inspections to insure compliance with this part and rules made by the board.

19-3-104 Registration and licensing of radiation sources by department -- Assessment of fees -- Rulemaking authority and procedure -- Siting criteria.

(1) As used in this section:
(a) "Decommissioning" includes financial assurance.
(b) "Source material" and "byproduct material" have the same definition as in 42 U.S.C.A. 2014, Atomic Energy Act of 1954, as amended.

(2) The board may require the registration or licensing of radiation sources that constitute a significant health hazard.

(3) All sources of ionizing radiation, including ionizing radiation producing machines, shall be registered or licensed by the department.

(4) The board may make rules:
(a) necessary for controlling exposure to sources of radiation that constitute a significant health hazard;
(b) to meet the requirements of federal law relating to radiation control to ensure the radiation control program under this part is qualified to maintain primacy from the federal government;
(c) to establish:
(i) board accreditation requirements and procedures for mammography facilities; and
(ii) certification procedure and qualifications for persons who survey mammography equipment and oversee quality assurance practices at mammography facilities; and
(d) as necessary regarding the possession, use, transfer, or delivery of source and byproduct material and the disposal of byproduct material to establish requirements for:
(i) the licensing, operation, decontamination, and decommissioning, including financial assurances; and
(ii) the reclamation of sites, structures, and equipment used in conjunction with the activities described in this Subsection (4).

(5)(a) On and after January 1, 2003, a fee is imposed for the regulation of source and byproduct material and the disposal of byproduct material at uranium mills or commercial waste facilities, as provided in this Subsection (5).
(b) On and after January 1, 2003 through March 30, 2003:
(i) $6, 667 per month for uranium mills or commercial sites disposing of or reprocessing byproduct material; and
(ii) $4,167 per month for those uranium mills the executive secretary has determined are on standby status.
(c) On and after March 31, 2003 through June 30, 2003 the same fees as in Subsection (5)(b) apply, but only if the federal Nuclear Regulatory Commission grants to Utah an amendment for agreement state status for uranium recovery regulation on or before March 30, 2003.
(d) If the Nuclear Regulatory Commission does not grant the amendment for state agreement status on or before March 30, 2003, fees under Subsection (5)(e) do not apply and are not

required to be paid until on and after the later date of:

(i) October 1, 2003; or

(ii) the date the Nuclear Regulatory Commission grants to Utah an amendment for agreement state status for uranium recovery regulation.

(e) For the payment periods beginning on and after July 1, 2003, the department shall establish the fees required under Subsection (5)(a) under Section 63-38-3 2, subject to the restrictions under Subsection (5)(d).

(f) The department shall deposit fees it receives under this Subsection (5) into the Environmental Quality Restricted Account created in Section 19-1-108.

(6)(a) The department shall assess fees for registration, licensing, and inspection of radiation sources under this section.

(b) The department shall comply with the requirements of Section 63-38-3.2 in assessing fees for licensure and registration.

(7) The department shall coordinate its activities with the Department of Health rules made under Section 26-21a-203.

(8)(a) Except as provided in Subsection (9), the board may not adopt rules, for the purpose of the state assuming responsibilities from the United States Nuclear Regulatory Commission with respect to regulation of sources of ionizing radiation, that are more stringent than the corresponding federal regulations which address the same circumstances.

(b) In adopting those rules, the board may incorporate corresponding federal regulations by reference.

(9)(a) The board may adopt rules more stringent than corresponding federal regulations for the purpose described in Subsection (8) only if it makes a written finding after public comment and hearing and based on evidence in the record that corresponding federal regulations are not adequate to protect public health and the environment of the state.

(b) Those findings shall be accompanied by an opinion referring to and evaluating the public health and environmental information and studies contained in the record which form the basis for the board's conclusion.

(10)(a) The board shall by rule:

(i) authorize independent qualified experts to conduct inspections required under this chapter of x-ray facilities registered with the division; and

(ii) establish qualifications and certification procedures necessary for independent experts to conduct these inspections.

(b) Independent experts under this Subsection (10) are not considered employees or representatives of the division or the state when conducting the inspections.

(11)(a) The board may by rule establish criteria for siting commercial low-level radioactive waste treatment or disposal facilities.

(b) Any facility under Subsection (11)(a) for which a radioactive material license is required by this section shall comply with those criteria.

(c) A facility may not receive a radioactive material license until siting criteria have been established by the board. The criteria also apply to facilities that have applied for but not received a radioactive material license.

(12) The board shall by rule establish financial assurance requirements for closure and postclosure care of radioactive waste land disposal facilities, taking into account existing financial assurance requirements.

Amended by ch 311, § 1, 2001 General Session (H B. 356)
Amended by ch 297, § 3, 2002 General Session (S B 96).

19-3-105 Legislative and gubernatorial approval required.

(1)(a) A person may not own, construct, modify, or operate any facility for the purpose of commercially transferring storing decaying in storage, treating, or disposing of radioactive waste without first submitting and receiving the approval of the board for a radioactive material license for the facility.

(b) A person may not construct a new commercial radioactive waste transfer, storage, decay in storage, treatment, or disposal facility until:

(i) the requirements of Section 19-3-104 have been met;

(ii) in addition and subsequent to the approval required in Subsection (a), the governor and the Legislature have approved the facility; and

(iii) local planning and zoning has authorized the facility.

(c) For purposes of this section, the following items shall be treated as submission of a new license application:

(i) the submission of a revised application specifying a different geographic site than a previously submitted application;

(ii) an application for amendment of a commercial radioactive waste license for transfer, storage, decay in storage, treatment, or disposal facilities, including incinerators, if the

construction would cost 50% or more of the cost of construction of the original transfer, storage, decay in storage, treatment, or disposal facility or the modification would result in an increase in capacity or throughput of a cumulative total of 50% of the total capacity or throughput which was approved in the facility license as of January 1, 1990, or the initial approval facility license if the initial license approval is subsequent to January 1, 1990; or

(iii) any request for approval for a commercial radioactive waste transfer, storage, decay in storage, treatment, or disposal facility to receive class B or class C low-level radioactive waste, including the submission of a new license application, revised license application, or major license amendment.

(2) A person need not obtain gubernatorial or legislative approval for the construction of a radioactive waste facility for which a license application has been approved by the Department of Health or submitted to the federal Nuclear Regulatory Commission and to the Department of Health for approval before January 1, 1990, and which has been determined, on or before October 31, 1990, by the Department of Health to be complete in accordance with state and federal requirements

(3) The board shall suspend acceptance of further applications for commercial radioactive waste facilities upon a finding that they cannot adequately oversee existing and additional radioactive waste facilities for license compliance, monitoring, and enforcement. The board shall report the suspension to the Legislative Management Committee

(4) The board shall review each proposed radioactive waste license application to determine whether the application complies with the provisions of this chapter and the rules of the board.

(5)(a) If the radioactive license application is determined to be complete, the board shall issue a notice of completeness.

(b) If the plan is determined by the board to be incomplete, the board shall issue a notice of deficiency, listing the additional information to be provided by the applicant to complete the application.

19-3-106 Fee for commercial radioactive waste disposal or treatment.

(1)(a) An owner or operator of a commercial radioactive waste treatment or disposal facility that receives radioactive waste shall collect a fee from the generator of the waste as provided in Subsection (1)(b).

(b)(i) On and after July 1, 1994 through June 30, 2001, the fee is $2.50 per ton, or fraction of a ton, of radioactive waste, other than byproduct material, received at the facility for disposal or treatment.

(ii) On and after July 1, 2001, the fee is equal to the sum of the following amounts:

(A) 10 cents per cubic foot, or fraction of a cubic foot, of radioactive waste, other than byproduct material, received at the facility for disposal or treatment; and

(B) $1 per curie, or fraction of a curie, of radioactive waste, other than byproduct material, received at the facility for disposal or treatment.

(2)(a) The owner or operator shall remit the fees imposed under this section to the department on or before the 15th day of the month following the month in which the fee accrued.

(b) The department shall deposit all fees received under this section into the Environmental Quality Restricted Account created in Section 19-1-108.

(c) The owner or operator shall submit to the department with the payment of the fee under this subsection a completed form as prescribed by the department that provides information the department requires to verify the amount of waste received and the fee amount for which the owner or operator is liable.

(3) The Legislature shall appropriate to the department funds to cover the cost of radioactive waste disposal supervision.

Amended by ch 314, § 3, 2001 General Session (H.B. 370).

19-3-106.2. Fee for perpetual care and maintenance of commercial radioactive waste disposal facilities -- Radioactive Waste Perpetual Care and Maintenance Fund created --Contents -- Use of fund monies.

(1) As used in this section, "perpetual care and maintenance" means perpetual care and maintenance of a commercial radioactive waste treatment or disposal facility, excluding sites within the facility used for the disposal of byproduct material, as required by applicable laws, rules, and license requirements beginning 100 years after the date of final closure of the facility.

(2)(a) On and after July 1, 2002, the owner or operator of an active commercial radioactive waste treatment or disposal facility shall pay an annual fee of $400,000 to provide for the perpetual care and maintenance of the facility.

(b) The owner or operator shall remit the fee to the department on or before July 1.

(3) The department shall deposit fees received under Subsection (2) into the Radioactive Waste Perpetual Care and Maintenance Fund created in Subsection (4).

(4)(a) There is created the Radioactive Waste Perpetual Care and Maintenance Fund to finance perpetual care and maintenance of commercial radioactive waste treatment or disposal facilities, excluding sites within those facilities used for the disposal of byproduct material.

(b) The sources of revenue for the fund are:
(i) the fee imposed under this section; and
(ii) investment income derived from money in the fund.

(c)(i) The revenues for the fund shall be segregated into subaccounts for each commercial radioactive waste treatment or disposal facility covered by the fund.

(ii) Each subaccount shall contain:
(A) the fees paid by each owner or operator of a commercial radioactive waste treatment or disposal facility; and
(B) the associated investment income.

(5) The Legislature may appropriate money from the Radioactive Waste Perpetual Care and Maintenance Fund for:
(a) perpetual care and maintenance of a commercial radioactive waste treatment or disposal facility, excluding sites within the facility used for the disposal of byproduct material, beginning 100 years after the date of final closure of the facility; or
(b) maintenance or monitoring of, or implementing corrective action at, a commercial radioactive waste treatment or disposal facility, excluding sites within the facility used for the disposal of byproduct material, before the end of 100 years after the date of final closure of the facility, if:
(i) the owner or operator is unwilling or unable to carry out postclosure maintenance, monitoring, or corrective action; and
(ii) the financial surety arrangements made by the owner or operator, including any required under applicable law, are insufficient to cover the costs of postclosure maintenance, monitoring, or corrective action.

(6) The money appropriated from the Radioactive Waste Perpetual Care and Maintenance Fund for the purposes specified in Subsection (5)(a) or (5)(b) at a particular commercial radioactive waste treatment or disposal facility may be appropriated only from the subaccount established under Subsection (4)(c) for the facility.

(7) The attorney general shall bring legal action against the owner or operator or take other steps to secure the recovery or reimbursement of the costs of maintenance, monitoring, or corrective action, including legal costs, incurred pursuant to Subsection (5)(b).

(8)(a) The board shall direct an evaluation of the adequacy of the Radioactive Waste Perpetual Care and Maintenance Fund every five years, beginning in 2006. The evaluation shall determine whether the fund is adequate to provide for perpetual care and maintenance of commercial radioactive waste treatment or disposal facilities.

(b) The board shall submit a report on the evaluation to the Legislative Management Committee on or before October 1 of the year in which the report is due.

(9) This section does not apply to a uranium mill licensed under 10 C F.R. Part 40, Domestic Licensing of Source Material.

Enacted by ch 314, § 4, 2001 General Session (H B. 370).

19-3-106.4. Generator site access permits.

(1) A generator or broker may not transfer radioactive waste to a commercial radioactive waste treatment or disposal facility in the state without first obtaining a generator site access permit from the executive secretary.

(2) The board may make rules pursuant to Section 19-3-104 governing a generator site access permit program.

(3)(a) Except as provided in Subsection (3)(b), the department shall establish fees for generator site access permits in accordance with Section 63-38-3.2.

(b) On and after July 1, 2001 through June 30, 2002, the fees are:
(i) $1,300 for generators transferring 1,000 or more cubic feet of radioactive waste per year;
(ii) $500 for generators transferring less than 1,000 cubic feet of radioactive waste per year; and
(iii) $5,000 for brokers.

(c) The department shall deposit fees received under this section into the Environmental Quality Restricted Account created in Section 19-1-108.

(4) This section does not apply to a generator or broker

transferring radioactive waste to a uranium mill licensed under 10 C.F.R. Part 40, Domestic Licensing of Source Material.

Enacted by ch 314, § 5, 2001 General Session (H B 370)

19-3-107 State radioactive waste plan.

(1) The board shall prepare a state plan for management of radioactive waste by July 1, 1993.

(2) The plan shall:

(a) provide an estimate of radioactive waste capacity needed in the state for the next 20 years;

(b) assess the state's ability to minimize waste and recycle;

(c) evaluate radioactive waste treatment and disposal options, as well as radioactive waste needs and existing capacity;

(d) evaluate facility siting, design, and operation;

(e) review funding alternatives for radioactive waste management; and

(f) address other radioactive waste management concerns that the board finds appropriate for the preservation of the public health and the environment.

19-3-108 Powers and duties of executive secretary.

(1) The executive director shall appoint an executive secretary, with the approval of the board, to serve under the direction of the executive director.

(2) The executive secretary may:

(a) develop programs to promote and protect the public from radiation sources in the state,

(b) advise, consult, and cooperate with other agencies, states, the federal government, political subdivisions, industries, and other groups to further the purposes of this chapter,

(c) as authorized by the board:

(i) issue licenses, registrations, and certifications;

(ii) review and approve plans;

(iii) enforce rules through the issuance of orders and assess penalties in accordance with Section 19-3-109;

(iv) impound radioactive material under Section 19-3-111; and

(v) authorize employees or representatives of the department to enter at reasonable times and upon reasonable notice in and upon public or private property for the purpose of inspecting and investigating conditions and records concerning radiation sources.

19-3-109 Civil penalties -- Appeals.

(1) A person who violates any provision of Sections 19-3-104 through 19-3-113, any rule or order issued under the authority of those sections, or the terms of a license, permit, or registration certificate issued under the authority of those sections is subject to a civil penalty not to exceed $5,000 for each violation.

(2) The board may assess and make a demand for payment of a penalty under this section and may compromise or remit that penalty.

(3) In order to make demand for payment of a penalty assessed under this section, the board shall issue a notice of agency action, specifying, in addition to the requirements for notices of agency action contained in Title 63, Chapter 46b, Administrative Procedures Act:

(a) the date, facts, and nature of each act or omission charged;

(b) the provision of the statute, rule, order, license, permit, or registration certificate that is alleged to have been violated,

(c) each penalty that the bureau proposes to impose, together with the amount and date of effect of that penalty; and

(d) that failure to pay the penalty or respond may result in a civil action for collection.

(4) A person notified according to Subsection (3) may request an adjudicative proceeding.

(5) Upon request by the board, the attorney general may institute a civil action to collect a penalty imposed under this section.

(6)(a) Except as provided in Subsection (b), the department shall deposit all monies collected from civil penalties imposed under this section into the General Fund.

(b) The department may reimburse itself and local governments from monies collected from civil penalties for extraordinary expenses incurred in environmental enforcement activities.

(c) The department shall regulate reimbursements by making rules that:

(i) define qualifying environmental enforcement activities; and

(ii) define qualifying extraordinary expenses.

19-3-110 Criminal penalties.

(1) Any person who knowingly violates any provision of Sections 19-3-104 through 19-3-113 or lawful orders or rules adopted by the department under those sections shall in a criminal proceeding:

(a) for the first violation, be guilty of a class B misdemeanor; and

(b) for a subsequent similar violation within two years, be guilty of a third degree felony.

(2) In addition, a person is liable for any expense incurred by the department in removing or abating any violation.
(3) Conviction under Sections 19-3-104 through 19-3-113 does not relieve the person convicted from civil liability for any act which was also a violation of the public health laws

Amended by ch. 271, § 2, 1998 General Session

19-3-111 Impounding of radioactive material.
(1) The board may impound the radioactive material of any person if:
  (a) the material poses an imminent threat or danger to the public health or safety; or
  (b) that person is violating:
    (i) any provision of Sections 19-3-104 through 19-3-113;
    (ii) any rules or orders enacted or issued under the authority of those sections; or
    (iii) the terms of a license, permit, or registration certificate issued under the authority of those sections.
(2) Before any dispositive action may be taken with regard to impounded radioactive materials, the board shall comply with the procedures and requirements of Title 63, Chapter 46b, Administrative Procedures Act.

19-3-112 Notification by the department to certain persons of release of radiation from Nevada Test Site -- Notification to certain news outlets.
(1) When informed by the United States Department of Energy of any release of radiation exceeding the Nuclear Regulatory Commission's limits for unrestricted use in air or water from the Nevada Test Site which is detected outside its boundaries, the department shall, unless prohibited by federal law, immediately convey to the persons specified in Subsection (2) all information that is made available to it, including:
  (a) the date;
  (b) the time and duration of each release of radiation;
  (c) estimates of total amounts of radiation released;
  (d) the types and amounts of each isotope detected off-site;
  (e) the locations of monitoring stations detecting off-site radiation; and
  (f) current and projected wind direction, wind velocity, and precipitation for the region.
(2) Unless prohibited by federal law, the department shall provide the information required under Subsection (1) to the following:
  (a) members of the Utah congressional delegation or their designated representatives;
  (b) the director of the Division of Emergency Services and Homeland Security;
  (c) the attorney general;
  (d) the regional director of the Federal Emergency Management Agency;
  (e) the regional director of the National Oceanic and Atmospheric Administration;
  (f) the executive director of the Utah League of Cities and Towns;
  (g) the executive director of the Department of Health; and
  (h) the chairpersons of the county commissions of affected counties.
(3) If the state is informed by the United States Department of Energy that any radiation released from the Nevada Test Site has been detected by the United States Department of Energy or United States Environmental Protection Agency or the department within the boundaries of the state of Utah, the department shall, unless prohibited by federal law, immediately provide all information available to it as specified in Subsection (1) to the Associated Press and United Press International outlets in the state.

Amended by ch. 14, § 1, 2002 General Session (H B. 40).

19-3-113 Federal-state agreement regarding radiation control.
(1) The governor, on behalf of the state, may enter into agreements with the federal government providing for discontinuation of the federal government's responsibilities with respect to sources of ionizing radiation and the assumption thereof by the state, pursuant to Section 19-3-104.
(2) Any person who, on the effective date of an agreement under Subsection (1), possesses a license issued by the federal government is considered to possess a federal license pursuant to a license issued by the department which shall expire either 90 days after receipt from the department of a notice of expiration of the license, or on the date of expiration specified in the federal license, whichever is earlier.

Decisions

Ruling on revocation of depleted uranium general license. Wrangler Laboratories, Larsen Laboratories, Orion Chemical Company and John P. Larsen, ALAB-951, 33 NRC 505 (1991).

PART 2
INTERSTATE COMPACT ON LOW-LEVEL RADIOACTIVE WASTE

19-3-201 Interstate Compact on Low-level Radioactive Waste -- Policy and purpose of compact.

The party states recognize that low-level radioactive wastes are generated by essential activities and services that benefit the citizens of the states. It is further recognized that the protection of the health and safety of the citizens of the party states and the most economical management of low-level radioactive wastes can be accomplished through cooperation of the states in minimizing the amount of handling and transportation required to dispose of the wastes and through the cooperation of the states in providing facilities that serve the region. It is the policy of the party states to undertake the necessary cooperation to protect the health and safety of the citizens of the party states and to provide for the most economical management of low-level radioactive wastes on a continuing basis. It is the purpose of this compact to provide the means for a cooperative effort among the party states so that the protection of the citizens of the states and the maintenance of the viability of the states' economies will be enhanced while sharing the responsibilities of radioactive low-level waste management.

19-3-201.1. Definitions.

As used in this compact:

(1) "Facility" means any site, location, structure, or property used or to be used for the storage, treatment, or disposal of low-level waste, excluding federal waste facilities.

(2) "Generator" means any person, partnership, association, corporation, or any other entity whatsoever which, as a part of its activities, produces low-level radioactive waste.

(3) "Host state" means a state in which a facility is located.

(4)(a) "Low-level waste" means waste material which contains radioactive nuclides emitting primarily beta or gamma radiation, or both, in concentrations or quantities which exceed applicable federal or state standards for unrestricted release.

(b) "Low-level waste" does not include waste containing more than ten nanocuries of transuranic contaminants per gram of material, nor spent reactor fuel, nor material classified as either high-level waste or waste which is unsuited for disposal by near-surface burial under any applicable federal regulations.

Enacted by ch. 314 § 6, 2001 General Session (H.B. 370)

19-3-202 Practices of party states regarding low-level waste shipments -- Fees for inspections.

(1) Each party state agrees to adopt practices which will require low-level waste shipments originating within its borders and destined for a facility within another party state to conform to the applicable packaging and transportation requirements and regulations of the host state including:

(a) maintaining an inventory of all generators within the state that have shipped or expect to ship low-level waste to facilities in another party state;

(b) periodic unannounced inspection of the premises of the generators and the waste management activities on the premises;

(c) authorization of the containers in which the waste may be shipped, and a requirement that generators use only the type of containers authorized by the state;

(d) assurance that inspections of the carriers which transport the waste are conducted by proper authorities, and appropriate enforcement action taken for violations; and

(e) after receiving notification from a host state that a generator within the party state is in violation of applicable packaging or transportation standards, taking appropriate action to assure that the violations do not recur including the inspection of every individual low-level waste shipment by that generator.

(2) Each party state may impose fees upon generators and shippers to recover the cost of the inspections and other practices under this compact.

(3) Nothing in this section limits any party state's authority to impose additional or more stringent standards on generators or carriers than those required under this section.

19-3-203 Acceptance of low-level waste by facilities in party states -- Requirements for acceptance of waste generated outside region of party states -- Cooperation in determining site of facility required within region of party states -- Allowance of access to low-level waste and hazardous chemical waste disposal facilities by certain party states -- Establishment of fees and requirements by host states.

(1) Facilities located in any party state, other than facilities established or maintained by individual low-level waste generators for the management of that party state's own low-level waste, shall accept low-level waste generated in any party state if the

waste has been packaged and transported according to applicable laws and regulations.

(2) No facility located in any party state may accept low-level waste generated outside of the region comprised of the party states, except as provided in Section 19-3-204.

(3) Until Subsection (2) takes effect, facilities located in any party state may accept low-level waste generated outside of any of the party states only if the waste is accompanied by a certificate of compliance issued by an official of the state in which the waste shipment originated. The certificate shall be in the form required by the host state, and shall contain at least the following:

(a) the generator's name and address;

(b) a description of the contents of the low-level waste container;

(c) a statement that the low-level waste being shipped has been inspected by the official who issued the certificate or by his or her agent or by a representative of the United States Nuclear Regulatory Commission, and found to have been packaged in compliance with applicable federal regulations;

(d) additional requirements imposed by the host state; and

(e) a binding agreement by the state of origin to reimburse any party state for any liability or expense incurred as a result of an accidental release of the waste during shipment or after the waste reaches the facility.

(4)(a) Each party state shall cooperate with the other party states in determining the appropriate site of any facility that may be required within the region comprised of the party states, in order to maximize public health and safety while minimizing the use of any party state as the host of the facilities on a permanent basis.

(b) Each party state further agrees that decisions regarding low-level waste management facilities in its region will be reached through a good faith process which takes into account the burdens borne by each of the party states as well as the benefits each has received.

(5)(a) The party states recognize that the issue of hazardous chemical waste management is similar in many respects to that of low-level waste management. Therefore, in consideration of the state of Washington allowing access to its low-level waste disposal facility by generators in other party states, party states such as Oregon and Idaho which host hazardous chemical waste disposal facilities will allow access to the facilities by generators within other party states.

(b) Nothing in this compact prevents any party state from limiting the nature and type of hazardous chemical or low-level wastes to be accepted at facilities within its borders or from ordering the closure of the facilities, so long as the action by a host state is applied equally to all generators within the region comprised of the party states.

(6) Any host state may establish a schedule of fees and requirements related to its facility, to assure that closure, perpetual care, maintenance, and contingency requirements are met including adequate bonding.

19-3-204 Governor to designate state official to administer compact -- Designated officials comprise northwest low-level waste compact committee -- Meetings of committee -- Duties relating to existing regulations -- Authority to make arrangements with entities outside region of party states.

(1) The governor of each party state shall designate one state official as the person responsible for administration of this compact. The officials so designated shall together comprise the northwest low-level waste compact committee.

(2) The committee shall meet as required to consider matters arising under this compact.

(3) The parties shall inform the committee of existing regulations concerning low-level waste management in their states and shall afford all parties a reasonable opportunity to review and comment upon any proposed modifications in the regulations.

(4) Notwithstanding any provision of Section 19-3-203 to the contrary, the committee may enter into arrangements with states, provinces, individual generators, or regional compact entities outside the region comprised of the party states for access to facilities on terms and conditions the committee considers appropriate. However, a two-thirds vote of all members is required, including the affirmative vote of the member of any party state in which a facility affected by the arrangement is located, for the committee to enter into an arrangement

19-3-205 Eligible party states -- Requirements regarding joinder and withdrawal from compact -- Consent of Congress.

(1) Each of the following states is eligible to become a party to this compact: Alaska, Hawaii, Idaho, Montana, Oregon, Utah, Washington, and Wyoming. As to any eligible party, this compact becomes effective upon enactment into law by that

party, but it is not initially effective until enacted into law by two states. Any party state may withdraw from this compact by enacting a statute repealing its approval

(2) After the compact has initially taken effect under Subsection (1), any eligible party state may become a party to this compact by the execution of an executive order by the governor of the state. Any state which becomes a party in this manner shall cease to be a party upon the final adjournment of the next general or regular session of its legislature or July 1, 1983, whichever occurs first, unless the compact has by then been enacted as a statute by that state.

(3) Section 19-3-203 takes effect on July 1, 1983, if consent is given by Congress As provided in Public Law 96-573, Congress may withdraw its consent to the compact after every five-year period.

Decisions

Ruling in uranium mill proceedings on alternate feed material license amendment ("Ashland 2" source material). International Uranium (USA) Corporation (Receipt of Material from Tonawanda, New York), LBP-99-5, 49 N.R.C. 107 (1999)

Ruling in uranium mill proceedings on alternate feed material license amendment (Teledyne Wah Chang zirconium ore processing wastes) UMETCO Minerals Corporation (Source Materials License No SUA-1358), LBP-93-7, 37 NRC 267 (1993)

PART 3
PLACEMENT OF HIGH LEVEL NUCLEAR WASTE

19-3-301 Restrictions on nuclear waste placement in state.

(1) The placement, including transfer, storage, decay in storage, treatment, or disposal, within the exterior boundaries of Utah of high-level nuclear waste or greater than class C radioactive waste is prohibited.

(2) Notwithstanding Subsection (1) the governor, after consultation with the county executive and county legislative body of the affected county and with concurrence of the Legislature, may specifically approve the placement as provided in this part, but only if.

(a)(i) the federal Nuclear Regulatory Commission issues a license, pursuant to the Nuclear Waste Policy Act, 42 U.S.C.A. 10101 et seq., or the Atomic Energy Act, 42 U.S.C.A. 2011 et seq., for the placement within the exterior boundaries of Utah of high-level nuclear waste or greater than class C radioactive waste; and

(ii) the authority of the federal Nuclear Regulatory Commission to grant a license under Subsection (2)(a)(i) is clearly upheld by a final judgment of a court of competent jurisdiction; or

(b) an agency of the federal government is transporting the waste, and all state and federal requirements to proceed with the transportation have been met.

(3) The requirement for the approval of a final court of competent jurisdiction shall be met in all of the following categories, in order for a state license proceeding regarding waste to begin:

(a) transfer or transportation, by rail, truck, or other mechanisms;

(b) storage, including any temporary storage at a site away from the generating reactor;

(c) decay in storage;

(d) treatment; and

(e) disposal.

(4)(a) Upon satisfaction of the requirements of Subsection (2)(a), for each category listed in Subsection (3), or satisfaction of the requirements under Subsection (2)(b), the governor, with the concurrence of the attorney general, shall certify in writing to the executive director of the Department of Environmental Quality that all of the requirements have been met, and that any necessary state licensing processes may begin.

(b) Separate certification under this Subsection (4) shall be given for each category in Subsection (3).

(5)(a) The department shall make, by rule, a determination of the dollar amount of the health and economic costs expected to result from a reasonably foreseeable accidental release of waste involving a transfer facility or storage facility, or during transportation of waste, within the exterior boundaries of the state. The department may initiate rulemaking under this Subsection (5)(a) on or after March 15, 2001.

(b)(i) The department shall also determine the dollar amount currently available to cover the costs as determined in Subsection (5)(a):

(A) under nuclear industry self-insurance;

(B) under federal insurance requirements; and

(C) in federal monies.

(ii) The department may not include any calculations of federal monies that may be appropriated in the future in determining the amount under Subsection (5)(b)(i).

(c) The department shall use the information compiled under Subsections (5)(a) and (b) to determine the amount of unfunded potential liability in the event of a release of waste from a storage or transfer facility, or a release during the transportation of waste.

(6)(a) State agencies may not, for the purpose of providing any goods, services, or municipal-type services to a storage facility or transfer facility, or to any organization engaged in the transportation of waste, enter into any contracts or any other agreements prior to:
(i) the satisfaction of the conditions in Subsection (4); and
(ii) the executive director of the department having certified that the requirements of Sections 19-3-304 through 19-3-308 have been met for the purposes of a license application proceeding for a storage facility or transfer facility.

(b) Political subdivisions of the state may not enter into any contracts or any other agreements for the purpose of providing any goods, services, or municipal-type services to a storage facility or transfer facility, or to any organization engaged in the transportation of waste.

(c) This Subsection (6) does not prohibit a state agency from exercising the regulatory authority granted to it by law.

(7)(a) Notwithstanding any other provision of law, any political subdivision may not be formed pursuant to the laws of Utah for the purpose of providing any goods, services, or municipal-type services to a storage facility or transfer facility prior to the satisfaction of the conditions in Subsection (4). These political subdivisions include:
(i) a cooperative;
(ii) a special district authorized by Title 17A, Special Districts;
(iii) a limited purpose local governmental entities authorized by Title 17, Counties;
(iv) any joint power agreement authorized by Title 11, Cities, Counties, and Local Taxing Units; and
(v) the formation of a municipality, or any authority of a municipality authorized by Title 10, Utah Municipal Code.

(b)(i) Subsection (7)(a) shall be strictly interpreted. Any political subdivision authorized and formed under the laws of the state on or after March 15, 2001 which subsequently contracts to, or in any manner agrees to provide, or does provide goods, services, or municipal-type services to a storage facility or transfer facility is formed in violation of Subsection (7)(a).

(ii) If the conditions of Subsection (7)(b)(i) apply, the persons who formed the political subdivision are considered to have knowingly violated a provision of this part, and the penalties of Section 19-3-312 apply.

(8)(a) An organization may not be formed for the purpose of providing any goods, services, or municipal-type services to a storage facility or transfer facility prior to:
(i) the satisfaction of the conditions in Subsection (4); and
(ii) the executive director of the department having certified that the requirements of Sections 19-3-304 through 19-3-308 have been met.

(b) A foreign organization may not be registered to do business in the state for the purpose of providing any goods, services, or municipal-type services to a storage facility or transfer facility prior to:
(i) the satisfaction of the conditions in Subsection (4); and
(ii) the executive director of the department having certified that the requirements of Sections 19-3-304 through 19-3-308 have been met.

(c) The prohibitions of Subsections (8)(a) and (b) shall be strictly applied, and:
(i) the formation of a new organization or registration of a foreign organization within the state, any of whose purposes are to provide goods, services, or municipal-type services to a storage facility or transfer facility may not be licensed or registered in the state, and the local or foreign organization is void and does not have authority to operate within the state;
(ii) any organization which is formed or registered on or after March 15, 2001, and which subsequently contracts to, or in any manner agrees to provide, or does provide goods, services, or municipal-type services to a storage facility or transfer facility has been formed or registered in violation of Subsection (8)(a) or (b) respectively; and
(iii) if the conditions of Subsection (8)(c)(ii) apply, the persons who formed the organization or the principals of the foreign organization, are considered to have knowingly violated a provision of this part, and are subject to the penalties in Section 19-3-312.

(9)(a)(i) Any contract or agreement to provide any

goods, services, or municipal-type services to any organization engaging in, or attempting to engage in the placement of high-level nuclear waste or greater than class C radioactive waste at a storage facility or transfer facility within the state are declared to be against the greater public interest, health, and welfare of the state, by promoting an activity which has the great potential to cause extreme public harm.

(ii) These contracts or agreements under Subsection (9)(a)(i), whether formal or informal, are declared to be void from inception, agreement, or execution as against public policy.

(b)(i) Any contract or other agreement to provide goods, services, or municipal-type services to storage or transfer facilities may not be executed within the state.

(ii) Any contract or other agreement, existing or executed on or after March 15, 2001, is considered void from the time of agreement or execution.

(10)(a) All contracts and agreements under Subsection (10)(b) are assessed an annual transaction fee of 75% of the gross value of the contract to the party providing the goods, services, or municipal-type services to the storage facility or transfer facility or transportation entity. The fee shall be assessed per calendar year, and is payable on a prorated basis on or before the last day of each month in accordance with rules established under Subsection (10)(d), and as follows:

(i) 25% of the gross value of the contract to the department; and

(ii) 50% of the gross value of the contract to the Department of Community and Economic Development, to be used by the Utah Division of Indian Affairs as provided in Subsection (11).

(b) Contracts and agreements subject to the fee under Subsection (10)(a) are those contracts and agreements to provide goods, services, or municipal-type services to a storage or transfer facility, or to any organization engaged in the transportation of high-level nuclear waste or greater than class C radioactive waste to a transfer facility or storage facility, and which:

(i) are in existence on March 15, 2001; or

(ii) become effective notwithstanding Subsection (9)(a).

(c) Any governmental agency which regulates the charges to consumers for services provided by utilities or other organizations shall require the regulated utility or organization to include the fees under Subsection (10)(a) in the rates charged to the purchaser of the goods, services, or municipal-type services affected by Subsection (10)(b).

(d)(i) The department, in consultation with the State Tax Commission, shall establish rules for the valuation of the contracts and assessment and collection of the fees, and other rules as necessary to determine the amount of and collection of the fee under Subsection (10)(a) The department may initiate rulemaking under this Subsection (d)(i) on or after March 15, 2001.

(ii) Persons and organizations holding contracts affected by Subsection (10)(b) shall make a good faith estimate of the fee under Subsection (10)(a) for calender year 2001, and remit that amount to the department on or before July 31, 2001.

(11)(a) The portion of the fees imposed under Subsection (10) which is to be paid to the Department of Community and Economic Development for use by the Utah Division of Indian Affairs shall be used for establishment of a statewide community and economic development program for the tribes of Native American people within the exterior boundaries of the state who have by tribal procedure established a position rejecting siting of any nuclear waste facility on their reservation lands.

(b) The program under Subsection (11)(a) shall include:

(i) educational services and facilities;

(ii) health care services and facilities;

(iii) programs of economic development;

(iv) utilities;

(v) sewer;

(vi) street lighting;

(vii) roads and other infrastructure; and

(viii) oversight and staff support for the program.

(12) It is the intent of the Legislature that this part does not prohibit or interfere with a person's exercise of the rights under the First Amendment to the Constitution of the United States or under Utah Constitution Article I, Sec. 15, by an organization attempting to site a storage facility or transfer facility within the borders of the state for the placement of high-level nuclear waste or greater than class C radioactive waste.

Amended by ch. 107 § 8, 2001 General Session (S.B. 81).

19-3-302. Legislative intent.

(1)(a) The state of Utah enacts this part to prevent the placement of any high-level nuclear waste or greater than class C radioactive waste in Utah. The state also recognizes that high-level nuclear waste or greater than class C radioactive waste may be placed within the exterior boundaries of the state, pursuant to a license from the federal government, or by the federal government itself, in violation of this state law.

(b) Due to this possibility, the state also enacts provisions in this part to regulate transportation, transfer, storage, decay in storage, treatment, and disposal of any high-level nuclear waste and greater than class C radioactive waste in Utah, thereby asserting and protecting the state's interests in environmental and economic resources consistent with 42 U.S.C.A. 2011 et seq., Atomic Energy Act and 42 U.S.C.A. 10101 et seq., Nuclear Waste Policy Act, should the federal government decide to authorize any entity to operate, or operate itself, in violation of this state law.

(2) Neither the Atomic Energy Act nor the Nuclear Waste Policy Act provides for siting a large privately owned high-level nuclear waste transfer, storage, decay in storage, or treatment facility away from the vicinity of the reactors. The Atomic Energy Act and the Nuclear Waste Policy Act specifically define authorized storage and disposal programs and activities. The state of Utah in enacting this part is not preempted by federal law, since any proposed facilities that would be sited in Utah are not contemplated or authorized by federal law and, in any circumstance, this part is not contrary to or inconsistent with federal law or Congressional intent.

(3) The state of Utah has environmental and economic interests which do not involve nuclear safety regulation, and which must be considered and complied with in siting a high-level nuclear waste or greater than class C radioactive waste transfer, storage, decay in storage, treatment, or disposal facility and in transporting these wastes in the state.

(4) An additional primary purpose of this part is to ensure protection of the state from nonradiological hazards associated with any waste transportation, transfer, storage, decay in storage, treatment, or disposal.

(5) The state recognizes the sovereign rights of Indian tribes within the state of Utah. However, any proposed transfer, storage, decay in storage, treatment, or disposal facility located on a reservation which directly affects and impacts state interests by creating off-reservation effects such as potential or actual degradation of soils and groundwater, potential or actual contamination of surface water, pollution of the ambient air, emergency planning costs, impacts on development, agriculture, and ranching, and increased transportation activity, is subject to state jurisdiction.

(6) There is no tradition of regulation by the Indian tribes in Utah of high-level nuclear waste or higher than class C radioactive waste. The state does have a long history of regulation of radioactive sources and natural resources and in the transfer, storage, treatment, and transportation of materials and wastes throughout the state. The state finds that its interests are even greater when nonmembers of an Indian tribe propose to locate a facility on tribal trust lands primarily to avoid state regulation and state authorities under federal law.

(7)(a) This part is not intended to modify existing state requirements for obtaining environmental approvals, permits, and licenses, including surface and groundwater permits and air quality permits, when the permits are necessary under state and federal law to construct and operate a high-level nuclear waste or greater than class C radioactive waste transfer, storage, decay in storage, treatment, or disposal facility.

(b) Any source of air pollution proposed to be located within the state, including sources located within the boundaries of an Indian reservation, which will potentially or actually have a direct and significant impact on ambient air within the state, is required to obtain an approval order and permit from the state under Section 19-2-108.

(c) Any facility which will potentially or actually have a significant impact on the state's surface or groundwater resources is required to obtain a permit under Section 19-5-107 even if located within the boundaries of an Indian reservation.

(8) The state finds that the transportation, transfer, storage, decay in storage, treatment, and disposal of high-level nuclear waste and greater than class C radioactive waste within the state is an ultra-hazardous activity which carries with it the risk that any release of waste may result in enormous economic and human injury.

Amended by ch. 107 § 9, 2001 General Session (S.B. 81).

19-3-303. Definitions.
As used in this part:
(1) "Final judgment" means a final ruling or judgment, including any supporting opinion, that determines the rights of the parties and concerning which all appellate remedies have been exhausted or the time for appeal has expired.
(2) "Goods" means any materials or supplies, whether raw, processed, or manufactured.
(3) "Greater than class C radioactive waste" means low-level radioactive waste that has higher concentrations of specific radionuclides than allowed for class C waste.
(4) "Gross value of the contract" means the totality of the consideration received for any goods, services, or municipal-type services delivered or rendered in the state without any deduction for expense paid or accrued with respect to it
(5) "High-level nuclear waste" has the same meaning as in Section 19-3-102.
(6) "Municipal-type services" includes, but is not limited to:
  (a) fire protection service;
  (b) waste and garbage collection and disposal;
  (c) planning and zoning;
  (d) street lighting;
  (e) life support and paramedic services;
  (f) water;
  (g) sewer;
  (h) electricity;
  (i) natural gas or other fuel; or
  (j) law enforcement.
(7) "Organization" means a corporation, limited liability company, partnership, limited liability partnership, joint venture, consortium, association, trust, or other entity formed to undertake an enterprise, whether or not for profit.
(8) "Placement" means transportation, transfer, storage, decay in storage, treatment, or disposal.
(9) "Political subdivision" means any county, city, town, school district, public transit district, redevelopment agency, special improvement or taxing district, or other governmental subdivision or public corporation.
(10) "Rule" means a rule made by the department under Title 63, Chapter 46a, Utah Administrative Rulemaking Act.
(11) "Service" or "services" means any work or governmental program which provides a benefit.
(12) "Storage facility" means any facility which stores, holds, or otherwise provides for the emplacement of waste regardless of the intent to recover that waste for subsequent use, processing, or disposal.
(13) "Transfer facility" means any facility which transfers waste from and between transportation modes, vehicles, cars, or other units, and includes rail terminals and intermodal transfer points.
(14) "Waste" or "wastes" means high-level nuclear waste and greater than class C radioactive waste.

Amended by ch 107 § 10, 2001 General Session (S.B. 81)

19-3-304 Licensing and approval by governor and Legislature -- Powers and duties of the department.
(1)(a) A person may not construct or operate a waste transfer, storage, decay in storage, treatment, or disposal facility within the exterior boundaries of the state without applying for and receiving a construction and operating license from the state Department of Environmental Quality and also obtaining approval from the Legislature and the governor.
  (b) The Department of Environmental Quality may issue the license, and the Legislature and the governor may approve the license, only upon finding the requirements and standards of this part have been met.
(2) The department shall by rule establish the procedures and forms required to submit an application for a construction and operating license under this part.
(3) The department may make rules implementing this part as necessary for the protection of the public health and the environment, including:
  (a) rules for safe and proper construction, installation, repair, use, and operation of waste transfer, storage, decay in storage, treatment, and disposal facilities;
  (b) rules governing prevention of and responsibility for costs incurred regarding accidents that may occur in conjunction with the operation of the facilities; and
  (c) rules providing for disciplinary action against the license upon violation of any of the licensure requirements under this part or rules made under this part.

Enacted by ch 348, § 4, 1998 General Session.

19-3-305 Application for license.
The application for a construction and operating license shall contain information required by department rules, which shall include:
(1) results of studies adequate to:
  (a) identify the presence of any groundwater aquifers in the area of the proposed site;
  (b) assess the quality of the groundwater of all

aquifers identified in the area of the proposed site;
(c) provide reports on the monitoring of vadose zone and other near surface groundwater;
(d) provide reports on hydraulic conductivity tests; and
(e) provide any other information necessary to estimate adequately the groundwater travel distance;
(2) identification of transportation routes and transportation plans within the state and demonstration of compliance with federal, state, and local transportation requirements;
(3) estimates of the composition, quantities, and concentrations of waste to be generated by the activities covered by the license;
(4) the environmental, social, and economic impact of the facility in the area of the proposed facility and on the state as a whole;
(5) detailed engineering plans and specifications for the construction and operation of the facility and for the closure of the facility;
(6) detailed cost estimates and funding sources for construction, operation, and closure of the facility;
(7) a security plan that includes a detailed description of security measures that would be installed in and around the facility;
(8) a detailed description of site suitability, including a description of the geologic, geochemical, geotechnical, hydrologic, ecologic, archaeologic, meteorologic, climatologic, and biotic features of the site and vicinity;
(9) specific identification of:
(a) the applicant, the wastes to be accepted, the sources of waste, and the owners and operators of the facility; and
(b) the persons or entities having legal responsibility for the facility and wastes;
(10) quantitative and qualitative environmental and health risk assessments for all proposed activities, including transfer, storage, and transportation of wastes;
(11) technical qualifications, including training and experience of the applicant, staff, and personnel who are to engage in the proposed activities;
(12) a quality assurance program, radiation safety program, and environmental monitoring program;
(13) a regional emergency plan for an area surrounding the facility having at least a 75 mile radius, but which may be greater, if required by department rule; and
(14) any other information and monitoring the department determines necessary to insure the protection of the public health and the environment.

Enacted by ch. 348, § 5, 1998 General Session

19-3-306 Information and findings required for approval by the department.
The department may not issue a construction and operating license unless information in the application:
(1) demonstrates the availability and adequacy of emergency services, including medical, security, and fire response, and environmental cleanup capabilities both at and in the region of the proposed site and for areas involved in the transport of wastes within the state;
(2) establishes financial assurance for operation and closure of the facility and for responding to emergency conditions in transportation and at the facility as required by department rules, including proof the applicant:
(a) possesses substantial resources that are sufficient to respond to any reasonably foreseeable injury or loss resulting from operation of the facility; and
(b) will maintain these resources throughout the term of the facility;
(3) provides evidence the wastes will not cause or contribute to an increase in mortality, an increase in illness, or pose a present or potential hazard to human health or the environment;
(4) provides evidence the personnel employed at the facility have appropriate and sufficient education and training for the safe and adequate handling of the wastes;
(5) demonstrates the public benefits of the proposed facility, including the lack of other available sites or methods for the management of the waste that would be less detrimental to the public health or safety or to the quality of the environment;
(6) demonstrates the technical feasibility of the proposed waste management technology;
(7) demonstrates conformance with federal laws, regulations, and guidelines for a waste facility;
(8) demonstrates conclusively that any facility is temporary and provides identified plans and alternatives for closure of the facility with an enforceable schedule and identified dates for closure, including evidence that:
(a) an identified party has irrevocably agreed to accept the waste at the end of the temporary storage period; and
(b) the waste will be moved to another facility;
(9) demonstrates that:

(a) the applicant is not a limited liability company, limited partnership, or other entity with limited liability, and

(b) the applicant and its officers and directors and those principals or other entities that are participating in and associated with the applicant regarding the facility are willing to accept unlimited strict liability, consistent with federal law, for any financial losses or human losses or injuries resulting from operation of any proposed facility;

(10) provides evidence the applicant has posted a cash bond in the amount of at least two billion dollars or in a greater amount as determined by department rule to be necessary to adequately respond to any reasonably foreseeable releases or losses, or the closure of the facility;

(11) provides evidence the applicant and its officers and directors, the owners or entities responsible for the generation of the waste, principals, and any other entities participating in or associated with the applicant, including landowners, lessors, and contractors, consent in writing to the jurisdiction of the state courts of Utah for any claims, damages, private rights of action, state enforcement actions, or other proceedings relating to the construction, operation, and compliance of the proposed facility; and

(12) demonstrates that any person or entity which sends wastes to a facility shall remain the owner of and responsible for the waste and its ultimate disposal and is willing to accept unlimited, strict liability, consistent with federal law, for any financial or human losses, liabilities, or injuries resulting from the wastes for the entire time period the waste is at the facility.

Enacted by ch. 348, § 6, 1998 General Session

19-3-307 Siting criteria.

(1) The department may not issue a construction and operating license to any waste transfer, storage, decay in storage, treatment, or disposal facility unless the facility location meets the siting criteria under Subsection (2).

(2) The facility may not be located:

(a) within or underlain by:

(i) national, state, or county parks; monuments or recreation areas; designated wilderness or wilderness study areas; or wild and scenic river areas;

(ii) ecologically or scientifically significant natural areas, including wildlife management areas and habitats for listed or proposed endangered species as designated by federal law;

(iii) 100-year flood plains;

(iv) areas 200 feet from Holocene faults;

(v) underground mines, salt domes, or salt beds;

(vi) dam failure flood areas;

(vii) areas subject to landslide, mud flow, or other earth movement, unless adverse impacts can be mitigated,

(viii) farmlands classified or evaluated as"prime," "unique," or of "statewide importance" by the U.S. Department of Agricultural Soil Conservation Service under the Prime Farmland Protection Act;

(ix) areas within five miles of existing permanent dwellings, residential areas, or other habitable structures, including schools, churches, or historic structures,

(x) areas within five miles of surface waters, including intermittent streams, perennial streams, rivers, lakes, reservoirs, and wetlands;

(xi) areas within 1,000 feet of archeological sites regarding which adverse impacts cannot reasonably be mitigated;

(xii) recharge zones of aquifers containing groundwater which has a total dissolved solids content of less than 10,000 mg/l; or

(xiii) drinking water source protection areas;

(b) in areas:

(i) above or underlain by aquifers that:

(A) contain groundwater which has a total dissolved solids content of less than 500 mg/l; and

(B) do not exceed state groundwater standards for pollutants;

(ii) above or underlain by aquifers containing groundwater which has a total dissolved solids content between 3,000 and 10,000 mg/l, when the distance from the surface to the groundwater is less than 100 feet;

(iii) of extensive withdrawal of water, gas, or oil;

(iv) above or underlain by weak and unstable soils, including soils that lose their ability to support foundations as a result of hydrocompaction, expansion, or shrinkage;

(v) above or underlain by karst terrains; or

(vi) where air space use and ground transportation routes present incompatible risks and uses; or

(c) within a distance to existing drinking water wells and watersheds for public water supplies of five years groundwater travel time plus 1,000 feet.

(3) An applicant for a license may request from the department an exemption from any of the siting criteria stated in this section upon demonstration

that the modification would be protective of and have no adverse impacts on the public health and the environment.

Enacted by ch. 348, § 7, 1998 General Session.

19-3-308 Application fee and annual fees.

(1)(a) Any application for a waste transfer, storage, decay in storage, treatment, or disposal facility shall be accompanied by an initial fee of $5,000,000.

(b) The applicant shall subsequently pay an additional fee to cover the costs to the state associated with review of the application, including costs to the state and the state's contractors for permitting, technical, administrative, legal, safety, and emergency response reviews, planning, training, infrastructure, and other impact analyses, studies, and services required to evaluate a proposed facility.

(2) For the purpose of funding the state oversight and inspection of any waste transfer, storage, decay in storage, treatment, or disposal facility, and to establish state infrastructure, including, but not limited to providing for state Department of Environmental Quality, state Department of Transportation, state Department of Public Safety, and other state agencies' technical, administrative, legal, infrastructure, maintenance, training, safety, socio-economic, law enforcement, and emergency resources necessary to respond to these facilities, the owner or operator shall pay to the state a fee as established by department rule under Section 63-38-3.2, to be assessed:

(a) per ton of storage cask and high level nuclear waste per year for storage, decay in storage, treatment, or disposal of high level nuclear waste;

(b) per ton of transportation cask and high level nuclear waste for each transfer of high level nuclear waste;

(c) per ton of storage cask and greater than class C radioactive waste for the storage, decay in storage, treatment, or disposal of greater than class C radioactive waste; and

(d) per ton of transportation cask and greater than class C radioactive waste for each transfer of greater than class C radioactive waste.

(3) Funds collected under Subsection (2) shall be placed in the Nuclear Accident and Hazard Compensation Account, created in Subsection 19-3-309(3).

(4) The owner or operator of the facility shall pay the fees imposed under this section to the department on or before the 15th day of the month following the month in which the fee accrued.

(5) Annual fees due under this part accrue on July 1 of each year and shall be paid to the department by July 15 of that year.

Enacted by ch. 348, § 8, 1998 General Session
Amended by ch. 107, § 11, 2001 General Session (S B 81).

19-3-309 Restricted account.

(1) There is created within the General Fund a restricted account known as the "Nuclear Waste Facility Oversight Account" and referred to in this section as the "oversight account".

(2)(a) The oversight account shall be funded from the fees imposed and collected under Subsections 19-3-308(1)(a) and(b).

(b) The department shall deposit in the oversight account all fees collected under Subsections 19-3-308(1)(a) and(b).

(c) The Legislature may appropriate the funds in this oversight account to departments of state government as necessary for those departments to carry out their duties to implement this part.

(d) The department shall account separately for monies paid into the oversight account for each separate application made pursuant to Section 19-3-304.

(3)(a) There is created within the General Fund a restricted account known as the "Nuclear Accident and Hazard Compensation Account," to be referred to as the "compensation account" within this part.

(b) The compensation account shall be funded from the fees assessed and collected under this part, except for Subsections 19-3-308(1)(a) and (b).

(c) The department shall deposit in the compensation account all fees collected under this part, except for those fees under Subsections 19-3-308(1)(a) and (b).

(d) The compensation account shall earn interest, which shall be deposited in the account.

(e) The Legislature may appropriate the funds in the compensation account to the departments of state government as necessary for those departments to comply with the requirements of this part.

(4) On the date when a state license is issued in accordance with Subsection 19-3-301(4)(a), the Division of Finance shall transfer all fees remaining in the oversight account attributable to that license into the compensation account.

Enacted by ch. 348, § 9, 1998 General Session.
Amended by ch.107 § 12, 2001 General Session (S.B. 81).

19-3-310 Benefits agreement.

(1) The department may not issue a construction and operating license under this part unless the applicant has entered into a benefits agreement with the department which is sufficient to offset adverse environmental, public health, social, and economic impacts to the state as a whole, and also specifically to the local area in which the facility is to be located.

(2)(a) The benefits agreement shall be attached to and made part of the terms of any license for the facility.

(b) Failure to adhere to the benefits agreement is a ground for the department to take enforcement action against the license, including permanent revocation of the license.

(3) This part may not be construed or interpreted to affect the rights of any person or entity to brings claims against or reach agreements with the applicant for impacts from the facility independent of the benefits agreement.

Enacted by ch. 348, § 10, 1998 General Session.

19-3-311 Length of license.

(1) Any construction and operating license shall be issued for a term established by department rule, but the term may not be longer than 20 years.

(2) The term of the license may be extended beyond 20 years only by approval of the department, the Legislature, and the governor.

Enacted by ch 348, § 11, 1998 General Session

19-3-312 Enforcement -- Penalties.

(1) When the department or the governor has probable cause to believe a person is violating or is about to violate any provision of this part, the department or the governor shall direct the state attorney general to apply to the appropriate court for an order enjoining the person from engaging in or continuing to engage in the activity.

(2) In addition to being subject to injunctive relief, any person who violates any provision of this part is subject to a civil penalty of up to $10,000 per day for each violation.

(3) Any person who knowingly violates a provision of this part is guilty of a class A misdemeanor and subject to a fine of up to $10,000 per day.

(4) Any person or organization acting to facilitate a violation of any provision of this part regarding the regulation of greater than class C radioactive waste or high-level nuclear waste is subject to a civil penalty of up to $10,000 per day for each violation, in addition to being subject to injunctive relief

(5) Any person or organization who knowingly acts to facilitate a violation of this part regarding the regulation of high-level nuclear waste or greater than class C radioactive waste is guilty of a class A misdemeanor and is subject to a fine of up to $10,000 per day.

(6)(a) This section does not impose a civil or criminal penalty on any Utah-based nonprofit trade association due to the membership in the organization of a member that is engaging in, or attempting to engage in, the placement of high-level nuclear waste or greater than class C radioactive waste at a storage facility or transfer facility within the state.

(b) Subsection (6)(a) does not apply to a nonprofit trade association if that association takes any affirmative action to promote or assist any individual or organization in efforts to conduct any activity prohibited by this part.

(c) A member of any Utah-based nonprofit trade association is not exempt from any civil or criminal liability or penalty due to membership in the association

Enacted by ch 348, § 12, 1998 General Session.
Amended by ch 107, § 13, 2001 General Session (S B. 81)

19-3-313 Reciprocity.

Waste may not be transported into and transferred, stored, decayed in storage, treated, or disposed of in the state if the state of origin of the waste or the state in which the waste was generated prohibits or limits similar actions within its own boundaries.

Enacted by ch. 348, § 13, 1998 General Session.

19-3-314 Local jurisdiction.

This part does not preclude any political subdivision of the state from establishing additional requirements under applicable state and federal law.

Enacted by ch. 348, § 14, 1998 General Session.

19-3-315 Transportation requirements.

(1) A person may not transport wastes in the state, including on highways, roads, rail, by air, or otherwise, without:

(a) having received approval from the state Department of Transportation; and

(b) having demonstrated compliance with rules of the state Department of Transportation.

(2) The Department of Transportation may:

(a) make rules requiring a transport and route approval permit, weight restrictions, tracking systems, and state escort; and
(b) assess appropriate fees as established under Section 63-38-3.2 for each shipment of waste, consistent with the requirements and limitations of federal law.

(3) The Department of Environmental Quality shall establish any other transportation rules as necessary to protect the public health, safety, and environment.

(4) Unless expressly authorized by the governor, with the concurrence of the Legislature, an easement or other interest in property may not be granted upon any lands within the state for a right of way for any carrier transportation system that:
(a) is not a class I common or contract rail carrier organized and doing business prior to January 1, 1999; and
(b) transports high level nuclear waste or greater than class C radioactive waste to a storage facility within the state.

Amended by ch. 190 § 1, 1999, General Session

19-3-316 Cost recovery.
The owner or transporter or any person in possession of waste is liable, consistent with the provisions of federal law, for any expense, damages, or injury incurred by the state, its political subdivisions, or any person as a result of a release of the waste.

Enacted by ch. 348, § 16, 1998 General Session (S.B. 196).

19-3-317 Severability.
If any provision of this part is held to be invalid, unconstitutional, or otherwise held to be inconsistent with law, the remainder of this part is not affected and remains in full force.

Enacted by ch. 348, § 17, 1998 General Session (S.B. 196).

19-3-318. No limitation of liability regarding businesses involved in high level radioactive waste.
(1) As used in this section:
(a) "Controlling interest" means:
(i) the direct or indirect possession of the power to direct or cause the direction of the management and policies of an organization, whether through the ownership of voting interests, by contract, or otherwise; or
(ii) the direct or indirect possession of a 10% or greater equity interest in an organization.
(b) "Equity interest holder" means a shareholder, member, partner, limited partner, trust beneficiary, or other person whose interest in an organization:
(i) is in the nature of an ownership interest;
(ii) entitles the person to participate in the profits and losses of the organization; or
(iii) is otherwise of a type generally considered to be an equity interest.
(c) "Organization" means a corporation, limited liability company, partnership, limited partnership, limited liability partnership, joint venture, consortium, association, trust, or other entity formed to undertake an enterprise or activity, whether or not for profit.
(d) "Parent organization" means an organization with a controlling interest in another organization.
(e)(i) "Subject activity" means:
(A) to arrange for or engage in the transportation or transfer of high level nuclear waste or greater than class C radioactive waste to or from a storage facility in the state; or
(B) to arrange for or engage in the operation or maintenance of a storage facility or a transfer facility for that waste.
(ii) "Subject activity" does not include the transportation of high level nuclear waste or greater than class C radioactive waste by a class I railroad that was doing business in the state as a common or contract carrier by rail prior to January 1, 1999.
(f) "Subsidiary organization" means an organization in which a parent organization has a controlling interest.

(2)(a) The Legislature enacts this section because of the state's compelling interest in the transportation, transfer, and storage of high level nuclear waste and greater than class C radioactive waste in this state. Legislative intent supporting this section is further described in Section 19-3-302.
(b) Limited liability for equity interest holders is a privilege, not a right, under the law and is meant to benefit the state and its citizens. An organization engaging in subject activities has significant potential to affect the health, welfare, or best interests of the state and should not have limited liability for its equity interest holders. To shield equity interest holders from the debts and obligations of an organization engaged in subject activities would have the effect of attracting capital to enterprises whose goals are contrary to the state's interests.

(c) This section has the intent of revoking any and all statutory and common law grants of limited liability for an equity interest holder of an organization that chooses to engage in a subject activity in this state

(d) This section shall be interpreted liberally to allow the greatest possible lawful recourse against an equity interest holder of an organization engaged in a subject activity in this state for the debts and liabilities of that organization.

(e) This section does not reduce or affect any liability limitation otherwise granted to an organization by Utah law if that organization is not engaged in a subject activity in this state.

(3) Notwithstanding any law to the contrary, if a domestic or foreign organization engages in a subject activity in this state, no equity interest holder of that organization enjoys any shield or limitation of liability for the acts, omissions, debts, and obligations of the organization incurred in this state. Each equity interest holder of the organization is strictly and jointly and severally liable for all these obligations

(4) Notwithstanding any law to the contrary, each officer and director of an organization engaged in a subject activity in this state is individually liable for the acts, omissions, debts, and obligations of the organization incurred in this state.

(5)(a) Notwithstanding any law to the contrary, if a subsidiary organization is engaged in a subject activity in this state, then each parent organization of the subsidiary is also considered to be engaged in a subject activity in this state. Each parent organization's equity interest holders and officers and directors are subject to this section to the same degree as the subsidiary's equity interest holders and officers and directors.

(b) Subsection (5)(a) applies regardless of the number of parent organizations through which the controlling interest passes in the relationship between the subsidiary and the ultimate parent organization that controls the subsidiary.

(6) This section does not excuse or modify the requirements imposed upon an applicant for a license by Subsection 19-3-306(9).

Enacted by ch. 190, § 2, 1999 General Session

Decisions

Ruling on the admissibility of the State's contentions in the high level nuclear waste storage license application proceeding Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142 (1998)

19-3-319. State response to nuclear release and hazards.

(1) The state finds that the placement of high-level nuclear waste inside the exterior boundaries of the state is an ultra-hazardous activity which may result in catastrophic economic and environmental damage and irreparable human injury in the event of a release of waste, and which may result in serious long-term health effects to workers at any transfer or storage facility, or to workers involved in the transportation of the waste.

(2)(a) The state finds that procedures for providing funding for the costs incurred by any release of waste, or for the compensation for the costs of long-term health effects are not adequately addressed by existing law.

(b) Due to these concerns, the state has established a restricted account under Subsection 19-3-309(3), known as the Nuclear Accident and Hazard Compensation Account, and referred to in this section as the compensation account. One of the purposes of this account is to partially or wholly compensate workers for these potential costs, as funds are available and appropriated for these purposes

(3)(a) The department shall require the applicant, and parent and subsidiary organizations of the applicant, to pay to the department not less than 75% of the unfunded potential liability, as determined under Subsection 19-3-301(5), in the form of cash or cash equivalents. The payment shall be made within 30 days after the date of the issuance of a license under this part.

(b) The department shall credit the amount due under Subsection 19-3-306(10) against the amount due under this Subsection (3).

(c) If the payments due under this Subsection (3) are not made within 30 days, as required, the executive director of the department shall cancel the license.

(4)(a) The department shall also require an annual fee from the holder of any license issued under this part This annual fee payment shall be calculated as:

(i) the aggregate amount of the annual payments required by Title 34A, Chapter 2, Workers' Compensation Act, of the licensee and of all parties contracted to provide goods, services, or municipal-type services to the licensee, regarding their employees who are working within the state at any time during the

calendar year; and

(ii) multiplied by the number of storage casks of waste present at any time and for any period of time within the exterior borders of the state during the year for which the fee is assessed.

(b)(i) The licensee shall pay the fee under Subsection (4)(a) to the department. The department shall deposit the fee in the compensation account created in Subsection 19-3-309(3).

(ii) The fee shall be paid to the department on or before March 31 of each calendar year.

(5) The department shall use the fees paid under Subsection (4) to provide medical or death benefits, or both, as is appropriate to the situation, to the following persons for death or any long term health conditions of an employee proximately caused by the presence of the high-level nuclear waste or greater than class C radioactive waste within the state, or a release of this waste within the state that affects an employee's physical health:

(a) any employee of the holder of any license issued under this part, or employees of any parties contracting to provide goods, services, transportation, or municipal-type services to the licensee, if the employee is within the state at any time during the calendar year as part of his employment; or

(b) that employee's family or beneficiaries.

(6) Payment of the fee under Subsection (4) does not exempt the licensee from compliance with any other provision of law, including Title 34A, Chapter 2, regarding workers' compensation.

(7)(a) An agreement between an employer and an employee, the employee's family, or beneficiaries requiring the employee to waive benefits under this section, requiring the employee to seek third party coverage, or requiring an employee contribution is void.

(b) Any employer attempting to secure any agreement prohibited under Subsection (7)(a) is subject to the penalties of Section 19-3-312.

(8)(a) The department, in consultation with the Division of Industrial Accidents within the Labor Commission, shall by rule establish procedures regarding application for benefits, standards for eligibility, estimates of annual payments, and payments.

(b) Payments under this section are in addition to any other payments or benefits allowed by state or federal law, notwithstanding provisions in Title 34A, Chapter 2, regarding workers' compensation.

(c) Payments or obligations to pay under this section may not exceed funds appropriated for these purposes by the Legislature.

(9)(a) Any fee or payment imposed under this section does not apply to any Utah-based nonprofit trade association due to the membership in the organization of a member that is engaging in, or attempting to engage in, the placement of high-level nuclear waste or greater than class C radioactive waste at a storage facility or transfer facility within the state.

(b) Subsection (9)(a) does not apply to a nonprofit trade association if that association takes any affirmative action to promote or assist any individual or organization in efforts to conduct any activity prohibited by this part.

(c) A member of any Utah-based nonprofit trade association is not exempt from any fee or payment under this section due to membership in the association.

Enacted by ch. 107, § 14, 2001 General Session (S.B. 81).

19-3-320 Efforts to prevent siting of any nuclear waste facility to include economic development study regarding Native American reservation lands within the state.

(1) It is the intent of the Legislature that the department, in its efforts to prevent the siting of a nuclear waste facility within the exterior borders of the state, include in its work the study under Subsection (2) and the report under Subsection (3).

(2) It is the intent of the Legislature that the Department of Environmental Quality, in coordination with the office of the governor, and in cooperation with the Departments of Community and Economic Development, Human Services, Health, Workforce Services, Agriculture and Food, Natural Resources, and Transportation, the state Office of Education, and the Board of Regents:

(a) study the needs and requirements for economic development on the Native American reservations within the state; and

(b) prepare, on or before November 30, 2001, a long-term strategic plan for economic development on the reservations.

(3) It is the intent of the Legislature that this plan, prepared under Subsection (2)(b), shall be distributed to the governor and the members of the Legislature on or before December 31, 2001.

Enacted by ch. 269, § 1, 2001 General Session (S.B. 198).

CHAPTER 5
WATER QUALITY ACT

Section

19-5-101 Short title.
This chapter is known as the "Water Quality Act."

19-5-102 Definitions.
As used in this chapter:

(1) "Board" means the Water Quality Board created in Section 19-1-106.

(2) "Contaminant" means any physical, chemical, biological, or radiological substance or matter in water.

(3) "Discharge" means the addition of any pollutant to any waters of the state.

(4) "Discharge permit" means a permit issued to a person who:
   (a) discharges or whose activities would probably result in a discharge of pollutants into the waters of the state; or
   (b) generates or manages sewage sludge.

(5) "Disposal system" means a system for disposing of wastes, and includes sewerage systems and treatment works

(6) "Effluent limitations" means any restrictions, requirements, or prohibitions, including schedules of compliance established under this chapter which apply to discharges.

(7) "Executive secretary" means the executive secretary of the board.

(8) "Point source":
   (a) means any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged; and
   (b) does not include return flows from irrigated agriculture.

(9) "Pollution" means any man-made or man-induced alteration of the chemical, physical, biological, or radiological integrity of any waters of the state, unless the alteration is necessary for the public health and safety.

(10) "Publicly owned treatment works" means any facility for the treatment of pollutants owned by the state, its political subdivisions, or other public entity.
(11) "Schedule of compliance" means a schedule of remedial measures, including an enforceable sequence of actions or operations leading to compliance with this chapter.
(12) "Sewage sludge" means any solid, semisolid, or liquid residue removed during the treatment of municipal wastewater or domestic sewage.
(13) "Sewerage system" means pipelines or conduits, pumping stations, and all other constructions, devices, appurtenances, and facilities used for collecting or conducting wastes to a point of ultimate disposal.
(14) "Treatment works" means any plant, disposal field, lagoon, dam, pumping station, incinerator, or other works used for the purpose of treating, stabilizing, or holding wastes.
(15) "Underground injection" means the subsurface emplacement of fluids by well injection
(16) "Underground wastewater disposal system" means a system for disposing of domestic wastewater discharges as defined by the board and the executive director.
(17) "Waste" or "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.
(18) "Waters of the state":
  (a) means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion of the state, and
  (b) does not include bodies of water confined to and retained within the limits of private property, and which do not develop into or constitute a nuisance, a public health hazard, or a menace to fish or wildlife.

Amended by ch. 274, § 1, 2001 General Session (H B. 14)

19-5-103 Water Quality Board -- Members of board -- Appointment -- Terms -- Organization -- Meetings -- Per diem and expenses.

(1) Committee members currently serving on the Water Pollution Control Committee created under Chapter 126, Laws of Utah 1981, shall serve on the board throughout the terms for which they were appointed.
(2) The board comprises the executive director and ten members appointed by the governor with the consent of the Senate.
(3) No more than five of the appointed members may be from the same political party.
(4) The appointed members, insofar as practicable, shall include the following:
  (a) one member representing the mineral industries;
  (b) one member representing the food processing industries;
  (c) one member representing other manufacturing industries;
  (d) two members who are officials of municipal government or their representatives involved in the management or operation of wastewater treatment facilities;
  (e) one member representing agricultural and livestock interests;
  (f) one member representing fish, wildlife, and recreation interests;
  (g) one member representing improvement and service districts; and
  (h) two members at large, one of whom represents organized environmental interests, selected with due consideration of the areas of the state affected by water pollution and not representing other interests named in this Subsection (4).
(5) When a vacancy occurs in the membership for any reason, the replacement shall be appointed for the unexpired term with the consent of the Senate.
(6)(a) Except as required by Subsection (6)(b), members shall be appointed for terms of four years and are eligible for reappointment.
  (b) Notwithstanding the requirements of Subsection (6)(a), the governor shall, at the time of appointment or reappointment, adjust the length of terms to ensure that the terms of board members are staggered so that approximately half of the board is appointed every two years.
(7) Members shall hold office until the expiration of their terms and until their successors are appointed, not to exceed 90 days after the formal expiration of their terms.
(8) The board shall:
  (a) organize and annually select one of its members as chair and one of its members as vice chair;
  (b) hold at least four regular meetings each calendar year; and
  (c) keep minutes of its proceedings which shall be open to the public for inspection.
(9) Special meetings may be called by the chair and must be called by him upon the request of three or

more members of the board.

(10) Each member of the board and the executive secretary shall be notified of the time and place of each meeting.

(11) Six members of the board constitute a quorum for the transaction of business, and the action of a majority of members present is the action of the board.

(12)(a) Members shall receive no compensation or benefits for their services, but may receive per diem and expenses incurred in the performance of the member's official duties at the rates established by the Division of Finance under Sections 63A-3-106 and 63A-3-107.

(b) Members may decline to receive per diem and expenses for their service.

(c) Local government members who do not receive salary, per diem, or expenses from the entity that they represent for their service may receive per diem and expenses incurred in the performance of their official duties at the rates established by the Division of Finance under Sections 63A-3-106 and 63A-3-107.

(d) Local government members may decline to receive per diem and expenses for their service.

Amended by ch 275, § 4, 2001 General Session (H.B. 16).
Amended by ch. 176, § 24, 2002 General Session (S B. 10).

19-5-104 Powers and duties of board.

(1) The board has the following powers and duties, but the board shall give priority to pollution that results in hazards to the public health:

(a) develop programs for the prevention, control, and abatement of new or existing pollution of the waters of the state;

(b) advise, consult, and cooperate with other agencies of the state, the federal government, other states, and interstate agencies, and with affected groups, political subdivisions, and industries to further the purposes of this chapter;

(c) encourage, participate in, or conduct studies, investigations, research, and demonstrations relating to water pollution and causes of water pollution as the board finds necessary to discharge its duties;

(d) collect and disseminate information relating to water pollution and the prevention, control, and abatement of water pollution;

(e) adopt, modify, or repeal standards of quality of the waters of the state and classify those waters according to their reasonable uses in the interest of the public under conditions the board may prescribe for the prevention, control, and abatement of pollution;

(f) make rules in accordance with Title 63, Chapter 46a, Utah Administrative Rulemaking Act, taking into account Subsection (2), to:

(i) implement the awarding of construction loans to political subdivisions and municipal authorities under Section 11-8-2, including:

(A) requirements pertaining to applications for loans;

(B) requirements for determination of eligible projects;

(C) requirements for determination of the costs upon which loans are based, which costs may include engineering, financial, legal, and administrative expenses necessary for the construction, reconstruction, and improvement of sewage treatment plants, including major interceptors, collection systems, and other facilities appurtenant to the plant;

(D) a priority schedule for awarding loans, in which the board may consider in addition to water pollution control needs any financial needs relevant, including per capita cost, in making a determination of priority; and

(E) requirements for determination of the amount of the loan;

(ii) implement the awarding of loans for nonpoint source projects pursuant to Section 73-10c-4.5;

(iii) set effluent limitations and standards subject to Section 19-5-116;

(iv) implement or effectuate the powers and duties of the board; and

(v) protect the public health for the design, construction, operation, and maintenance of underground wastewater disposal systems, liquid scavenger operations, and vault and earthen pit privies;

(g) issue, modify, or revoke orders:

(i) prohibiting or abating discharges;

(ii) requiring the construction of new treatment works or any parts of them, or requiring the modification, extension, or alteration of existing treatment works as specified by board rule or any parts of them, or the adoption of other remedial measures to prevent, control, or abate pollution;

(iii) setting standards of water quality, classifying waters or evidencing any other determination by the board under this chapter; and

(iv) requiring compliance with this chapter and with rules made under this chapter;

(h) review plans, specifications, or other data relative to disposal systems or any part of disposal systems, and issue construction permits for the installation or modification of treatment works or

any parts of them;

(i) after public notice and opportunity for a public hearing, issue, continue in effect, revoke, modify, or deny discharge permits under reasonable conditions the board may prescribe to control the management of sewage sludge or to prevent or control the discharge of pollutants, including effluent limitations for the discharge of wastes into the waters of the state;

(j) give reasonable consideration in the exercise of its powers and duties to the economic impact of water pollution control on industry and agriculture,

(k) exercise all incidental powers necessary to carry out the purposes of this chapter, including delegation to the department of its duties as appropriate to improve administrative efficiency;

(l) meet the requirements of federal law related to water pollution;

(m) establish and conduct a continuing planning process for control of water pollution including the specification and implementation of maximum daily loads of pollutants;

(n) make rules governing inspection, monitoring, recordkeeping, and reporting requirements for underground injections and require permits for them, to protect drinking water sources, except for wells, pits, and ponds covered by Section 40-6-5 regarding gas and oil, recognizing that underground injection endangers drinking water sources if.

(i) injection may result in the presence of any contaminant in underground water which supplies or can reasonably be expected to supply any public water system, as defined in Section 19-4-102; and

(ii) the presence of the contaminant may result in the public water system not complying with any national primary drinking water standards or may otherwise adversely affect the health of persons;

(o) make rules governing sewage sludge management, including permitting, inspecting, monitoring, recordkeeping, and reporting requirements;

(p) adopt and enforce rules and establish fees to cover the costs of testing for certification of operators of treatment works and sewerage systems operated by political subdivisions; and

(q) notwithstanding the provisions of Section 19-4-112, make rules governing design and construction of irrigation systems which convey sewage treatment facility effluent of human origin in pipelines under pressure, unless contained in surface pipes wholly on private property and for agricultural purposes, and which are constructed after May 4, 1998.

(2) In determining eligible project costs and in establishing priorities pursuant to Subsection (1)(f)(i), the board shall take into consideration the availability of federal grants.

(3) In establishing certification rules under Subsection (1)(p), the board shall:

(a) base the requirements for certification on the size, treatment process type, and complexity of the treatment works and sewerage systems operated by political subdivisions;

(b) allow operators until three years after the date of adoption of the rules to obtain initial certification;

(c) allow new operators one year from the date they are hired by a treatment plant or sewerage system or three years after the date of adoption of the rules, whichever occurs later, to obtain certification;

(d) issue certification upon application and without testing, at a grade level comparable to the grade of current certification to operators who are currently certified under the voluntary certification plan for wastewater works operators as recognized by the board; and

(e) issue a certification upon application and without testing that is valid only at the treatment works or sewerage system where that operator is currently employed if the operator:

(i) is in charge of and responsible for the treatment works or sewerage system on March 16, 1991;

(ii) has been employed at least ten years in the operation of that treatment works or sewerage system prior to March 16, 1991; and

(iii) demonstrates to the board his capability to operate the treatment works or sewerage system at which he is currently employed by providing employment history and references as required by the board.

Amended by ch 282 § 1, 2000 General Session
Amended by ch. 274 § 2, 2001 General Session (H.B. 14)

19-5-105 Rulemaking authority and procedure.

(1) Except as provided in Subsection (2), no rule which the board makes for the purpose of the state administering a program under the federal Clean Water Act or the federal Safe Drinking Water Act may be more stringent than the corresponding federal regulations which address the same circumstances. In making rules, the board may incorporate by reference corresponding federal regulations.

(2) The board may make rules more stringent than corresponding federal regulations for the purpose described in Subsection (1), only if it makes a

written finding after public comment and hearing and based on evidence in the record that the corresponding federal regulations are not adequate to protect public health and the environment of the state. Those findings shall be accompanied by an opinion referring to and evaluating the public health and environmental information and studies contained in the record which form the basis for the board's conclusion.

19-5-106 Executive secretary -- Appointment -- Duties.

The executive secretary shall be appointed by the executive director with the approval of the board, shall serve under the administrative direction of the executive director, and has the following duties:

(1) to develop programs for the prevention, control, and abatement of new or existing pollution of the waters of the state;

(2) to advise, consult, and cooperate with other agencies of the state, the federal government, other states and interstate agencies, and with affected groups, political subdivisions, and industries in furtherance of the purposes of this chapter;

(3) to employ full-time employees as necessary to carry out the provisions of this chapter;

(4) as authorized by the board and subject to the provisions of this chapter, to authorize any employee or representative of the department to enter at reasonable times and upon reasonable notice in or upon public or private property for the purposes of inspecting and investigating conditions and plant records concerning possible water pollution;

(5) to encourage, participate in, or conduct studies, investigations, research, and demonstrations relating to water pollution and causes of water pollution as necessary for the discharge of duties assigned under this chapter, including the establishment of inventories of pollution sources;

(6) to collect and disseminate information relating to water pollution and the prevention, control, and abatement of water pollution;

(7) to develop programs for the management of sewage sludge;

(8) as authorized by the board and subject to the provisions of this chapter, to enforce rules made by the board through the issuance of orders which may be subsequently amended or revoked by the board, which orders may include:

(a) prohibiting or abating discharges of wastes into the waters of the state;

(b) requiring the construction of new control facilities or any parts of them or the modification, extension, or alteration of existing control facilities or any parts of them, or the adoption of other remedial measures to prevent, control, or abate water pollution; and

(c) prohibiting any other violation of this chapter or rules made under this chapter;

(9) to review plans, specifications, or other data relative to pollution control systems or any part of the systems provided for in this chapter;

(10) as authorized by the board and subject to the provisions of this chapter, to exercise all incidental powers necessary to carry out the purposes of this chapter, including certification to any state or federal authorities for tax purposes only if the fact of construction, installation, or acquisition of any facility, land, or building, machinery, or equipment, or any part of them conforms with this chapter;

(11) to cooperate, where the board finds appropriate, with any person in studies and research regarding water pollution and its control, abatement, and prevention; and

(12) to represent the state with the specific concurrence of the executive director in all matters pertaining to water pollution, including interstate compacts and other similar agreements.

19-5-107 Discharge of pollutants unlawful -- Discharge permit required.

(1)(a) Except as provided in this chapter or rules made under it, it is unlawful for any person to discharge a pollutant into waters of the state or to cause pollution which constitutes a menace to public health and welfare, or is harmful to wildlife, fish or aquatic life, or impairs domestic, agricultural, industrial, recreational, or other beneficial uses of water, or to place or cause to be placed any wastes in a location where there is probable cause to believe it will cause pollution.

(b) For purposes of injunctive relief, any violation of this subsection is a public nuisance.

(2)(a) A person may not generate, store, treat, process, use, transport, dispose, or otherwise manage sewage sludge, except in compliance with this chapter and rules made under it.

(b) For purposes of injunctive relief, any violation of this subsection is a public nuisance.

(3) It is unlawful for any person, without first securing a permit from the executive secretary as authorized by the board, to:

(a) make any discharge or manage sewage sludge not authorized under an existing valid discharge permit; or

(b) construct, install, modify, or operate any treatment works or part of any treatment works or any extension or addition to any treatment works,

or construct, install, or operate any establishment or extension or modification of or addition to any treatment works, the operation of which would probably result in a discharge.

Amended by ch. 271, § 3, 1998 General Session

19-5-108 Discharge permits -- Requirements and procedure for issuance.

(1) The board may prescribe conditions for and require the submission of plans, specifications, and other information to the executive secretary in connection with the issuance of discharge permits.

(2) Each discharge permit shall have a fixed term not exceeding five years Upon expiration of a discharge permit, a new permit may be issued by the executive secretary as authorized by the board after notice and an opportunity for public hearing and upon condition that the applicant meets or will meet all applicable requirements of this chapter, including the conditions of any permit granted by the board.

(3) The board may require notice to the executive secretary of the introduction of pollutants into publicly-owned treatment works and identification to the executive secretary of the character and volume of any pollutant of any significant source subject to pretreatment standards under Subsection 307(b) of the federal Clean Water Act The executive secretary shall provide in the permit for compliance with pretreatment standards.

(4) The board may impose as conditions in permits for the discharge of pollutants from publicly-owned treatment works appropriate measures to establish and insure compliance by industrial users with any system of user charges required under this chapter or the rules adopted under it.

(5) The board may apply and enforce against industrial users of publicly-owned treatment works, toxic effluent standards and pretreatment standards for the introduction into the treatment works of pollutants which interfere with, pass through, or otherwise are incompatible with the treatment works.

19-5-109 Grounds for revocation, modification, or suspension of discharge permit.

(1) Any permit issued under this chapter may be revoked, modified, or suspended in whole or in part for cause including:

(a) violation of any condition of the permit;

(b) obtaining a permit by misrepresentation or failure to disclose fully all relevant facts; or

(c) change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

(2) For purposes of Subsection (1)(c), "condition" does not include statutory or regulatory effluent limitations enacted or adopted during the permit term, other than for toxic pollutants.

19-5-110 Designation by governor of areas with quality control problems -- Classification of waters -- Adoption of standards of quality.

(1) The governor may identify and designate by boundary, or make a determination not to designate, areas within the state which, as a result of urban-industrial concentration or other factors, have substantial water quality control problems, and designate planning agencies and waste treatment management agencies for these areas.

(2) The board may group the waters of the state into classes according to their present most reasonable uses, and after public hearing, upgrade and reclassify from time to time the waters of the state to the extent that it is practical and in the public interest.

(3)(a) The board may establish standards of quality for each classification consistent with most reasonable present and future uses of the waters, and the standards may be modified or changed from time to time.

(b) Prior to classifying waters, setting quality standards or modifying or repealing them the board shall conduct public hearings for the consideration, adoption, or amendment of the classifications of waters and standards of purity and quality.

(c) The notice shall specify the waters concerning which a classification is sought to be made for which standards are sought to be adopted and the time, date, and place of the hearing.

(d) The notice shall be published at least twice in a newspaper of general circulation in the area affected and shall be mailed at least 30 days before the public hearing to the chief executive of each political subdivision of the area affected and to other persons the board has reason to believe will be affected by the classification and the setting of standards.

(4)(a) The adoption of standards of quality for the waters of the state and classification of the waters or any modification or change in classification shall be effectuated by an order of the board which shall be published in a newspaper of general circulation in the area affected.

(b) In classifying waters and setting standards of water quality, adopting rules, or making any modification or change in classification or

standards, the board shall allow and announce a reasonable time, not exceeding statutory deadlines contained in the federal Clean Water Act, for persons discharging wastes into the waters of the state to comply with the classification or standards and may, after public hearing if requested by the permittee, set and revise schedules of compliance and include these schedules within the terms and conditions of permits for the discharge of pollutants.

(5) Any discharge in accord with classification or standards authorized by a permit is not pollution for the purpose of this chapter.

19-5-111 Notice of violations -- Hearings.

(1) Whenever the board determines there are reasonable grounds to believe that there has been a violation of this chapter or any order of the board, it may give written notice to the alleged violator specifying the provisions that have been violated and the facts that constitute the violation.

(2) The notice shall require that the matters complained of be corrected.

(3) The notice may order the alleged violator to appear before the board at a time and place specified in the notice and answer the charges.

19-5-112 Hearings conducted by board -- Hearing on denial or revocation of permit conducted by executive director.

(1)(a) The hearings authorized by Section 19-5-111, except hearings for a person who is denied a permit or whose permit has been revoked, may be conducted by the board at a regular or special meeting, or by an examining officer designated by the board.

(b) All decisions shall be rendered by a majority of the board.

(2)(a) A hearing for a person who has been denied a permit, or who has had a permit revoked, shall be conducted before the executive director or his designee.

(b) The decision of the executive director is final and binding on all parties as a final determination of the board unless stayed or overturned on appeal.

19-5-113 Power of board to enter property for investigation -- Records and reports required of owners or operators.

(1) The board or its authorized representative has, after presentation of credentials, the authority to enter at reasonable times upon any private or public property for the purpose of:

(a) sampling, inspecting, or investigating matters or conditions relating to pollution or the possible pollution of any waters of the state, effluents or effluent sources, monitoring equipment, or sewage sludge; and

(b) reviewing and copying records required to be maintained under this chapter.

(2)(a) The board may require a person managing sewage sludge, or the owner or operator of a disposal system, including a system discharging into publicly-owned treatment works, to:

(i) establish and maintain reasonable records and make reports relating to the operation of the system or the management of the sewage sludge;

(ii) install, use, and maintain monitoring equipment or methods;

(iii) sample, and analyze effluents or sewage sludges; and

(iv) provide other information reasonably required.

(b) The records, reports, and information shall be available to the public except as provided in Subsection 19-1-306(2) or Subsections 63-2-304(1) and (2), Government Records Access and Management Act, as appropriate, for other than effluent information.

19-5-114 Spills or discharges of oil or other substance -- Notice to executive secretary.

Any person who spills or discharges any oil or other substance which may cause the pollution of the waters of the state shall immediately notify the executive secretary of the spill or discharge, any containment procedures undertaken, and a proposed procedure for cleanup and disposal, in accordance with rules of the board.

19-5-115 Violations -- Penalties -- Civil actions by board -- Ordinances and rules of political subdivisions.

(1) The terms "knowingly," "willfully," and "criminal negligence" shall mean as defined in Section 76-2-103.

(2) Any person who violates this chapter, or any permit, rule, or order adopted under it, upon a showing that the violation occurred, is subject in a civil proceeding to a civil penalty not to exceed $10,000 per day of violation.

(3)(a) A person is guilty of a class A misdemeanor and is subject to imprisonment under Section 76-3-204 and a fine not exceeding $25,000 per day who with criminal negligence:

(i) discharges pollutants in violation of Subsection 19-5-107(1) or in violation of any condition or limitation included in a permit issued under Subsection 19-5-107(3);

(ii) violates Section 19-5-113;

(iii) violates a pretreatment standard or toxic

effluent standard for publicly owned treatment works; or

(iv) manages sewage sludge in violation of this chapter or rules adopted under it.

(b) A person is guilty of a third degree felony and is subject to imprisonment under Section 76-3-203 and a fine not to exceed $50,000 per day of violation who knowingly:

(i) discharges pollutants in violation of Subsection 19-5-107(1) or in violation of any condition or limitation included in a permit issued under Subsection 19-5-107(3);

(ii) violates Section 19-5-113,

(iii) violates a pretreatment standard or toxic effluent standard for publicly-owned treatment works; or

(iv) manages sewage sludge in violation of this chapter or rules adopted under it.

(4) A person is guilty of a third degree felony and subject to imprisonment under Section 76-3-203 and shall be punished by a fine not exceeding $10,000 per day of violation if that person knowingly:

(a) makes a false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under this chapter, or by any permit, rule, or order issued under it; or

(b) falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this chapter.

(5)(a) As used in this section:

(i) "Organization" means a legal entity, other than a government, established or organized for any purpose, and includes a corporation, company, association, firm, partnership, joint stock company, foundation, institution, trust, society, union, or any other association of persons.

(ii) "Serious bodily injury" means bodily injury which involves a substantial risk of death, unconsciousness, extreme physical pain, protracted and obvious disfigurement, or protracted loss or impairment of the function of a bodily member, organ, or mental faculty.

(b) A person is guilty of a second degree felony and, upon conviction, is subject to imprisonment under Section 76-3-203 and a fine of not more than $250,000 if that person:

(i) knowingly violates this chapter, or any permit, rule, or order adopted under it; and

(ii) knows at that time that he is placing another person in imminent danger of death or serious bodily injury.

(c) If a person is an organization, it shall, upon conviction of violating Subsection (a), be subject to a fine of not more than $1,000,000.

(d)(i) A defendant who is an individual is considered to have acted knowingly if:

(A) the defendant's conduct placed another person in imminent danger of death or serious bodily injury; and

(B) the defendant was aware of or believed that there was an imminent danger of death or serious bodily injury to another person.

(ii) Knowledge possessed by a person other than the defendant may not be attributed to the defendant.

(iii) Circumstantial evidence may be used to prove that the defendant possessed actual knowledge, including evidence that the defendant took affirmative steps to be shielded from receiving relevant information.

(e)(i) It is an affirmative defense to prosecution under Subsection (5) that the conduct charged was consented to by the person endangered and that the danger and conduct charged were reasonably foreseeable hazards of:

(A) an occupation, a business, or a profession; or

(B) medical treatment or medical or scientific experimentation conducted by professionally approved methods and the other person was aware of the risks involved prior to giving consent.

(ii) The defendant has the burden of proof to establish any affirmative defense under this Subsection (e) and must prove that defense by a preponderance of the evidence.

(6) For purposes of Subsections 19-5-115(3) through 19-5-115(5), a single operational upset which leads to simultaneous violations of more than one pollutant parameter shall be treated as a single violation.

(7)(a) The board may begin a civil action for appropriate relief, including a permanent or temporary injunction, for any violation or threatened violation for which it is authorized to issue a compliance order under Section 19-5-111.

(b) Actions shall be brought in the district court where the violation or threatened violation occurs.

(8)(a) The attorney general is the legal advisor for the board and its executive secretary and shall defend them in all actions or proceedings brought against them.

(b) The county attorney or district attorney as appropriate under Sections 17-18-1, 17-18-1.5, and 17-18-1.7 in the county in which a cause of action arises, shall bring any action, civil or criminal, requested by the board, to abate a

condition that exists in violation of, or to prosecute for the violation of, or to enforce, the laws or the standards, orders, and rules of the board or the executive secretary issued under this chapter.

(c) The board may itself initiate any action under this section and be represented by the attorney general.

(9) If any person fails to comply with a cease and desist order that is not subject to a stay pending administrative or judicial review, the board may, through its executive secretary, initiate an action for and be entitled to injunctive relief to prevent any further or continued violation of the order.

(10) Any political subdivision of the state may enact and enforce ordinances or rules for the implementation of this chapter that are not inconsistent with this chapter.

(11)(a) Except as provided in Subsection (b), all penalties assessed and collected under the authority of this section shall be deposited in the General Fund.

(b) The department may reimburse itself and local governments from monies collected from civil penalties for extraordinary expenses incurred in environmental enforcement activities.

(c) The department shall regulate reimbursements by making rules that:

(i) define qualifying environmental enforcement activities; and

(ii) define qualifying extraordinary expenses.

Amended by ch 271, § 4, 1998 General Session

Decisions

Illegal discharges

For discharging waste water in excess of copper concentration limits to publicly owned treatment works in violation of U.S. Clean Water Act, 33 U.S.C. §§ 1317, -1319, corporate defendant fined $1,000,000, and contributed $150,000 to Salt Lake City Corporation, Department of Public Utilities, Water Reclamation Plant, Laboratory & Pretreatment Program, $150,000 to Utah Hazardous Substances Mitigation Fund, and $50,000 to Western States Project Fund; 5 years probation. U.S.A. v. Compea, International, Dkt. No. 98-CR-297-ALL, U.S. District Court, District of Utah.

For discharging waste water containing zinc to publicly owned treatment works in violation of U.S. Clean Water Act, 33 U.S.C. §§ 1319, corporate defendant fined $750,000, and contributed $250,000 to South Davis County Sewer Improvement District, $100,000 to Utah Hazardous Substances Mitigation Fund, and $50,000 to Western States Project Fund. U.S.A. v. Syro, Inc., Dkt. No. 98-CR-9-ALL, U.S. District Court, District of Utah

19-5-116 Limitation on effluent limitation standards for BOD, SS, Coliforms, and pH for domestic or municipal sewage.

Unless required to meet instream water quality standards or federal requirements established under the federal Water Pollution Control Act, the board shall not establish, under Section 19-5-104, effluent limitation standards for Biochemical Oxygen Demand (BOD), Total Suspended Solids (SS), Coliforms, and pH for domestic or municipal sewage which are more stringent than the following:

(1) Biochemical Oxygen Demand (BOD): The arithmetic mean of BOD values determined on effluent samples collected during any 30-day period shall not exceed 25 mg/l, nor shall the arithmetic mean exceed 35 mg/l during any seven-day period.

(2) Total Suspended Solids (SS): The arithmetic mean of SS values determined on effluent samples collected during any 30-day period shall not exceed 25 mg/l, nor shall the arithmetic mean exceed 35 mg/l during any seven-day period.

(3) Coliform: The geometric mean of total coliforms and fecal coliform bacteria in effluent samples collected during any 30-day period shall not exceed either 2000/100 ml for total coliforms or 200/100 ml for fecal coliforms. The geometric mean during any seven-day period shall not exceed 2500/100 ml for total coliforms or 250/100 for fecal coliforms.

(4) pH: The pH level shall be maintained at a level not less than 6.5 or greater than 9.0.

19-5-117 Purpose and construction of chapter.

(1) It is the purpose of this chapter to provide:

(a) additional and cumulative remedies to prevent, abate, and control the pollution of the waters of the state; and

(b) sufficient authority to allow the state to meet federal requirements for the state's assumption of primacy under the federal Water Pollution Control Act, as amended by the Water Quality Act of 1987, 33 U.S.C. Section 1251 et seq.

(2) Nothing in this chapter:

(a) abridges or alters rights of action or remedies in equity or under common or statutory law, criminal or civil; or

(b) estops the state or any municipality or person, as riparian owners or otherwise, in the exercise of their rights in equity or under common or statutory law to suppress nuisances or to abate pollution.

19-5-118 Chapter deemed auxiliary and supplementary to other laws.

This chapter does not repeal any laws relating to the pollution of waters or any conservation laws, but is

auxiliary and supplementary to them except to the extent that the laws are in direct conflict with this chapter.

19-5-119 State permits not required where federal government has primary responsibility.
If for any reason, including cessation of federal funding, the federal government has the primary responsibility for the discharge permit or underground injection permit programs in this state, discharge or underground injection permits established by this chapter are not required.

19-5-120 Sewage permit program fee.
(1) The department may assess a fee established under Section 63-38-3.2 against persons required to obtain a permit under Section 19-5-108 for the management of sewage sludge, to be applied to the costs of administering the sewage permit program required by this chapter.
(2) The total of the combined fees assessed against all permittees under this section may not be more than $28,000 annually.
(3) In establishing the fee for each sludge disposal permit holder, the department shall take into account the proportionate size of the population served by the permit holder.
(4) All proceeds from the fee shall be applied to the administering of the sewage permit program required by this chapter.

19-5-121. Underground wastewater disposal systems -- Certification required to design, inspect, maintain, or conduct percolation or soil tests -- Exemptions -- Rules -- Fees.
(1) As used in this section, "maintain" does not include the pumping of an underground wastewater disposal system.
(2)(a) Except as provided in Subsections (2)(b) and (2)(c), beginning January 1, 2002, a person may not design, inspect, maintain, or conduct percolation or soil tests for an underground wastewater disposal system, without first obtaining certification from the board.
(b) An individual is not required to obtain certification from the board to maintain an underground wastewater disposal system that serves a noncommercial, private residence owned by the individual or a member of the individual's family and in which the individual or a member of the individual's family resides or an employee of the individual resides without payment of rent.
(c) The board shall make rules allowing an uncertified individual to conduct percolation or soil tests for an underground wastewater disposal system that serves a noncommercial, private residence owned by the individual and in which the individual resides or intends to reside, or which is intended for use by an employee of the individual without payment of rent, if the individual:
(i) has the capability of properly conducting the tests; and
(ii) is supervised by a certified individual when conducting the tests.
(3)(a) The board shall adopt and enforce rules for the certification and recertification of individuals who design, inspect, maintain, or conduct percolation or soil tests for underground wastewater disposal systems.
(b)(i) The rules shall specify requirements for education and training and the type and duration of experience necessary to obtain certification.
(ii) The rules shall recognize the following in meeting the requirements for certification:
(A) the experience of a contractor licensed under Title 58, Chapter 55, Utah Construction Trades Licensing Act, who has five or more years of experience installing underground wastewater disposal systems;
(B) the experience of an environmental health scientist licensed under Title 58, Chapter 20a, Environmental Health Scientist Act; or
(C) the educational background of a professional engineer licensed under Title 58, Chapter 22, Professional Engineers and Professional Land Surveyors Licensing Act.
(iii) If eligibility for certification is based on experience, the applicant for certification must show proof of experience.
(4) The department may establish fees in accordance with Section 63-38-3.2 for the testing and certification of individuals who design, inspect, maintain, or conduct percolation or soil tests for underground wastewater disposal systems.

Enacted by ch. 274, § 3, 2001 General Session (H.B. 14).

19-5-122. Underground wastewater disposal systems -- Fee imposed on new systems.
(1) Beginning July 1, 2001, a one-time fee is imposed on each new underground wastewater disposal system installed.
(2)(a) From July 1, 2001 through June 30, 2002, the fee shall be $25.
(b) Beginning July 1, 2002, the fee shall be established by the department in accordance with

Section 63-38-3.2.

(3)(a) The fee shall be paid when plans and specifications for the construction of a new underground wastewater disposal system are approved by the local health department or the Department of Environmental Quality.

(b) A local health department shall remit the fee revenue to the Division of Finance quarterly.

(4) The fee revenue shall be:

(a) deposited into the Underground Wastewater Disposal Restricted Account created in Section 19-5-123; and

(b) used to pay for costs of underground wastewater disposal system training programs.

Enacted by ch 274, § 4, 2001 General Session (H B. 14)

19-5-123. Underground Wastewater Disposal System Restricted Account created -- Contents -- Use of account monies.

(1) The Underground Wastewater Disposal System Restricted Account is created within the General Fund.

(2) The contents of the account shall consist of:

(a) revenue from fees collected under Sections 19-5-121 and 19-5-122; and

(b) interest and earnings on account monies.

(3) Monies in the account shall be appropriated by the Legislature to the department for costs of training, testing, and certifying individuals who design, inspect, maintain, or conduct percolation or soils tests for underground wastewater disposal systems.

Enacted by ch 274, § 5, 2001 General Session (H B. 14).

Utah Code -- Title 63 -- Chapter 46a -- Utah Administrative Rulemaking Act

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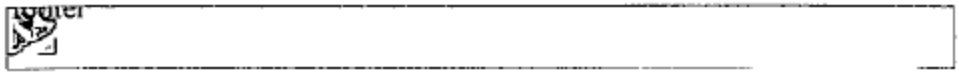

63-46a-4. Rulemaking procedure.

(1) Except as provided in Sections **63-46a-6** and **63-46a-7**, when making, amending, or repealing a rule agencies shall comply with:

(a) the requirements of this section;

(b) consistent procedures required by other statutes;

(c) applicable federal mandates; and

(d) rules made by the division to implement this chapter.

(2) Subject to the requirements of this chapter, each agency shall develop and use flexible approaches in drafting rules that meet the needs of the agency and that involve persons affected by the agency's rules.

(3) (a) Each agency shall file its proposed rule and rule analysis with the division.

(b) Rule amendments shall be marked with new language underlined and deleted language struck out.

(c) (i) The division shall publish the information required under Subsection (3) on the rule analysis and the text of the proposed rule in the next issue of the bulletin.

(ii) For rule amendments, only the section or subsection of the rule being amended need be printed.

(iii) If the director determines that the rule is too long to publish, the director shall publish the rule analysis and shall publish the rule by reference to a copy on file with the division.

(4) Prior to filing a rule with the division, the department head shall consider and comment on the fiscal impact a rule may have on businesses.

(5) The rule analysis shall contain:

(a) a summary of the rule or change;

(b) the purpose of the rule or reason for the change;

(c) the statutory authority or federal requirement for the rule;

(d) the anticipated cost or savings to:

(i) the state budget;

(ii) local governments; and

(iii) other persons;

(e) the compliance cost for affected persons;

(f) how interested persons may review the full text of the rule;

(g) how interested persons may present their views on the rule;

(h) the time and place of any scheduled public hearing;

(i) the name and telephone number of an agency employee who may be contacted about the rule;

(j) the name of the agency head or designee who authorized the rule;

(k) the date on which the rule may become effective following the public comment period; and

(l) comments by the department head on the fiscal impact the rule may have on businesses.

(6) (a) For a rule being repealed and reenacted, the rule analysis shall contain a summary that generally includes the following:

(i) a summary of substantive provisions in the repealed rule which are eliminated from the enacted rule; and

(ii) a summary of new substantive provisions appearing only in the enacted rule.

(b) The summary required under this Subsection (6) is to aid in review and may not be used to contest any rule on the ground of noncompliance with the procedural requirements of this chapter.

(7) A copy of the rule analysis shall be mailed to all persons who have made timely request of the agency for advance notice of its rulemaking proceedings and to any other person who, by statutory or federal mandate or in the judgment of the agency, should also receive notice.

(8) Following the publication date, the agency shall allow at least 30 days for public comment on the rule.

(9) (a) Except as provided in Sections **63-46a-6** and **63-46a-7**, a proposed rule becomes effective on any date specified by the agency that is no fewer than 30 nor more than 120 days after the publication date.

(b) The agency shall provide notice of the rule's effective date to the division in the form required by the division.

(c) The notice of effective date may not provide for an effective date prior to the date it is received by the division.

(d) The division shall publish notice of the effective date of the rule in the next issue of the bulletin.

(e) A proposed rule lapses if a notice of effective date or a change to a proposed rule is not filed with the division within 120 days of publication.

Amended by Chapter 138, 2001 General Session
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Rule R317-6. Ground Water Quality Protection.

As in effect on September 1, 2002

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R317-6-1. Definitions.

1.1 "Aquifer" means a geologic formation, group of geologic formations or part of a geologic formation that contains sufficiently saturated permeable material to yield usable quantities of water to wells and springs.

1.2 "Background Concentration" means the concentration of a pollutant in ground water upgradient or lateral hydraulically equivalent point from a facility, practice or activity which has not been affected by that facility, practice or activity.

1.3 "Best Available Technology" means the application of design, equipment, work practice, operation standard or combination thereof at a facility to effect the maximum reduction of a pollutant achievable by available processes and methods taking into account energy, public health, environmental and economic impacts and other costs.

1.4 "Best Available Technology Standard" means a performance standard or pollutant concentration achievable through the application of best available technology.

1.5 "Board" means the Utah Water Quality Board.

1.6 "Class TDS Limit" means the upper boundary of the TDS range for an applicable class as specified in Section R317-6-3.

1.7 "Community Drinking Water System" means a public drinking water system which serves at least fifteen service connections used by year-round residents or regularly serves at least twenty-five year-round residents.

1.8 "Comparable Quality (Source)" means a potential alternative source or sources of water supply which has the same general quality as the ground water source.

1.9 "Comparable Quantity (Source)" means a potential alternative source of water supply capable of reliably supplying water in quantities sufficient to meet the year-round needs of the users served by the ground water source.

1.10 "Compliance Monitoring Point" means a well, seep, spring, or other sampling point used to determine compliance with applicable permit limits.

1.11 "Contaminant" means any physical, chemical, biological or radiological substance or matter in water.

1.12 "Conventional Treatment" means normal and usual treatment of water for distribution in public drinking water supply systems including flocculation, sedimentation, filtration, disinfection and storage.

1.13 "Discharge" means the release of a pollutant directly or indirectly into subsurface waters of the state.

1.14 "Existing Facility" means a facility or activity that was in operation or under construction after August 14, 1989 and before February 10, 1990.

1.15 "Economically Infeasible" means, in the context of a public drinking water source, the cost to the typical water user for replacement water would exceed the community's ability to pay.

1.16 "Executive Secretary" means the Executive Secretary of the Utah Water Quality Board.

1.17 "Facility" means any building, structure, processing, handling, or storage facility, equipment or activity; or contiguous group of buildings, structures, or processing, handling or storage facilities, equipment, or activities or combination thereof.

1.18 "Gradient" means the change in total water pressure head per unit of distance.

1.19 "Ground Water" means subsurface water in the zone of saturation including perched ground water.

1.20 "Ground Water Quality Standards" means numerical contaminant concentration levels adopted by the Board in or under R317-6-2 for the protection of the subsurface waters of the State.

1.21 "Infiltration" means the movement of water from the land surface into the pores of rock, soil or sediment.

1.22 "Institutional Constraints" means legal or other restrictions that preclude replacement water delivery and which cannot be alleviated through administrative procedures or market transactions.

1.23 "Lateral Hydraulically Equivalent Point" means a point located hydraulically equal to a facility and in the same ground water with similar geochemistry such that the ground water at that point has not been affected by the facility.

1.24 "Limit of Detection" means the concentration of a chemical below which it can not be detected using currently accepted sampling and analytical techniques for drinking water as determined by the U.S. Environmental Protection Agency.

1.25 "New Facility" means a facility for which construction or modification is initiated after February 9, 1990.

1.26 "Permit Limit" means a ground water pollutant concentration limitation specified in a Ground Water Discharge Permit and may include protection levels, class TDS limits, ground water quality standards, alternate concentration limits, permit-specific ground water quality standards, or limits stipulated in the application and use of best available technology. For facilities permitted by rule under R317-6-6.2, a permit limit is a ground water pollutant concentration limitation specified in R317-6-6.2.B.

1.27 "Person" means any individual, corporation, partnership, association, company or body politic, including any agency or instrumentality of the federal, state, or local government.

1.28 "Point of Discharge" means the area within outermost location at which effluent or leachate has been stored, applied, disposed of, or discharged; for a diked facility, the outermost edge of the dikes.

1.29 "Pollutant" means dredged spoil, solid waste, incinerator residue, sewage, sewage sludge, garbage, munitions, trash, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal and agricultural waste discharged into waters of the state.

1.30 "Pollution" means such contamination, or other alteration of the physical, chemical, or biological properties of any waters of the State, or such discharge of any liquid, gaseous, or solid substance into any waters of the state as will create a nuisance or render such waters harmful or detrimental or injurious to public health, safety, or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life.

1.31 "Protection Level" means the ground water pollutant concentration levels specified in R317-6-4.

1.32 "Substantial Treatment" means treatment of water utilizing specialized treatment methods including ion exchange, reverse osmosis, electrodialysis and other methods needed to upgrade water quality to meet standards for public water systems.

1.33 "Technology Performance Monitoring" means the evaluation of a permitted facility to determine compliance with best available technology standards.

1.34 "Total Dissolved Solids (TDS)" means the quantity of dissolved material in a sample of water which is determined by weighing the solid residue obtained by evaporating a measured volume of a filtered sample to dryness; or for many waters that contain more than 1000 mg/l, the sum of the chemical constituents.

1.35 "Radius of Influence" means the radial distance from the center of a well bore to the point

where there is no lowering of the water table or potentiometric surface because of pumping of the well; the edge of the cone of depression.

1.36 "Upgradient" means a point located hydraulically above a facility such that the ground water at that point has not been impacted by discharges from the facility.

1.37 "Vadose Zone" means the zone of aeration including soil and capillary water. The zone is bound above by the land surface and below by the water table.

1.38 "Waste" see "Pollutant."

1.39 "Water Table" means the top of the saturated zone of a body of unconfined ground water at which the pressure is equal to that of the atmosphere.

1.40 "Water Table Aquifer" means an aquifer extending downward from the water table to the first confining bed.

1.41 "Waters of the State" means all streams, lakes, ponds, marshes, water courses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion thereof; except bodies of water confined to and retained within the limits of private property, and which do not develop into or constitute a nuisance or a public health hazard, or a menace to fish and wildlife, shall not be considered to be "waters of the state" under this definition.

1.42 "Zone of Influence" means the area contained by the outer edge of the drawdown cone of a water well.

R317-6-2. Ground Water Quality Standards.

2.1 The following Ground Water Quality Standards as listed in Table I are adopted for protection of ground water quality.

TABLE 1
GROUND WATER QUALITY STANDARDS

Parameter	Milligrams per liter (mg/l) unless noted otherwise and based on analysis of filtered sample except for Mercury and organic compounds
PHYSICAL CHARACTERISTICS	
Color (units)	15.0
Corrosivity (characteristic)	noncorrosive
Odor (threshold number)	3.0
pH (units)	6.5-8.5
INORGANIC CHEMICALS	
Cyanide (free)	0.2
Fluoride	4.0

Nitrate (as N)	10.0
Nitrite (as N)	1.0
Total Nitrate/Nitrite (as N)	10.0
METALS	
Arsenic	0.05
Barium	2.0
Cadmium	0.005
Chromium	0.1
Copper	1.3
Lead	0.015
Mercury	0.002
Selenium	0.05
Silver	0.1
Zinc	5.0
ORGANIC CHEMICALS	
Pesticides and PCBs	
Alachlor	0.002
Aldicarb	0.003
Aldicarb sulfone	0.002
Aldicarb sulfoxide	0.004
Atrazine	0.003
Carbofuran	0.04
Chlordane	0.002
Dibromochloropropane	0.0002
2, 4-D	0.07
Diquat	0.02
Dichlorophenoxyacetic acid (2, 4-) (2,4D)	0.07
Endothall	0.1
Endrin	0.002
Ethylene Dibromide	0.00005
Heptachlor	0.0004
Heptachlor epoxide	0.0002
Lindane	0.0002
Methoxychlor	0.04
Polychlorinated Biphenyls	0.0005
Pentachlorophenol	0.001
Toxaphene	0.003
2, 4, 5-TP (Silvex)	0.05
VOLATILE ORGANIC CHEMICALS	
Benzene	0.005
Carbon tetrachloride	0.005
1, 2 - Dichloroethane	0.005
1, 1 - Dichloroethylene	0.007
1, 1, 1-Trichloroethane	0.200
para - Dichlorobenzene	0.075
o-Dichlorobenzene	0.6
cis-1,2 dichloroethylene	0.07
trans-1,2 dichloroethylene	0.1
1,2 Dichloropropane	0.005
Ethylbenzene	0.7
Monochlorobenzene	0.1
Styrene	0.1
Tetrachloroethylene	0.005
Toluene	1

Trichloroethylene	0.005
Vinyl chloride	0.002
Xylenes (Total)	10

OTHER ORGANIC CHEMICALS

Trihalomethanes	0.1

RADIONUCLIDES

The following are the maximum contaminant levels for Radium-226 and Radium-228 beta particle radioactivity, and photon radioactivity:

Combined Radium-226 and Radium-228	5pCi/l
Gross alpha particle activity, including Radium-226 but excluding Radon and Uranium	15pCi/l

Beta particle and photon radioactivity

The average annual concentration from man-made radionuclides of beta particle radionuclides shall not produce an annual dose equivalent to the total body or any millirem/year.

Except for the radionuclides listed below, the concentration of man-made radic or organ dose equivalents shall be calculated on the basis of a two liter per day c data listed in "Maximum Permissible Body Burden and Maximum Permissible Concentrati August 1962, U.S. Department of Commerce. If two or more radionuclides are present to the total body or to any organ shall not exceed four millirem/year.

Average annual concentrations assumed to produce a total body or organ dose of

Radionuclide	Critical Organ	pCi per liter
Tritium	Total Body	20,000
Strontium-90	Bone Marrow	8

2.2 A permit specific ground water quality standard for any pollutant not specified in Table 1 may be established by the Executive Secretary at a level that will protect public health and the environment. This permit limit may be based on U.S. Environmental Protection Agency maximum contaminant level goals, health advisories, risk based contaminant levels, standards established by other regulatory agencies and other relevant information.

R317-6-3. Ground Water Classes.

3.1 GENERAL

The following ground water classes are established: Class IA - Pristine Ground Water; Class IB - Irreplaceable Ground Water; Class IC - Ecologically Important Ground Water; Class II - Drinking Water Quality Ground Water; Class III - Limited Use Ground Water; Class IV - Saline Ground Water.

3.2 CLASS IA - PRISTINE GROUND WATER

Class IA ground water has the following characteristics:

A. Total dissolved solids of less than 500 mg/l.

B. No contaminant concentrations that exceed the ground water quality standards listed in Table 1.

3.3 CLASS IB - IRREPLACEABLE GROUND WATER

Class IB ground water is a source of water for a community public drinking water system for which no reliable supply of comparable quality and quantity is available because of economic or institutional constraints.

3.4 CLASS IC - ECOLOGICALLY IMPORTANT GROUND WATER

Class IC ground water is a source of ground water discharge important to the continued existence of wildlife habitat.

3.5 CLASS II - DRINKING WATER QUALITY GROUND WATER

Class II ground water has the following characteristics:

A. Total dissolved solids greater than 500 mg/l and less than 3000 mg/l.

B. No contaminant concentrations that exceed ground water quality standards in Table 1.

3.6 CLASS III - LIMITED USE GROUND WATER

Class III ground water has one or both of the following characteristics:

A. Total dissolved solids greater than 3000 mg/l and less than 10,000 mg/l, or;

B. One or more contaminants that exceed the ground water quality standards listed in Table 1.

3.7 CLASS IV - SALINE GROUND WATER

Class IV ground water has total dissolved solids greater than 10,000 mg/l.

R317-6-4. Ground Water Class Protection Levels.

4.1 GENERAL

A. Protection levels are ground water pollutant concentration limits, set by ground water class, for the operation of facilities that discharge or would probably discharge to ground water.

B. For the physical characteristics (color, corrosivity, odor, and pH) and radionuclides listed in Table 1, the values listed are the protection levels for all ground water classes.

4.2 CLASS IA PROTECTION LEVELS

A. Class IA ground water will be protected to the maximum extent feasible from degradation due to facilities that discharge or would probably discharge to ground water.

B. The following protection levels will apply:

1. Total dissolved solids may not exceed the lesser of 1.1 times the background value or 500 mg/l.

2. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.1 times the ground water quality standard value, or the limit of detection.

3. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.1 times the background concentration or 0.1 times the ground water quality standard; however, in no case will the concentration of a pollutant be allowed to exceed the ground water quality standard.

4.3 CLASS IB PROTECTION LEVELS

A. Class IB ground water will be protected as an irreplaceable source of drinking water.

B. The following protection levels will apply:

1. Total dissolved solids may not exceed the lesser of 1.1 times the background value or 2000 mg/l.

2. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.1 times the ground water quality standard, or the limit of detection.

3. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.1 times the background concentration or 0.1 times the ground water quality standard; however, in no case will the concentration of a pollutant be allowed to exceed the ground water quality standard.

4.4 CLASS IC PROTECTION LEVELS

Class IC ground water will be protected as a source of water for potentially affected wildlife habitat. Limits on increases of total dissolved solids and organic and inorganic chemical compounds will be determined in order to meet applicable surface water standards.

4.5 CLASS II PROTECTION LEVELS

A. Class II ground water will be protected for use as drinking water or other similar beneficial use with conventional treatment prior to use.

B. The following protection levels will apply:

1. Total dissolved solids may not exceed 1.25 times the background value.

2. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.25 times the ground water quality standard, or the limit of detection.

3. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.25 times the background concentration or 0.25 times the ground water quality standard; however, in no case will the

concentration of a pollutant be allowed to exceed the ground water quality standard.

4.6 CLASS III PROTECTION LEVELS

A. Class III ground water will be protected as a potential source of drinking water, after substantial treatment, and as a source of water for industry and agriculture.

B. The following protection levels will apply:

1. Total dissolved solids may not exceed 1.25 times the background concentration level.

2. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.5 times the ground water quality standard, or the limit of detection.

3. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.5 times the background concentration or 0.5 times the ground water quality standard; however, in no case will the concentration of a pollutant be allowed to exceed the ground water quality standard. If the background concentration exceeds the ground water quality standard no increase will be allowed.

4.7 CLASS IV PROTECTION LEVELS

Protection levels for Class IV ground water will be established to protect human health and the environment.

R317-6-5. Ground Water Classification for Aquifers.

5.1 GENERAL

A. When sufficient information is available, entire aquifers or parts thereof may be classified by the Board according to the quality of ground water contained therein and commensurate protection levels will be applied.

B. Ground water sources furnishing water to community drinking water systems with ground water meeting Class IA criteria are classified as Class IA.

5.2 CLASSIFICATION AND RECLASSIFICATION PROCEDURE

A. The Board may initiate classification or reclassification.

B. Any person may petition the Board for classification and reclassification.

C. Boundaries for class areas will be delineated so as to enclose distinct ground water classes as nearly as known facts permit. Boundaries will be based on hydrogeologic properties, existing ground water quality and for Class IB and IC, current use. Parts of an aquifer may be classified differently.

D. The petitioner requesting reclassification will provide sufficient information to determine if reclassification is in the best interest of the beneficial users.

E. A petition for classification or reclassification shall include:

1. factual data supporting the proposed classification;

2. a description of the proposed ground waters to be classified or reclassified;

3. potential contamination sources;

4. ground water flow direction;

5. current beneficial uses of the ground water; and

6. location of all water wells in the area to be classified or reclassified.

F. One or more public hearings will be held to receive comment on classification and reclassification proposals.

G. The Board will determine the disposition of all petitions for classification and reclassification, except as provided in R317-6-5.2.H.

H. Ground water proximate to a facility for which an application for a ground water discharge permit has been made may be classified by the Executive Secretary for purposes of making permitting decisions.

R317-6-6. Implementation.

6.1 DUTY TO APPLY FOR A GROUND WATER DISCHARGE PERMIT

A. No person may construct, install, or operate any new facility or modify an existing or new facility, not permitted by rule under R317-6-6.2, which discharges or would probably result in a discharge of pollutants that may move directly or indirectly into ground water, including, but not limited to land application of wastes; waste storage pits; waste storage piles; landfills and dumps; large feedlots; mining, milling and metallurgical operations, including heap leach facilities; and pits, ponds, and lagoons whether lined or not, without a ground water discharge permit from the Executive Secretary. A ground water discharge permit application should be submitted at least 180 days before the permit is needed.

B. All persons who constructed, modified, installed, or operated any existing facility, not permitted by rule under R317-6-6.2, which discharges or would probably result in a discharge of pollutants that may move directly or indirectly into ground water, including, but not limited to: land application of wastes; waste storage pits; waste storage piles; landfills and dumps; large feedlots; mining, milling and metallurgical operations, including heap leach facilities; and pits, ponds, and lagoons whether lined or not, must have submitted a notification of the nature and location of the discharge to the Executive Secretary before February 10, 1990 and must submit an application for a ground water discharge permit within one year after receipt of written notice from the Executive Secretary that a ground water discharge permit is required.

6.2 GROUND WATER DISCHARGE PERMIT BY RULE

A. Except as provided in R317-6-6.2.C, the following facilities are considered to be permitted by rule and are not required to obtain a discharge permit under R317-6-6.1 or comply with R317-6-6.3 through R317-6-6.7, R317- 6-6.9 through R317-6-6.11, R317-6-6.13, R317-6-6.16, R317-6-6.17 and R317-6-6.18:

1. facilities with effluent or leachate which has been demonstrated to the satisfaction of the

Executive Secretary to conform and will not deviate from the applicable class TDS limits, ground water quality standards, protection levels or other permit limits and which does not contain any contaminant that may present a threat to human health, the environment or its potential beneficial uses of the ground water. The Executive Secretary may require samples to be analyzed for the presence of contaminants before the effluent or leachate discharges directly or indirectly into ground water. If the discharge is by seepage through natural or altered natural materials, the Executive Secretary may require samples of the solution be analyzed for the presence of pollutants before or after seepage;

2. water used for watering of lawns, gardens, or shrubs or for irrigation for the revegetation of a disturbed land area except for the direct land application of wastewater;

3. application of agricultural chemicals including fertilizers, herbicides and pesticides including but not limited to, insecticides fungicides, rodenticides and fumigants when used in accordance with current scientifically based manufacturer's recommendations for the crop, soil, and climate and in accordance with state and federal statutes, regulations, permits, and orders adopted to avoid ground water pollution;

4. water used for irrigated agriculture except for the direct land application of wastewater from municipal, industrial or mining facilities;

5. flood control systems including detention basins, catch basins and wetland treatment facilities used for collecting or conveying storm water runoff;

6. natural ground water seeping or flowing into conventional mine workings which re-enters the ground by natural gravity flow prior to pumping or transporting out of the mine and without being used in any mining or metallurgical process;

7. leachate which results entirely from the direct natural infiltration of precipitation through undisturbed materials;

8. wells and facilities regulated under the underground injection control (UIC) program;

9. land application of livestock wastes, within expected crop nitrogen uptake;

10. individual subsurface wastewater disposal systems approved by local health departments or large subsurface wastewater disposal systems approved by the Board;

11. produced water pits, and other oil field waste treatment, storage, and disposal facilities regulated by the Division of Oil, Gas, and Mining in accordance with Section 40-6-5(3)(d) and R649-9, Disposal of Produced Water;

12. reserve pits regulated by the Division of Oil, Gas and Mining in accordance with Section 40-6-5(3)(a) and R649-3-7, Drilling and Operating Practices;

13. storage tanks installed or operated under regulations adopted by the Utah Solid and Hazardous Waste Control Board;

14. coal mining operations or facilities regulated under the Coal Mining and Reclamation Act by the Utah Division of Oil, Gas, and Mining (DOGM). The submission of an application for ground water discharge permit under R317-6-6.2.C may be required only if the Executive Secretary, after consideration of recommendations, if any, by DOGM, determines that the discharge violates applicable ground water quality standards, applicable Class TDS limits, or is interfering with a

reasonable foreseeable beneficial use of the ground water. DOGM is not required to establish any administrative or regulatory requirements which are in addition to the rules of DOGM for coal mining operations or facilities to implement these ground water regulations;

15. hazardous waste or solid waste management units managed or undergoing corrective action under R315-1 through R315-14;

16. solid waste landfills permitted under the requirements of R315-303;

17. animal feeding operations, as defined in UAC R317-8-3.5(2) that use liquid waste handling systems, which are not located within Zone 1 (100 feet) for wells in a confined aquifer or Zone 2 (250 day time of travel) for wells and springs in unconfined aquifers, in accordance with the Public Drinking Water Regulations UAC R309-113, and which meet either of the following criteria:

a) operations constructed prior to the effective date of this rule which incorporated liquid waste handling systems and which are either less than 4 million gallons capacity or serve fewer than 1000 animal units, or

b. operations with fewer than the following numbers of confined animals:

i. 1,500 slaughter and feeder cattle,

ii. 1,050 mature dairy cattle, whether milked or dry cows,

iii. 3,750 swine each weighing over 25 kilograms (approximately 55 pounds),

iv. 18,750 swine each weighing 25 kilograms or less (approximately 55 pounds),

v. 750 horses,

vi. 15,000 sheep or lambs,

vii. 82,500 turkeys,

viii. 150,000 laying hens or broilers that use continuous overflow watering but dry handle wastes,

ix. 45,000 hens or broilers,

x. 7,500 ducks, or

xi. 1,500 animal units

18. animal feeding operations, as defined in UAC R317-8-3.5(2), which do not utilize liquid waste handling systems;

19. mining, processing or milling facilities handling less than 10 tons per day of metallic and/or nonmetallic ore and waste rock, not to exceed 2500 tons/year in aggregate unless the processing or milling uses chemical leaching;

20. pipelines and above-ground storage tanks;

21. drilling operations for metallic minerals, nonmetallic minerals, water, hydrocarbons, or

geothermal energy sources when done in conformance with applicable regulations of the Utah Division of Oil, Gas, and Mining or the Utah Division of Water Rights;

22. land application of municipal sewage sludge for beneficial use, at or below the agronomic rate and in compliance with the requirements of 40 CFR 503, July 1, 1993 edition;

23. land application of municipal sewage sludge for mine-reclamation at a rate higher than the agronomic rate and in compliance with 40 CFR 503, July 1, 1993 edition;

24. municipal wastewater treatment lagoons receiving no wastewater from a significant industrial discharger as defined in R317-8-8.2(12); and

25. facilities and modifications thereto which the Executive Secretary determines after a review of the application will have a de minimis actual or potential effect on ground water quality.

B. No facility permitted by rule under R317-6-6.2.A may cause ground water to exceed ground water quality standards or the applicable class TDS limits in R317-6-3.1 to R317-6-3.7. If the background concentration for affected ground water exceeds the ground water quality standard, the facility may not cause an increase over background. This section, R317-6-6.2B. does not apply to facilities undergoing corrective action under R317-6-6.15A.3.

C. The submission of an application for a ground water discharge permit may be required by the Executive Secretary for any discharge permitted by rule under R317-6-6.2 if it is determined that the discharge may be causing or is likely to cause increases above the ground water quality standards or applicable class TDS limits under R317- 6-3 or otherwise is interfering or may interfere with probable future beneficial use of the ground water.

6.3 APPLICATION REQUIREMENTS FOR A GROUND WATER DISCHARGE PERMIT

Unless otherwise determined by the Executive Secretary, the application for a permit to discharge wastes or pollutants to ground water shall include the following complete information:

A. The name and address of the applicant and the name and address of the owner of the facility if different than the applicant. A corporate application must be signed by an officer of the corporation. The name and address of the contact, if different than above, and telephone numbers for all listed names shall be included.

B. The legal location of the facility by county, quarter-quarter section, township, and range.

C. The name of the facility and the type of facility, including the expected facility life.

D. A plat map showing all water wells, including the status and use of each well, topography, springs, water bodies, drainages, and man-made structures within a one-mile radius of the discharge. The plat map must also show the location and depth of existing or proposed wells to be used for monitoring ground water quality.

E. Geologic, hydrologic, and agricultural description of the geographic area within a one-mile radius of the point of discharge, including soil types, aquifers, ground water flow direction, ground water quality, aquifer material, and well logs.

F. The type, source, and chemical, physical, radiological, and toxic characteristics of the effluent or leachate to be discharged; the average and maximum daily amount of effluent or leachate discharged (gpd), the discharge rate (gpm), and the expected concentrations of any pollutant

(mg/l) in each discharge or combination of discharges. If more than one discharge point is used, information for each point must be given separately.

G. Information which shows that the discharge can be controlled and will not migrate into or adversely affect the quality of any other waters of the state, including the applicable surface water quality standards, that the discharge is compatible with the receiving ground water, and that the discharge will comply with the applicable class TDS limits, ground water quality standards, class protection levels or an alternate concentration limit proposed by the facility.

H. For areas where the ground water has not been classified by the Board, information on the quality of the receiving ground water sufficient to determine the applicable protection levels.

I. The proposed monitoring plan, which includes a description, where appropriate, of the following:

1. ground water monitoring to determine ground water flow direction and gradient, background quality at the site, and the quality of ground water at the compliance monitoring point;

2. installation, use and maintenance of monitoring devices;

3. description of the compliance monitoring area defined by the compliance monitoring points including the dimensions and hydrologic and geologic data used to determine the dimensions;

4. monitoring of the vadose zone;

5. measures to prevent ground water contamination after the cessation of operation, including post- operational monitoring;

6. monitoring well construction and ground water sampling which conform to A Guide to the Selection of Materials for Monitoring Well Construction and Ground Water Sampling, (1983) and RCRA Ground Water Monitoring Technical Enforcement Guidance Manual (1986), unless otherwise specified by the Executive Secretary;

7. description and justification of parameters to be monitored.

J. The plans and specifications relating to construction, modification, and operation of discharge systems.

K. The description of the ground water most likely to be affected by the discharge, including water quality information of the receiving ground water prior to discharge, a description of the aquifer in which the ground water occurs, the depth to the ground water, the saturated thickness, flow direction, porosity, hydraulic conductivity, and flow systems characteristics.

L. The compliance sampling plan which includes, where appropriate, provisions for sampling of effluent and for flow monitoring in order to determine the volume and chemistry of the discharge onto or below the surface of the ground and a plan for sampling compliance monitoring points and appropriate nearby water wells. Sampling and analytical methods proposed in the application must conform with the most appropriate methods specified in the following references unless otherwise specified by the Executive Secretary:

1. Standard Methods for the Examination of Water and Wastewater, eighteenth edition, 1992; Library of Congress catalogue number: ISBN: 0-87553-207-1.

2. E.P.A. Methods, Methods for Chemical Analysis of Water and Wastes, 1983; Stock Number EPA-600/4- 79-020.

3. Techniques of Water Resource Investigations of the U.S. Geological Survey, (1982); Book 5, Chapter A3.

4. Monitoring requirements in 40 CFR parts 141 and 142, 1991 ed., Primary Drinking Water Regulations and 40 CFR parts 264 and 270, 1991 ed.

5. National Handbook of Recommended Methods for Water-Data Acquisition, GSA-GS edition; Book 85 AD- 2777, U.S. Government Printing Office Stock Number 024-001-03489-1.

6. Manual of Analytical Methods for the Analysis of Pesticide Residues in Humans and Environmental Samples, 1980; Stock Number EPA-600/8-80-038, U.S. Environmental Protection Agency.

M. A description of the flooding potential of the discharge site, including the 100-year flood plain, and any applicable flood protection measures.

N. Contingency plan for regaining and maintaining compliance with the permit limits and for reestablishing best available technology as defined in the permit.

O. Methods and procedures for inspections of the facility operations and for detecting failure of the system.

P. For any existing facility, a corrective action plan or identification of other response measures to be taken to remedy any violation of applicable ground water quality standards, class TDS limits or permit limit established under R317-6-6.4E. which has resulted from discharges occurring prior to issuance of a ground water discharge permit.

Q. Other information required by the Executive Secretary.

6.4 ISSUANCE OF DISCHARGE PERMIT

A. The Executive Secretary may issue a ground water discharge permit for a new facility if the Executive Secretary determines, after reviewing the information provided under R317-6-6.3, that:

1. the applicant demonstrates that the applicable class TDS limits, ground water quality standards protection levels, and permit limits established under R317-6-6.4E will be met;

2. the monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;

3. the applicant is using best available technology to minimize the discharge of any pollutant; and

4. there is no impairment of present and future beneficial uses of the ground water.

B. The Board may approve an alternate concentration limit for a new facility if:

1. The applicant submits a petition for an alternate concentration limit showing the extent to which the discharge will exceed the applicable class TDS limits, ground water standards or

applicable protection levels and demonstrates that:

a. the facility is to be located in an area of Class III ground water;

b. the discharge plan incorporates the use of best available technology;

c. the alternate concentration limit is justified based on substantial overriding social and economic benefits; and,

d. the discharge would pose no threat to human health and the environment.

2. One or more public hearings have been held by the Board in nearby communities to solicit comment.

C. The Executive Secretary may issue a ground water discharge permit for an existing facility provided:

1. the applicant demonstrates that the applicable class TDS limits, ground water quality standards and protection levels will be met;

2. the monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;

3. the applicant utilizes treatment and discharge minimization technology commensurate with plant process design capability and similar or equivalent to that utilized by facilities that produce similar products or services with similar production process technology; and,

4. there is no current or anticipated impairment of present and future beneficial uses of the ground water.

D. The Board may approve an alternate concentration limit for a pollutant in ground water at an existing facility or facility permitted by rule under R317-6-6.2 if the applicant for a ground water discharge permit shows the extent the discharge exceeds the applicable class TDS limits, ground water quality standards and applicable protection levels that correspond to the otherwise applicable ground water quality standards and demonstrates that:

1. steps are being taken to correct the source of contamination, including a program and timetable for completion;

2. the pollution poses no threat to human health and the environment; and

3. the alternate concentration limit is justified based on overriding social and economic benefits.

E. An alternate concentration limit, once adopted by the Board under R317-6-6.4B or R317-6-6.4D, shall be the pertinent permit limit.

F. A facility permitted under this provision shall meet applicable class TDS limits, ground water quality standards, protection levels and permit limits.

G. The Board may modify a permit for a new facility to reflect standards adopted as part of corrective action.

6.5 NOTICE OF INTENT TO ISSUE A GROUND WATER DISCHARGE PERMIT

The Executive Secretary shall publish a notice of intent to approve in a newspaper in the affected area and shall allow 30 days in which interested persons may comment to the Board. Final action will be taken by the Executive Secretary following the 30-day comment period.

6.6 PERMIT TERM

A. The ground water discharge permit term will run for 5 years from the date of issuance. Permits may be renewed for 5-year periods or extended for a period to be determined by the Executive Secretary but not to exceed 5 years.

B. In the event that new ground water quality standards are adopted by the Board, permits may be reopened to extend the terms of the permit or to include pollutants covered by new standards. The holder of a permit may apply for a variance under the conditions outlined in R317-6-6.4.D.

6.7 GROUND WATER DISCHARGE PERMIT RENEWAL

The permittee for a facility with a ground water discharge permit must apply for a renewal or extension for a ground water discharge permit at least 180 days prior to the expiration of the existing permit. If a permit expires before an application for renewal or extension is acted upon by the Executive Secretary, the permit will continue in effect until it is renewed, extended or denied.

6.8 TERMINATION OF A GROUND WATER DISCHARGE PERMIT BY THE EXECUTIVE SECRETARY

A ground water discharge permit may be terminated or a renewal denied by the Executive Secretary if one of the following applies:

A. noncompliance by the permittee with any condition of the permit where the permittee has failed to take appropriate action in a timely manner to remedy the permit violation;

B. the permittee's failure in the application or during the permit approval process to disclose fully all significant relevant facts at any time;

C. a determination that the permitted facility endangers human health or the environment and can only be regulated to acceptable levels by plan modification or termination; or

D.the permittee requests termination of the permit.

6.9 PERMIT COMPLIANCE MONITORING

A. Ground Water Monitoring

The Executive Secretary may include in a ground water discharge permit requirements for ground water monitoring, and may specify compliance monitoring points where the applicable class TDS limits, ground water quality standards, protection levels or other permit limits are to be met.

The Executive Secretary will determine the location of the compliance monitoring point based upon the hydrology, type of pollutants, and other factors that may affect the ground water quality. The distance to the compliance monitoring points must be as close as practicable to the point of discharge. The compliance monitoring point shall not be beyond the property boundaries

of the permitted facility without written agreement of the affected property owners and approval by the Executive Secretary.

B. Performance Monitoring

The Executive Secretary may include in a ground water discharge permit requirements for monitoring performance of best available technology standards.

6.10 BACKGROUND WATER QUALITY DETERMINATION

A. Background water quality contaminant concentrations shall be determined and specified in the ground water discharge permit. The determination of background concentration shall take into account any degradation.

B. Background water quality contaminant concentrations may be determined from existing information or from data collected by the permit applicant. Existing information shall be used, if the permit applicant demonstrates that the quality of the information and its means of collection are adequate to determine background water quality. If existing information is not adequate to determine background water quality, the permit applicant shall submit a plan to determine background water quality to the Executive Secretary for approval prior to data collection. One or more up- gradient, lateral hydraulically equivalent point, or other monitoring wells as approved by the Executive Secretary may be required for each potential discharge site.

C. After a permit has been issued, permittee shall continue to monitor background water quality contaminant concentrations in order to determine natural fluctuations in concentrations. Applicable up-gradient, and on- site ground water monitoring data shall be included in the ground water quality permit monitoring report.

6.11 NOTICE OF COMMENCEMENT AND DISCONTINUANCE OF GROUND WATER DISCHARGE OPERATIONS

A. The permittee shall notify the Division of Water Quality immediately upon commencement of the ground water discharge and submit a written notice within 30 days of the commencement of the discharge.

B. The permittee shall notify the Division of Water Quality of the date and reason for discontinuance of ground water discharge within 30 days.

6.12 SUBMISSION OF DATA

A. Laboratory Analyses

All laboratory analysis of samples collected to determine compliance with these regulations shall be performed in accordance with standard procedures by the Utah Division of Laboratory Services or by a laboratory certified by the Utah Department of Health.

B. Field Analyses

All field analyses to determine compliance with these regulations shall be conducted in accordance with standard procedures specified in R317-6-6.3.L.

C. Periodic Submission of Monitoring Reports

Results obtained pursuant to any monitoring requirements in the discharge permit and the methods used to obtain these results shall be periodically reported to the Executive Secretary according to the schedule specified in the ground water discharge permit.

6.13 REPORTING OF MECHANICAL PROBLEMS OR DISCHARGE SYSTEM FAILURES

The permittee shall notify the Executive Secretary within 24 hours of the discovery of any mechanical or discharge system failures that could affect the chemical characteristics or volume of the discharge. A written statement confirming the oral report shall be submitted to the Executive Secretary within five days of the failure.

6.14 CORRECTION OF ADVERSE EFFECTS REQUIRED

A. If monitoring or testing indicates that the permit conditions may be or are being violated by ground water discharge operations or the facility is otherwise in an out-of-compliance status, the permittee shall promptly make corrections to the system to correct all violations of the discharge permit.

B. The permittee, operator, or owner may be required to take corrective action as described in R317- 6-6.15 if a pollutant concentration has exceeded a permit limit.

6.15 CORRECTIVE ACTION

It is the intent of the Board that the provisions of these regulations should be considered when making decisions under any state or federal superfund action; however, the protection levels are not intended to be considered as applicable, relevant or appropriate clean-up standards under such other regulatory programs.

A. Application of R317-6-6.15

1. Generally - R317-6-6.15 shall apply to any person who discharges pollutants into ground water in violation of Section 19-5-107, or who places or causes to be placed any wastes in a location where there is probable cause to believe they will cause pollution of ground water in violation of Section 19-5-107.

2. Corrective Action shall include, except as otherwise provided in R317-6-6.15, preparation of a Contamination Investigation and preparation and implementation of a Corrective Action Plan.

3. The procedural provisions of R-317-6-6.15 shall not apply to any facility where a corrective or remedial action for ground water contamination, that the Executive Secretary determines meets the substantive standards of this rule, has been initiated under any other state or federal program. Corrective or remedial action undertaken under the programs specified in Table 2 are considered to meet the substantive standards of this rule unless otherwise determined by the Executive Secretary.

TABLE 2

PROGRAM

Leaking Underground Storage Tank, Sections 19-6-401, et seq.

Federal Comprehensive Environmental Response, Compensation and Liability Act, 42 U.

Hazardous Waste Mitigation Act, Sections 19-6-301 et seq.

Utah Solid and Hazardous Waste Act, Sections 19-6-101 et seq.

B. Notification and Interim Action

1. Notification - A person who spills or discharges any oil or other substance which may cause pollution of ground waters in violation of Section 19-5-107 shall notify the Executive Secretary within 24 hours of the spill or discharge. A written notification shall be submitted to the Executive Secretary within five days after the spill or discharge.

2. Interim Actions - A person is encouraged to take immediate, interim action without following the steps outlined in R317-6-6.15 if such action is required to control a source of pollutants. Interim action is also encouraged if required to protect public safety, public health and welfare and the environment, or to prevent further contamination that would result in costlier clean-up. Such interim actions should include source abatement and control, neutralization, or other actions as appropriate. A person that has taken these actions shall remain subject to R317-6-6.15 after the interim actions are completed unless he demonstrates that:

a. no pollutants have been discharged into ground water in violation of 19-5-107; and

b. no wastes remain in a location where there is probable cause to believe they will cause pollution of ground water in violation of 19-5-107.

C. Contamination Investigation and Corrective Action Plan - General

1. The Executive Secretary may require a person that is subject to R317-6-6.15 to submit for the Executive Secretary's approval a Contamination Investigation and Corrective Action Plan, and may require implementation of an approved Corrective Action Plan. A person subject to this rule who has been notified that the Executive Secretary is exercising his or her authority under R317-6-6.15 to require submission of a Contamination Investigation and Corrective Action Plan, shall, within 30 days of that notification, submit to the Executive Secretary a proposed schedule for those submissions, which may include different deadlines for different elements of the Investigation and Plan. The Executive Secretary may accept, reject, or modify the proposed schedule.

2. The Contamination Investigation or the Corrective Action Plan may, in order to meet the requirements of this Part, incorporate by reference information already provided to the Executive Secretary in the Contingency Plan or other document.

3. The requirements for a Contamination Investigation and a Corrective Action Plan specified in R317- 6-6.15.D are comprehensive. The requirements are intended to be applied with flexibility, and persons subject to this rule are encouraged to contact the Executive Secretary's staff to assure its efficient application on a site-specific basis.

4. The Executive Secretary may waive any or all Contamination Investigation and Corrective Action Plan requirements where the person subject to this rule demonstrates that the information that would otherwise be required is not necessary to the Executive Secretary's evaluation of the Contamination Investigation or Corrective Action Plan. Requests for waiver shall be submitted to the Executive Secretary as part of the Contamination Investigation or Corrective Action Plan, or may be submitted in advance of those reports.

D. Contamination Investigation and Corrective Action Plan - Requirements

1. Contamination Investigation - The contamination investigation shall include a characterization of pollution, a characterization of the facility, a data report, and, if the Corrective Action Plan proposes standards under R317-6-6.15.F.2. or Alternate Corrective Action Concentration Limits higher than the ground water quality standards, an endangerment assessment.

a. The characterization of pollution shall include a description of:

(1) The amount, form, concentration, toxicity, environmental fate and transport, and other significant characteristics of substances present, for both ground water contaminants and any contributing surficial contaminants;

(2) The areal and vertical extent of the contaminant concentration, distribution and chemical make- up; and

(3) The extent to which contaminant substances have migrated and are expected to migrate.

b. The characterization of the facility shall include descriptions of:

(1) Contaminant substance mixtures present and media of occurrence;

(2) Hydrogeologic conditions underlying and, upgradient and downgradient of the facility;

(3) Surface waters in the area;

(4) Climatologic and meteorologic conditions in the area of the facility; and

(5) Type, location and description of possible sources of the pollution at the facility;

(6) Groundwater withdrawals, pumpage rates, and usage within a 2-mile radius.

c. The report of data used and data gaps shall include:

(1) Data packages including quality assurance and quality control reports;

(2) A description of the data used in the report; and

(3) A description of any data gaps encountered, how those gaps affect the analysis and any plans to fill those gaps.

d. The endangerment assessment shall include descriptions of any risk evaluation necessary to support a proposal for a standard under R317-6-6.15.F.2 or for an Alternate Corrective Action Concentration Limit.

e. The Contamination Investigation shall include such other information as the Executive Secretary requires.

2. Proposed Corrective Action Plan

The proposed Corrective Action Plan shall include an explanation of the construction and operation of the proposed Corrective Action, addressing the factors to be considered by the Executive Secretary as specified in R317- 6-6.15.E. and shall include such other information as the Executive Secretary requires. It shall also include a proposed schedule for completion.

E. Approval of the Corrective Action Plan

After public notice in a newspaper in the affected area and a 30-day period for opportunity for public review and comment, the Executive Secretary shall issue an order approving, disapproving, or modifying the proposed Corrective Action Plan. The Executive Secretary shall consider the following factors and criteria in making that decision:

1. Completeness and Accuracy of Corrective Action Plan.

The Executive Secretary shall consider the completeness and accuracy of the Corrective Action Plan and of the information upon which it relies.

2. Action Protective of Public Health and the Environment

a. The Corrective Action shall be protective of the public health and the environment.

b. Impacts as a result of any off-site activities shall be considered under this criterion (e.g., the transport and disposition of contaminated materials at an off-site facility).

3. Action Meets Concentration Limits

The Corrective Action shall meet Corrective Action Concentration Limits specified in R317-6-6.15.F, except as provided in R317-6-6.15.G.

4. Action Produces a Permanent Effect

a. The Corrective Action shall produce a permanent effect.

b. If the Corrective Action Plan provides that any potential sources of pollutants are to be controlled in place, any cap or other method of source control shall be designed so that the discharge from the source following corrective action achieves ground water quality standards or, if approved by the Board, alternate corrective action concentration limits (ACACLs). For purposes of this paragraph, sources of pollutants are controlled "in place" even though they are moved within the facility boundaries provided that they are not moved to areas with unaffected ground water.

5. Action May Use Other Additional Measures

The Executive Secretary may consider whether additional measures should be included in the Plan to better assure that the criteria and factors specified in R317-6-6.15.E are met. Such measures may include:

a. Requiring long-term ground water or other monitoring;

b. Providing environmental hazard notices or other security measures;

c. Capping of sources of ground water contamination to avoid infiltration of precipitation;

d. Requiring long-term operation and maintenance of all portions of the Corrective Action; and

e. Periodic review to determine whether the Corrective Action is protective of public health and the environment.

F. Corrective Action Concentration Limits

1. Contaminants with specified levels

Corrective Actions shall achieve ground water quality standards or, where applicable, alternate corrective action concentration limits (ACACLs).

2. Contaminants without specified levels

For contaminants for which no ground water quality standard has been established, the proposed Corrective Action Plan shall include proposed Corrective Action Concentration Limits. These levels shall be approved, disapproved or modified by the Executive Secretary after considering U.S. Environmental Protection Agency maximum contaminant level goals, health advisories, risk-based contaminant levels or standards established by other regulatory agencies and other relevant information.

G. Alternate Corrective Action Concentration Limits

An Alternate Corrective Action Concentration Limit that is higher or lower than the Corrective Action Concentration Limits specified in R317-6-6.15.F may be required as provided in the following:

1. Higher Alternate Corrective Action Concentration Limits

A person submitting a proposed Corrective Action Plan may request approval by the Board of an Alternate Corrective Action Concentration Limit higher than the Corrective Action Concentration Limit specified in R317-6- 6.15.F. The proposed limit shall be protective of human health, and the environment, and shall utilize best available technology. The Corrective Action Plan shall include the following information in support of this request:

a. The potential for release and migration of any contaminant substances or treatment residuals that might remain after Corrective Action in concentrations higher than Corrective Action Concentration Limits;

b. An evaluation of residual risks, in terms of amounts and concentrations of contaminant substances remaining following implementation of the Corrective Action options evaluated, including consideration of the persistence, toxicity, mobility, and propensity to bioaccumulate such contaminants substances and their constituents; and

c. Any other information necessary to determine whether the conditions of R317-6-6.15.G have been met.

2. Lower Alternate Corrective Action Concentration Limits

The Board may require use of an Alternate Corrective Action Concentration Limit that is lower than the Corrective Action Concentration Limit specified in R317-6-6.15.F if necessary to protect human health or the environment. Any person requesting that the Board consider requiring a lower Alternate Corrective Action Concentration Limit shall provide supporting information as described in R317-6-6.15.G.3.

3. Protective of human health and the environment

The Alternate Corrective Action Concentration Limit must be protective of human health and the

environment. In making this determination, the Board may consider:

a. Information presented in the Contamination Investigation;

b. Other relevant cleanup or health standards, criteria, or guidance;

c. Relevant and reasonably available scientific information;

d. Any additional information relevant to the protectiveness of a Corrective Action; and

e. The impact of additional proposed measures, such as those described in R317-6-6.15.E.5.

4. Good cause

An Alternate Corrective Action Concentration Limit shall not be granted without good cause.

a. The Board may consider the factors specified in R317-6-6.15.E in determining whether there is good cause.

b. The Board may also consider whether the proposed remedy is cost-effective in determining whether there is good cause. Costs that may be considered include but are not limited to:

(1) Capital costs;

(2) Operation and maintenance costs;

(3) Costs of periodic reviews, where required;

(4) Net present value of capital and operation and maintenance costs;

(5) Potential future remedial action costs; and

(6) Loss of resource value.

5. Conservative

An Alternate Corrective Action Concentration Limit that is higher than the Corrective Action Concentration Limits specified in R317-6-6.15.F must be conservative. The Board may consider the concentration level that can be achieved using best available technology if attainment of the Corrective Action Concentration Limit is not technologically achievable.

6. Relation to background and existing conditions

a. The Board may consider the relationship between the Corrective Action Concentration Limits and background concentration limits in considering whether an Alternate Corrective Action Concentration Limit is appropriate.

b. No Alternate Corrective Action Concentration Limit higher than existing ground water contamination levels or ground water contamination levels projected to result from existing conditions will be granted.

6.16 OUT-OF-COMPLIANCE STATUS

A. Accelerated Monitoring for Probable Out-of-Compliance Status

If the concentration of a pollutant in any compliance monitoring sample exceeds an applicable permit limit, the facility shall:

1. Notify the Executive Secretary in writing within 30 days of receipt of data;

2. Initiate monthly sampling, unless the Executive Secretary determines that other periodic sampling is appropriate, for a period of two months or until the compliance status of the facility can be determined.

B. Violation of Permit Limits

Out-of-compliance status exists when:

1. two consecutive samples from a compliance monitoring point exceed:

a. one or more permit limits; and

b. the mean ground water pollutant concentration for that pollutant by two standard deviations (the standard deviation and mean being calculated using values for the ground water pollutant at that compliance monitoring point); or

2. the concentration value of any pollutant in two or more consecutive samples is statistically significantly higher than the applicable permit limit. The statistical significance shall be determined using the statistical methods described in Statistical Methods for Evaluating Ground Water Monitoring Data from Hazardous Waste Facilities, Vol. 53, No. 196 of the Federal Register, Oct. 11, 1988.

C. Failure to Maintain Best Available Technology Required by Permit

1. Permittee to Provide Information

In the event that the permittee fails to maintain best available technology or otherwise fails to meet best available technology standards as required by the permit, the permittee shall submit to the Executive Secretary a notification and description of the failure according to R317-6-6.13. Notification shall be given orally within 24 hours of the permittee's discovery of the failure of best available technology, and shall be followed up by written notification, including the information necessary to make a determination under R317-6-6.16.C.2, within five days of the permittee's discovery of the failure of best available technology.

2. Executive Secretary

The Executive Secretary shall use the information provided under R317-6-6.16.C.1 and any additional information provided by the permittee to determine whether to initiate a compliance action against the permittee for violation of permit conditions. The Executive Secretary shall not initiate a compliance action if the Executive Secretary determines that the permittee has met the standards for an affirmative defense, as specified in R317-6-6.16.C.3.

3. Affirmative Defense

In the event a compliance action is initiated against the permittee for violation of permit

conditions relating to best available technology, the permittee may affirmatively defend against that action by demonstrating the following:

a. The permittee submitted notification according to R317-6-6.13;

b. The failure was not intentional or caused by the permittee's negligence, either in action or in failure to act;

c. The permittee has taken adequate measures to meet permit conditions in a timely manner or has submitted to the Executive Secretary, for the Executive Secretary's approval, an adequate plan and schedule for meeting permit conditions; and

d. The provisions of 19-5-107 have not been violated.

6.17 PROCEDURE WHEN A FACILITY IS OUT-OF-COMPLIANCE

A. If a facility is out of compliance the following is required:

1. The permittee shall notify the Executive Secretary of the out of compliance status within 24 hours after detection of that status, followed by a written notice within 5 days of the detection.

2. The permittee shall initiate monthly sampling, unless the Executive Secretary determines that other periodic sampling is appropriate, until the facility is brought into compliance.

3. The permittee shall prepare and submit within 30 days to the Executive Secretary a plan and time schedule for assessment of the source, extent and potential dispersion of the contamination, and an evaluation of potential remedial action to restore and maintain ground water quality and insure that permit limits will not be exceeded at the compliance monitoring point and best available technology will be reestablished.

4. The Executive Secretary may require immediate implementation of the contingency plan submitted with the original ground water discharge permit in order to regain and maintain compliance with the permit limit standards at the compliance monitoring point or to reestablish best available technology as defined in the permit.

5. Where it is infeasible to re-establish BAT as defined in the permit, the permittee may propose an alternative BAT for approval by the Executive Secretary.

6.18 GROUND WATER DISCHARGE PERMIT TRANSFER

A. The permittee shall give written notice to the Executive Secretary of any transfer of the ground water discharge permit, within 30 days of the transfer.

B. The notice shall include a written agreement between the existing and new permittee establishing a specific date for transfer of permit responsibility, coverage and liability.

6.19 ENFORCEMENT

These rules are subject to enforcement under Section 19-5-115 of the Utah Water Quality Act.

6.20 HEARING AND APPEALS

A. Any person may request a hearing before the Board who:

1. is denied a permit by rule by the Executive Secretary under R317-6-6.2;

2. objects to a discharge limit established by the Executive Secretary;

3. objects to conditions or limitations proposed or established by the Executive Secretary in the ground water discharge permit; or

4. objects to monitoring, sampling, information, or other requests or requirements made by the Executive Secretary;

5. objects to denial by the Executive Secretary of a proposed Corrective Action Plan under R317-6- 6.15; or

6. objects to conditions proposed or established by the Executive Secretary in a Corrective Action Plan under R317-6-6.15.

B. Any person who is denied a permit or whose permit is proposed to be terminated or revoked by the Executive Secretary may appeal that decision to the Executive Director of the Department of Environmental Quality pursuant to Section 19-5-112(2).

C. Hearings under R317-6 will be conducted using the Utah Administrative Procedures Act, Title 63, Chapter 46b.

KEY

water quality, ground water

Date of Enactment or Last Substantive Amendment

January 22, 2002

Notice of Continuation

December 12, 1997

~~**Authorizing, Implemented, or Interpreted Law**~~

19-5

STATE REGULATION STATUS

State: Utah
[Two amendments reviewed are identified by a ★ at the beginning of each equivalent NRC regulation.]

Tracking Ticket Number: 2-248
Date: November 22, 2002

NRC Chronology Identification	FR Notice (Due Date for State Implementation)	RATS ID	Proposed (P) / Final (F)[1] Rule / ML #[2]	NRC Review / Y, N[3] / Date / ML #[4]	Final State Regulation[1] (Effective Date)
Safety Requirements for Radiographic Equipment-Part 34	55 FR 843; (1/10/94)	1991-1			1/10/94
ASNT Certification of Radiographers-Part 34	56 FR 11504; (none)	1991-2			Not required[5]
Standards for Protection Against Radiation-Part 20	56 FR 23360; 56 FR 61352; 57 FR 38588; 57 FR 57877; 58 FR 67657; 59 FR 41641; 60 FR 20183; (1/1/94)	1991-3	F	N 2/10/98	1/23/98
Notification of Incidents-Parts 20, 30, 31, 34, 39, 40, 70	56 FR 64980; (10/15/94)	1991-4			10/26/94
Quality Management Program and Misadministrations-Part 35	56 FR 34104; (1/27/95)	1992-1	P	N 1/26/96	3/10/95
Eliminating the Recordkeeping Requirements for Departures from Manufacturer's Instructions-Parts 30, 35	57 FR 45566; (none)	1992-2			Not required[5]
Decommissioning Recordkeeping and License Termination: Documentation Additions [Restricted areas and spill sites]-Parts 30, 40	58 FR 39628; (10/25/96)	1993-1	F	N 1/8/97	11/15/96
Licensing and Radiation Safety Requirements for Irradiators-Part 36	58 FR 7715; (7/1/96)	1993-2	F	N 6/14/00	3/10/00
Definition of Land Disposal and Waste Site QA Program-Part 61	58 FR 33886; (7/22/96)	1993-3	P	N 9/23/96	5/31/96
Self-Guarantee as an Additional Financial Mechanism-Parts 30, 40, 70	58 FR 68726; 59 FR 1618; (none)	1994-1			Not required[5]
★Uranium Mill Tailings Regulations: Conforming NRC Requirements to EPA Standards-Part 40	59 FR 28220; (7/1/97)	1994-2	F ML023100574	N 11/22/02 ML023290240	10/7/02[5]
Timeliness in Decommissioning Material Facilities-Parts 30, 40, 70	59 FR 36026; (8/15/97)	1994-3	F	N 2/10/98	7/18/97
Preparation, Transfer for Commercial Distribution, and Use of Byproduct Material for Medical Use-Parts 30, 32, 35	59 FR 61767; 59 FR 65243; 60 FR 322; (1/1/98)	1995-1	F	N 2/10/98	7/18/97
Frequency of Medical Examinations for Use of Respiratory Protection Equipment-Part 20	60 FR 7900; (3/13/98)	1995-2	P	N 1/26/98	3/20/98
Low-Level Waste Shipment Manifest Information and Reporting-Parts 20, 61	60 FR 15649; 60 FR 25983; (3/1/98)	1995-3	P	N 1/26/98	1/23/98
Performance Requirements for Radiography Equipment-Part 34	60 FR 28323; (6/30/98)	1995-4			7/18/97
Radiation Protection Requirements: Amended Definitions and Criteria-Parts 19, 20	60 FR 36038; (8/14/98)	1995-5	P	N 1/26/98	3/20/98
Clarification of Decommissioning Funding Requirements-Parts 30, 40, 70	60 FR 38235; (11/24/98)	1995-6	F	N 2/10/98	7/18/97
Medical Administration of Radiation and Radioactive Materials-Parts 20, 35	60 FR 48623; (10/20/98)	1995-7	P	N 1/26/98	8/11/98

NRC Chronology Identification	FR Notice (Due Date for State Implementation)	RATS ID	Proposed (P) / Final (F)[1] Rule / ML #[2]	NRC Review / Y, N[2] / Date / ML #[4]	Final State Regulation[1] (Effective Date)
10 CFR Part 71: Compatibility with the International Atomic Energy Agency - Part 71	60 FR 50248; 61 FR 28724; (4/1/99)	1996-1	F	N 4/16/99	3/12/99
One Time Extension of Certain Byproduct, Source and Special Nuclear Materials Licenses-Parts 30, 40, 70	61 FR 1109; (none)	1996-2	F	N 2/10/98	Not required[3]
Termination or Transfer of Licensed Activities: Recordkeeping Requirements-Parts 20, 30, 40, 61, 70	61 FR 24669; (6/17/99)	1996-3	F Part 30	N 2/10/98	3/20/98
Resolution of Dual Regulation of Airborne Effluents of Radioactive Materials; Clean Air Act-Part 20	61 FR 65120; (1/9/00)	1997-1	P	N 1/26/98	3/20/98
Recognition of Agreement State Licenses in Areas Under Exclusive Federal Jurisdiction Within an Agreement State-Part 150	62 FR 1662; (2/27/00)	1997-2			6/11/99
Criteria for the Release of Individuals Administered Radioactive Material-Parts 20, 35	62 FR 4120; (5/29/00)	1997-3	P	N 1/26/09	3/20/98
Fissile Material Shipments and Exemptions-Part 71	62 FR 5907; (none)	1997-4			Not required[3]
Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiography Operations-Parts 30, 34, 71, 150	62 FR 28947; (6/27/00)	1997-5	F	N 4/1/98	5/15/97
Radiological Criteria for License Termination-Parts 20, 30, 40, 70	62 FR 39057; (8/20/00)	1997-6	F	N 6/14/00	3/10/00
Exempt Distribution of a Radioactive Drug Containing One Microcurie of Carbon-14 Urea-Part 30	62 FR 63634; (1/02/01)	1997-7	F	N 4/16/99	3/12/99
Deliberate Misconduct by Unlicensed Persons-Parts 30, 40, 61, 70, 71, 150	63 FR 1890; 63 FR 13773; (2/12/01)	1998-1	F ML011100015	N 7/31/01 ML012150220	1/26/01
Self-Guarantee of Decommissioning Funding by Nonprofit and Non-Bond-Issuing Licensees- Parts 30, 40, 70	63 FR 29535; (none)	1998-2			Not required[3]
License Term for Medical Use Licenses-Part 35	63 FR 31604; (none)	1998-3			Not required[3]
Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations-Part 34	63 FR 37059; (7/9/01)	1998-4	P ML010870073	N 4/27/01 ML011170330	5/11/01
Minor Corrections, Clarifying Changes, and a Minor Policy Change-Parts 20, 35, 36	63 FR 39477; 63 FR 45393; (10/26/01)	1998-5	F ML013530478	Y 2/7/02 ML020390486	9/14/01
Transfer for Disposal and Manifests: Minor Technical Conforming Amendment-Part 20	63 FR 50127; (11/20/01)	1998-6	F ML013530478	N 2/7/02 ML020390486	9/14/01
★Radiological Criteria for License Termination of Uranium Recovery Facilities-Part 40	64 FR 17506; (6/11/02)	1999-1	F ML023100574	N 11/22/02 ML023290240	10/7/02[3]
Requirements for Those Who Possess Certain Industrial Devices Containing Byproduct Material to Provide Requested Information-Part 31	64 FR 42269; (none)	1999-2			Not required[3]
Respiratory Protection and Controls to Restrict Internal Exposure-Part 20	64 FR 54543; 64 FR 55524; (2/2/03)	1999-3	F ML013530478	N 2/7/02 ML020390486	9/14/01

NRC Chronology Identification	FR Notice (Due Date for State Implementation)	RATS ID	Proposed (P) / Final (F)[1] Rule / ML #[4]	NRC Review / Y, N[2] / Date / ML #[4]	Final State Regulation[1] (Effective Date)
Energy Compensation Sources for Well Logging and Other Regulatory Clarifications-Part 39	65 FR 20337; (5/17/03)	2000-1	F ML012850044	N 12/27/01 ML020020182	9/14/01
New Dosimetry Technology-Parts 34, 36, 39	65 FR 63750; (1/8/04)	2000-2	P Part 34 ML010870073	N 4/27/01 ML011170330	
Requirements for Certain Generally Licensed Industrial Devices Containing Byproduct Material-Parts 30, 31, and 32	65 FR 79162; (2/16/04)	2001-1			
Revision of the Skin Dose Limit-Part 20 that became effective April 5, 2002.	67 FR 16298; (4/5/05)	2002-1			
Medical Use of Byproduct Material-Parts 20, 32, and 35	67 FR 20249; (4/24/05)	2002-2			

1. Or other generic Legally Binding Requirements.

2. (Y/N) Y means "Yes," there are comments in the review letter that the State needs to address.
N means "No," there are no comments in the review letter.

3. Not required means these regulations are not required for purposes of compatibility.

4. ADAMS ML Number

5. The regulation package contained several regulations with earlier effective dates. The uranium milling regulations are not to be implemented until the amended Agreement is signed and effective.

NRC STP Procedure Approval
SA-700
Utah Applicable Statues and Rules

STP PROCEDURE APPROVAL
SA-700
UTAH APPLICABLE STATUES AND RULES

4.1.1 Program/Agreement Authority: Utah Code Annotated (UCA) 19-3-113

4.1.1.1 State Law

a. UCA 19-3-113

b. UCA 19-3-104, Utah Radiation Control Rule (URC) R313-19-2

1. URC R313-12
2. URC R313-12
3. URC R313-19-30
4. URC R313-19
5. URC R313-19

c. UCA 19-3-104, 19-3-105

d. UCA 19-3-108

e. URC R313-19-20

f. UCA 19-109 thru 111
URC R313-14

Regulation of low-level waste: UCA 19-3-104(8), URC R313-25

4.1.1.2 Evaluation Criteria

a. UCA 19-3-113

b. The rules will be modified to accommodate reservation of Authority to the NRC.

c. UCA 19-3-104 & 105, URC R313-19-30

d. URC R313-12-54

e. URC R313-12-55

f. UCA 19-3-103.5

g. URC R313-12-52

h. UCA 19-3-108 thru 111

I. URC R313-14-15, UCA 19-3-108

4.1.1.3 Low-level waste

URC R313-25

UCA 19-3-104 thru 106

4.1.1.4 11.e(2)

a. Adoption of UCA 19-3-104(3)(d)

b. Adoption of 10 CFR 40
UCA 19-3-104(3)(b)

c. URC R313-17

1. URC R313-17-2
2. The URC rules will be modified in R313-17 to allow for the preparation of a written environmental analysis.
3. & 4. URC R313-17
5. The rules will be modified in URC R313-17 to ban construction before completion of the written environmental analysis.

d. URC R313-17
UCA 19-3-103.5

e. The rules will be modified to require the program, before terminating 11e.(2) byproduct material license, to do the following:

(1) transfer funds collected for decommissioning and long-term surveillance and maintenance to the United States. The rule will require this transfer when custody of the deposal site transfers to the Untied Sates. Funds transferred must include all funds collected from a licensee or it surety. The only exceptions are funds collected for decommissioning if it is completed.

(2) choose whether or not to take title to the disposal site and byproduct material; and

(3) obtain a determination from the Commission that all applicable standards are satisfied.

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ROUTINE PROCEDURES
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1.00 OVERVIEW OF ROUTINE PROCEDURES

This document is proposed as a method to clarify general policy for the Radioactive Materials Inspection Programs as follows:

- To define specific requirements for a performance-based materials inspection program that gives licensees credit for good performance by extending the interval of the next inspection and requires poor performers to be inspected more frequently.

- To place the major emphasis of the materials inspection program on timely and thorough follow-up of events.

- To establish inspection priorities for all licensees and types of inspections.

- To aid in the achievement of a consistent process of inspection for materials licensees.

The Radioactive Materials Inspection Program designates priorities for various types of inspections. Reactive inspections are considered as having the highest priority, followed by core inspections. Reactive inspections include allegations, misadministration, overexposure, loss or release of significant quantities of radioactive materials and incident or special investigation inspections. Core inspections include initial and routine inspections. Termination inspections for licensees that used sealed sources or short lived isotopes would be of the lowest priority and are performed as resources permit.

Each new license issued is reviewed by a Division of Radiation Control (DRC) license reviewer. The reviewer determines the license category and inspection priority and schedules the initial inspection. License category, inspection frequency, DRC/NRC program codes and DRC/NRC Priority codes can be identified by use of, Table A, Radioactive Material License Inspection Program, dated, September 1998 (Attachment 1). If a license involves more than one type of use, the type associated with the highest priority (most frequent) inspection shall establish the inspection priority.

2.00 GENERAL LICENSE PROCEDURES and REQUIREMENTS

2.01 Definition of inspection

An inspection is the act of assessing licensee performance to determine whether the licensee is using radioactive material safely and whether an individual or organization is in compliance with established standards, such as rules, license conditions, and the licensee commitments submitted in support of a license and incorporated by "tie down" conditions. Inspections involve a visit to a licensee's facility and/or temporary job site by a representative of the Executive Secretary, observations of licensed activities, interaction with licensee personnel, and transmission of the inspection findings. Pre-licensing visits or telephonic communications are not considered inspections.

2.02 Unannounced Inspections

All inspections contain certain routine steps or requirements. One major concern is that all routine materials inspections should be performed on an unannounced basis. Additional routine procedures to be taken by the inspector are described below.

2.03 Preparation for an Inspection

First the inspector prepares for the inspection by reviewing appropriate background material (e.g., license, past inspection reports, incident reports, related allegations, and other pertinent information). The inspector identifies the location of the licensee and works out travel arrangements. The inspector should develop an itinerary and discuss special aspects of the inspection with his or her supervisor. Finally, the inspector selects appropriate and calibrated radiation detection instrumentation to take and acquires the necessary inspection forms.

2.04 Performing the inspection

The second part of the process is where the inspector conducts the onsite inspection. This begins with an entrance meeting with appropriate licensee personnel. Inspectors should ensure that licensee management is made aware of the inspection. Observations of licensee operations, interviews with staff, document review to complement and support inspector observations, and radiation surveys to obtain independent and confirmatory measurements should then be conducted. Emphasis should be placed on observing licensee performance as it relates to staff training, equipment operation and adequacy, overall management of the licensed program, and integration of safety. Review of licensee records and other documents should be directed toward verifying that

current operations are in compliance and further review of "historical" records should only occur if the current records are out of compliance and the inspector believes it necessary to determine the presence of a prevalent or persistent problem. Finally, the inspection concludes with an exit meeting with licensee management.

2.05 Inspection Methods

To the maximum extent practicable, inspectors should ascertain whether a licensee is in compliance with specific provisions of the license and the rules by direct observation of work activities, demonstrations of how the licensee performs a DRC-required test or other activity, interviews of licensee employees, and, in appropriate cases, by independent measurements of radiation and air concentrations. Less reliance should be placed on determining compliance based solely on information in licensee records.

2.06 Closeout of Inspection with DRC Management

After returning from an inspection trip, the inspector shall discuss the results of the inspection trip with his or her supervisor. This discussion should be sufficient to alert management to significant enforcement, safety, or regulatory issues. This meeting need not be documented, but it should be held in all cases. To complete the inspection, the inspector documents the inspection results in accordance with guidance.

2.07 NOV'S General Guidance.

The Notice of Violation (RAMinsp.wcm at I\rad\director\let_macs\winmacs) explains that the notice is sent pursuant to the provisions of R313-14 and that the licensee should provide, within 30 days, a written statement or explanation which includes:

a. Corrective steps which have been taken and the results achieved;

b. Corrective steps which will be taken to avoid further violations; and

c. The date when full compliance will be achieved

Other specific responses or actions may be required in enforcement letters. The inspector assigned to follow-up on the licensee's actions should therefore conduct a careful review of the enforcement letter. In addition, inspection reports may contain concerns with licensee performance, valuable as background information to the inspector.

3.00 SPECIFIC REQUIREMENTS

3.01 Written Inspection Plans

Inspections of major licensees shall include all of the afore mentioned general requirements and should include the use of an written inspection plan. Inspection plans should be developed for all routine inspections of major licensees and all team inspections. Major licensees include those programs that routinely use large quantities of radioactive material, such that special facilities and procedures are necessary for handling and control (i.e., broad-scope academic, broad-scope medical licensees, and large manufacturers). Inspection plans may also be developed for any other inspections, as decided by the Executive Secretary. The inspection field notes should be documented (a Supplemental Comment will suffice) to indicate whether or not an inspection plan was prepared. After the inspection, the inspection plan may be discarded.

a. The inspection plan sets specific requirements and priorities to aid in the achievement of a consistent process for inspection of materials licensees.

3.02 Management Meetings - Entrance and Exit Interview

The objective of these meetings and interviews is to assure that licensee management is aware of the overall scope and schedule for the inspection to be performed and that they are apprized of the preliminary findings of the inspection including any apparent noncompliance with regulatory requirements or other safety related concerns prior to the inspector leaving the site.

3.03 Entrance Interview

a. If more than one inspector is involved, they will review the scope of the proposed inspection prior to the entrance interview with the licensee and confirm at this time that only one inspector (the lead inspector) will be spokesperson during entrance and exit interviews.

b. An entrance interview shall be conducted with the most senior licensee representative available who is directly responsible for the areas to be inspected.

c. During the entrance interview, the inspector should address the following as related to the functional areas to be examined during the inspection, as appropriate.

(1) Status of resolution of outstanding inspection items.

(2) Status of corrective action relating to licensee commitments in correspondence.

(3) Scope of inspection including estimated duration.

(4) Records, procedures or documents to be reviewed.

(5) Personnel to be interviewed.

(6) Special tests or activities to be witnessed which require coordination between the inspector and the licensee.

3.04 Exit Interview

a. If the lead inspector has allowed the assistant inspector to conduct inspection activities independently, the findings of the assistant inspector(s) must be communicated to the lead inspector prior to the exit interview.

b. At the conclusion of each inspection, an exit interview shall be conducted with the most senior licensee representative at the location of the inspection.

c. During the exit interview, the licensee representative should be made aware of the preliminary inspection findings including any apparent items of noncompliance with requirements of Utah Radiation Control Rules, safety related concerns, or unresolved items identified during the inspection. Significant safety concerns must receive immediate attention from the licensee.

3.05 Interview Guidance

a. Do not discuss trivia, don't ramble, present your point concisely and support your position with facts.

b. When the senior most licensee representative is not available, the interview will be conducted with the next lower level of licensee management.

c. At the entrance interview, if desired, the licensee representative may be given an indication of the tentative schedule for discussing or reviewing selected inspection items with various licensee staff personnel.

d. Certain inspection items involving visual observations and/or records review may be performed better when they are unannounced. If the inspector believes that prior notification is undesirable, then the inspector may elect to not discuss the items during the Entrance Interview.

e. Identification of personnel to be interviewed may enhance inspector efficiency and give the licensee the opportunity to have the most knowledgeable individual present to respond in the areas being inspected. If no prior notification to the licensee of an area to be inspected is planned, then this item is not to be discussed during the opening interview.

f. The licensee should have been informed of preliminary negative findings in a timely manner before the exit interview - no surprises.

g. If items of noncompliance or safety concerns are identified that affect continued operation of a facility, in violation of significant regulatory requirements, or the facility is operating in an unsafe manner, prompt corrective action must be initiated by the licensee. The inspector should not leave the site until the concern is fully understood by the licensee and corrective action has been initiated. If disagreement exists between the inspector and the licensee as to the magnitude of the concern relative to continued operation, the inspector's section manager should be notified immediately.

3.06 Permissible Frequency of Inspection

To achieve the goals of cost saving and efficient use of staff time, inspections (other than initial inspections) may be performed at a frequency other than that defined by the license category system. However, the frequency of inspection for a licensee should not fall outside the following points:

Type of Inspection	Permissible Frequency
Initial inspections of new licensees	Should be within 6 months for categories I through V.
Inspection of licensees in Categories I, II, III	Interval between inspections may vary by $\pm$ 25%
Inspection of licensees in Categories IV, and V	Interval between inspections may vary by $\pm$ 50% of inspection interval length.

If escalated enforcement action has taken place, an inspection may be conducted within one year following closeout of the escalated enforcement action.

a. The inspection frequency assigned to a licensee is based on the potential hazard of the licensee's programs. For example, a license with an inspection frequency of one year is one in which there is the greatest potential for hazards in health and safety; this priority requires the most frequent inspections because of the nature of the operations. On the other hand, an inspection frequency of 5 years involves little potential hazard to health and safety and requires less frequent inspection.

b. The inspection priority assigned to a license or registration is numerically the same as the inspection frequency in years. For example, a license assigned an inspection frequency of 5 years is an inspection priority V license.

c. When a new license is issued, it shall be assigned an initial inspection priority and scheduled for an initial inspection. If a license involves more than one type of use, the type associated with the most frequent inspection shall establish the inspection priority.

d. The interval between inspections may be extended (increased) beyond that specified by the priority system on the basis of good licensee performance. The main consideration in extending inspection intervals should be evidence of a well-managed and effective radiation safety program that shows a history of compliance. Specifically, the inspection frequency may be extended, for licensees meeting the following conditions:

1. the violations identified during the licensee's current and preceding inspections are Severity Level IV; and

2. the licensee has not had a significant program change since the preceding inspection. Significant program changes should relate to changes in the scope or type of operations, changes in the authorized materials or possession limits, changes in key personnel, or changes in locations of use. (NOTE: Extension should not be considered for licensees who have undergone significant program changes, to ensure that the licensee can maintain adequate performance over the next inspection period.)

3.07 Extension of Interval

Licensees that meet the above criteria may have their inspection interval extended as follows:

Priority I	increased up to 2 years
Priority II	increased up to 3 years
Priority III	increased up to 5 years
Priority IV	increased up to 6 years

For instance, a radiographer (priority I) who meets the above criteria may have his/her next inspection due date lengthened to 2 years from the last inspection. A portable gauge licensee (priority III) that meets the above criteria may have its next inspection due date lengthened to 5 years from the last inspection (rather than 3). The extension shall be valid only until the next inspection, but may be renewed on the basis of repeated favorable findings.

a.. The designated inspection priority for these licensees should not be changed in the Division database. However, the inspector is responsible for initiating the change in the "next inspection date" field on the inspection field form. To identify the extended inspection date in the Division database, the data entry person shall use the "next inspection date" from the inspection field form and enter this date in the database.

b. To document the extension in the interval between inspections, a brief note (e.g., on the inspection form cover sheet) should be written by the inspector, approved and signed by the inspector's immediate supervisor, and placed in the licensing file.

c. The decision to extend the inspection should be made immediately after each routine inspection.

3.08 Reduction of Inspection Frequency

The interval between inspections may be reduced (shortened) and inspections conducted more frequently than specified in the priority system on the basis of poor licensee performance. The main consideration in reducing the inspection interval should be evidence of moderate to severe problems in the licensee's radiation safety program. Poor compliance history is one indicator of such problems. Lack of management involvement or control over the radiation safety program is another indicator. Specifically, licensees that meet the following conditions should be considered for reduction in inspection interval:

a.. a Severity Level I, II, or III violation on the most recent inspection, or
b. issuance of an Order or escalated enforcement on the most recent inspection, or

c. if a "management paragraph" appears, in the cover letter transmitting the

notice of violation on the most recent inspection (i.e., a paragraph that requires the licensee to address adequate management control over the licensed program), or

d. repetitive violations.

The above list is not exhaustive; the inspection frequency can and should be reduced for any other reason deemed pertinent by the Section Manager. An example would be an enforcement conference where the outcome did not include escalated enforcement action, but did indicate the need for the licensee to improve some aspect(s) of its compliance program.

Licensees that meet the above criteria may have their inspection interval reduced by any length. For instance, a priority IV licensee with a poor performance record could be rescheduled for its next inspection in 2 years, rather than 3. A priority I licensee with a Severity Level III violation could be rescheduled for its next inspection in 6 months. The reduction shall be valid only until the next inspection, but the Section Manager shall consider the results of the next inspection when determining whether the reduced frequency should be continued, changed, or returned to normal.

The designated inspection priority for these licensees should not be changed in the Division database. However, the "next inspection date" field in the database should be changed to contain the reduced date for the next inspection.

To document the reduction in the interval between inspections, a brief note (e.g., on the inspection form cover sheet) should be written by the inspector, approved and signed by the inspector's immediate supervisor, and placed in the licensee's file.

3.09 Telephonic Contacts and Inquiries

Some inquiries may be done by telephone using a questionnaire to determine the status of the activities of low priority licenses. This is limited to inspection category V and General licenses.

Some inquiries may be done by telephone to: (1) determine some facts about the licensed program such as reminding the licensee that its license is near expiration, (2) determine if there is sufficient activity to conduct an inspection (radioactive material may be in storage), or (3) determine if the licensee currently possesses radioactive material.

These are only examples. There may be other reasons to make telephonic

inquiries of licenses regarding license expiration, decommissioning, and so forth. Telephone inquiries generally do not involve direct inspection effort, whereas telephone contacts do. When considerable travel is required, inspectors may telephone licensees to verify that a routine inspection can be performed before undertaking such travel.

Notification that a license has expired or is being processed for termination will require prompt action to ensure that licensed material has been properly disposed of and areas wherein material was used can be safely released to unrestricted use. Final action, including inspection and confirmatory survey, if necessary, should be conducted as soon as possible. Telephone inquires will usually be necessary to initiate this process.

Procedures for using the telephonic contacts are included as Attachments.

a. Evaluation of Possession and Use of Radioactive Material, for use with inspection category IV And V Licensees only. (Attachment 2)

Follow- up Letter for Telephone Contact #1 (Attachment 3)

Follow-up Letter for Telephone Contact #2 (Attachment 4)

3.10 Inspection Activities Which do not Result in a Completed Inspection

The following sections outline conditions where it is considered that an inspection has not taken place.

a. Before scheduling an initial inspection, determine if the licensee possesses any radioactive material. An initial inspection should not be attempted if it is determined that the licensee does not possess licensed material. An inspection should not be considered to have been performed if, after arriving on an announced initial inspection, it is found that no radioactive material is possessed. Before attempting an initial inspection, the licensee should be contacted by telephone.

b. An inspection should not be considered to have been performed (1) if, after arriving on an unannounced inspection, it is found that no radioactive material is possessed or used because of disposal or storage of the material and no inspection activities are performed or (2) if the licensee or licensee's representatives are not available to assist with the inspection and the inspector is unable to perform inspection activities. On the other hand, if it is possible to inspect records or other items according to license conditions or DRC rules, such activities should be inspected and be recorded as an inspection whether the radiation safety officer (RSO) is present or not, including those licenses that have been terminated.

c. For any situation where an inspection was not performed as defined above, the inspector should not prepare a notification to the licensee and should not record the attempted inspection as "an inspection." However, a note should be placed in the licensee/registrant file to record the reason an inspection could not be performed and giving a date when the next inspection should be performed.

d. Telephone contacts are not inspections. Therefore, the results of these activities should not be recorded in a Notice of Violation.

3.11 Inspection of Waste Disposal Activities [See UCA 19-3-202(1)(b)]

In connection with all inspections of licensees who generate radioactive waste, the following information will be obtained:

1. Characteristics of waste stream (especially any mixed waste, i.e. physical form, volume, activity/nuclides, etc.).

2. Frequency of transfer to burial site.

3. Involvement of waste disposal brokers.

4. Type of waste packages or containers.

5. Identity of carrier who transports waste to burial site.

6. Volume reduction or "treatment" methods utilized at the facility.

4.00 SCHEDULING INSPECTIONS

4.01 Basis for Scheduling

An inspection may be completed earlier or later than scheduled for the purpose of the efficiency realized in inspector travel time. The efficiencies of travel time should be balanced against the basic purpose of the inspection priorities, that is, effective use of an inspector's time versus the potential hazards in a licensee's operation. A low-priority licensee should not be over inspected just because an inspector is in the area of the facility. Inspection of a high-priority licensee should not be unduly delayed merely for scheduling purposes.

4.02 Radiography Inspections

For licensees authorized to work at temporary jobsites, inspectors should plan to include an unannounced inspection of licensed activities at these locations, when possible, in addition to inspecting licensed activities at the licensee's principal place of business. During the inspection of the licensee's principal place of

business, the inspector should, through discussions with the licensee and review of licensed material utilization records, ascertain if the licensee is working at these temporary jobsite locations. To assist the inspector in locating these locations, the customer of the licensee may be contacted and the temporary jobsite inspection scheduled when the licensed activities are in progress. The licensee's customer should be requested not to notify the licensee of the inspection. If an unannounced inspection of these locations is not possible, then the inspector should attempt to arrange an announced inspection at temporary jobsites.

4.03 Combining Inspections

If a licensee holds more than one kind of license/registration (that is, of different license categories or a combination of licenses and registrations), a single inspection may be scheduled whenever practicable to aid in more effective use of inspector's time spent in travel status. In the determination to combine inspections on a continuing basis, consideration should be given to "over inspecting" a lower priority license versus the need and desirability of inspecting a licensee's total activities for a more complete picture of its safety and compliance performance. The priority designations of the lower priority license registrations shall not be changed in these cases; the more frequent inspections of lower priority license/registrations shall be handled only in the scheduling process.

4.04 Performance Indicators

Performance Indicators shall be used by inspectors (See Attachment 9) to determine if the licensee is conducting its operation in a way, that may, if not corrected or changed, lead to violations. There is no regulatory basis for most performance indicators, but there is a basis in sound radiation protection.

4.05 Inspection Before License Renewal

Before renewing a license in categories I, II, or III, the compliance inspection history of the licensee should be checked to determine whether additional requirements should be made a part of the license, particularly for those licensees that have a history of marginal performance. In some cases, it may require an on-site inspection to determine if the license should be renewed, based on prior performance and up-to-date information on the licensee.

4.06 Change in Priority Based on Change in Type of Program

A change to a lower or higher inspection frequency should be made when it is determined that the licensed activity being carried out warrants a lower or higher inspection frequency. Any changes from the usual priorities shall be authorized by the Section Manager and a note placed in the licensees/registrants file.

A reduction from a category IV frequency to a category V frequency may be done

if:

a. it is not likely that radiation workers will be exposed to airborne contaminants which exceed 10% of the airborne radioactive limits listed in R313-15-203

b. it is not likely that a radiation worker will exceed 25% of the radiation dose limits listed in R313-15-201 or will not need to use personnel monitoring devices

c. it is not likely that work with radioactive material will result in a spill causing spread of contamination

d. complex surveys are not required

e. waste disposal is not required

4.07 Inspection of General Licensees

Inspections of general licensees are to be performed once per five years. Inspections should also be made to resolve allegations, complaints, or other indications of an unsafe practice or a case of noncompliance, or when such an inspection is directly pertinent to an inspection involving a specific license. Any inspections conducted under these provisions should be done while other activities are being conducted in the same area of the State.

4.08 Inspections of Activities Under Reciprocity

Inspectors shall make every reasonable effort to conduct inspections of licensees working in the state under reciprocity at the same frequency as required by NRC. (See NRC Manual Chapter 1220, Appendix III, 9/8/97).

4.09 Construction and Preoperational Inspections of Irradiators

Construction and preoperational inspections of new walk in or pool type irradiator facilities shall be a regular part of the inspection program. The inspections will require the assistance of engineering inspectors and will require that the materials staff identify the parts of the facility that are especially important to safe operations of the irradiators.

4.10 Special Inspections

Special inspections are reactive in nature and cannot be scheduled on a routine basis. Occasions for which a special inspection should be performed include, but are not necessarily limited to the following:

1. Licensee report of an incident where onsite inspection is needed to

determine the facts of the case, the cause of the incident, and adequacy of the licensee actions to correct the cause of the incident, mitigate its consequences, and prevent recurrence. (See Allegations/Investigations, Sections 5.00 through 9.99)

2. Follow-up within 1 year of escalated enforcement to determine whether the licensee has taken the actions to which it committed itself in its response to an enforcement order. (See Follow-up Inspections, Sections 12.00 through 13.99)

3. Obtain information as to the validity and significance of an alleged unsafe operations. (See Allegations/Investigations, Sections 5.00 through 9.99)

ALLEGATIONS/INVESTIGATIONS
(Sections 5.00 to 9.99)

5.00 GENERAL OVERVIEW - ALLEGATIONS /INVESTIGATIONS

This document outlines the procedures used to evaluate and respond to complaints, allegations, and incident notifications and provides guidance on how to perform surveys necessary to evaluate the extent of a radioactive materials incident.

The following guidelines are used to determine whether an investigation is necessary when incidents or complaints are reported to the Division. Included in this section, in addition to the guidelines, are procedures to be followed when conducting an investigation and the materials needed for such an investigation.

6.00 INSPECTION REQUIREMENTS

Prior to conducting the inspection, the allegation will be reviewed by the Section Manager. The Section Manager will, with the concurrence of the Division Director, determine if the issues raised in the allegation warrant a physical investigation or other option, such as referring the matter to the licensee for resolution. The decision to devote a special inspection to the allegation or to review the issues during a routine inspection will generally be made at this time.

Allegations that appear to involve complex issues or significant safety, security, or confidentiality issues should be assigned to a senior inspector, if possible. Other allegations may be assigned to senior or non-senior inspectors, as appropriate.

Inspections to review and resolve allegations are to be conducted in a manner similar to that used for any inspection designed to review a limited aspect of the licensee's program. The inspector must not inform the licensee that the inspection is being conducted to review an allegation unless instructed to do so by the Section Manager or the Division

Director. The inspection should not focus too narrowly on the issues raised in the allegation, but should include the general area of the licensee's program within which the alleged activities occurred or failed to occur.

Matters of confidentiality are preferably settled prior to the inspection, and the inspector should clearly understand the alleger's confidentiality status and the alleger's feelings regarding the possibility of revealing his/her identity. The inspector should also be aware of procedures used to safeguard allegation documents, to communicate with the alleger and the licensee. Note however, that because of safety concerns or urgency dictated by other considerations, the Section Manager or Director may decide to send an inspector before confidentiality issues are resolved.

7.00 SPECIFIC GUIDANCE - Allegations/Investigations

7.01 Confidentiality

Allegers are granted confidentiality only in non-routine cases where it is deemed necessary for purposes of resolving the allegation. Nevertheless, the identity of the alleger should be protected as much as possible, even when confidentiality is not granted. Any information connected with the allegation should be provided to other persons, within or outside the Division of Radiation Control (DRC), only on a need-to-know basis. Files should be secured when not in use, and any documents that are released for general use should be redacted. Exceptions to the above are those cases in which it is clearly documented that the alleger has no objection to making his/her identity known, and releasing the alleger's identity would significantly facilitate review and resolution of the allegation.

7.02 Document Security

To help maintain anonymity, the inspector should avoid taking any documents that contain information that may reveal the nature of the inspection or the identity of the alleger, unless it is considered important to the conduct of the inspection. In addition, care should be taken to assure that documents about the allegation are protected from inadvertent disclosure. Documents related to an allegation in which confidentiality was formally granted must be kept in a secure file cabinet or safe, and access to such documents granted only on a need-to-know basis, as determined by the Division Director or Section Manager.

7.03 Origin of Concerns and "Off-the-Record" Statements

Should the licensee ask whether the inspection is being conducted in response to an allegation, the inspector should inform the licensee that the inspection includes a review of concerns which the DRC has with regard to the licensee's facility or operations. The inspector should decline to comment further on the origin of the concerns. The inspector should also remember that "off-the-record" Statements with licensee personnel are not acceptable. Any information provided, including

that which is considered by the informant to be "off-the-record", may be used by DRC in resolving the allegation or for any other purpose.

7.04 Instrumentation for Incident Investigation

Preparation for an incident investigation is similar to preparation for an inspection. The file must be carefully reviewed to determine the types and quantities of radioactive materials potentially involved and then all equipment deemed necessary for the investigation should be assembled. This equipment should be sufficient to ensure that the investigation is conducted safely and thoroughly.

7.05 Conducting an Incident Investigation

Each incident must be considered on an individual basis. After notifying the facility management upon arrival (if possible, and depending on the immediate steps needed to protect the public health and safety), the inspector should make a preliminary assessment of the situation at the incident site. The first consideration is to protect the employees and the public from any radiation hazard. Should a radiation hazard exist, assure that the area is secure and escalation of the hazard is not probable. If it is obvious that no radiation hazard has existed or does exist, documentation of this is still necessary.

7.06 Advisory Role of Inspector

After the immediate health and safety problems have been addressed, the inspector's role should be advisory only. The licensee, registrant, or local emergency response personnel is responsible for performing any corrective action. It is important to consider the consequences of all possible recovery operations in order to select the best solution with regard to the circumstances surrounding the hazard. When a course of action for recovery has been determined, monitor the procedures to ensure they are conducted within the ALARA concept.

7.07 Determination of Nature and Severity of Hazard

At this time, interview personnel involved to determine the nature and severity of the hazard and to determine possible corrective actions. These interviews should be performed as soon as possible to assure complete, independent, observations are obtained from all parties. Photocopies of pertinent records should also be acquired whenever possible. If the inspector suspects that criminal practices have occurred, the Section Manager must be contacted and arrangements made for law enforcement personnel to be notified.

Completion of an investigation involves the gathering of all pertinent information

not previously obtained. This may include review of records, interviews, surveys, samples, and calculations of exposures to individuals.

7.08 Preparing and Submitting an Incident Investigation Report

At the conclusion of an investigation, a thorough report shall be completed. Investigation reports are normally of the narrative form submitted as a memorandum to the license or registration file and the incident/investigation file. The usual format consists of a description of the complaint and identification of the persons interviewed and/or participating in the investigation. The body of the narrative can then be given chronologically as the inspector proceeded through the investigation. Interviews with individual may be set out by indenting and /or underlining so that the information and its source are readily identifiable.

The narrative of the report should end with the concluding remarks of the inspector which summarize the facts. Personal opinions should not be stated in the report. Apparent violations found should be listed (in the same format as inspection reports) at the end of the report. If you are unsure whether one or more of the apparent violations are valid, you can include a section indicating possible violations.

Attachments of records, photographs, surveys, and other items shall be identified as Attachment A, B, C, etc, and added to the end of the report. Be sure that the attachments are appropriately referenced in the body of the report. Photographs should be attached to a sheet of paper. Each photograph must be labeled (date, person taking photograph, description of item of interest in photography, etc.). Often, the investigation occurs in stages and it may be necessary to prepare a number of smaller reports in order to submit the reports in a timely fashion.

7.09 Staff Requirements for Responding to Incidents

Division staff responding to incidents are to:

1. Notify the Section Manager when radiation incidents occur. Indicate at the time of management notification, if the incident meets Abnormal Occurrence Criteria. (See Sections 7.15 and 9.02)

b. Provide written documentation of radiation incidents and submit these to the Section Manager for review.

c. Track radiation material incidents until they are closed.

d. Complete DRC "Event Report" (Attachment 5) or DRC Medical

Misadministration Report, (Attachment 8) (whichever is appropriate) when radioactive materials are the cause of an incident.

e. Place the completed report in the appropriate file folder located in the front of the Division's radioactive material licensee "A" file drawer. See that copies of the report are placed in all appropriate files such as radioactive material licensee, registrant, or reciprocity files.

7.10 Complaints or Allegations Response

Any allegation made by any individual or group, received in person by a Division inspector, either verbally or (preferably) in writing, and regarding a possible radiation hazard, is considered a complaint. The Division should respond to each complaint within a 72-hour period. The response may be sooner depending on the potential radiation hazard. Complaint notifications shall be immediately referred to the Section Manager, as previously indicated.

Individual staff members receiving a complaint should exercise extreme care in the following areas's in which inappropriate response may intimidate the alleger and/or unnecessarily amplify the complaint.

7.11 Answering Allegers Concerns

Trying to answer the allegers concerns; the alleger may view the prompt answers as an attempt to minimize his concerns and hold back or yield his concerns in a different context.

7.12 Verbalizing Your Concerns

Verbalizing your own concerns about the potential consequences of the allegation, if proven true; the alleger may encompass this speculation into a new allegation of his own.

7.13 Reportable Misadministration

The following guidelines are applicable when medical licensee staff ask if an incident is a reportable misadministration, or if an inspector discovers a set of circumstances that might be a reportable misadministration, and there are significant questions on the interpretation of reportability among the staff. (Includes events with greater than 30 microcuries I-131 and I-125)

a. In all cases, keep a detailed log to document all telephone inquiries and/or

discussions of the incident.

b. Obtain preliminary details describing the incident and potential misadministration and notify the Section Manager.

c. If the incident involves therapy, schedule a reactive inspection with the licensee within two weeks of the misadministration incident.

d. Most potential diagnostic misadministrations will not require an inspection. To obtain an accurate description of the event, a phone discussion with the principals involved in the incident will normally be sufficient.

e. During the inspection or phone discussions, interview the principals involved to develop an accurate time sequence and description of the event. Do not rely entirely on summary information provided by other licensee personnel such as radiation safety officer, administrative department head, or hospital director, if they are not directly involved with the incident.

f. Interviews should include questions on personnel involved with the incident, their training and experience, circumstances surrounding the incident, contributing factors, events leading to discovery, time sequence of actions and consequent decision, immediate and proposed follow-up and corrective actions.

g. Review and obtain copies of pertinent documents such as physician prescription or directive, description of the treatment plan, and changes made to the plan or prescription. Depending on the case, other documents may also provide valuable information, such as equipment calibration and service records and training records. Attach all pertinent documents to the incident report form.

h. After review by the section manager, place the "Medical Misadministration Follow-up Report" (with all pertinent documentation attached) in the appropriate file folder located in the front of the Division's radioactive material licensee "A" file drawer.

7.14 Specific Information of Allegers Concerns

It is imperative that the inspector obtain specific information about the allegers concerns. Statements that reflect only the inspectors feelings, such as "they are all messed up" or "I don't like the way they run things", should not be expressed by an inspector. Such statements reflect a bias which has no place or purpose in an investigation. When such statements are made by the alleger they should be recorded as a record of such bias. If the alleger makes no specific allegations

there is no basis for an investigation.

7.15 Specific Role of Section Manager/Alleger/Staff

If at all possible, the Section Manager should be the focal point of discussions between the Division staff and the alleger.

The Section Manager will evaluate the allegations and determine whether follow-up investigations will be conducted. As the follow-up investigation progresses, other allegations or concerns expressed by the alleger may be dropped from further review as ongoing efforts provide new perspective about the credibility of the alleger.

7.16 Provision of Allegation Summary

A written summary of the allegations should be provided to the alleger shortly after the interview along with a request that the alleger confirm whether the summary captures the scope of his concerns.

When the investigation results and Division or Department enforcement actions have become public, the alleger may be provided copies of the documents that describe the Department's review of the allegation, if so requested. In cases of protracted follow-up, periodic contact with the alleger should be maintained.

7.17 Preparing for a Complaint Investigation

Preparation for a complaint investigation may be very much the same as preparation for an inspection. If so, preparation procedures for incident investigations may be followed. However, some complaints do not involve a licensee or registrant and thus no file is available for review. If a complaint does not involve a licensee or registrant, possible actions to be taken and equipment needed for the investigation may be suggested by the Section Manager.

7.18 Conducting a Complaint Investigation

Each complaint must be considered on an individual basis. The inspector should make a preliminary assessment of the complaint to determine the equipment needed for the investigation. The investigation will involve the gathering of all pertinent information. This might include interviews, surveys, samples, reviews of past records, and calculations of exposures to individuals.

7.19 Preparing and Submitting a Complaint Investigation Report

At the conclusion of an investigation, a thorough report should be compiled in the same manner and format as for an incident investigation. A copy of the complaint report should be filed and a copy sent to the complainant, if the complainant has so requested.

7.20 Conducting Interviews

The following guidance provide direction that will help maximize the amount of pertinent information obtained during the interview, if followed.

a. Explain the purpose of the interview.

b. Try to put the person being interviewed at ease.

2. The interview should not be conducted as a confrontation between the inspector and the person being interviews.

Know in advance what questions to ask.

5. Prior to the interview, review the subject or subjects to be discussed in order to have as much information as possible.

6. Show the person being interviewed you are knowledgeable concerning the subject to be discussed.

7. Avoid asking questions that lead the person being interviewed to an answer you want to hear, or a simple yes or no answer.

7.21 Participating Parties at An Interview

a. A second Investigator should accompany the lead inspector during an interview. If the person being interviewed is to be at a place other than his/her place of employment, a second investigator should accompany the lead investigator.

7.22 Third parties may be present

If the individual being interviewed wishes to have a third party present at the interview, it is allowable. However, that person is not to interfere with the interview or to be allowed to ask or answer questions. If the interview is to be performed at the licensee's or registrant's place of business, a representative of management may be present if his presence would not compromise the interview

and the person being interviewed does not object. Again, this person should not interfere with the interview. The interview may be conducted at a location other than the licensee's facility.

7.23 Surveys

Surveys are performed to determine the presence of a radiation field and the amount of exposure a person would receive at a specific distance from a source of radiation. The Division has available count rate meters with various probes as well as ionization chamber instruments for inspectors. Many other more specialized instruments are available upon request. For all probes used with the count rate meter, readings are obtained in units of counts per minute. Readings obtained with the ionization chamber instrument are to be in units of milliroentgens per hour.

Prior to release of premises or equipment for unrestricted use, a comprehensive radiation survey shall be performed to establish that radiation and contamination levels are within the limits outlined in DRC Criteria. These surveys are normally performed by the licensee, but may be performed by Division personnel. If this survey is performed by Division representatives, a report shall include a floor plan or other sketch with sufficient detail to identify all the sampling points.

The instruments used for radiation surveys must be sufficiently sensitive to detect 0.24 mrem per hour if there may have been unsealed sources at the facility. Instruments used to measure for fixed contamination must have been calibrated in such a way that results may be obtained in units of dpm per 100 cm^2 or be sufficiently sensitive to demonstrate the absence of levels listed in Table I, form DRC-14, (Attachment 6). To survey for removable contamination, filter paper wipes are analyzed by Division staff and may be analyzed at the State Health Laboratory before a final determination is made.

7.24 Sampling Procedures

While sampling for contamination, it is important to insure that exposure is kept as low as reasonably achievable and that the sample is not cross-contaminated. It is also important to insure that proper documentation of the sample is maintained at all times. This documentation shall include the date and time, location, type of sample, area sampled, weather conditions, person performing the sampling, and any other information deemed appropriate by the inspector. The need for chain-of-custody records should be considered.

7.25 Sealed Source Leak Tests

For sealed source leak tests, the location and method of obtaining the sample depends on the source's strength and location. After determining the normal background reading for an area free of radioactive material, use a cotton-tipped applicator or filter paper and wipe the surface of the source or the surface of the device upon which one would expect contamination to accumulate. Be sure to wipe any welds, seams or breaks in the surface of the source. Do not touch the source with the hand. Use a pair of tongs or other device to handle the filter paper. Retire to the area where normal background was determined and, using a count rate meter with a NaI scintillation probe, or other appropriate detector, determine whether any detectable contamination is present on the wipe. Package the samples appropriately for analysis.

7.26 Soil, Air, Water & Vegetation Samples

Soil, air, water and vegetation samples must be representative of the general area being sampled. A sample typical of the area and free of contamination must be obtained to serve as a basis for determining concentrations of naturally occurring elements in the soil. This could normally be an area uphill from a spill of liquid and an area upwind from an airborne release of radioactive material. Samples for analysis should be obtained from areas with the highest readings detected with survey instruments. When examining the area for contamination from a spill, observe the normal pathways of water flow and any damp areas in the soil. For samples of soil contaminated by liquid releases, consideration must be given to the contour of the land surrounding the source of the release in order to choose correct locations for sampling. If the contamination is due to airborne releases, determine wind direction and velocity at time of release as an aid in locating areas to be sampled.

8.00 INCIDENTS REQUIRING PROMPT INVESTIGATION

8.01 Possible Overexposure

The licensee or registrant is required to report excessive exposures to the Division in accordance with the notification requirements set forth in R313-15-1202 "Notification of Incidents" and R313-32-33 "Notifications, Reports and Records of Misadministrations".

Although Utah Radiation Control Rules do not require licensees to notify the Division for all of the following types of incidents, a prompt physical investigation of the possibility of overexposure shall be conducted by Division representatives when any of the following conditions are known to exist:

a. An individual is believed to have received, in a period of 24 hours –

(1) A total effective dose equivalent exceeding 5 rems (0.05 Sv); or

(2) An eye dose equivalent exceeding 15 rems (0.15 Sv); or

(3) A shallow-dose equivalent to the skin or extremities, exceeding 50 rems (0.5 Sv); or

b. An industrial radiographer, an assistant radiographer, helper or supervisor received an exposure from a source disconnect, subsequent source recovery, or other episode which results in a pocket dosimeter (0-200 millirem) being discharged beyond its range. Assistant radiographers, helpers, and supervisors should not be involved in source recovery operations in any way that would result in such exposure.

c. A situation which could cause whole body exposures to members of the general public in excess of 100 millirem.

4. The failure of facilities or equipment which could lead to radiation exposure in excess of those listed in 8.01 a.1.

e. A bioassay sample in excess of limits specified in license condition. This is defined as an overexposure and is to be reported to the Division in accordance with the license provision.

f. A prompt physical investigation is not required when the requirements set forth in R313-32-33 "Notifications, Reports and Records of Misadministrations" have been complied with. If a member of the licensee's staff or other interested party requests assistance in determining if a medical misadministration has occurred or an inspector discovers evidence of an unreported misadministration, a prompt physical investigation is then necessary.

8.02 Potential Release or Discharge of Radioactive Materials

A release or discharge of radioactive material is defined as a level of radiation or concentration of radioactive material (not involving overexposure of any individual) in an unrestricted area in excess of applicable limits as set forth in the rules. The licensee or registrant shall report such a release or discharge of radioactive materials to the Division in accordance with notification requirements as set forth in R313-15-1203 "Reports of Exposures, Radiation Levels, and

Concentrations of Radioactive Material Exceeding the Constraints or Limits".

A prompt physical investigation of a release or discharge of radioactive material shall be conducted by Division representatives when any of the following conditions exist:

a. Release of radioactive material to an unrestricted area due to an accident, fire, tornado, earthquake, or other means causes or threatens to cause:

   1. Release of a quantity of Radioactive Material greater than five times the lowest annual limit on intake specified in Appendix B of 10 CFR Part 20, 1997 ed;

   2. Access to the contamination area, by workers of the public, to restricted for more than twenty-four (24); or

   3. Medical treatment at a medical facility of an individual with spreadable radioactive contamination on the individual's clothing or body.

b. A transportation accident involving radioactive material occurs where:

   1. The radioactive material container or its contents may have been damaged resulting in leakage of the material or shifting of the shielding material; or

   2. The vehicle driver, passenger, or others are seriously injured or killed.

c. The failure of facilities or equipment which could lead to release of radioactive materials to unrestricted areas in excess of those specified in a.1..

8.03. Lost or Stolen Sources of Radiation

When a licensee or registrant does not have possession or control of a licensed or registered source of radiation due to loss or theft, prompt physical investigation of the loss or theft shall be conducted if so directed by the Section Manager. The licensee or registrant must report such theft or loss of any licensed or registered source of radiation in accordance with reporting requirements as set forth in R313-15-1201.

8.04 Other

A physical investigation may be conducted of an incident in which none of the previous criteria are exceeded but where the level of public concern dictates that a prompt investigation be conducted.

8.05 Cases Where Prompt or Delayed Inspections May be Necessary

The following examples summarize many incidents for which an investigation (prompt or delayed) may be necessary.

a. Excessive contamination or radiation levels on radioactive material packages or loss of package effectiveness, [R313-15-906(4)];

b. Theft or loss of radioactive material, [R313-15-1201];

c. Any event for which a report is required by R313-15-1202, "Notification of Incidents"; including any overexposures, excessive radiation levels, or releases of material to unrestricted areas, [R313-15-1203];

d. Any safety related failures of measuring, gauging, or controlling devices reported under R313-21-22(4)(c)(xii);

e. Any pharmaceutical misadministration, whether diagnostic or therapeutic, (R313-32-33);

f. Any transportation accident in which a radioactive material package has been damaged, 49 CFR Part 171.15 and 171.16];

Any major deficiency in design, construction, operation, or management control, with sufficient safety implications to require remedial action through modification or suspension of a license;

h. Recurring incidents, or incidents with implications for similar facilities, which are of major concern regarding safety; and

i. Events relating to current high visibility issues such as radioactive waste disposal.

9.00 ABNORMAL EVENTS

9.01 Reports of Abnormal Events to Other Agencies

After a completed incident or complaint investigation report has been submitted, along with analyses of any samples which had been taken, the Section Manager will review the documents to determine whether copies should be sent to other state or federal agencies for their information. During this evaluation the inspector should comply with the directions found in SA-300, Reporting Material Events, May 23, 2001.

Any report prepared as a result of notifications required by R313-15-1203 that meet the Abnormal Occurrence Criteria must be sent to the NRC. Copies of reports of incidents involving licensees of the NRC or another Agreement or Licensing State shall be sent to the appropriate agency. DRC Form Event Report, (Attachment 5) is to be utilized by Division staff to summarize radioactive material incident data. A summary or listing of radioactive materials incidents which have been reported to the NRC will be available through the Nuclear Materials Event Database.

Incidents involving high visibility and/or the possibility of unusual publicity need to be reported to NRC by telephone immediately. Examples include incidents involving: radioactive waste; major design, construction or operation deficiencies necessitating immediate remedial action; serious deficiencies in management or procedural controls; recurring incidents or incidents with implications for similar facilities, which imply a major safety concern.

9.02 Notification of Abnormal Events to Section Managers

Incidents involving the following may need to be reported to the Nuclear Regulatory Commission and should therefore be brought to the Section Managers immediate attention:

a. Excessive contamination or radiation levels on radioactive material packages or loss of package effectiveness, R313-15-906;

b.. Theft or loss of radioactive material, R313-15-1201;

c. Any event for which a report is required by R313-15-1203, "Notification of Incidents"; including any overexposures, excessive radiation levels, or releases of material to unrestricted areas, R313-15-1203

d. Any safety related failures of measuring, gauging, or controlling devices reported under R-313-21-22(4)(c)(xii);

e.. Any pharmaceutical misadministration, whether diagnostic or therapeutic, R313-32-33;

f. Any transportation accident in which a radioactive material package has been damaged, 49 CFR Part 171.15 and 171.16;

g. Any major deficiency in design, construction, operation, or management control, with sufficient safety implications to require remedial action through modification or suspension of a license;

Recurring incidents, or incidents with implications for similar facilities, which are of major concern regarding safety; and

Events relating to current high visibility issues such as radioactive waste disposal

CLOSEOUT INSPECTIONS AND CLOSEOUT SURVEYS
(Sections 10.00 through 11.99)

10.00 GENERAL OVERVIEW OF CLOSEOUT INSPECTIONS & SURVEYS

These instructions are used in conjunction with form DRC-14, (Attachment 6), which should be filled out by the licensee and returned to the Division at least 30 days prior to the planned date of abandonment and prior to the initiation of a close out inspection or close out survey. These instructions do not apply to facilities unable to meet the requirements of form DRC-14. The ownership of licensed facilities must be transferred to another licensee specifically licensed to posses the licensed radioactive material or the radioactive material must remain on a license possessed by the licensee. Licensed radioactive material must remain licensed unless action by the Utah Radiation Control Board authorizes otherwise. This is not intended to preclude the possibility of such things as razing buildings etc. and transferring the material in question to a duly authorized recipient.

Problems involving the contamination of soil are quite varied in nature and are not covered in this guidance, they must be dealt with on an individual basis. Facilities having the potential for soil contamination will usually have posted a bond to cover the cost of clean-up. The criteria for such clean up should have been, but is not always, included as a license condition.

11.00 INSPECTION REQUIREMENTS - CLOSEOUT INSPECTIONS

11.01 Closeout Review

a. The Division will review each proposed retirement of expired, superseded, or terminated license to determine the necessity of performing a closeout survey. The review will be on a case-by-case basis to determine the scope of the licensee's program and the potential for site contamination. The need or lack of need for a survey or inspection will be determined as follows:

b. Those facilities that meet any of the following criteria do not require a confirmatory survey:

1. An adequate closeout survey has been conducted by the licensee.

2. Use has been limited to small quantities of radionuclides with half-lives of 60 days or less.

3. Use has been limited to sealed sources only (if leak tests have been < 0.005 uCi).

4. Use has been limited to materials that pose a very low risk to public health and safety.

c. Those facilities that meet any of the following criteria do require a confirmatory survey:

1. Unsealed radionuclides with half-lives in excess of 60 days have been used and significant residual contamination is possible.

2. A significant safety issue has occurred (for example an enforcement conference and civil penalties during the course of the license).

3. Politically sensitive issues are involved, such as cases pending before a hearing board, or other technical issues that have been brought to the attention of the DRC by concerned citizens or elected public officials.

4. An adequate closeout survey has not been conducted by the licensee. (Prior to the initiation of a close out survey or close out inspection by the Division, the licensee should have submitted form DRC-14 for review. The Division will determine the need for a closeout survey upon review of this document.)

11.02 Licensee Obligations Prior to Closeout Inspection

Prior to initiating a closeout inspection, the inspector shall review the documentation submitted by the licensee with form DRC-14 to determine that the licensee has made a reasonable effort to eliminate residual contamination and is ready for a closeout inspection or survey. The inspector should at this time determine if a close out inspection is still necessary. Form DRC-14 contains adequate instruction to the licensee and if these instructions are followed, the inspector should have no difficulty in making these determinations. Form DRC-14 and the instructions are attached to this document for the readers review. (Attachment 6)

11.03. Confirmation of the Disposition of Materials

In addition to the review of form DRC-14, the inspector should confirm by inspection of records (inventory, transfer, disposal, etc.) that licensed material has been transferred to an authorized recipient.

Verify by inspection of the licensee's facility that licensed material and

radioactive/contaminated equipment, materials, scrap, etc. are not being used or stored. This should be done following receipt and evaluation of any reports of the facility's status that have been provided to the Division.

11.04 The Conduct of Confirmatory Surveys.

Determine by performing a survey that there is no residual radioactivity greater that the criteria in form DRC-14. This survey should include measurements for both fixed and removable contamination (as appropriate). If the potential for contamination exists outside the facility, environmental samples should be taken. (See NUREG CR-2082 Section 3.3 for Specific Survey Procedures and Section 4 regarding instrumentation needed and sampling procedures) This survey should include the following:

a. Buildings, rooms, furniture, systems and equipment; ventilation ducts, filters, sinks, drains, traps and sumps; overhead fixtures, walls and floors, etc., should all be considered as areas to be surveyed. The number of the confirming measurements made by the inspector will vary with the magnitude of the potential for contamination and the thoroughness of the licensee's survey.

b. The number and type of samples collected for analysis will depend on the determination that a potential exists for facility and environmental contamination and on other findings; i.e., the material involved, extent of area affected, nature of media involved, etc., and in the inspector's professional judgement.

3. "As appropriate" is determined on the basis of the potential for environmental contamination and in the inspectors professional judgment.

d. Radiation levels should be below those listed in form DRC-14, which should be used by the licensee during decontamination and or decommissioning. If levels exceed those listed, the licensee should demonstrate that reasonable efforts to decontaminate the facility do not result in an appreciable reduction in the radiation levels. If the radiation levels are greater than the accepted levels and the licensee had made a reasonable effort to decontaminate the facility, the Executive Secretary should be consulted in determining an acceptable radiation level for release of the facility.

11.05 Review of Reports and Records.

Verify by reviewing records and files that:

a. Reports of personnel exposures for terminated employees or employees no longer working with radioactive materials required by R313-18-13 have been submitted to the employee.

b. Plans or arrangements have or have not been made for preserving records required by R313-15-1102 through 1110. Although certain licensees are not required to report personnel exposures, and the limitations of a license removes the legal obligation to maintain the records required by R313-15-1102 through 1110, the licensee should be informed that retention of these records is highly recommended.

11.06. Assessment of the Burial of Waste.

Determine if waste has been buried on the site. If burial has occurred, do the following:

a. Obtain information on the type and quantity of the materials buried. Also identify the following: radionuclides, type of packaging, specific location of burial, depth and spacing used for burial. Obtain information on the planned use of the area after the license is terminated.

b. Conduct a surface survey to determine the radiation levels at the burial site.

c. Submit the information acquired under a. and b. (above) to the Section Manager for assistance in determining the final action.

d. Radiation levels and geographical coordinates or other specific means of identification should be recorded on a map, diagram, photo, or other similar document. Information is required to determine whether long-term control of the area will be required.

11.07 Closeout Inspection Report

Prepare a final inspection report which summarizes the actions taken under this inspection procedure and the findings and evaluations for review by DRC staff and approval by the Executive Secretary. This report becomes the official certification of the disposal of licensed material and forms the basis for retiring and eventually disposing of both the licensing and inspection files.

FOLLOW-UP INSPECTIONS
(Section 12.00 through 13.99)

12.00 GENERAL OVERVIEW - FOLLOW UP INSPECTIONS

Follow-up inspections may be performed as a part of a routine inspection. If escalated enforcement action has taken place for a particular licensee, a follow-up inspection should be scheduled within six (6) months of the last inspection. The inspection should occur after completion of the escalated enforcement action. The objective of this inspection is to assess the licensee's follow-up actions in response to the previous violations.

This document outlines the means by which an inspector should ascertain that the licensee's response for items of noncompliance identified in a Notice of Violation (NOV) is in conformance with regulatory requirements, that the corrective measures were completed including the identification of root causes and addressing of general implications, and that the program procedures and practices have been appropriately strengthened to prevent recurrence. The determination of root causes of deficient management controls and their potential generic implications is the most important item in this inspection procedure.

13.00 FOLLOW-UP INSPECTION - REQUIREMENTS

13.01 Follow-up Inspection

Verify by a record review, observation, and discussions with licensee personnel the following information relating to follow-up on items of noncompliance:

a. That the licensee responded in a timely manner.

b. That the measures taken to correct the item and avoid further items of noncompliance were effected as described and within the time period specified in the reply. When repetitive items of noncompliance recur, the licensee should be requested to conduct an in depth analysis of the management control system to assure that all deficient management controls were corrected rather than just correcting the controls that were associated with the specific item. This entails the determination of root causes and potential generic implications.

c. That other licensee commitments discussed in the reply were also completed.

13.02 Identified Noncompliance Items

The following inspection requirements need not be completed for each noncompliance item, but may help to verify proper functioning of the licensee's administrative controls:

a. That licensee management forwarded copies of reply to appropriate personnel within the licensee's organization.

b. That responsibility has been assigned for effecting the described corrective action including effecting the identified changes in procedures and practices.

c. That the item(s) of noncompliance and identified corrective measures were reviewed as required by approved administrative procedures.

d. That the licensee posted copies of enforcement correspondence as required by R313-18-11 (required only for noncompliance items related to radiological working conditions).

e. That the licensee conducted audits of the inspection area in which violations were identified, noted deficiencies, and effective follow-up actions were initiated.

As part of a follow up inspection it might be necessary to evaluate the licensee and procedures that they have in place to correct problems and identify potential areas of non-compliance. (Sections 14.00 through 15.99 addresses this inspection activity).

ASSESSMENT OF LICENSEE PERFORMANCE
(Section 14.00 through 15.99)

14.00 GENERAL OVERVIEW

This document outlines the procedures to evaluate the effectiveness of licensee controls in identifying, resolving, and preventing issues that degrade the quality of operations or safety. Procedures are used to evaluate performance information from the previous 12-24 months.

15.00 INSPECTION REQUIREMENTS

15.01 Inspection Preparation

a. Review the strengths and weaknesses of licensee controls.

b. Review the results of licensee self-assessments, placing special emphasis on the conclusions and corrective actions.

c. Review performance reviews, enforcement history, performance indicators, and licensee operating activities, to determine any current areas of strengths or weaknesses.

NOTE: Use of Performance Evaluation Factors (PEF'S) Form dated 4/98 may be used by the inspector to assist in performing the inspection. Attachment 9.

15.02 Licensees Resolution of Problems

a. Select a sample of issues or problems from the list below for detailed analysis to assess the licensee's ability to identify and correct problems.

1. Operational events, testing, or maintenance activities (such as temporary repairs or troubleshooting activities).

2. Deficiencies or modifications requiring safety evaluations or operability determinations.

3. Procedural adherence deficiencies and procedure change backlog.

4. QA audits and self-assessments.

5. Repetitive equipment deficiencies.

6. Other events or issues that may indicate weaknesses.

b. Analyze in detail the problems selected above to determine the licensee's effectiveness in performing the following:

Initial identification and characterization of the problem.

2. Elevation of problems to proper level of management for resolution (internal communications and procedures).

3. Root-cause analysis.

4. Disposition of any operability/reportability issues.

5. Implementation of corrective actions including evaluation of repetitive conditions.

6. Expansion of the scope of corrective actions to include applicable related systems, equipment, procedures, and personnel actions.

c. Identify any strengths and determine the root causes of any weaknesses or slow response identified during the detailed analysis above. Possible root causes might include understaffing, lack of training, lack of funding, lack of accountability, unclear responsibility, procedure inadequacy, undue schedule pressure, or inaccuracy in design-basis documents.

15.03 Corrective Action Programs

a. Review the deficiencies tracked in the licensee's corrective action programs, including the evaluation of deferred items, or interim resolutions.

b. Review the results of licensee audits that evaluated the effectiveness of the associated corrective action programs.

c. Interview selected individuals involved with the licensee's problem identification process to determine the extent of the individual's understanding of the process and willingness to report problems.

d. Evaluate the licensee's corrective action programs to verify that the licensee is appropriately identifying significant issues and implementing timely corrective actions which achieve lasting results. Determine the adequacy of root-cause analyses.

15.04 Operating Experience Feedback

a. Evaluate the adequacy of the licensee's programs that implement operational experience feedback. Focus on the licensee's effectiveness to assess, to inform appropriate personnel of the results, and to initiate corrective actions for information obtained both within and outside the licensee's organization. Consider operational experience information reports as sources of information:

b. Identify any strengths or contributing conditions which reflect a lack of responsiveness in licensee programs that implement operational experience feedback.

15.05 Self-Assessment Activities

Evaluate the effectiveness of the licensee's self-assessment capability by reviewing self-assessment reports, audits, and evaluations.

Evaluate the significance of self-assessment findings to determine the effectiveness of the self-assessment effort. If relatively few significant findings are identified, review the scope of the self-assessment and the qualification of the licensee's staff involved in the self assessment. Determine if the self-assessment findings are consistent with previous inspection findings, plant performance, and third-party audits.

b. Determine if the licensee is aggressive in following up on self-assessment findings and determine whether the licensee's corrective actions are adequate, timely, and properly prioritized. Determine if individuals at all levels in the self-assessment and corrective action process are held sufficiently accountable to ensure that corrective actions are technically adequate and timely. Determine if the licensee has a meaningful trending program with sufficient information available for identifying recurring problems.

c. Interview selected individuals involved with the oversight function, to gain their insight on the effectiveness of their effort and the responsiveness of management and staff to issues raised.

ATTACHMENT

1

Septe ber 1998

RADIOACTIVE MATERIAL LICENSE INSPECTION PROGRAM

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
22120 (SNM Pu -Sealed Neutron Source <200g) 22140 (SNM Pu - Sealed Sources in Devices)	1-a	SNM - Sealed Sources in Devices	6 month	III		5 5	1
22110 (SNM Pu - Unsealed < Critical Mass) 22111 (SNM U-235 and/or U-233 - Unsealed < Critical Mass)	1-b	SNM <15 grams for Research and Development	6 month	II		2 2	
22150 (SNM Pu - Sealed Sources < Critical Mass) 22151 SNM U-235 and/or U-233 - Sealed Sources < Critical Mass)	1-c	SNM - All Others	6 month	III		5 5	
No NRC Equivalent	1-d	SNM - Calibration & Reference Sources	6 month	III		N/A	

September 1998

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
11300 (Source Material - Other > 150 kg, includes munition production, subcritical assembly, and other)	2-a	Source Material	6 month	II		3	
11210 (Source Material - Shielding)	2-b	Shielding	6 month	V		7	
11200 (Source Material - Other < 150 kg) 11700 (Rare-Earth - extraction and processing)	2-c	Source Material - Other (< 150 kg)	6 month	III		5 3	1

September 1998

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
03211 (Manufacturing & Distribution - Type A Broad)	3-ai.1	Manufacturing for Commercial Distribution (Type A Broad)	6 month	I		1	
03212 (Manufacturing & Distribution - Type B Broad)	3-ai.2	Manufacturing for Commercial Distribution (Type B Broad)	6 month	II		3	
03213 (Manufacturing & Distribution - Type C Broad)	3-ai.3	Manufacturing for Commercial Distribution (Type C Broad)	6 month	III		5	
03214 (Manufacturing & Distribution - Other)	3-aii	Manufacturing for Commercial Distribution (Other)	6 month	I		3	1
02500 (Nuclear Pharmacies)	3-b.1	Nuclear Pharmacies	6 month	I		1	2

Revised: October 1998 September 1998

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
02511 (Medical Product Distribution - 32.72, prepared radio-pharmaceuticals)	3-b.2	Processing, Manufacturing, and Distribution (Prepared Radiopharmaceuticals)	6 month	II		3	
02513 (Medical Product Distribution - 32.74, Sources and Devices, therapy sources, calibration and reference sources)	3-b.3	Processing, Manufacturing, and Distribution (Sources and Devices)	6 month	II		3	
No NRC Equivalent	3-c	Distribution or Redistribution of Radiopharmaceuticals (See R313-70)		II			1
03310 (Industrial Radiography - Fixed)	3-d.1	Industrial Radiography (Fixed)	6 month	I		1	4
03320 (Industrial Radiography - Temporary Jobsites)	3-d.2	Industrial Radiography (Temporary Jobsites)	6 month	I		1	3

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
No NRC Equivalent	3-d.3	Industrial Radiography (Both Fixed and Temporary Jobsites)	6 month	I			4
03510 (Irradiators - Self-Shielded, <10,000 Ci, includes blood irradiators) 03520 (Irradiators - Self-Shielded, >10,000 Ci)	3-e	Irradiators (Self-Shielded)	6 month	III		5 3	2
03511 (Irradiators Other < 10,000 Ci - panoramic, includes converted teletherapy units)	3-fi	Irradiators (< 10,000 Ci Exposed)	6 month	I		3	
03521 (Irradiators - Other >10,000 Ci)	3-fii	Irradiators (> 10,000 Ci Exposed)	Prelicense & 6 month	I		1	1

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
03254 (Exempt Distribution - 32.22, self-luminous products) 03255 (Exempt Distribution - 32.26, smoke detectors)	3-g	Distribution to Exempt (items or quantities that require device evaluation)	6 month	III		5 5	

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
03250 (Exempt Distribution - 32.11, exempt concentrations; includes broad) 03251 (Exempt Distribution - 32.14; H-3, Pm-147, and other isotopes in 10 CFR 30.15) 03252 (Exempt Distribution, Resins - 32.17; Sc-46 resins) 03253 (Exempt Distribution - 32.18 Small Quantities, byproduct material in processed chemicals, elements, compounds, mixtures, tissue samples, etc.)	3-h	Distribution to Exempt (items or quantities that require no device evaluation)	6 month	III		5 5 5 5	

Revised: November 1998 September 1998

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
03240 (General License Distribution - 32.51, generally licensed gauges, other) 03241 (General License Distribution - 32.53, H-3, Pm-147 signs or markers) 03242 (General License Distribution - 32.57, Am-241 calibration sources) 03243 (General License Distribution - 32.61, Sr-90 ice detection) 11230 (Source Material - General License Distribution - 10 CFR 40.34)	3-i	Distribution to General Licensee (items or quantities that require device evaluation)	6 month	III		5 5 5 5 5	

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
03244 (General License Distribution - 32.71, In-Vitro Kits)	3-j	Distribution to General License (items or quantities that require no device evaluation)	6 month	III		5	
03620 (Research and Development - Other)	3-k.0	Research and Development - Other	6 month	II		5	9
03610 (Research and Development - Type A Broad, committee-approved users)	3-k.1	Research and Development - Type A Broad	6 month	II		2	
03611 (Research and Development - Type B Broad, RSO-approved users)	3-k.2	Research and Development - Type B Broad	6 month	II		3	

Revised: November 1998

September 1998

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
03612 (Research and Development - Type C Broad, named users)	3-k.3	Research and Development - Type C Broad	6 month	II		5	
03613 (Research and Development - Broad, multisite-multiregional)	3-k.4	Research & Development, Broad (multisite)	6 month	II		1	
03124 (Measuring Systems - Other)	3-l.0	All Others	6 month	III		7	2
03121 (Measuring Systems - Portable Gauges, including Industrial Lixiscope)	3-l.1	Portable Gauges	6 month	III		5	91
03120 (Measuring Systems - Fixed Gauges)	3-l.2	Fixed Gauges	6 month	IV		5	19
03122 (Measuring Systems - Analytical Instruments)	3-l.3	Analytical Instruments	6 month	IV		7	10

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
03123 (Measuring Systems - Gas Chromatographs)	3-l.4	Gas Chromatographs	6 month	V		7	2
02410 (In-Vitro Testing Laboratories)	3-l.5	In-Vitro Testing Laboratories	6 month	IV		5	3
02400 (Veterinary Nonhuman)	3-l.6	Veterinary Nonhuman	6 month	III		5	
No NRC Equivalent	3-l.7	Source Storage	6 month	III			3
No NRC Equivalent	3-l.8	Redistribution	6 month	III			2
No NRC Equivalent	3-l.9	Radiological Assay	6 month	II			4
01100 (Academic Type A Broad, Committee-approved users)	3-m.1	Academic Type A Broad	6 month	II		2	1
01110 (Academic Type B Broad, RSO-approved users)	3-m.2	Academic Type B Broad	6 month	II		3	1
01120 (Academic Type C Broad, named users)	3-m.3	Academic Type C Broad	6 month	III		5	1

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
No NRC Equivalent	3-m.4	Academic/Medical Broad Scope	6 month	I			1
03225 (Other Services, includes teletherapy, irradiator, and gauge services)	3-n.1	Service Licenses (Gauge)	6 month	III		3	
03221 (Instrument Calibration Services Only, Self-Shielded) 03222 (Instrument Calibration Services Only - Other)	3-n.2	Instrument Calibration (<100 Ci)	6 month	IV		5 3	1
No NRC Equivalent	3-n.3	Instrument Calibration (>100 Ci) and Leak Testing	6 month	III			1
03219 (Decontamination Services)	3-n.4	Decontamination/ Decommissioning	6 month	II		2	3
03220 (Leak Test Services Only)	3-o	Leak Testing Only	6 month	V		7	

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
03231 (Waste Disposal - Burial)	4-a	Waste Disposal	6 month	I		1	1
03234 (Waste Disposal Service - Processing and/or Repackaging)	4-b	Repackaging Waste	6 month	I		1	1
03232 (Waste Disposal Service - Prepackaged Only)	4-c	Receipt of Prepackaged Waste	6 month	II		2	
No NRC Equivalent	4-d	On Site Radioactive Waste Packaging	6 month	III			
03110 (Well Logging - Byproduct and/or SNM, Tracer and Sealed Sources) 03111 (Well Logging - Byproduct and/or SNM, Sealed Sources Only) 03112 (Well Logging- Byproduct Only, Tracers Only)	5-a	Well Logging (No Field Flood)	6 month	II		3 3 3	7

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
03113 (Field Flooding Studies)	5-b	Well Logging (Field Flood)	6 month	II		3	
03218 (Nuclear Laundry)	6-a	Nuclear Laundry	6 month	II		2	
02300 (Teletherapy - human use only)	7-a	Teletherapy	6 month	I		3	
02120 (Medical Institution, Hospitals, Clinics - QMP required) 02121 (Medical Institution - no QMP required)	7-b.1	Medical Institution Limited	6 month	III		3 5	27
02200 (Medical Private Practice - QMP required) 02201 (Medical Private Practice - no QMP required) Broad)	7-b.2	Medical Private Practice	6 month	III		3 5	1

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ (R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
02210 (Eye Applicators Strontium-90, hospitals or physicians' offices)	7-b.3	Strontium-90 Eye Applicator	6 month	IV		3	
22160 (Pacemaker Byproduct, and/or SNM - Medical Institution 22161 (Pacemaker Byproduct, and/or SNM - Individual)	7-b.4	Medical (Pacemaker)	6 month	IV		7 7	1
02220 (Mobile Nuclear Medicine Service)	7-b.5	Medical (Mobile)	6 month	II		2	
02110 (Medical Institution Broad, hospitals only)	7-c	Medical Institution Broad	6 month	I		1	1

NRC PROGRAM CODE	LIC. CAT. NO.	LICENSE CATEGORY TITLE	CUR. INSPEC. FREQ.(I)	CUR. PRIOR. & INSPEC. FREQ.(R)	CHANGE IN PRIOR.	NRC PRIOR.	UTAH LIC. NO.
03710 (Civil Defense)	8-a	Civil Defense	6 month	IV		5	1
22130 (Power Sources with Byproduct and/or SNM	10-a	Power Source	6 month	III		7	

ATTACHMENT 2

TELEPHONE

EVALUATION OF POSSESSION AND USE OF RADIOACTIVE MATERIAL

(For use with inspection category IV and V Licenses only)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 7, 1998

ALL AGREEMENT STATES
OHIO, OKLAHOMA, PENNSYLVANIA

TRANSMITTAL OF STATE AGREEMENTS PROGRAM INFORMATION (SP-98-040)

Your attention is invited to the enclosed correspondence which contains:

INCIDENT AND EVENT INFORMATION..... XX *GUIDANCE FOR REPORTING MATERIAL EVENTS*

PROGRAM MANAGEMENT INFORMATION....

TRAINING COURSE INFORMATION.....

TECHNICAL INFORMATION.....

OTHER INFORMATION.....

Supplementary information: Enclosed is Office of State Programs (OSP) Procedure SA-300, Reporting Material Events, and it's Appendix, a revised "Handbook on Nuclear Material Reporting in the Agreement States." The "Handbook" is a final version of the handbook previously provided to you for use and comment by OSP in March 1995 (SP-95-036). The procedure and handbook provide guidance for Agreement State reporting of material events to the NRC. SA-300 and the "Handbook" contain procedures for providing NRC:

(1) Initial notification of the occurrence of a significant or routine event involving nuclear material (Section 1.0, of the "Handbook," pp.1-3).

(2) Pertinent follow-up information (results of any evaluations or investigations, dose assessments, leak tests, equipment assessments, inspection reports, corrective actions, etc.); and any additional information on technical or regulatory action through resolution and close out of the event (Sections 1.3 and 1.4, pp. 4-6).

(3) Guidance on electronic reporting of event information to the "Nuclear Materials Events Database" (NMED) and on written (hard copy) reporting through submission of Agreement State licensee event reports to the Director, OSP (Sections 1.3 and 1.4, pp. 4-6).

Guidance covering recent revisions to Title 18 of the Criminal Code, that expands the role of the Federal Bureau of Investigations (FBI) in the criminal use of radioactive material, and guidance on Agreement State notification to the FBI regarding specific categories of material events is contained in All Agreement States Letter SP-98-038. An Errata Sheet is also enclosed which adds the FBI guidance to the Reference Manual Section of the "Handbook."

For purposes of compatibility, the reporting of incidents and events involving the use of nuclear material by an Agreement State to NRC is now mandatory under the Policy Statement on Adequacy and Compatibility of Agreement State Programs approved by the Commission on June 30, 1997. The quality, thoroughness, and timeliness of material event reporting by the Agreement States to NRC, including Agreement State event information contained in NMED, will be reviewed during the annual meetings with Agreement States between the Integrated Materials Performance Evaluation Program (IMPEP) reviews, and will be evaluated during IMPEP reviews under the Common Performance Indicator, Response to Incidents and Allegations. We hope the enclosed procedure and handbook will be of assistance to you and your staff in the reporting of event information and will help in maintaining a national database of NRC and Agreement State information.

Information requested in the Handbook has been approved by OMB 3130-0178, expiration date June 30, 2000. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

If you have any questions regarding this correspondence, please contact me or the individual named below.

POINT OF CONTACT: Patricia M. Larkins
TELEPHONE: (301) 415-2309
FAX: (301) 415-3502
INTERNET: PML@NRC.GOV

Paul H. Lohaus, Deputy Director
Office of State Programs

Enclosures:
As stated

Attachment 2
Instructions

IV and V Licenses Telephone Contact Procedures for Inspection Category

In the event a backlog of scheduled inspections has occurred, or it appears a backlog will occur, the inspector has the option, with the Section Managers approval, of exempting inspection category IV and V licenses from routine inspection by the DRC.

Information regarding radioactive material registration under a General License may also be obtained in a similar manner.

1. Select licensee to interview from the computer listing of licenses needing inspections. Select only licensees that have had initial inspections.

2. Pull the license/or registration file and review the file to determine the person to contact for information needed to complete interview questionnaire (Enclosure 2).

3. Telephone licensee/registrant and complete questionnaire (see following page). Note that not all licenses require each procedure mentioned in the questionnaire.

4. If the licensee reports any problems, namely:

   a. personnel exposures in excess of 1.25 rems for a calendar quarter
   b. lost licensed material
   c. leak tests indicating source leakage or
   d. any event the licensee/registrant considered unusual

   The person filling in the questionnaire should promptly notify the Section Manager. Provide the Section Manager with the appropriate draft letter, (Attachment 3).

5. If the licensee responses confirm no problems are present, prepare the appropriate draft transmittal letter (Attachment 4).

6. Send appropriate letter to Licensee/registrant after it has been reviewed by a member of the appropriate section.

ATTACHMENT 2
FORM

TELEPHONE

EVALUATION OF POSSESSION AND USE OF RADIOACTIVE MATERIAL
(For use with inspection category IV and V Licenses only)

Name: _____License Number _____
Address: _____Phone Number: _____
_____
_____

Name and Title of person responsible for radiation safety program: _____
_____

Describe how this material is used: _____
_____
_____

Described how you safeguard the byproduct material from use by unauthorized personnel:
_____
_____

Describe how you safeguard the material from loss or theft: _____
_____
_____

Describe controls which prevent individuals who work in the area around the material becoming exposed to radiation: _____
_____
_____

Do you have a personal monitoring program for your employees such as film badges, dosimeters:
Yes ___ No ___

If yes, were there any exposures to individuals in excess of 1.25 rems for any calendar quarter for the year(s) _____?

Yes _____ No _____

Do you perform surveys to detect external radiation in the area around the radioactive material?
Yes___ No ___

If yes, how often are the surveys performed? _____
_____

What instruments is used to perform the surveys? _____
_____

When was this instrument last calibrated? _____

On what date was the last physical inventory of all radioactive material in your possession performed? _____

Do you perform leak tests on the sealed source? Yes ___ No ___
If yes, how often are these leak tests performed? _____
Who evaluates the leak test results? _____
If no, describe the provisions you have made to have the leak tests done:
_____
_____

Describe your provisions for repair and maintenance of your device or source holder: _____
_____
_____

Describe any unusual events involving the radioactive material, radiation machines or devices. ___
_____
_____
_____

Name of person filling in questionnaire: _____

Title: _____

Date: _____

ATTACHMENT

3

Follow-up Letter for Telephone Contact #1

ATTACHMENT 3

Follow-up Letter for Telephone Contact #1

License No. _____

_____
_____
_____
_____

Gentlemen:

This refers to a telephone contact conducted on _____, 19 _.

The contact was an examination of activities conducted under your license registration as they relate to radiation safety and to compliance of the Utah State Radiation Control rules and with the conditions of your license registration. The contact consisted of discussions with _____ _____.

As a result of this examination of activities, the following concerns were noted and are specified below. These may be evaluated at an on site inspection at your facility in the near future.

As you described on the telephone, the following apparent regulatory concerns were identified.

(examples)

1. failure to leak test sealed sources at the required intervals

2. an exposure of _____ rems to an individual during the third quarter of _____*

3. an apparently lost gauge containing _____ curies of _____*

*(If apparently serious enough [such as overexposure], add the following)

You should examine your license and Utah State Radiation Control Rules to determine how you can correct the apparent regulatory concerns that you discussed on the telephone. In addition, we would like to highlight the following items that licensees should pay particular attention to as follows:

a. maintaining awareness and control of licensed material

Facility Name

b. proper transfers and disposal of radioactive sources

c. promptly reporting losses or thefts of licensed materials

If you have any questions regarding this contact, you may contact us at _____
_____.

Sincerely,

ATTACHMENT

4

FOLLOW UP LETTER FOR TELEPHONE CONTACT #2

ATTACHMENT 4

FOLLOW UP LETTER FOR TELEPHONE CONTACT #2

License No. _____

_____
_____
_____
_____

Gentlemen:

This refers to a telephone contact conducted on _____ , 19 _.

The contact was an examination of activities conducted under your license registration as they relate to radiation safety and to compliance of the rules and with the conditions of your license registration. The contact consisted of discussions with _____.

No regulatory concerns were identified.

If you have any questions regarding this contact, you may contact us at 536-4250

Sincerely,

ATTACHMENT

5

DRC INCIDENT REPORT

Attachment 5
DRC-INCIDENT

UTAH STATE
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL
INCIDENT REPORT

DATE: _____

INCIDENT NO: UT_____

LICENSEE: _____ LICENSE NO: _____

CITY: _____ CONTACT:

EVENT INVOLVED:

[ ] Loss of package effectiveness or contamination
[ ] Theft or loss of RAM
[ ] Overexposure of individual
[ ] Excessive levels of radiation or
[ ] Therapeutic concentrations of RAM
[ ] Transportation
[ ] Device safety failure
[ ] Possible generic [ ] GL
[ ] Leaking source
[ ] Misadministration
[ ] Diagnostic
[ ] Uranium mill occurrence
[ ] Other _____

DATE OF EVENT: _____ DATE REPORTED TO DIVISION _____

BRIEF DESCRIPTION OF EVENT:

_____
_____
_____

ISOTOPE: _____ AMOUNT: _____

OTHER UTAH OR OUT-OF-STATE LICENSEES INVOLVED:

LICENSEE: _____ LICENSE NO: _____
JURISDICTION: _____ RECIPROCITY LICENSEE? Y/N _____
CORRECTIVE ACTIONS TAKEN BY LICENSEE:

Corrective Actions (Continued)

_____
_____
_____

EVENT REPORTED BY PHONE or IMMEDIATE CORRESPONDENCE WITH:

[ ] *NRC WHO? _____ DATE: _____ BY: _____

[ ] LAW ENFORCEMENT: WHO? _____ DATE: _____ BY: _____

[ ] OTHER AGREEMENT STATES: WHO? _____ DATE: _____ BY: _____

[ ] OTHER LICENSES WHO? _____ DATE: _____ BY: _____

[ ] MEDIA: WHO? _____ DATE: _____ BY: _____

OTHER ACTIONS TAKEN:

_____
_____
_____
_____

CLOSEOUT SUMMARY:

DATE CLOSED: _____ REPORTED CLOSED BY _____

SUMMARY OF CLOSEOUT:

_____
_____
_____
_____
_____

*Only incidents involving high visibility and/or the possibility of unusual publicity need to be reported to NRC immediately. Examples include incidents involving: Radioactive Waste; Major design, construction or operation deficiencies necessitating immediate remedial action; Serious deficiencies in management or procedural controls; Recurring incidents which imply a major safety concern.

ATTACHMENT

6

DRC- FORM 14

DRC-14
03/96

(6)

UTAH DIVISION OF RADIATION CONTROL
CERTIFICATE - TERMINATION AND DISPOSITION OF RADIOACTIVE MATERIAL

INSTRUCTIONS:

Submit this form to: Utah Division of Radiation Control, Department of Environmental Quality, P.O. Box 144850, Salt Lake City, Utah 84114-4850. Please place an X or N/A (Not applicable) in the space preceding each number.

LICENSEE	3. License Number
1. Name	
2. Address	4. Expiration Date

CERTIFICATE

_____ 1. All use of radioactive materials authorized under the above-referenced license has been terminated.

_____ 2. Any radioactive contamination resulting from use of materials possessed under the authorization granted by the above-referenced license has been accounted for as follows (choose applicable answer):

_____ a. No possibility of contamination exists. A survey does not need to be performed to determine the presence of contamination. A brief explanation justifying this conclusion is attached.

_____ b. Radioactive contamination has been removed to the extent practicable. Attached are the reports and information specified in R313-22-36(4)(a)(iv) and (v).

_____ 3. All sealed sources containing licensed material, possessed under the above-referenced license, other than Hydrogen-3, with a half-life greater than 30 days and in a form other than gas were tested for contamination and/or leakage within six months prior to transfer and were transferred to an individual specifically licensed to possess them.

_____ 4. All radioactive material previously procured and/or possessed under the authorization granted by the above-referenced license has been disposed of as follows:

_____ a. Transferred in accordance with R313-19-41 to (Name and Address)

_____

which is authorized to possess such material under License Number _____

Issued by (Licensing Agency): _____

_____ b. Decayed, surveyed, and disposed of as non-radioactive trash.

_____ c. Other (attach additional pages).

_____ 5. No radioactive material has ever been procured and/or possessed by the licensee under the authorization granted by the above-referenced license.

_____ 6. Additional remarks (attached additional pages).

The undersigned, on behalf of the licensee, hereby certifies that licensed quantities of radioactive material under the jurisdiction of the Division of Radiation Control are not possessed by the licensee. It is requested that the above-referenced license be terminated.

DATE: _____ SIGNATURE: _____

TITLE: _____

UTAH DIVISION OF RADIATION CONTROL
CERTIFICATE - TERMINATION AND
DISPOSITION OF RADIOACTIVE MATERIAL

INSTRUCTIONS
FOR
RADIATION SURVEY REPORT

Prior to the release of facilities and equipment for uncontrolled use, the licensee shall submit a radiation survey report to confirm the absence of radioactive material or to establish the levels of residual radioactive contamination, unless the licensee demonstrates the absence of residual radioactive contamination in some other acceptable manner. (Refer to Table 1, Acceptable Surface Contamination Levels for Uncontrolled Release of Facilities and Equipment.)

In accordance with R313-22-36(4)(a)(v)(A) and (B) and R313-22-36(4)(c)(ii), please provide the following information, as appropriate:

1. Report levels of radiation in units of microrads per hour of beta and gamma radiation at one centimeter and gamma radiation at one meter from surfaces; and report levels of radioactivity, including alpha, in units of disintegrations per minute, or microcuries, per 100 square centimeters removable and fixed on surfaces; microcuries per milliliter in water; and picocuries per gram in contaminated solids such as soils or concrete.

   Regulatory guidance concerning radiation levels in water and in contaminated solids, such as soils or concrete, is available from the Division of Radiation Control.

2. Specify the instrumentation used and certify that each instrument was properly calibrated and tested.

3. Submit a plan for decontamination, if required, in regards to remaining radioactive contamination.

   Regulatory guidance is available from the Division of Radiation Control to assist a licensee in the preparation of a plan for decontamination of facilities or equipment.

UTAH DIVISION OF RADIATION CONTROL
CERTIFICATE - TERMINATION AND
DISPOSITION OF RADIOACTIVE MATERIAL

TABLE 1

Acceptable Surface Contamination Levels for
Uncontrolled Release of Facilities and Equipment*

Nuclide[a]	Average [b,c,f]	Maximum [b,d,f]	Removable [b,e,f]
U-Nat, U-235, U-238 and associated decay products	5,000 dpm alpha/100 cm²	15,000 dpm alpha/100 cm²	1,000 dpm alpha/100 cm²
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm²	300 dpm/100 cm²	20 dpm/100 cm²
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm²	3,000 dpm/100 cm²	200 dpm/100 cm²
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000 dpm beta-gamma/100 cm²	15,000 dpm beta-gamma/100 cm²	1,000 dpm beta-gamma/100 cm²

[a] Where surface contamination by both alpha- and beta-gamma emitting nuclides exists, the limits established for alpha- and beta-gamma emitting nuclides should apply independently.

[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than one square meter. For objects of less surface area, the average should be derived from each such object.

[d] The maximum contamination level applies to an area of not more than 100 cm².

[e] The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping the area with a dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

[f] The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

* Contamination on equipment or surfaces shall not be covered by paint, plating or other covering material unless contamination levels, as determined by a survey and documented and confirmed by a survey by the Division of Radiation Control, are below the limits specified. Contamination on the interior surfaces of pipes, drainlines or ductwork shall be determined by measurements using radiation survey instrument(s) and smear tests at all traps and other appropriate access points, provided that contamination at those locations are likely to be representative of contamination on the interior of pipes, drainlines, or ductwork.

ATTACHMENT

7

Event reporting in the Agreement States

NRC Handbook
SA-300
Feb 20, 1998

ERRATA SHEET
April 30, 1998
for
Handbook on Nuclear Material Event Reporting in the Agreement States
(Issued: February 20, 1998)

Subsequent to publication of the "Handbook" the following corrections and additions apply:

Reference Manual insert:

FBI A recent revision to Section 831 of Chapter 39 of Title 18 of the U.S. Code regarding criminal activity, includes a significant expansion of Federal Bureau of Investigation (FBI) jurisdiction to initiate criminal investigations and pursue prosecutions when radioactive materials are involved. In instances involving the suspected criminal misuse of nuclear material and byproduct material, your notification of the FBI is warranted. However, the U.S. Attorney's Office and the FBI will determine whether or not a criminal investigation is to be conducted by the FBI or deferred to State or local authorities for investigation and prosecution. The Commission also requests that Agreement States inform NRC of reports of events involving theft or terrorist activities warranting FBI notification.

Please make the following pen and ink corrections to Table 1.2 Event Reporting Requirements, p. 10-11.

10 CFR Part	
20.2201(a)(1)(I) (a)(1)(ii)	Change to read as follows: 20.2201(a)(1)(i) Change the ≥ symbol to read greater than >.
34.25(d)	Change to read as follows: 34.27(d)
34.30(a)	Change to read as follows: 34.101(a)

Please add the following additional reporting requirement to Table 1.2.

39.35 (d)(2)	reports of leaking sealed sources found during periodic leak testing requirement	5 day notification

FINAL APPLICATION
VOLUME 2
AMENDED AGREEMENT FOR URANIUM RECOVERY REGULATION

STATE OF UTAH

DIVISION OF RADIATION CONTROL
UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

JANUARY 2003

VOLUME 2

APPENDIX E: LICENSING PROCEDURES

Technical Procedures for License Review
Expired License Policy Procedure
NRC Regulatory Guides 3.11, 3.11.1, 3.51, 3.56, 4.14, 8.22. 8.25. 8.30, and 8.31

APPENDIX F: INSTRUMENTATION AND CALIBRATION PROCEDURES

Equipment Inventory
Instrument Calibration Procedures
Procedures for Sample Analysis

APPENDIX G: GROUNDWATER PROGRAM EQUIVALENCY

Cover letter transmitting groundwater program information
Enclosure 1 - Summary of the process used to determine how to best regulate groundwater at Utah uranium mill facilities
Enclosure 2 - Executive Summary - Comparison of NRC Groundwater Protection Criteria in 10 CFR Part 40, Appendix A with Utah Ground Water Quality Protection Rules, R317-6
Enclosure 3 - Detailed Comparison of NRC Groundwater Protection Criteria in 10 CFR Part 40, Appendix A with Utah Ground Water Quality Protection Rules, R317-6

APPENDIX H: FEE SCHEDULE

Updated final approved FY2004 DEQ fee schedule (containing Uranium mills/tailings annual and review fees)

APPENDIX I: 2002 LEGISLATION

Enrolled copy of Senate Bill 96, Uranium Mill Tailings Oversight, 2002 General Session, State of Utah

APPENDIX J: 2002 URANIUM RECOVERY RULEMAKINGS

Cover letter transmitting rulemaking information of October 9, 2002
Copies of all uranium rulemakings filed with Utah Division of Administrative Rules
Response to comments - June 4, 2002

APPENDIX J (continued)

Response to comments - July 2002
Response to comments - September 2002
Utah Administrative Rulemaking rules R15-1-5
NRC letter of November 22, 2002 (rules are compatible)
Nonsubstantive rulemaking request as result of November 22. 2002 letter

APPENDIX K: AGREEMENT/AMENDED AGREEMENT/DRAFT AMENDED AGREEMENT

Original agreement between NRC and State of Utah , effective April 1, 1984
Amended agreement between NRC and State of Utah (low-level waste), effective May 8, 1990
Suggested language for amendment agreement between NRC and State of Utah (uranium mills and tailings)

Appendix E

DIVISION OF RADIATION CONTROL

TECHNICAL PROCEDURES FOR LICENSE REVIEW

Radioactive materials licensing is a process whereby applicants are approved to receive, possess, and use radioactive materials. Technical personnel should understand the concepts of R313-12, -19, -21, -22, -25, -32, -34, -36, and -38. These regulations codify standards for radiation protection and describe the limitations for using different types of radioactive material in various circumstances.

As license reviewers, we review and approve the use of the material, qualifications of the person, and the place of use, as requested. There are several basic questions which should be asked (and answered) to preface this license review procedure. These are:

I. What is a license review?

II. How do you do a license review?

III. When do you do a license review?

IV. Who does the license review?

V. Why do a license review?

This procedure answers each one of these questions - and leaves room for changes. Adequate radioactive materials programs must have personnel and procedures that address each of these questions.

I. What is a license review?

A license review is an evaluation, based on health physics principles, of a request to:

- o change or update an existing license, or
- o to request authorization for a new use condition in an existing license, or
- o to request a new license and authorization, or
- o to request a new or unusual use of radioactive material.

The license review is designed to assure that the uses of, and authorizations for, radioactive material will not present a hazard to the general public or to the workers. It is the DRC's job, therefore, to assure that license reviewers are well trained in health physics principles and understand the rules governing the safe handling of radioactive material.

II. How do you do a license review?

The license review is based on common sense and health physics principles. Using the appropriate review check sheet and licensing guidance available, the reviewer must read the requestor's material, and decide if it meets DRC safety criteria. The check sheets help assure safety criteria are addressed.

After safety criteria has been reviewed, the reviewer writes a Request for Information Letter or if there are no deficiencies, the reviewer writes a draft license. After peer and supervisory review, the license is issued.

III. When do you do a license review?

A license review is done any time a licensee submits a request for a license amendment (change to an existing license) or an applicant requests a new license or a renewal of an existing license. The DRC is obligated to review these applications in a timely manner.

IV. Who does the license review?

The license review is done by at least two persons: a Technical Reviewer (Primary Reviewer) and a Peer Reviewer. The Technical Reviewer completes the first (Phase I) review of a licensing action. This person has the responsibility to identify any gross health and safety deficiencies in a license application or amendment request, prepare Request for Information letters, and write a draft version of the licensing action.

The Technical Reviewer should use appropriate standard guidance to review actions to assure proper quality control, to conform to regulatory positions and evaluate health and safety issues. Various documents may be useful for license reviews and processing: NCRP guidelines, ANSI standards, NUREG publications, NRC Standard Review Plans (SRPs), CRCPD guidelines and many other publications. Advisory Committees and Legal Assistance from the DRC's legal support also should be available. DRC procedures should identify available guidance and provide a framework on which programs may obtain technical or legal assistance. *License reviewers should remember that good health physics practices guide the reviewers' evaluations of any action.*

The Peer Reviewer performs a second (Phase II) review of the licensing action. The purpose of this review is to serve as a quality control check on the accuracy of decisions made in Phase I, to issue any Request for Information letter, and to prepare a final copy of the licensing action for approval and signature.

V. Why do a license review?

License reviews are done to:

- o Issue licenses
- o Issue amendments to licenses
- o Assure health and safety criteria are applied to radioactive materials licenses.

PROCEDURE FOR HANDLING LICENSE ACTIONS
(See the Flow Chart provided as Exhibit A.)

Flow Chart Summary

1. The applicant's submission is logged into the DRC mail log tracking system by an Office Technician III. After the submission has been logged into this system, the action item is given to the Support Services Coordinator.

2. The Support Services Coordinator (SSC) logs the action into the DataEase database and the Excel tracking spreadsheet. The SSC also prepares the Licensing Action Routing Sheet.

3. The SSC must determine if the applicant's submission is a renewal of an existing radioactive materials license.

   3.A If the submission is not a renewal, the SSC prepares a letter to the applicant. The letter acknowledges DRC's receipt of the action. Next, the SSC gives the item to a Technical Reviewer for a Phase I Review.

   3.B If the submission is a renewal application, the SSC must determine if it was filed in a timely manner. All licensees who send applications to the DRC so that they are received at least 30 days before the expiration date are sent a letter acknowledging DRC's receipt of the license renewal. This letter states that the submission was filed in a timely manner. Any licensee who does not send the license renewal in a timely manner receives a letter acknowledging DRC's receipt of the renewal. Next, the SSC gives the action item to a license reviewer for a Phase I Review. Note that some renewal submissions may require enforcement action.

4. A Phase I License Review is performed in accordance with the following:

Name(s)	Assignment(s)
Don	PHASE I 1. Enter Sign-Out Date on Routing Sheet and complete Licensing Action Routing Sheet for Phase I review. 2. Enter date in "Phase I Start Date" and "By" in EXCEL license action tracking spread sheet. 3. Perform a thorough and complete initial review of licensing action. 4. For New or Renewal actions, complete appropriate license review check list. 5. If information or commitments are lacking, draft Request for Information letter. 6. Place draft license, cover letter and Request for Information letter (if needed) in RAD/COMMON/OLD_LIC. Record file names on Routing Sheet. 7. Enter Phase I Completion Date in EXCEL license action tracking spread sheet. 8. Review Licensing Action Routing Sheet entries.

5. A Phase II License Review is performed in accordance with the following:

Name(s)	Assignment(s)
Gwyn, Julie and/or Phil	PHASE II 1. Determine if necessary, who will perform Phase II review. 2. Enter Phase II Start Date and By in EXCEL license action tracking spread sheet. 3. Perform secondary review of licensing action. 4. Telephone licensee if necessary to confirm or clarify information. 5. If additional information or commitments are missing, add to Request for Information letter. 6. If needed, final Request for Information letter. (Licensee contact for letter now becomes Gwyn, Julie and/or Phil). 7. Final licensing action and cover letter. 8. Enter Phase II Completion Date in EXCEL license action tracking spread sheet. 9. Review and complete License Action Routing Sheet. 10. The responsibility for completion of licensing action rests with Gwyn, Julie and/or Phil.

6. After completion of the license review, the action is routed to the Section Manager. All actions are closed out on the Excel spread sheet. The manager also performs a supervisory review on each tenth licensing action as well as all actions processed for major licensees. The Licensing Action Routing Sheet is used to document the supervisory review.

7. The action is presented to the Executive Secretary for review and signature as an official license amendment.

8. An Office Technician III logs the action in the outgoing mail log, photocopies the action, and distributes a file copy to the licensing staff.

9. Final data entry notations are made into the DataEase database and the file copies are placed in the licensee's file folder.

NEW LICENSE APPLICATIONS

1. Using an appropriate review checklist, confirm that operating and emergency procedures are adequate and that all items on the application are complete. In particular:

   - o Application signed and dated by management.
   - o RSO and authorized users designated; training adequate.
   - o Place of use authorized; surveys and environmental factors addressed if appropriate.
   - o Leak test, waste disposal, survey, RAM ordering and package opening procedures adequate.
   - o Instrumentation and calibration adequate.
   - o RAM, quantity, form, use designated with adequate procedures.
   - o Other conditions: bioassay, maintenance, distribution, etc.

2. Confirm that all fiscal documents have been received and are being processed. The DRC cannot issue a new license without payment.

3. Identify on the checklist if a prelicensing inspection should be performed. If appropriate, this should be scheduled with an inspector.

4. Follow the steps for Phase I and Phase II review.

5. New licenses should be issued in a timely manner.

6. All involved in review and processing of an application should sign off on the tracking sheet.

RENEWAL APPLICATIONS

1. Renewal applications should be complete, stand-alone applications. Using an appropriate review checklist, confirm that operating and emergency procedures are adequate and that all items on the application are complete. In particular:

   - o Application signed and dated by management.
   - o RSO and authorized users designated; training adequate.
   - o Place of use authorized; surveys and environmental factors addressed if appropriate.
   - o Leak test, waste disposal, survey, RAM ordering and package opening procedures adequate.
   - o Instrumentation and calibration adequate.
   - o RAM, quantity, form, use designated with adequate procedures.
   - o Other conditions: bioassay, maintenance, distribution, etc.

2. Identify on the checklist if a prelicensing inspection should be performed. If appropriate, this should be scheduled with an inspector.

3. Follow the steps for Phase I and Phase II review.

4. Renewal licenses should be issued in a timely manner.

5. All involved in review and processing of an application should sign off on the tracking sheet.

AMENDMENT REQUESTS

1. Review amendment request carefully. Confirm that:

   - o For authorized user changes, training documents are complete and adequate.
   - o For medical facilities, confirm that the RSC has authorized the user applicant and that a Preceptor Statement or board certification is submitted with the request.

- o For industrial gauge facilities, confirm that training certificates are included with individual requests.

- o If place of authorized use has changed, that surveys and environmental factors are addressed if appropriate; state should verify when appropriate.

- o Leak test, waste disposal, survey, RAM ordering and package opening procedures have changed, that documentation is adequate.

- o If instrumentation and calibration request is made, that procedures are adequate.

- o If RAM, quantity, form, or use change is requested, that there are adequate procedures submitted.

- o If other activities such as gauge maintenance, distribution, etc. are requested, confirm that safe operating procedures and techniques are submitted.

2. If the amendment is a major change in the License Type, confirm that all fiscal aspects of the change have been cleared through the Support Services Coordinator.

3. Identify if a prelicensing inspection should be performed. If appropriate, this should be scheduled with an inspector.

4. Follow the steps for Phase I and Phase II review.

5. Amendments should be issued in a timely manner.

6. All involved in review and processing of an application should sign off on the tracking sheet.

PROCEDURE FOR TERMINATION OF LICENSES

1. Documents needed

   - o Written request for termination

   - o Supporting details

     Copies of transfers, preferably of receipts by recipient with details

     If sealed source and not disposed of as waste; need LT records

     If unsealed, long-lived material needs:

     copies of licensee close out surveys

by whom? date? qualifications of person?

instrument? calibration date?

maps, diagrams of surveys

Statement of decontamination criteria authorized by DRC

Current license as far back as possible

Check for amendments deleting previously authorized materials - what was their disposition?

Cross check with termination request - everything accounted for?

Check for unusual conditions, amendments

- Inspection reports as far back as possible

Check and cross check with license and with termination request regarding relocations and RAM used

Check for indication/citation of unauthorized RAM, and use or disposal

Burials?

Check for indications of incidents, spills, losses of RAM? Bad compliance history?

Get correspondence as far back as possible

Reports of incidents, losses

- DRC close-out surveys/inspections

A must for most users of unsealed, long lived RAM (e.g. H-3, C-14, I-125, etc.) users and for some ss users, e.g., w/ poor compliance history

Inspections should include:

surveys of some points evaluated by licensee

surveys where contamination could be expected (restricted areas)

surveys for contamination where none should have occurred (unrestricted areas, e.g. soils, drains, sewers, lobbies, offices and homes)

records stating decontamination criteria authorized by state:

instrumentation used and calibration

who did surveys

review of disposition of radioactive waste generated by licensee

decontamination activities: solid, liquid

review of decontamination activities - personnel exposures and monitoring including bioassay or airborne activity

strong documentation of results

review of records of disposition/transfer of RAM and inventories

2. Other Involved Parties

- o In addition to those above:

In cases of transfer of RAM, verify recipients were both authorized for RAM and received it

Discussions (not just exchanges of questions) between license reviewer and inspector are essential - talk about incidents, telephone conversations, and other occurrences that are remembered

Make sure everything is covered

Look for employees with institutional memories

3. Miscellaneous

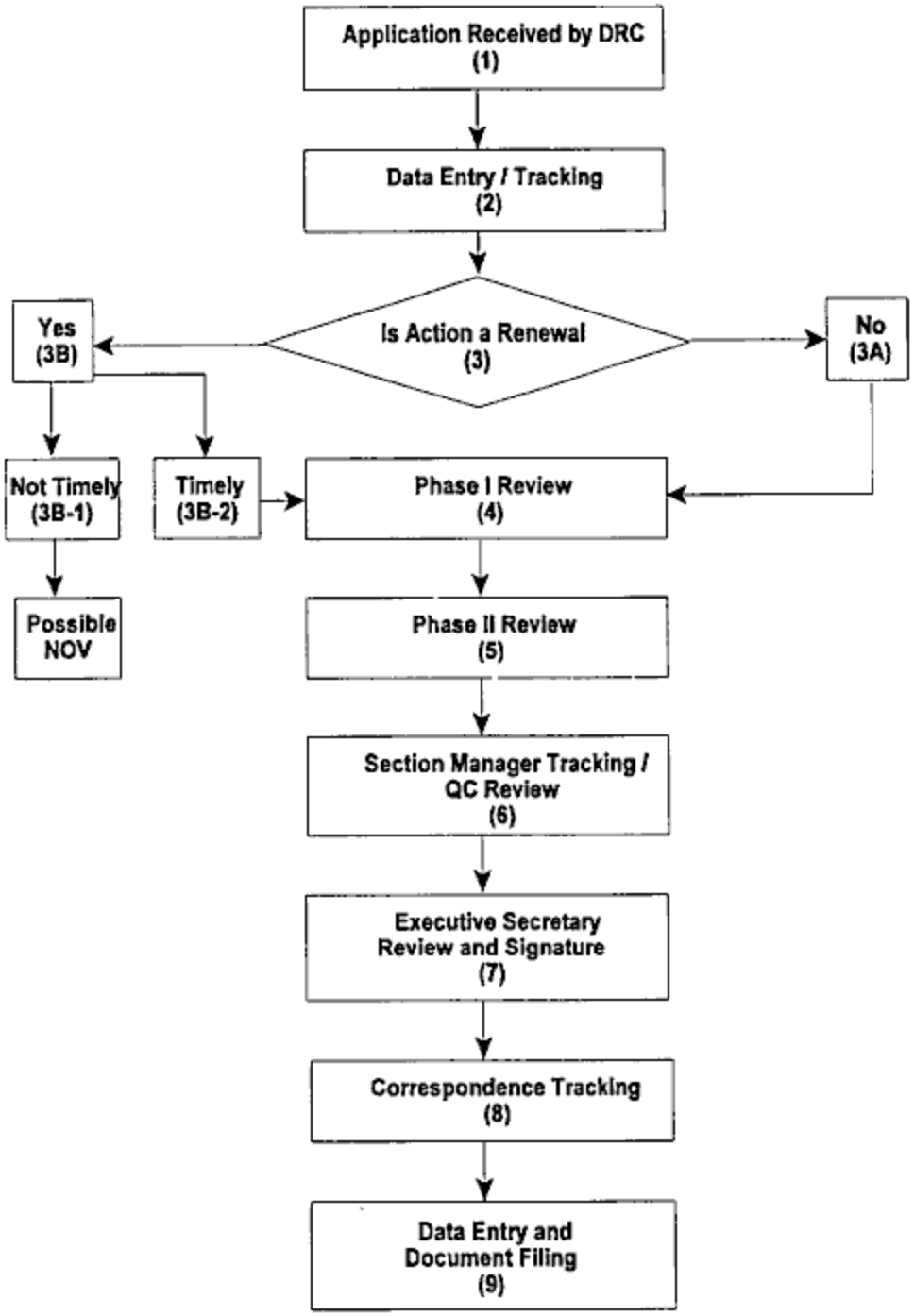
- o Watch out for General Licensed material used by specific licensees, e.g. instrument calibration sources.

- o On transfer of RAM to out-of-state licensees, don't hesitate to call NRC or State Radiation Control Program to verify recipient is properly licensed and to request verification that RAM was received.

- Be thorough and skeptical - it's your last chance to deal with the applicant as a licensee.

- Finally - are out cards removed from main file drawers and are files placed in proper storage boxes?

Exhibit A


Application Received by DRC
(1)
Data Entry / Tracking
(2)
Is Action a Renewal
(3)
Yes
(3B)
No
(3A)
Not Timely
(3B-1)
Timely
(3B-2)
Phase I Review
(4)
Possible
NOV
Phase II Review
(5)
Section Manager Tracking /
QC Review
(6)
Executive Secretary
Review and Signature
(7)
Correspondence Tracking
(8)
Data Entry and
Document Filing
(9)

UTAH DEPARTMENT OF HEALTH
BUREAU OF RADIATION CONTROL

EXPIRED LICENSE POLICY & PROCEDURE

The following steps are taken regarding expiring licenses:

I. Approximately 2 months in advance a list of expiring licenses are developed using the dataease program. Standard letter glossary 314-number 1 (copy attached), is sent along with the appropriate regulatory guide and license application form.

II. NRC Procedure 83895 Section 02.03(a) and (b) and Bureau guidance information numbers 1 through 3 are followed when licenses expire.

III. Licensees who do not timely file a renewal application are sent a Notice of Violation using standard glossary 314-number 9 (copy attached), with the appropriate additional statements inserted as necessary. NRC Procedure 83895 Section 02.03(c) and Bureau guidance information number 4 and 5 are followed.

IV. The issuance of a new license number when the original license has expired will be reviewed on a case-by-case basis.

UTAH DEPARTMENT OF HEALTH
BUREAU OF RADIATION CONTROL

EXPIRED LICENSE GUIDANCE INFORMATION

The following will be effective in the event a license expires.

1. The licensee never acquired licensed material.

   Request a written statement that material was never acquired and that final termination of the license is requested.

2. The licensee already disposed of the licensed material.

   Request written documentation as to the appropriate disposition of the licensed material, a statement as to the retention of all required records, and a formal request to terminate the license.

3. The licensee currently possesses licensed material and does not plan to renew the license.

   a. Issue a Notice of Violation for possession of radioactive material without a valid radioactive material license. Inform the licensee to dispose of the material to an authorized recipient.

   b. Request written documentation as to the appropriate disposition of the licensed material, a statement as to the retention of all required records, and a formal request to terminate the license.

4. The licensee currently possesses licensed material and plans to renew the license.

   Issue a Notice of Violation for possession of radioactive material without a valid license. Instruct the licensee to store the material and submit an application to renew the license. If adequate storage facilities are not available instruct the licensee to transfer the material to an authorized recipient until the renewed license is issued.

5. The licensee currently possesses licensed material and has submitted an application to renew the license.

   Issue a Notice of Violation for possession of radioactive material without a valid license. Instruct the licensee to store the material. If adequate storage facilities are not available instruct the licensee to transfer the material to an authorized recipient until the renewed license is issued.

The issuance of a new license number when the original license has expired will be reviewed on a case-by-case basis.

Craig W Jones
Approved

Jan 10, 1990
Date

GLOSSARY 314 CALL NUMBER 1

DATE

ADDRESS

Re: Radioactive Material License No. _____

Dear _____:

Your Utah Radioactive Materials License No. UT _____ will expire on _____. You will need to carefully follow the enclosed guide in addressing all items of the application form to complete your license renewal. You may make reference to previous submissions to the Utah Burerau of Radiation Control by following the guide procedure titled "Renewal of a License".

If you do not wish to renew your license, please submit a letter which describes the disposition of your radioactive material and the provisions that have been made for the retention of all records required by Utah Radiation Control Rules and your current license.

Please note: R447-22-37(2) provides that if your application for renewal is received in our office 30 days prior to the expiration of your present license, extension of the expiration date is automatic. Your renewal application fee (R447-70-7) of $_____, must accompany the application.

This notice of your license expiration is sent for your convenience. The responsibility for submission of a properly completed application to assure timely license renewal remains with the licensee, further notices may not be forthcoming.

Sincerely,

_____
Bureau of Radiation Control

Enclosure

GLOSSARY 0314 CALL NUMBER 9

DATE

CERTIFIED MAIL
RETURN RECEIPT REQUIRED

LICENSEE ADDRESS

Dear _____:

This refers to the activities authorized by Radioactive Material License No. _____.

Based on the review of your radioactive material license, it appears that certain of your activities were not conducted in full compliance with Bureau requirements. The violations which occurred are described in the enclosed Notice.

Sincerely,

Larry F. Anderson, Director
Bureau of Radiation Control

Attachment

BUREAU OF RADIATION CONTROL
NOTICE OF VIOLATION

LICENSEE
ADDRESS

License No. _____

During a review of your radioactive material license on _____, a violation was identified. In accordance with Utah Radiation Control Rules, R447-14, "Violations and Escalated Enforcement," the particular violation is set forth below:

R447-22-37(2) of the Utah Radiation Control Rules states:

> "In any case in which a licensee, not less than thirty days prior to expiration of the existing license, has filed an application in proper form for renewal or for a new license authorizing the same activities, such existing license shall not expire until the application has been finally determined by the Bureau."
>
> Contrary to this, radioactive material license number UT _____ issued to _____, expired on _____.

To resolve this issue you must do the following:

1. Store all radioactive material.

   If adequate storage facilities are not available, then the material should be transferred to an authorized recipient until a new license has been issued.

2. Submit a letter within 30 days to the Bureau stating the following:

   a. Make the following commitments in writing.

      (1) To store or transfer the radioactive material you now possess.

      (2) State that you will not use any of the stored radioactive material until a new license has been issued.

R447-18-11(1)(d) requires that you post a copy of this Notice in a conspicuous place. Should you have any questions concerning this Notice please contact us at 538-6734.

Sincerely,

Larry F. Anderson, Director
Bureau of Radiation Control

Dated at Salt Lake City, Utah
this _____th day of _____, 19____.

y
!The following statement shall be added to Standard Notice of Violation glossary 314 call number 9 if the application has not been signed by the appropriate individual.!

Paragraph R447-22-37(2) states, "In any case in which a licensee not less than thirty days prior to expiration of the existing license has filed an application in proper form for renewal or for a new license authorizing the same activities, such existing license shall not expire until the application has been finally determined by the Bureau."

Contrary to this rule, an application for renewal of license number _____ was received by the Bureau of Radiation Control on _____ without the appropriate required signature on the application.

z
!The following statement shall be added to Standard Notice of Violation glossary 314 call number 9 if the application is not accompanied by the appropriate fee.!

Paragraph R447-70-5(1) of the Bureau of Radiation Control Rules states, "Each application for machine registration or radioactive material licensing for which a fee is prescribed, shall be accompanied by a remittance in the full amount of the fee. No application will be accepted for filing or process prior to payment of the full amount specified."

Contrary to this rule, an application for renewal of license number _____ was received by the Bureau of Radiation Control on _____ without the required f accompanying the application.

Revision 2
December 1977

U.S. NUCLEAR REGULATORY COMMISSION

REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 3.11

DESIGN, CONSTRUCTION, AND INSPECTION OF EMBANKMENT RETENTION SYSTEMS FOR URANIUM MILLS

A. INTRODUCTION

Each licensee who processes or refines uranium ores in a milling operation is required by §20.1 of 10 CFR Part 20, "Standards for Protection Against Radiation," to make every reasonable effort to maintain radiation exposures and releases of radioactive materials in effluents to unrestricted areas as low as is reasonably achievable, taking into account the state of technology and the economics of improvements in relation to benefits to the public health and safety. In addition, 40 CFR Part 190, "Environmental Radiation Standards for Nuclear Power Operations," requires that the maximum annual radiation dose to individual members of the public resulting from fuel cycle operations be limited to 25 millirems to the whole body and to all organs except the thyroid, which must be limited to 75 millirems. Liquid and solid wastes (tailings) generated in the uranium milling operation contain radioactive materials in excess of the discharge limits and are generally confined by an embankment retention system.

This guide describes some engineering practices and methods generally considered satisfactory for the design, construction, and inspection of earth and rockfill embankments used for retaining uranium mill tailings. They result from review and action on a number of specific cases and reflect the latest general approaches to the problem that are acceptable to the NRC staff. If new information that may be developed in the future results in alternative methods, such methods will be reviewed by the staff to determine their acceptability. Guidance on operation and abandonment of the retention system is presented in separate guides.

B. DISCUSSION

The milling of uranium ores results in the production of large volumes of liquid and solid wastes (tailings). These tailings are usually stored behind man-made retaining structures, following the practice of the non-uranium mining industry. The design and construction of tailing retention structures have in the past been based largely on mining experience, with little use of design concepts. These empirical approaches resulted in various mining dam mishaps and failures (Refs. 1 and 2). The failure of Buffalo Creek Dam in West Virginia even resulted in the U.S. Congress quickly passing a national dam safety law affecting all water-impounding structures in excess of either 25 feet in height or 50 acre-feet in impoundment capacity (Ref. 3).

Uranium mill tailings, unlike most non-uranium mine tailings, contain concentrations of radioactive materials in excess of the allowable discharge limits (Ref. 4). Furthermore, the most significant radioactive element in the tailings is radium-226, which has a half-life of about 1600 years (Ref. 5). Therefore, it is necessary to confine those tailings to prevent or control their release to the environment not only during the operating life of the mill, but also for genera-

* Lines indicate substantive changes from previous issue.

tions after milling operation has ceased. The embankment, foundation, and abutments need to be stable under all conditions to prevent the uncontrolled release of the retained water or semifluid tailings. Seepage from the tailing pond, which contains dissolved radium and other toxic substances (Ref. 5), needs to be controlled under normal and severe operating conditions to prevent the possibility of unacceptable contamination of the groundwater or nearby streams. Wind and water erosion of the tailings needs to be prevented during and after the milling operation.

Obviously, factors pertaining to safety, contamination, and environmental damage determine the basic requirements in planning and constructing retention systems. To achieve the basic requirements, the design must be based on a thorough understanding of both the geotechnical problems involved and the requirements of the milling operation.

The latest advances in geotechnical engineering, together with engineering experience and knowledge available in the field of water storage dams, can be used in the design and construction of retention dams. The basic concepts of conventional water storage dams can be suitably modified to produce economical designs that will ensure the stability of the retention system and minimal contamination.

1. GENERAL PLANNING AND DESIGN CONSIDERATIONS

Because the prime functions of the retention system are to store radioactive solids and to provide temporary storage of contaminated water for clarification and evaporation, it is important that the system be designed and constructed to remain stable for its intended life. It must provide the required storage at any given time, and it must provide sufficient control of seepage to prevent unacceptable contamination of adjacent land, waterways, and groundwaters. It must also provide effective means to prevent wind and water erosion.

Stage construction with the freeboard maintained sufficiently above the storage level may be considered. The use of coarse tailings as embankment fill materials is not desirable because the tailings contain radioactive materials that may cause unacceptable environmental impacts.

Detailed site conditions, including climate, hydrology, geology, and seismology, need to be assessed and their impact evaluated. Detailed knowledge is needed of such physical and mechanical properties of foundation and embankment materials as classification, shear strength, consolidation, permeability, sedimentation, compaction, piping and cracking susceptibility, and wind-water erosion characteristics. The chemical qualities of the tailings and slurry must be assessed to determine if a water-collecting system is needed to prevent unacceptable downstream contamination resulting from seepage or surface water runoff.

Subsurface investigations at the site of the retention system and at possible borrow areas need to be adequate to determine the suitability of the foundation and abutments, the requirements of foundation treatment, and the availability and characteristics of embankment materials. The investigations should cover classification, physical and chemical properties, location and extent of soil and rock strata, and variations in groundwater conditions.

The foundation conditions must be determined to assess the adequacy of subsurface materials to support the dam without failure and without excessive total or differential settlement. The permeability of foundation soils and rocks must be ascertained to estimate the amount of seepage, piping potential, and, if necessary, the methods of seepage control. The availability of suitable borrow material for dam construction must be assessed, taking into consideration the construction sequence and schedule.

2. DESIGN ANALYSIS

It is important that design analysis consider stability, settlement, seepage, and hydrologic analyses. Specifically, the design needs to ensure that retention dam failure would not occur. Historical records (Refs. 6–9) indicate that most failures associated with earth or tailing dams are caused by overtopping by flood waters, erosion, piping in either the dam or the foundation, collapse of the dewatering conduit, foundation failure, slope failure, or liquefaction.

2.1 Hydrologic Analyses

There will always be some catchment area contributing runoff into the tailing retention system. This may vary from the area of the system itself to a substantial area incorporating the drainage area of streams entering the valley across which a retention dam is constructed. Substantial runoff volumes and flows can result from heavy precipitation or snowmelt over relatively small catchment areas.

The maximum runoff used in the design is usually called the Spillway Design Flood (SDF), representing the largest flood that need be analyzed, regardless of whether or not a spillway is provided. The magnitude of the SDF (flood volume, peak flow, etc.) as adopted in the United States for the past 30 years is equal to that of the Probable Maximum Flood[1] at the

[1] The Probable Maximum Flood (PMF) is defined as the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.

site of the dam. Methodology to estimate the Probable Maximum Flood is available in Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants," and other publications (Refs. 10 and 11).

For small retention dams built on isolated streams in areas where failure would neither jeopardize human life nor create damage to property or the environment beyond the sponsor's legal liabilities and financial capabilities, less conservative flood design criteria may be used in the design. However, the selection of the design flood needs to be at least compatible with the guidelines set forth by the Corps of Engineers (Ref. 12).

If decant or other reclaim systems have not been designed specifically to pass the design flood, other measures need to be taken. Those other measures may be one or a combination of the following:

a. Storing the whole volume of flood runoff. Sufficient freeboard should always be available to provide the necessary storage capacity without overtopping the dam.

b. Providing a spillway or diversion channels to convey runoff water safely past the dam.

Because of the toxic nature of the impounded material, a is preferred.

Determination of the freeboard necessary at any time to store flood runoff will require information on pond storage versus elevation, anticipated embankment settlement versus time, and the effective height of wind-generated waves. Procedures for determining the minimum freeboard are presented in Reference 10. It is important that the embankment construction schedule ensure that this required freeboard is always available.

Adequate slope protection is needed to guard the embankment against wind and water erosion, weathering, and ice damage. Methods for protecting slopes include dumped riprap, precast and cast-in-place concrete pavements, bituminous pavement, soil cement, sodding, and planting. The necessary upstream slope protection depends on the expected wind velocity and duration and the size and configuration of the reservoir at the water-surface elevation. The necessary downstream protection depends on the expected erosion of surface runoff and wind erosion. References 10 and 13 provide methods and criteria for the selection and design of slope protections.

2.2 Stability Analysis

Slope failure occurs when an outer portion of an embankment slides downward and outward with respect to the remaining part of the embankment. The slide generally occurs along a fairly well-defined slip surface. Stability analyses involve comparing the shearing stresses along potential failure surfaces with the available shearing resistance along those surfaces. The ratio of the available shear strength to developed maximum sheer stress gives the factor of safety.

2.2.1 Methods of Stability Analysis

2.2.1.1 Static Stability Analysis

There are many methods using the limiting equilibrium approach. Detailed discussion can be found in various publications (Refs. 14–16). These methods may be conveniently grouped into three categories:

a. *Friction Circle Method.* This method considers the entire sliding block as a rigid free body and makes assumptions regarding the distribution of normal stresses along the failure surface. This method can only be used to evaluate failure surfaces that are circles or single straight lines. The logarithmic spiral method is a different version of this method.

b. *Method of Slices.* This method divides the free body into many vertical slices, and the equilibrium of each slice is considered. The best known and most widely used versions of this method are the Swedish Circle Method, Modified Swedish Method, Simplified Bishop Method, and Morgenstern-Price Method.

c. *Wedge Method.* This method is used whenever the failure surface can be satisfactorily approximated by a series of straight lines—usually two or three lines.

The method of slices offers the best approach for obtaining a reasonably accurate solution for any shape of failure surface (Refs. 17 and 18). While the friction circle method can provide solutions in homogeneous soil, it is difficult to apply these approaches with confidence when the soil is stratified or zoned. The wedge method can provide reasonable solutions for situations where the failure surfaces are composed of straight lines.

Computer solutions to the method of slices have been developed (Ref. 18). By using computers, many more assumed conditions and failure surfaces can be tried. The effects of possible variations in material properties can also be evaluated. The computed results need to be checked with respect to their reasonableness and compatibility with the design procedures and criteria.

2.2.1.2 Seismic Stability Analysis

In areas where embankments are subjected to seismic disturbances, analyses should be made of the seismic effects on the dams. Seismic vibrations can cause liquefaction of saturated or nearly saturated loose sands and sensitive silts (Ref. 1). The dynamic shearing stresses induced during the seismic events can cause excessive deformation or distortion of the embankment—even shear failure (Refs. 19 and 20).

Seismic stability analyses of embankment dams are conventionally made using pseudostatic methods (Ref. 21). In this approach, the stability of a potential sliding mass is determined as for static loading conditions, and the effects of an earthquake are taken into account in the computation by including an equivalent horizontal force acting on the potential sliding mass. The horizontal force representing earthquake effects is expressed as the product of the weight of the sliding mass and a seismic coefficient. The value of the seismic coefficient is normally selected on the basis of the seismicity of the region in which the dam is to be constructed.

During earthquakes, large cyclic inertia forces are induced in embankments. In certain zones of an embankment, the inertia forces may be sufficiently large and may occur a sufficient number of times to cause permanent displacements. Procedures for estimating the magnitude of these displacements have been proposed by Newmark (Ref. 22) and by Goodman and Seed (Ref. 19). Both of these procedures presume a knowledge of the time-history of the inertia forces acting on an embankment during the earthquake. These approaches are more involved than the conventional methods and have been used successfully to predict the surface displacements of embankments of dry cohesionless soils. However, for soils in which pore pressure changes as a result of the shear strains induced by the earthquake, determination of appropriate values of the yield acceleration becomes difficult.

In dealing with saturated cohesionless soils, the dynamic analysis procedures developed by Seed (Ref. 23) provide a basis for assessing the stability and deformation of the embankment during earthquakes. This type of analysis may be used to predict the development of the liquefaction zone and the anticipated movements, deformation, and stability of the embankment and its foundation. However, good engineering judgment based on adequate data must be exercised in the selection of soil characteristics for use in the analyses, in the detailed steps followed to conduct the analyses, and in the evaluation of the results obtained.

A detailed discussion and applicable guidelines for seismic analysis and design of tailing dams can be found in Reference 24.

2.2.1.3 Liquefaction Potential Evaluation

It is important that the possibility of liquefaction of foundation soils be evaluated by means of "state-of-the-art" procedures involving seismological and geological investigations. The objective of such evaluations is to establish earthquake design parameters for use in the analyses and the dynamic testing of materials. Procedures currently used for evaluating liquefaction potential are based on either comparing the past experience with similar soil deposits supplemented by laboratory tests or using detailed ground response analyses combined with dynamic laboratory testing. Past experience provides the most useful guidance on the probable performance of similar soil deposits, while the ground response method provides a means for considering the effects of the amplitude and time history of the earthquake ground motions, the in-situ soil characteristics, the overburden pressure, and the groundwater conditions.

2.2.2 Loading Conditions and Factor of Safety

A tailing dam and its foundation are subjected to shear stresses imposed by the weight of the dam and by the filling of the pool, seepage, or earthquake forces. The cases for which stability analyses are necessary are

a. *End of construction*. Analyses of the upstream and downstream slopes are needed for the end of construction conditions if the embankment and its foundation are composed partially or entirely of impervious soils. The unconsolidated undrained (UU) shear strength should be used in the analyses for slow-draining soils, while consolidated drained (CD) shear strength should be used for free-draining soils where excess pore pressures would not develop.

b. *Partial pool with steady seepage*. Analyses of the upstream slope are needed for several intermediate pool stages with corresponding steady seepage conditions. The analyses account for reduction in effective normal stresses where pore water pressures that developed during construction or filling are not dissipated before the subsequent partial pool condition. The lower strength from either the consolidated undrained (CU) shear test or consolidated drained (CD) shear test is used in the analyses. The minimum factor of safety should be determined as a function of pool elevations.

c. *Maximum storage pool with steady seepage*. This condition may develop and may be critical to downstream slope stability. A flow net would be helpful in determining the phreatic line and seepage forces. Shear strength selection should be the same as for the partial pool with steady seepage condition.

d. *Earthquake*. In areas subjected to seismic shocks, appropriate earthquake forces need to be added onto the previous loading conditions in the stability analyses.

The use of a factor of safety in stability analyses should allow sufficient margin for variations between the parameters used in design and those existing in the field and consideration of the limits of strains. Many soils undergo relatively large plastic strains as the applied shear stresses approach the shear strength of the soil.

The consequence of a failure, the tolerable limits of strains, and the degree of confidence in engineer-

ing parameters used in the analyses all need to be considered in choosing the factor of safety. The minimum factor of safety suggested in the regulatory position of this guide presumes that the stability analysis has been sufficient to locate the critical failure surface and that parameters used in the analysis are known, with reasonable certainty, to be representative of actual conditions of the dam and its foundation. Otherwise, higher factors of safety would be required.

2.2.3 Settlement Analyses

If the foundations beneath an embankment consist of layers of compressible soils or weathered rock or if the bedrock profile is very irregular, differential settlements could result from uneven loading or variable thicknesses in the compressible site conditions. These differential settlements may cause longitudinal or transverse cracks in the dam that could lead to subsurface erosion and dam failure by piping.

The magnitude of the anticipated settlement can be estimated from the results of laboratory consolidation tests on samples recovered from the compressible foundation strata and remolded embankment materials. The rate of settlement can also be estimated. However, the potential error in estimating the time for settlement to occur is appreciable, since settlement is influenced by soil drainage that is controlled by minute geological details that may not be detected during the foundation investigation. All predictions on the rate and magnitude of settlement and the change in pore water pressures need to be checked by field instrumentation. Predictions based on laboratory data can be modified by actual measurements to provide reasonably accurate long-term estimates.

If compressible soils are thick, it may be necessary to design the dam to absorb the anticipated differential settlements. If considerable total settlement is expected, the dam must be built higher to allow for the settlement.

2.2.4 Seepage Analyses

Seepage analyses evaluate the effects of seepage on the stability of the tailing dams and the rate of seepage through and beneath the dam and basin area. It is important that seepage pressures be controlled so that quick conditions and piping do not develop. Special design features such as impervious cores, cutoffs, impervious liners, a secondary collection system, etc., are needed to maintain the quality and quantity of seepage from the retention system within tolerable limits of water supply and pollution control requirements.

Seepage analyses—usually based on the steady flow of an incompressible fluid through a porous medium—may use the graphical method of plotting flow nets, electric analogs, model studies, or mathematical solutions by digital computer using either finite-element or finite-difference methods. The graphical method of plotting flow nets is economically and easily performed, and it gives sufficiently accurate results for many seepage problems.

3. CONSTRUCTION METHODS

Construction methods for mill tailing dams are closely related to the planning and operation of the mill. Where a tailing embankment is constructed in a single stage of natural borrow materials or overburden and waste rock, conventional procedures for earth and rock-fill dams can be used.

Where a tailing dam is constructed in stages, one of the following three methods is used: (a) upstream method, (b) downstream method, or (c) centerline method.

The upstream construction method is the oldest used by the mining industry and is a naturally developed procedure for disposing of the tailing as economically as possible. An initial starter dike is constructed at the downstream toe of the ultimate dam with borrow materials. The crest of the dam is raised by placing fill materials in successive dikes located on the upstream side of the initial starter dike. The centerline of the embankment crest is shifted toward the upstream pond area as the height of the dam increases. The downstream toe of each subsequent dike is supported on the top of the previous dike, with the upstream portion of the dike placed over finer tailings (slimes) within the impoundment. These slimes, placed hydraulically, have a relatively low shear strength and remain in a loose and saturated state for many years after deposition (Ref. 25). As the height of the dam increases, the potential failure is located at an increasingly greater distance from the downstream face and through the slimes. As a result, the outside shell contributes less to stability as the height increases. The retained slimes are sufficiently loose and saturated that they could be liquefied to cause the failure of the dam if subjected to seismic shock or blasting.

With the downstream construction method, an initial starter dike is constructed at the upstream toe of the ultimate dam. The crest of the dam is raised by placing fill materials in successive dikes located on the downstream side of the starter dike. The centerline of the dam crest is shifted downstream as the dam is raised. Each subsequent stage of dike construction is supported on the top of the downstream slope of the previous section. All of the embankment section lies ouside the boundaries of the sediment tailings. Materials incorporated in subsequent stages of the embankments may consist of the coarse mine waste or borrow materials from nearby pits. Downstream construction permits controlled placement and compaction to achieve higher shear strength. It also permits the incorporation of drainage facilities to control the piezometric pressures within

the embankment. Thus the dam can be designed and subsequently constructed to whatever degree of competency may be required, including resistance to seismic and blasting shocks.

The centerline method is intermediate between the previous two construction methods. The crest of the embankment is maintained in approximately the same horizontal position as the embankment is raised to its final height. The dam is raised by spreading and compacting successive layers of materials on the crest, on the upstream shoulder, and on the downstream slope. The centerline method permits the downstream half of the tailing dam to be designed and constructed to conventionally acceptable engineering standards; however, certain portions of upstream slopes rest over the slimes and are therefore vulnerable to slope failure and seismic liquefaction.

These three construction methods lead to substantially different embankment cross sections and produce different embankment material characteristics. Consequently, the embankment stability conditions are affected. In the upstream and centerline methods of construction, the stability of the ultimate dam is dependent, to a large degree, on the shear strength characteristics of tailings deposited upstream of the dam. The shear strength is governed by the gradation and density of the solids, the consistency of the slurry, and the distribution of the pore water pressures within the deposit. When initially deposited, the tailings have very low shear strength. The strength theoretically increases with time as drainage and consolidation take place under the weight of overlying materials. However, because of the very fine gradation of the tailings and the random nature of deposition, large variations in permeability and pore water pressure exist within the tailings, and the strength may not increase adequately to ensure the stability of the final slope (Ref. 26).

Downstream construction is the only method wherein all embankment sections lie outside the tailing boundaries, thereby permitting controlled placement and compaction of fill and incorporation of drainage facilities. Thus, for a given height and a given downstream fill slope, a tailing dam constructed using the downstream method will have a higher factor of safety than a tailing dam constructed by either the upstream method or the centerline method.

Because the most important purpose of the tailing dam structure is to contain the radioactive waste materials and the performance of hydraulically constructed dams and tailing dams has been unsatisfactory (Refs. 6, 8, and 27), the downstream method appears to be the best of the stage construction methods to ensure the safety function of the tailing dams, especially in seismically active areas.

4. INSPECTION AND MAINTENANCE

Different conditions can develop throughout the whole active life of the retention system and could include unanticipated seepage conditions and changes in material characteristics. Such changes can drastically change the conditions governing the stability of a dam from those provided for in the original design. Therefore, a continuous program of inspection of the retention system is needed, beginning with the start of construction, through the tailing disposal, and continuing after abandonment of the completed system.

The main objectives of such a program are to ascertain:

a. Whether the dam and its foundation are behaving as anticipated in the design, whether there are any unusual movements, settlements, cracks, erosions, sloughs, or leakages, and whether the waste and borrow materials being placed in the dam have the characteristics assumed in the design;

b. Whether the tailing pond levels are rising as anticipated and whether the rate of dam construction is sufficiently rapid to keep the crest above rising pond; and

c. Whether embankment drainage is adequate, whether the capacity of diversion channels is adequate to pass experienced and anticipated runoffs, whether embankment soil is becoming saturated by seepage, whether piping or subsurface erosion is occurring in the tailing dam, and whether there is any unusual release of radioactive materials.

It is necessary that inspection be performed on a regular basis and that it include visual inspection of the abutments. A checklist similar to that used in water retention dams may be used to help the inspector in performing such a visual inspection.

Instrumentation needs to be installed to monitor dam and basin performances at regularly scheduled intervals. Instruments commonly used include piezometers to measure hydrostatic and pore pressure levels; weirs or flumes to measure seepage flows; wells to permit monitoring of water quality; and slope indicators, inclinometers, and settlement points to measure horizontal and vertical movements. The instrumentation should be simple, robust, rugged, reliable, and easy to read, repair, and maintain. It is important that recorded data from instrumentation and inspections be evaluated by competent personnel with delegated authority to take prompt action if remedial treatment is needed to maintain the safe operation of the retention system.

C. REGULATORY POSITION

The following criteria reflect the latest general approaches approved by NRC.[1] Information related to the investigation, engineering design, proposed construction, instrumentation, and performance of the retention system should be presented in accordance with the applicable portion of Section 2.5.6 of Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants." If an applicant wishes to use new information that may be developed in the future or to use an alternative method, NRC will review the proposal and will approve its use, if it is found acceptable.

1. BASIC DESIGN CRITERIA

a. Stability of the retention system, including the tailing dam, foundation, and abutments, should be ensured under all conditions of construction and operation.

b. The magnitude of total and differential settlement should be within tolerable limits that will not result in harmful cracking and dam instability.

c. Seepage through the embankment, foundation, abutments, and basin area should be controlled to prevent excessive uplift pressures, piping, sloughing, and erosion of materials by loss into cracks, joints, and cavities. The quality and quantity of seepage should be limited to the extent that the concentration of radioactive materials and other toxic materials at the site boundary is within the limits specified in applicable Federal and State regulations.

d. Freeboard should be sufficient at all times to prevent overtopping by wind-generated waves and should include an allowance for settlement of the foundation and dam. Adequate slope protection should be provided for the embankment against wind and water erosion, weathering, and ice damage.

e. Either the surcharge capacity of the retention system should be sufficient to store runoffs over its service life or there should be an emergency discharge capacity capable of passing the probable maximum flood. The emergency discharge capacity may be obtained by constructing a spillway or by other means. The surcharge capacity should be adequate to store a probable maximum flood series[3] preceded or followed by a 100-year flood, assuming a pool elevation equivalent to the average annual runoff.

2. METHODS OF ANALYSIS

a. The probable maximum flood should be determined in accordance with applicable portions of Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants."

b. The static stability of the embankment should be analyzed using commonly accepted detailed stability methods. Appropriate static soil and rock properties established on tested representative samples over anticipated in-situ and placement conditions should be used in the analyses. Results of a manual check on computer stability analysis results should be presented to illustrate adopted design procedures and criteria.

c. Conventional pseudostatic analysis may be considered acceptable if the seismic coefficient appropriately reflects the geologic and seismologic conditions of the site and if the materials are not subject to significant loss of strength under dynamic loads. Liquefaction potential and the dynamic stability of the tailing dam and foundation should be assessed using appropriate state-of-the-art methods. The extent of the required dynamic analyses will be determined in accordance with Reference 24. Appropriate dynamic material properties established on representative materials through adequate field and laboratory testing should be used in the analyses.

d. The loading conditions to be evaluated in dam stability analyses and corresponding minimum factors of safety are:

Loading Condition	Minimum Factor of Safety	Shear Strength
End of construction	1.3	UU and CD
Partial pool with steady seepage	1.5	CU or CD
Maximum pool with steady seepage	1.5	CU or CD
Earthquake (in combination with the above conditions)	1.0[4]	

e. The rate and magnitude of settlement should be estimated on the basis of appropriate laboratory test results.

f. Seepage analyses may be based on a graphical method, model studies, or mathematical solutions using appropriate soil and rock parameters.

[1] The Nuclear Regulatory Commission announced in the *Federal Register* of June 3, 1976, (41 FR 22431) its intent to prepare a generic environmental impact statement (GEIS) on uranium milling operations. Management practices for uranium mill tailings may be subject to revision in accordance with the conclusions of that statement and any related rule making.

[3] Probable maximum flood series as used herein comprises two floods: the Probable Maximum Flood and the flood equivalent to about 40% of the PMF and about 3 to 5 days prior to the occurrence of the main flood.

[4] Factor of safety is for pseudostatic stability analysis. In addition, liquefaction and excessive deformation should be assessed.

[5] Use shear strength for case analyzed without earthquake.

3. CONSTRUCTION METHODS

a. Conventional acceptable engineering practices of construction control for water retention dams (e.g., controls on foundation preparation, suitability of materials, proper placement, field moisture, and density) should be used for mill tailing dams. Where a tailing dam is raised in stages, the downstream construction method is preferred. Provision should be made to limit the concentration of radioactive and other toxic materials released from seepage and wind-water erosion to within the limits specified in 10 CFR Part 20, 40 CFR Part 190, and applicable State regulations.

b. The upstream and centerline construction methods will be acceptable only if extensive explorations and testing reveal the extent and characteristics of deposited tailings to have adequate strength under static and dynamic loading conditions for the stability and support of the added materials.

4. INSPECTION AND MAINTENANCE

a. A detailed systematic inspection and maintenance program should be established to detect and repair damage that might tend to lessen the integrity of the retention system. Generally, visual inspections performed on a regular basis and supplemented by adequate instrumentation are acceptable. The safety inspection guidelines (Ref. 12) for earth dams set forth by the Corps of Engineers in response to the National Dam Safety Act should be used to develop a detailed checklist for performing field inspections. In addition, radiometric and water quality surveys should be included in the program.

b. Instrumentation should be installed in the dam or its foundation to monitor changes that might be critical to dam stability or seepage conditions. Generally, instruments should be installed to measure piezometric levels, seepage flows, water quality, and embankment movements. The extent to which such instrumentation should be installed will be evaluated on a case-by-case basis.

c. Results of inspection and instrumentation programs should be evaluated by competent and experienced engineers who have delegated authority to take prompt effective actions when necessary. Inspection and evaluation reports should be kept at the site and be available for staff review.

d. The inspection and maintenance program should start at the beginning of construction and continue at least through the operation.

REFERENCES

1. R. Dobrey and L. Alvarez, "Seismic Failures of Chilean Tailings Dams," ASCE Journal of the Soil Mechanics and Foundations Div., Nov. 1967.

2. W. A. Wahler and D. P. Schlick, "Mine Refuse Impoundments in the U.S.," Proceedings of the International Congress on Large Dams, Mexico City, 1976.

3. National Dam Safety Act, Public Law 92-367, Aug. 8, 1972.

4. S. R. Borrowman and P. T. Brooks, "Radium Removal from Uranium Ores and Mill Tailings," U.S. Bureau of Mines, U.S. Dept. of Interior, 1975.

5. "Use of Uranium Mill Tailings for Construction Purposes," Hearings before the Subcommittee on Raw Materials of the Joint Committee on Atomic Energy of the U.S. Congress, Oct. 28 and 29, 1971.

6. E. S. Smith, "Tailing Disposal—Failures and Lessons," Proceedings of the First International Tailing Symposium, Tucson, Arizona, Nov. 1972.

7. E. Gruner, "Classification of Risk," Proceedings of the International Congress on Large Dams, Madrid, 1973, Vol. 1.

8. A. O. Babb and T. W. Mermel, "Catalog of Dam Disasters, Failures and Accidents," Bureau of Reclamation, U.S. Dept. of Interior, 1968.

9. A. Casagrande, "Notes on Design of Earth Dams," Contributions to Soil Mechanics, Boston Society of Civil Engineers, 1950.

10. "Design of Small Dams," Bureau of Reclamation, U.S. Dept. of the Interior, 1973.

11. "Engineering and Design—Standard Project Flood Determinations," Corps of Engineers, EM 1110-2-1411, U.S. Army Corps of Engineers, 1965.

12. "Recommended Guidelines for Safety Inspection of Dams," U.S. Army Corps of Engineers, Dept. of the Army, 1976.

13. "Earth and Rock-Fill Dams—General Design and Construction Considerations," EM 1110-2-2300, U.S. Army Corps of Engineers, 1971.

14. J. L. Sherard et al., "Earth and Earth-Rock Dams," John Wiley & Sons, Inc., New York, 1963.

15. T. W. Lambe and R. V. Whitman, "Soil Mechanics," John Wiley & Sons, Inc., New York, 1969.

16. "Engineering and Design Stability of Earth and Rock-Fill Dams," EM 1110-2-1902, U.S. Army Corps of Engineers, 1970.

17. J. Lowe, III, "Stability Analysis of Embankments," ASCE Journal of the Soil Mechanics and Foundations Div., July 1967.

18. R. V. Whitman and W. A. Bailey, "Use of Computers for Slope Stability Analysis," ASCE Journal of the Soil Mechanics and Foundations Div., July 1967.

19. R. E. Goodman and H. B. Seed, "Earthquake Induced Displacement in Sand Embankments," ASCE Journal of the Soil Mechanics and Foundations Div., March 1965.

20. H. B. Seed et al., "The Slides in the San Fernando Dam During the Earthquake of February 9, 1971," ASCE Journal of the Geotechnical Engineering Div., July 1975.

21. H. B. Seed, "Slope Stability During Earthquakes," ASCE Journal of the Soil Mechanics and Foundations Div., July 1967.

22. N. M. Newmark, "Effects of Earthquakes on Dams and Embankments," Geotechnique, June 1965.

23. H. B. Seed et al., "Dynamic Analysis of the Slide in the Lower San Fernando Dam During the Earthquake of February 9, 1971," ASCE Journal of the Geotechnical Engineering Div., Sept. 1975.

24. "Earthquake Design and Analysis for Corps of Engineer Dams," ER 1110-2-1806, U.S. Army Corps of Engineers, April 1977.

25. "Summary Report Phase I Study of Inactive Mill Sites and Tailing Piles," Unnumbered ERDA/EPA Report, Oct. 1974.

26. "Monticello Mill Tailings Erosion Control Project, Monticello, Utah, Supplemental Report," USAEC, April 1966.

27. "Lessons from Dam Incidents, USA," ASCE/USCOLD Report, 1973.

BIBLIOGRAPHY

C. D. Kealy and R. L. Soderberg, "Design of Dams for Mill Tailings," U.S. Bureau of Mines Inf. Circ. 8410, 1969.

"Engineering and Design Manual—Coal Refuse Disposal Facilities," U.S. Dept. of Interior, MESA. Prepared by D'Appolonia Consulting Engineers, Inc.

"Tentative Design Guide for Mine Waste Embankments in Canada," Dept. of Energy, Mines and Resources, March 1972.

"Management of Wastes from the Mining and Milling of Uranium and Thorium Ores," IAEA, 1976.

DATED: MAY 7, 1998 SIGNED BY: PAUL H. LOHAUS

ALL AGREEMENT STATES
OHIO, OKLAHOMA, PENNSYLVANIA

TRANSMITTAL OF STATE AGREEMENTS PROGRAM INFORMATION (SP-98-040)

Your attention is invited to the enclosed correspondence which contains:

INCIDENT AND EVENT INFORMATION..... XX *GUIDANCE FOR REPORTING MATERIAL EVENTS*

PROGRAM MANAGEMENT INFORMATION....

TRAINING COURSE INFORMATION.....

TECHNICAL INFORMATION.....

OTHER INFORMATION.....

Supplementary information: Enclosed is Office of State Programs (OSP) Procedure SA-300, Reporting Material Events, and it's Appendix, a revised "Handbook on Nuclear Material Reporting in the Agreement States." The "Handbook" is a final version of the handbook previously provided to you for use and comment by OSP in March 1995 (SP-95-036). The procedure and handbook provide guidance for Agreement State reporting of material events to the NRC. SA-300 and the "Handbook" contain procedures for providing NRC:

(1) Initial notification of the occurrence of a significant or routine event involving nuclear material (Section 1.0, of the "Handbook," pp.1-3).

(2) Pertinent follow-up information (results of any evaluations or investigations, dose assessments, leak tests, equipment assessments, inspection reports, corrective actions, etc.); and any additional information on technical or regulatory action through resolution and close out of the event (Sections 1.3 and 1.4, pp. 4-6).

(3) Guidance on electronic reporting of event information to the "Nuclear Materials Events Database" (NMED) and on written (hard copy) reporting through submission of Agreement State licensee event reports to the Director, OSP (Sections 1.3 and 1.4, pp. 4-6).

Guidance covering recent revisions to Title 18 of the Criminal Code, that expands the role of the Federal Bureau of Investigations (FBI) in the criminal use of radioactive material, and guidance on Agreement State notification to the FBI regarding specific categories of material events is contained in All Agreement States Letter SP-98-038. An Errata Sheet is also enclosed which adds the FBI guidance to the Reference Manual Section of the "Handbook."

For purposes of compatibility, the reporting of incidents and events involving the use of nuclear material by an Agreement State to NRC is now mandatory under the Policy Statement on Adequacy and Compatibility of Agreement State Programs approved by the Commission on June 30, 1997. The quality, thoroughness, and timeliness of material event reporting by the

Agreement States to NRC, including Agreement State event information contained in NMED, will be reviewed during the annual meetings with Agreement States between the Integrated Materials Performance Evaluation Program (IMPEP) reviews, and will be evaluated during IMPEP reviews under the Common Performance Indicator, Response to Incidents and Allegations. We hope the enclosed procedure and handbook will be of assistance to you and your staff in the reporting of event information and will help in maintaining a national database of NRC and Agreement State information.

Information requested in the Handbook has been approved by OMB 3130-0178, expiration date June 30, 2000. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

If you have any questions regarding this correspondence, please contact me or the individual named below.

POINT OF CONTACT: Patricia M. Larkins
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Paul H. Lohaus, Deputy Director
Office of State Programs

Enclosures:
As stated

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Paul H. Lohaus, Deputy Director
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Appendix
to
OSP Procedure SA-300, Reporting Material Events

Handbook on Nuclear Material Event Reporting in the Agreement States

OSP Procedure Approval

Issue Date: February 25, 1998

Expiration Date: February 25, 2001

Richard L. Bangart
Director, OSP
Richard L Bangart
Date: February 25, 1998

Paul H. Lohaus
Deputy Director, OSP
Paul H Lohaus
Date: February 24, 1998

Patricia M. Larkins
Procedure Contact, OSP
Patricia M. Larkins
Date: February 20, 1998

NOTE

The OSP Director's Secretary is responsible for the maintenance of this master copy document as part of the OSP Procedure manual. Any changes to the procedure will be the responsibility of the OSP Procedure Contact. Copies of OSP procedures will be distributed for information.

ABSTRACT

The review and evaluation of operational event information identifies safety-significant events and concerns, and their causes. This handbook has been developed to provide information to the staff of the Agreement States that are responsible for the preparation of event reports for incidents and events involving the use of nuclear materials that have occurred in their State. Reporting of Agreement State material events to NRC is mandatory for purposes of compatibility. The handbook describes the procedure to be followed in reporting significant and routine material events to NRC. Guidance is provided on what information should be reported, the level of detail, and where to report. Procedures for identifying and reporting Abnormal Occurrences (AOs) are also included. The objective of the handbook is to:

- Improve technical information
- Standardize format
- Ensure consistency
- Facilitate information retrieval

It has been divided into two sections and one appendix.

Section I - Event Reporting Process, describes the process for reporting significant and routine incidents and events involving the use of nuclear materials that have occurred in the Agreement States. Information is provided on reporting material events to the Nuclear Materials Events Database (NMED).

Section II - Abnormal Occurrence Guidelines and Criteria, describes the process for identifying and reporting material events that reach the level of an abnormal occurrence (AO) that have occurred in the Agreement States.

Appendix - contains a glossary of terms and listing of reference manuals and information.

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SECTION II - Abnormal Occurrence Guidelines and Criteria

APPENDIX

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PREFACE

The regulatory authority and policies governing the Agreement State program are presented below.

Regulatory Authority

Section 274 of the Atomic Energy Act provides a statutory basis under which the Federal government may relinquish portions of its regulatory authority to the States and authorizes and directs NRC to cooperate with the States in the formulation of standards to protect employees or the general public against hazards of radiation and to assure that State and Commission programs will be coordinated and compatible. Pursuant to the "Act" and the Energy Reorganization Act of 1974, as amended, the NRC evaluates material events and abnormal occurrences in licensed facilities. In addition, the Energy Reorganization Act requires NRC to provide to Congress on an annual basis, information on significant events that meet the abnormal occurrence criteria.

Regulations have been established that require material licensees to monitor and control activities that can lead to the exposure of employees or the general public to radiation. For purposes of compatibility the reporting of incidents and events involving the use of nuclear materials by the Agreement States to NRC is now mandatory. The information from reports of medical misadministrations, overexposures, equipment failures, and other events that have occurred involving the use of nuclear materials licensed by both the NRC and the Agreement States is invaluable in assessing trends or patterns and inadequacies or unreliability of specific equipment or procedures. The reported information will significantly aid in understanding why the events occurred and identifying any actions necessary to improve the effectiveness of NRC and Agreement State regulatory programs.

SECTION I

Event Reporting Process

1.0 EVENT REPORTING PROCESS

1.1 Introduction

Procedures for the Agreement States to report to NRC information on material events that have occurred in their State are presented below. Guidance is provided on electronic reporting of event information to the "Nuclear Materials Events Database (NMED)." Guidance is also provided on hard copy reporting (written reports) of Agreement State licensee event reports to the Director, OSP. When submitting an event report, enough information about an event should be provided so that NRC and Agreement States can evaluate the event in terms of safety significance, long-term generic implications, and as a possible candidate for the "Abnormal Occurrence Report to Congress."

- Reportability Determination

  Agreement States should receive event information from Agreement State licensees that is compatible with the information provided by NRC licensees under applicable, compatible Agreement State regulatory reporting requirements. Table 1.1 of this guide contains a listing of NRC regulatory reporting requirements that are the basis for equivalent reporting requirements in Agreement State regulations. Table 1.2 provides further clarification by including a brief description of the specific reporting requirement. These tables begin on page 7 of the "handbook."

- How often are material events reported to NRC?

  Significant events (requiring 24 hour or less notification by an Agreement State licensee) should be reported promptly to NRC by an Agreement State, within 24 hours or less of notification by an Agreement State licensee. Routine events (requiring 5, 15, 30 or 60 day notification by an Agreement State licensee) should be reported within one month of notification of the occurrence of an event by an Agreement State licensee, member of the public, or other agency. Follow-up reports through closeout of the event should be provided within 30 days of receipt from an Agreement State licensee. Information on State action, e.g., investigation results or enforcement actions may be requested by NRC on an ad hoc basis.

- Voluntary Reporting

  The Commission encourages voluntary reporting of an occurrence that actually happened (event) or something that may happen (condition) that does not meet the regulatory reporting criteria that the State believes might be of safety significance or of generic interest or concern, or involves media interest.

- Event Report Number

All event reports (significant and routine) should have a report identification number. For each agency in your State, Agreement States should assign an event report number to the preliminary or initial notification report and any follow-up reports, with the "Agreement State Identification No.," consisting of the State agency ID, year, and a sequentially assigned ID number, e.g., (NY-98-001), (NYC-98-001), (NYL-98-001), (NYE-98-001), (TX-97-001), (TXNR-98-001), (GA-98-001), (NE-98-001), (CA-98-001). NOTE: The Agreement State ID# field in NMED can accommodate up to four characters for the State or agency identifier. The "Agreement State ID No." should be specified by the State for all telephone, electronic or written notification involving each specific event. This will ensure proper coding in NRC's internal Document Control System (DCS) and that all information on a given event is contained in one record in NMED. It will also aid in simplifying the search for all of a State's information in the NMED database.

- The Nuclear Materials Events Database (NMED)

All material event information is maintained in the Nuclear Materials Events Database (NMED) by the NRC Office for Analysis and Evaluation of Operational Data (AEOD). NMED contains NRC's historical collection of information on the occurrence, description, and resolution of events involving the use of byproduct nuclear material in the United States. The database is maintained by NRC through a contractor, Idaho National Engineering and Environmental Laboratory (INEEL). NMED accommodates the sharing of material event data submitted by Agreement States and NRC licensees. INEEL enters material event information received from the Agreement States via PC diskette, e-mail file, or in writing into NMED. Agreement States will receive monthly updates of data directly from INEEL in a format previously designated by the State. The monthly update should be reviewed to ensure that each State's event information has been properly included. A copy of the NMED software, and the accompanying NMED Coding Manual, have been provided to all Agreement States.

1.2 Reporting Significant Events (requiring immediate or 4-24 hour notification by an Agreement State licensee)

a. Report Significant Events to the NRC Operations Center.

b. Agreement States should report to the NRC, within 24 hours or less of notification by an Agreement State licensee, significant events requiring prompt notification as determined under applicable Agreement State regulations. (For reference, NRC reporting requirements for significant events are presented in Table 1.1 and 1.2 on pages 7 and 9)

c. Agreement States should report the events by telephone or FAX to the NRC Operations Center, telephone No. (301) 816-5100, (301) 951-0550, and FAX (301) 816-5151.

The following information should be provided, if known:

1. Event Report Identification No.
2. License No.
3. Licensee
4. Event time, date, location
5. Event type (e.g., misadministration, lost source, overexposure, etc.)
6. Any notifications, i.e., other agencies, patient, press release, etc.
7. Event description: release, isotope, activity, exposure(s), dose, contamination level(s), equipment malfunction, model, serial #, etc.
8. Transport vehicle description, if applicable
9. Media attention

NOTE: Personal or sensitive information, i.e., names, personal address, social security #, etc. should not be included in event descriptions.

d. NRC Operations Center

The NRC Operations Center staff will promptly notify the appropriate Region Duty Officer (RDO) of Agreement State events. No separate notification of the appropriate NRC Region by an Agreement State is necessary.

e. Event Notification System

All events reported to the NRC Operations Center will be entered into the Event Notification (EN) database. The EN will be publicly available through Internet on NRC's external home page at (http://www.nrc.gov/opa) under "Event Reports," within one day or less of notification. As a result of public access to this information, Agreement States may receive contacts from the public or media requesting additional information.

f. Preliminary Notifications (PN)

Agreement States should be aware that the NRC regional staff may prepare Preliminary Notifications (PN), which are brief summary reports of significant events, as appropriate, based on information provided by the Agreement State. Region staff may contact the State for additional information on the event. PNs

are usually issued within approximately two hours of notification of the occurrence of a significant event. The PN will be publicly available through Internet on NRC's external home page under PN Reports at (http//www.nrc.gov/opa). Updates to PNs occur when significant additional information about an event is provided to NRC.

g. NMED Initial Data Entry Record and NMED Follow-up Reports for "Significant" Events

Information about "significant" events initially reported to the NRC Operations Center will be entered into NMED by the NRC. The Agreement State initially reporting the event is responsible for updating the initial NMED report with revised or new information. In most cases this can be accomplished by reviewing the licensees written event report and updating the initial event information incorporated into NMED by one of the reporting methods described in Section 1.3 or 1.4. The NMED event report update should be submitted within 30 days of receipt of the licensee's written report by the Agreement State. If the licensee submits multiple written reports, more than one NMED event report update may be required for all new or revised information.

h. NRC Review of Significant Material Events

Both NRC and Agreement State events identified as having a "significant" potential risk to public health and safety will receive appropriate NRC management review. This review may be related to the reporting of additional information to the NMED database or may become part of a separate NRC initiative. Based on the "significance" of the event and/or the possibility of generic issues, the NRC may request that the State provide a final report. Additionally, based on the "significance" and/or generic implications, NRC staff may review and follow-up through closure (complete and final information has been received from the licensee; and the NRC or Agreement State evaluation is complete). The State may be requested to participate in NRC management briefings by telephone to keep NRC informed of actions taken by the State and others to protect public health and safety.

1.3 Electronic Reporting to NMED via PC Diskette or E-mail: Routine Event Reports and Follow-up Information on Routine and Significant Events (routine = 5-day Event Report, 15-day Medical Misadministration Report; 30 and 60 day Event Reports)

a. Routine NMED Event Reports

1. The Agreement State should provide an electronic NMED report via E-mail or PC diskette to NRC based on the information provided by the

Agreement State licensee in the 5, 15, 30 or 60 day report. (for reference, NRC routine reporting requirements are presented in Tables 1.1 and 1.2 on pages 7 through 10.)

2. The Agreement States assigned event report identification number (State\Yr.\No., e.g., GA-97-001) should be included in the NMED record. This will ensure that all information on a given event is contained in one record, eliminate duplicates, and aid in searching for information on events that have occurred in a specific State. The NMED record should be updated as new or clarifying information is developed. Follow procedures for data entry contained in the NMED Coding Manual provided by INEEL.

b. NMED Event Report Updates (follow-up information on both significant and routine events)

1. The initial event report identification number (State\Yr.\No.) should be included whenever additional follow-up event information is provided to NRC. Indicate that it is a follow-up report.

2. Any follow-up information that revises earlier information or provides additional information on a given event should be provided to NRC to ensure a complete historical NMED record. Follow-up information necessitating an NMED event update may be found in licensee event reports, results of any evaluations or investigations, dose assessments, leak tests, inspection reports, corrective actions, etc. Information on sealed sources and devices should include the manufacturer, model No. and serial No., and identify whether or not the lost or stolen gauge or material has been found. The follow-up event information may be provided in writing or extracted, summarized, and entered into NMED. Follow the procedures for filing NMED event update reports in the NMED Coding Manual provided by INEEL. Follow guidance below in item 1.4 for non-electronic (written) event reports.

3. Additionally, when providing follow-up NMED event information, provide clear reference to documents on file that the State used to generate the NMED event reports, e.g., licensee inspection report dated mm/dd/yr., if applicable and appropriate.

1.4 Non-Electronic Reporting of Material Events (Written Reports): Routine Event Reports and Follow-up Information on Routine and Significant Events

(Routine: 5-day Event Report, 15-day Medical Misadministration Report, 30 and 60 day Event Reports)

The following guidance is provided for Agreement States that report event information through submission of written reports. NOTE: Initial reporting of "significant" events should always be reported via telephone or FAX to the NRC Operations Center within 24 hours of notification by an Agreement State licensee (see Section 1.2).

a. **Event Report Cover Page:** An Event Report Cover is included on page 18 of this Handbook. The Event Report Cover page should be included as the cover page for all written Agreement State licensee event information provided to NRC. The cover page will ensure proper identification and coding as an Agreement State Event Report.

b. **Event Report Number:** Include the assigned event report number [Agreement State Identification No., (e.g.CO-98-001)] where indicated, on the cover page to avoid duplication of effort.

c. Written event reports should be sent to the Director, OSP.

d. Written report information should be comparable with the level of detail on an event that is specified in the "NMED" database and applicable regulatory requirements. A State may print out the NMED screens or provide a copy of the licensees event report to NRC. A listing of the minimum basic information to be provided on a given event that is necessary for the NMED database is provided in item 1.14, page 19. A listing of the basic information for preparing a medical event report is also provided (see item 1.15, page 20).

e. All follow-up information that revises the initial event information or provides additional information should be provided through close-out of the case. Send written event report information, along with a cover page (see p. 18 of the Handbook) to the Director, OSP.

1.5 Public Availability of Event Information

Any event information that is considered preliminary predecisional information by the State should be clearly identified on the cover page as follows: "**Preliminary, Not for Public Disclosure.**" For event information in NRC's possession, the final determination on whether to withhold from public disclosure will be made by NRC on a case-by-case basis in accordance with the requirements of 10 CFR Part 9.

TABLES:

The following four tables are provided. NRC 10 CFR reporting requirements are contained throughout the 10 CFR rather than contained in one Part or Section. Therefore, the following tables provide a complete listing of the current 10 CFR material reporting requirements in one place. Additionally, the tables further differentiate significant and routine reporting requirements. The tables are listed as follows: 1.1 Event notification by category and NRC reporting requirement, 1.2 Event Reporting Requirements, 1.3 Examples of reportable events, and 1.4 Sample NMED data entry screens.

TABLE 1.1 EVENT NOTIFICATION BY CATEGORY AND NRC REPORTING REQUIREMENT

SIGNIFICANT EVENTS (POSSIBLE AO)			ROUTINE EVENTS (POSSIBLE AO)	
REGULATORY REPORTING REQUIREMENT	IMMEDIATE NOTIFICATION BY LICENSEE TO APPROPRIATE REGULATORY AGENCY WITHIN 1 HR.	PROMPT NOTIFICATION BY LICENSEE TO APPROPRIATE REGULATORY AGENCY WITHIN 24 HRS.	LICENSEE NOTIFICATION TO APPROPRIATE REGULATORY AGENCY VIA 30 DAY LICENSEE EVENT REPORT (LER)	LICENSEE NOTIFICATION TO APPROPRIATE REGULATORY AGENCY VIA 60 DAY LER REPORT
10 CFR Part 20, Standards for Protection Against Radiation	§20.1906(d)(1) and (d) 2)			
	§20.2201(a)(1)(I)		§20.2201(a)(1)(I) and (ii)	
	§20.2202(a)	§20.2202(2)(b)		
			§20.2203(a)	
10 CFR Part 21, Reporting of Defects and Noncompliance[1]				§21.21(a)(1) and (2)
10 CFR Part 30, Rules of General Applicability to Domestic Licensing of Byproduct Material	§30.50(a)	§30.50(b)	§30.50(a) and (b)	
10 CFR Part 31, General Domestic Licenses for Byproduct Material			§31.5(c)(5)	
10 CFR Part 34, Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations		§34.25(d) NOTE: 5 day report	§34.30(a)	

[1]Not a compatibility requirement for Agreement State, but States voluntarily provide information on equipment failure and defects.

Table 1.1 Event Notification cont.

SIGNIFICANT EVENTS (POSSIBLE AO)			ROUTINE EVENTS (POSSIBLE AO)	
REGULATORY REPORTING REQUIREMENT	IMMEDIATE NOTIFICATION BY LICENSEE TO APPROPRIATE REGULATORY AGENCY WITHIN 1 HR.	PROMPT NOTIFICATION BY LICENSEE TO APPROPRIATE REGULATORY AGENCY WITHIN 24 HRS.	LICENSEE NOTIFICATION TO APPROPRIATE REGULATORY AGENCY VIA 30 DAY LICENSEE EVENT REPORT (LER)	LICENSEE NOTIFICATION TO APPROPRIATE REGULATORY AGENCY VIA 60 DAY LER REPORT
10 CFR Part 35, Medical Use of Byproduct Material[2]		§35.33(a),(1),(2),(3) and (4)		
10 CFR Part 36, Licenses and Radiation Safety Requirements for Irradiators		§36.83(a) and (b)	§36.83(a) and (b)	
10 CFR Part 39, Licenses and Radiation Safety Requirements for Well Logging		§39.77(a),(b) and (c)	§39.77(b)	§39.77(a),(b),(c) and (d)
10 CFR Part 40, Domestic Licensing of Source Material		§40.60(a)	§40.60(b)	§40.60(c)(2)
10 CFR Part 70, Domestic Licensing of Special Nuclear Material		§70.50(a)	§70.50(b)	§70.50(c)
10 CFR Part 71, Packing and Transportation of Radioactive Material			§71.47,71.87 and 71.95	

[2]Misadministration event requires 15 day LER report and 24 hour notification to referring physician and patient.

Table 1.2 EVENT REPORTING REQUIREMENTS

Typical items covered under reporting requirements include the following:

10 CFR Part	Reporting Requirement	Notification
20.1906(d) (1)	reports of removable contamination on package > limits in 10 CFR 71.87.	Immediate
(d)(2)	radiation levels on package > limits in 10 CFR 71.47	Immediate
20.2201(a)(1)(i)	reports of theft or loss of licensed material ≥ 1000 X App C value	(i) (I) Immediate.
(a)(1)(ii)	reports of theft or loss of licensed material ≥ 10 X App. C value	(ii) 30 day
20.2202(a)(1)	exposure (real or threatened) ≥ TEDE of 25 rem (.25 Sv), or eye or lens dose equiv. of 75 rem (.75 Sv) or shallow dose equiv. (skin\extremities) of 250 rads (2.5 Gy).	(a)(1) Immediate
(b)(1)	exposure (real or threatened) ≥ TEDE of 5 rem (.05 Sv), or eye or lens dose equiv. of 15 rem (.15 Sv), or shallow dose equiv. (skin\extremities) of 50 rads (.5 Gy).	(b)(1) 24 hours
20.2202(a)(2)	release where individual could have intake > 5 X ALI over 24 hours.	(a)(1) Immediate
(b)(2)	release where individual could have intake > 1 X ALI over 24 hours	(b)(2) 24 hours
20.2203(a),(b)	radiation exposures, releases or concentrations of radioactive material that exceed the limits.	30 day
21.21(a)(1-2)	reporting of defect in basic component, structure or system.[3]	60 day
30.50	reporting of events involving:	
(a)	prevention of immediate protective action, involving exposures or releases that could exceed regulatory limits	4 hour
(b)(1)	unplanned contamination restricting access >24 hours (no isotopes with half-lives <24 hrs)	24 hour
(b)(2)	equipment failure or disability to function as designed when equipment is required to be available and operable and no redundant equipment is available and operable.	24 hour

[3]Not a compatibility requirement for Agreement States, but States voluntarily provide information on equipment failure and defects.

Table 1.2 Event Reporting Requirements cont.

10 CFR Part	Reporting Requirement	Notification
30.50 cont.		
(b)(3)	unplanned medical treatment of contaminated person,	24 hour
(b)(4)	Fire, explosion affecting integrity of material, device or container.	24 hour
31.5(C)(5)	failure or damage to shielding, on-off mechanism or indicator, or ≥ 0.005 microcuries (185 Bq) removable radioactive material for generally licensed device.	30 day
~~34.25(d)~~ 34.27(d)	reporting of leaking sources, leak test results ≥ 0.005 μCu (185 Bq)	5 day
~~34.30~~(a) 34.101(a)	radiography source disconnect, inability to retract source, or component failure (critical to safe operation of device)	30 day.
35.33(a)	notifications and reports of misadministrations.[4]	Next day(24 hr)
36.83	irradiator events, release of material, defective components, systems or structures; (if not reported under other 10 CFR reporting requirements)	24 hour
39.35(d)(2)	reports of leaking sealed sources found during periodic leak testing requirements	5 day
39.77(a,c)	well logging source rupture, irretrievable source, abandonment	(a)Immediate (c) When apparent recovery impossible
40.60	requirements for domestic licensing of source material to receive, possess, use transfer, or deliver source and byproduct material. (NOTE: Same as 30.50 above)	
70.50	events involving special nuclear material (SNM)	
(a)		(a) 24 hour
(b)		(b) 30 day
(c)		(c) 60 day
71.47, 71.87	transportation events involving defective packaging of material, contamination	30 day

[4]Misadministration events require 15 day LER report and 24 hour notification to referring physician and patient.

TABLE 1.3 EXAMPLES OF REPORTABLE EVENTS

This Table provides examples of reportable material events or occurrences that are required to be reported by both NRC and Agreement State material licensees. The Table addresses specific reporting requirements for either immediate notification (within 24 hours or less) or 30 day written reports. The Agreement States should provide detailed event information that is comparable with the NMED database system.

Immediately reportable under 10 CFR 20.2201	**Stolen Portable Gauge** Licensee reported that a [Manufacturer] [Model #] [serial #] portable gauge containing 9 millicuries of cesium-137 and 40 millicuries of americium-241:beryllium was stolen from the licensee's vehicle parked at the licensee's facility. The gauge was padlocked in its original carrying case. The State is following the incident and working with local authorities to develop a press release. Follow-up information will be provided to NRC on the recovery of the stolen gauge and entered into NMED.
Reportable within 24 hours under 10 CFR 30.50	**Possible Damage to Portable Gauge** Licensee reported that a [Manuf.] [Model #] [serial #] portable gauge was run over by a bulldozer at a field construction site. The gauge housing appeared to have been damaged, but the source appeared to be intact. The licensee is investigating why the radiographer failed to maintain constant surveillance. The gauge will be sent to the manufacturer for leak testing. A follow-up report will be provided to the State by the licensee, and the State will share information on the results of the licensees investigation into the occurrence and the results of the leak test with NRC through entry into NMED.
Reportable within 30 days under 10 CFR 71.47 and 20.1906	**Shipment of Brachytherapy Sources Received with Radiation Levels Exceeding Regulatory Limits** A medical licensee reported receiving a shipment of two packages containing cesium-137 brachytherapy sources. Radiation surveys of the packages with an ion chamber detector found radiation levels of 250 millirem per hour on one package, which exceeds the state and federal limit at the external surface of a package of 200 millirem per hour. The third and final package was received two days later with radiation levels of 400 millirem per hour at the surface of the package. The shipper has retained a consultant to determine the cause of the elevated radiation levels. The State will keep NRC informed of the results of the consultants review of the event, and the information will be entered into NMED.
Reportable within 24 hours under 10 CFR 20.1301, 20.2203	**Exposure to Nonradiation Worker at a Licensed Facility** A licensee reported to the State that a nonradiation worker had received an exposure as a result of picking up a 5 curie Americium-241:Beryllium neutron source used for well logging and placed it in his pocket. The worker, a temporary contractor employee, was cleaning a well logging tool at the licensee facility. (The licensee was under the assumption that all of the source material had been removed from the equipment.) While cleaning the tool, the source fell out, and the worker picked it up and placed it his pocket. The worker was not a radiation worker and had no knowledge of what the object was. Preliminary calculations performed by [identify Consultant/Contractor] indicate that the individual may have received a dose of 4-6 Rem. The licensee's RSO is investigating the incident. The State plans to keep NRC informed of the ongoing results of the investigation, and the information will be entered into NMED.

Reportable within 24 hours under 10 CFR Part 35 and 30.50(b)(2)	**Possible Misadministration involving a Teletherapy Unit Malfunction** A patient undergoing a Cobalt-60 teletherapy treatment with a [Manufacturer][Model #] received an unintended exposure. The RSO estimated that the patient received an exposure of 138 centiGray (Rads) to a depth of 0.5 centimeters to the wrong treatment site, based on a possible total treatment time of 1.5 minutes. The exposure occurred as a result of two power disruptions during a thunderstorm. The loss of electrical power caused the unit table to move which resulted in treatment to the wrong site. The patient received 0.35 minutes of the intended fractionated treatment time of 1.5 minutes. The patent was prescribed a total dose of 5040cGy to be given in 28 fractions of 180 cGy per day at the rate of 5 fractions per week. The prescribing physician elected not to make up the missed dose. The prescribing physician indicated that the patient is not expected to have any adverse effects from the misadministration. The patient and referring physician were notified of the event. The licensee was able to recreate the event to demonstrate how the event occurred. The licensee has contacted the manufacturer. The State will keep NRC informed of the results of the review for any generic implications.
Reportable within 24 hours under 10 CFR 36.83(9)	**Possible Loss of Water or Leakage from Source Water Pool at Irradiator Facility** Licensee notified the State that the controls at a Co-60 irradiator facility were indicating that the water level was low, circulating pump off, and fill valves were open. The pool water level gauge indicated a pool water level of 93 inches, well below the normal level of 137 inches. Previous incidents indicated that a loss of compressed air pressure to the water level gauge could result in an erroneously low water level gauge reading, causing the automatic pool fill valves to open, and the pool water circulating pump to turn off. The compressed air system pressure was found to be in the normal range, but the operator found water and congealed oil in the air line supplying the pool water level gauge, and the air line supplying the elevator control valve. Further investigation found that the compressed air line water traps were full of water. A past similar incident resulted in a failure to raise the elevator. The operator then verified that the pool water level was in fact normal. The licensee requested the building maintenance personnel to diagnose and repair the compressed air supply immediately, to prevent the conductivity in the pool water from reaching abnormal levels as a result of the resin filter circulating pump being automatically turned off by the false low pool water level meter reading. Maintenance personnel responded and replaced a failed compressed air dryer, and monitored the open air lines to clear the lines of water. A float activated automatic water drain was installed in the air line to prevent a possible reoccurrence by allowing any water to automatically drain from the air line.

1.6 Nuclear Material Events Database (NMED) Sample Data Entry Screens

The following pages contain sample data entry screens from the NMED database which shows the level of detail the States need to provide for a given event. Detailed NMED user information is contained in the NMED Coding Manual provided by INEEL along with the software to the Agreement States.

"This information request has been approved by OMB 3130-0178, expiration date 06/30/2000. The estimated burden per response to comply with this collection request is 1.25 hours. Forward any comments regarding the burden estimate to the Information and Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0052), Office of Management and Budget, Washington, DC 20503. If a document does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB clearance number."

Table 1.4 Sample NMED Data Entry Screens (OMB 3130-0178).

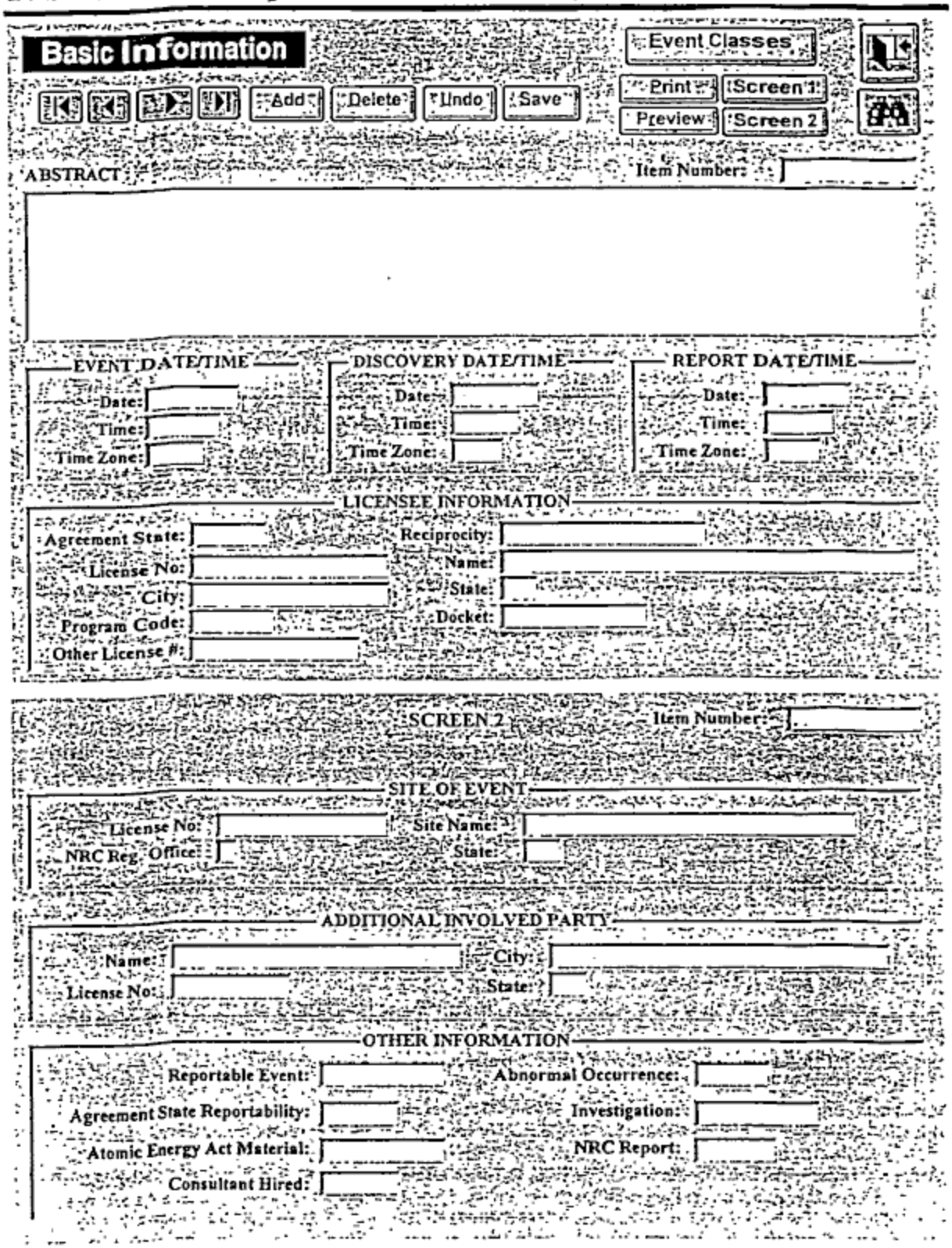
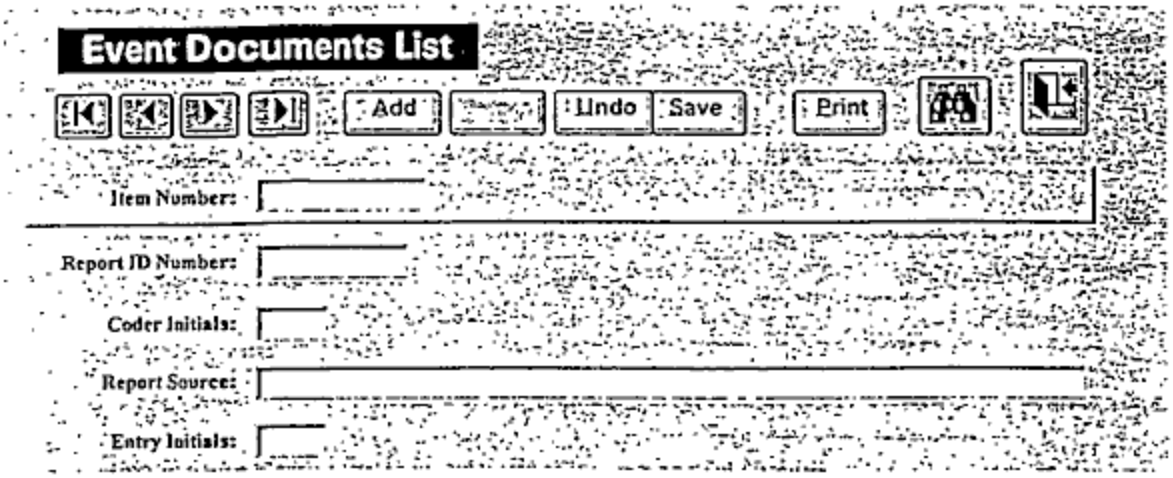
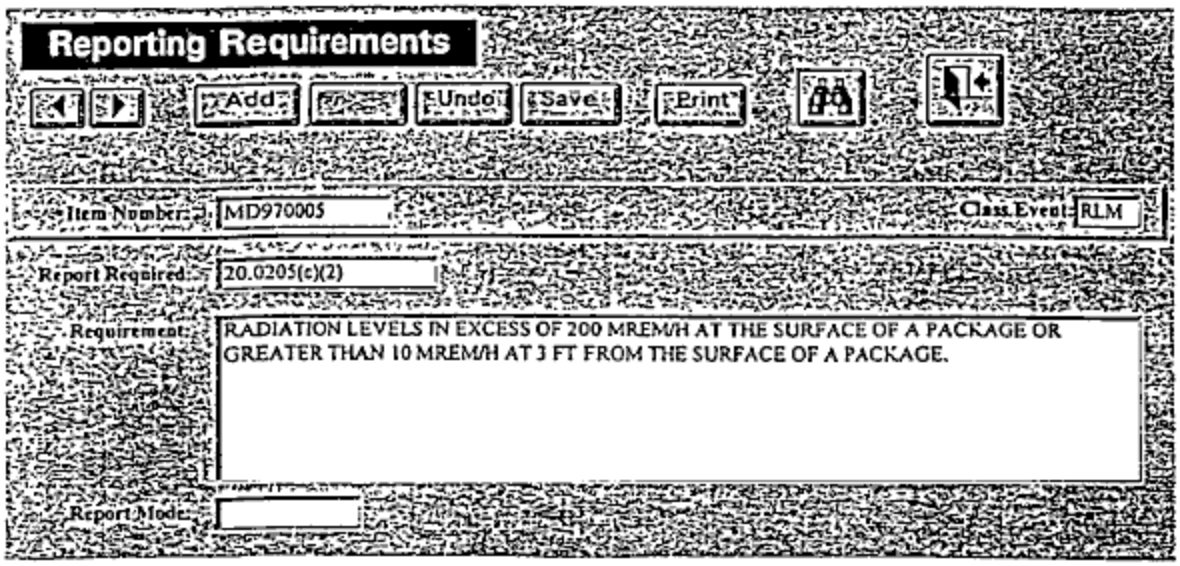


Table 1.4 NMED cont.





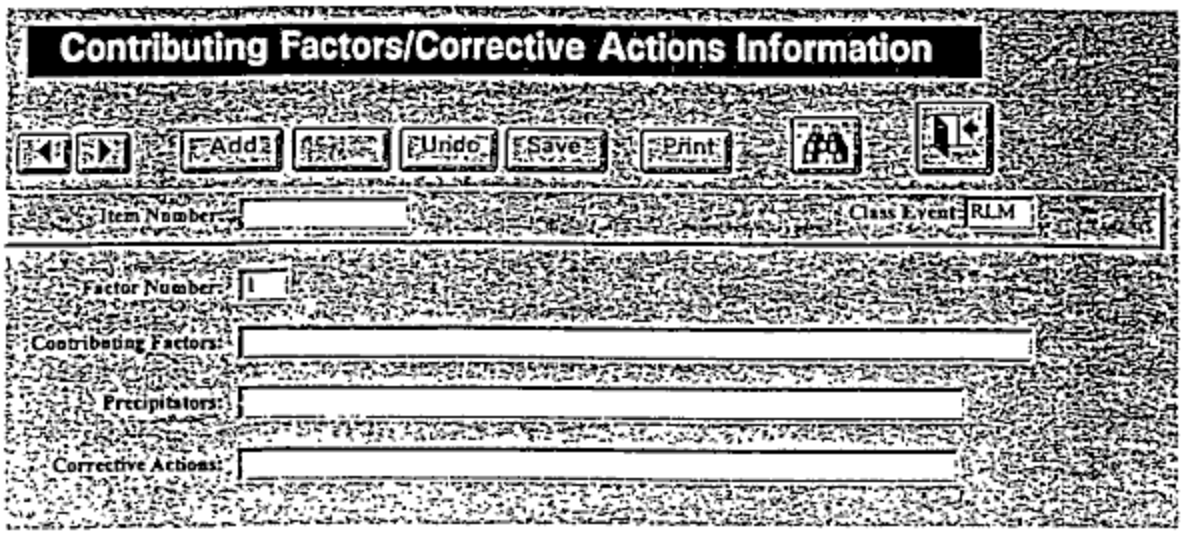
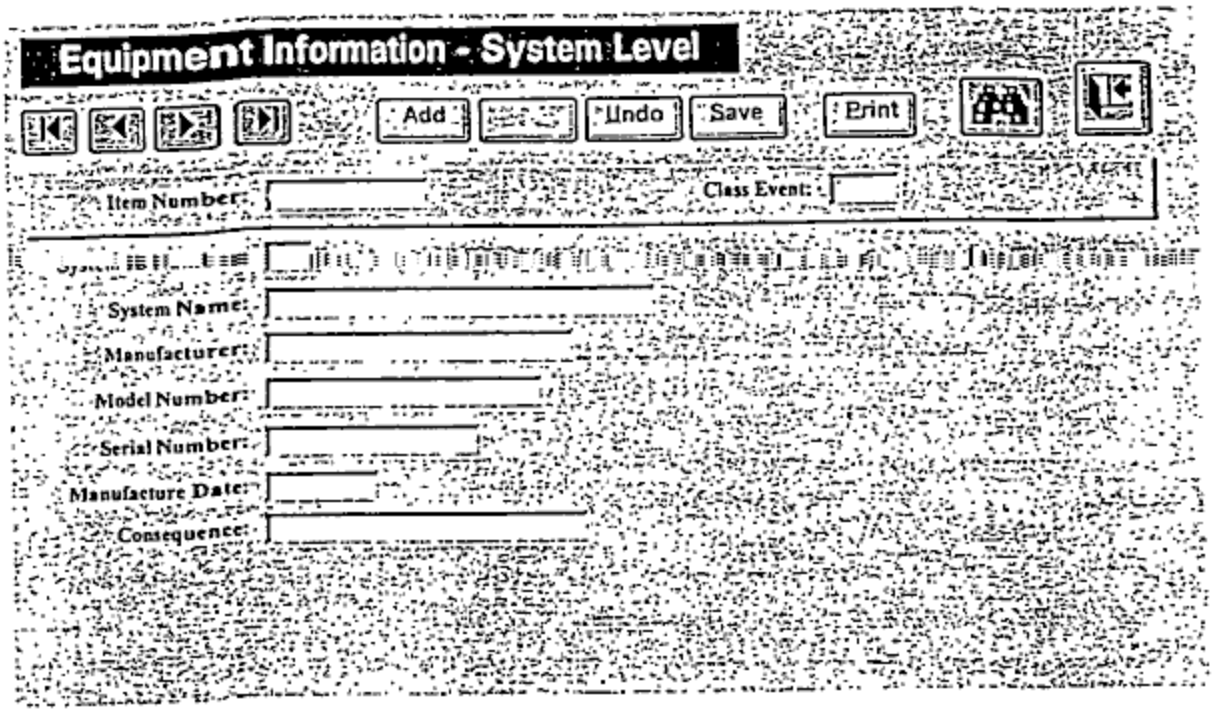


Table 1.4 NMED cont.



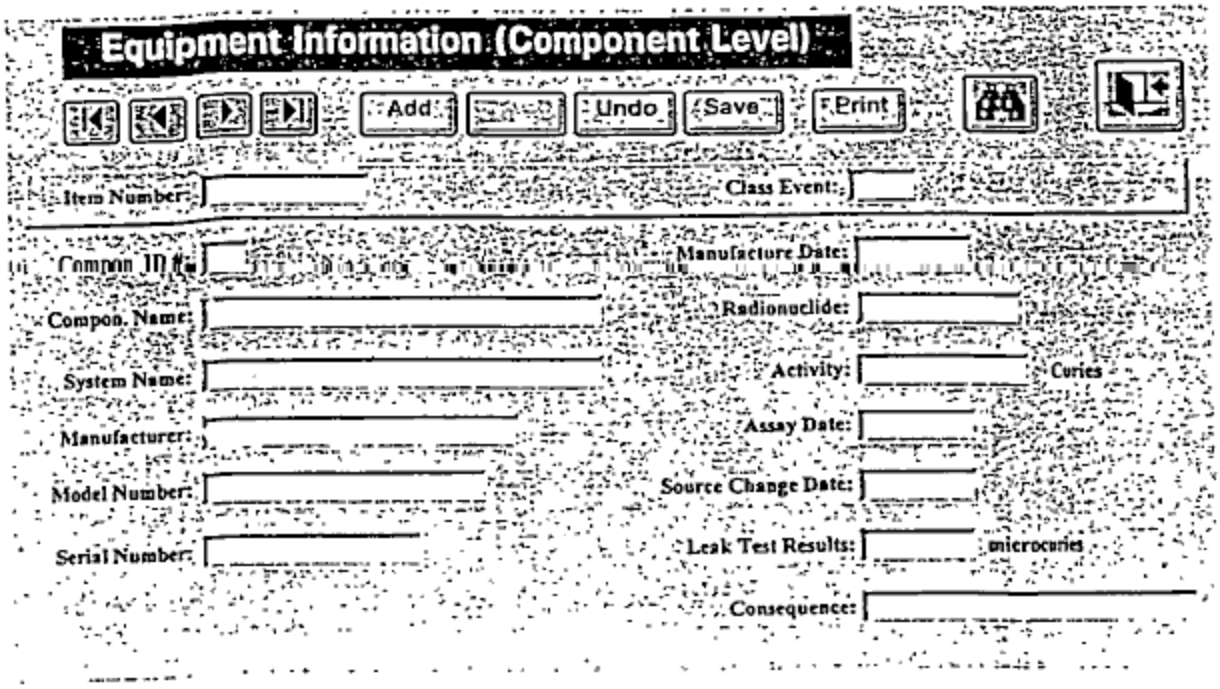


Table 1.4 NMED cont.

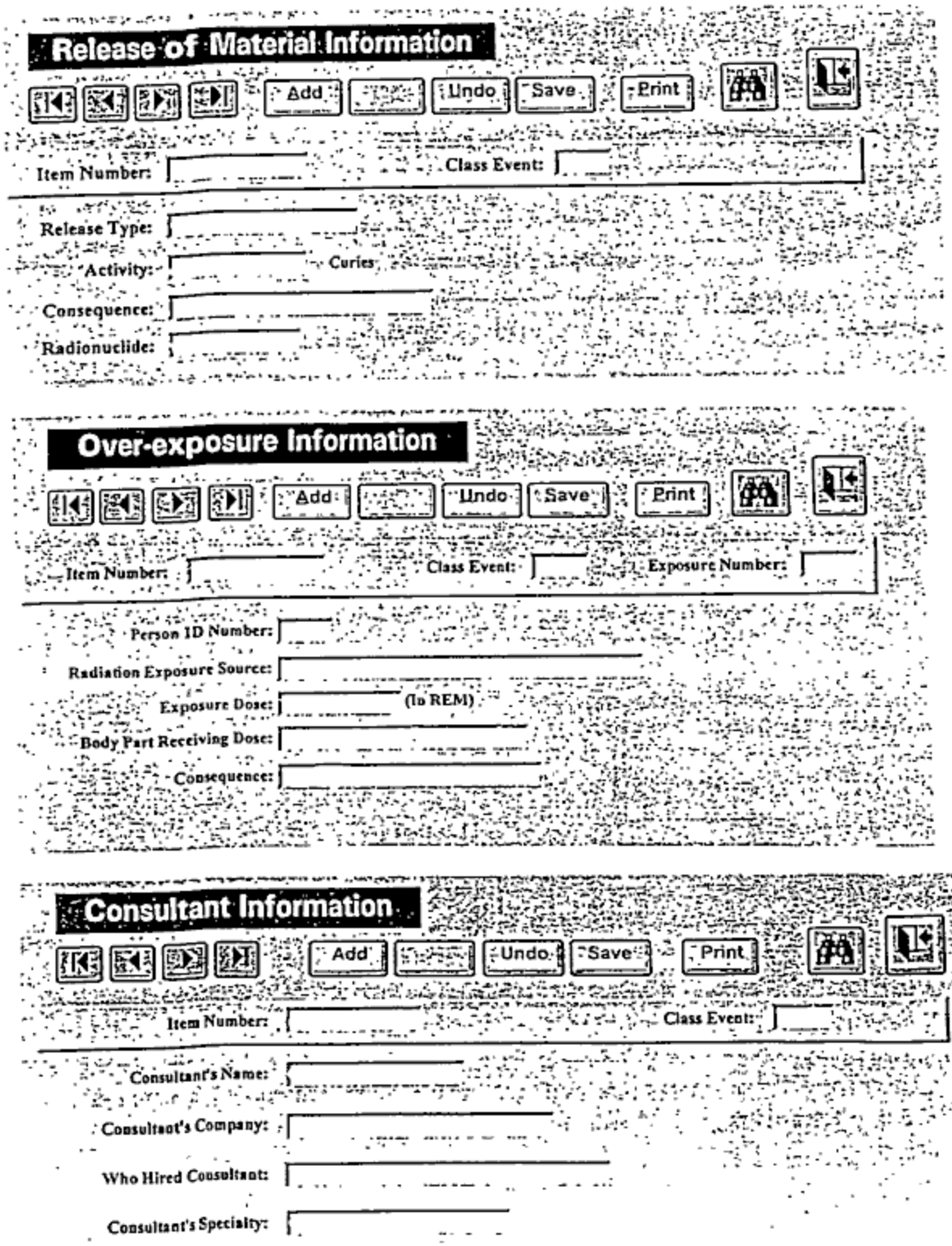
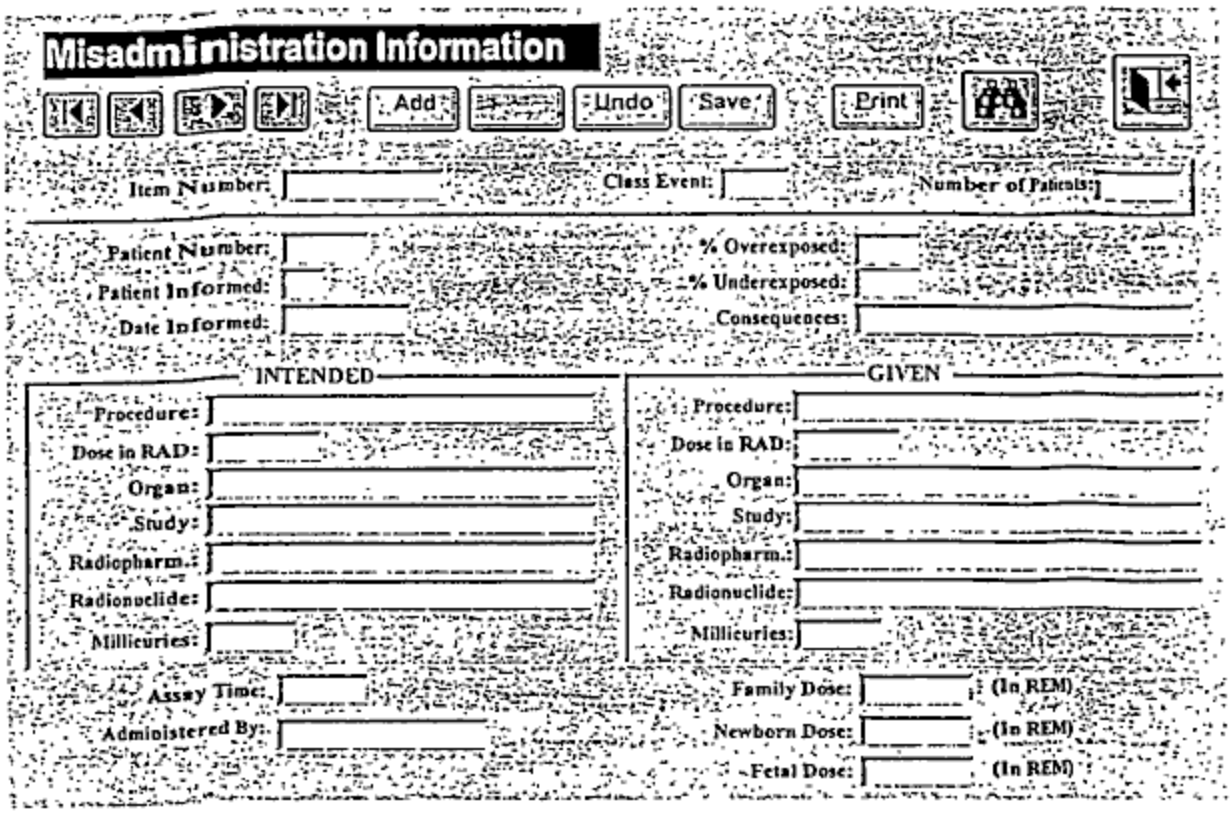
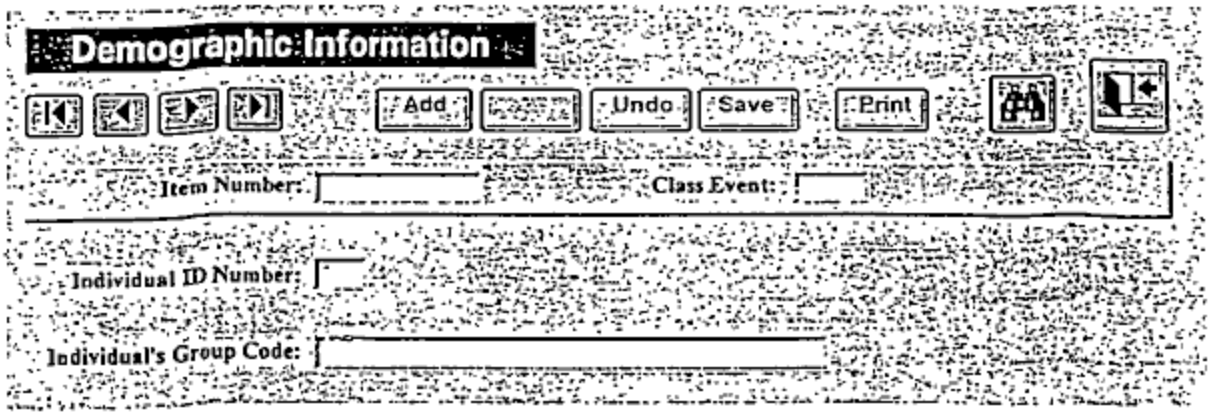


Table 1.4 NMED cont.





The following pages contain items 1.7 Sample Event Report Cover Page (for event reports provided in writing), 1.8 a listing of the basic information to be included in a written event report, and item 1.9 a listing of the basic information to be included in a written medical misadministration event report.

EVENT REPORT COVER PAGE

AGREEMENT STATE

EVENT REPORT ID NO. __ - __ - ___
(State\Yr.\No.)

DATE:

TO:
Director
Office of State Programs

SUBJECT:

STATE:

Signature and Title: _____

_____

_____

_____

1.8 EVENT REPORT (Basic Information)

This list is an option for those Agreement States who choose not to enter event data electronically into the Nuclear Material Events Database (NMED). The information provided must be compatible to the information needed for the NMED system and presented clearly in readable form.

(a) Licensee (Name, city and State)

(b) Agreement State ID No. (NY-97-001) (MS-97-001). State ID, year, sequentially assigned ID number.

(c) Type of License

(d) License No.

(e) This Item No. (Follow-up Report No. 01, 02, etc.)

(f) Abnormal Occurrence (Y\N). See AO Criteria contained in NUREG-0090

(g) Isotope (i.e., Cs-137; Ir-192, Co-60, Am-241, Po-210 etc.
- Activity
- Need to clearly show radiopharmaceuticals, as well as isotopes.

(h) Type of Isotope and activity (AEA material, accelerator produced, NORM)

(i) Date of Event

(j) Date of this Report

(k) Amount of Radioactive Material

(l) Events Involving Overexposure

- No. of Individuals Overexposed
- Source of Radiation
- Type of Individual (occupational worker, member of the public)
- Event Location
- Dose Estimated to Individuals Involved in the Event (In REM)
- Body Part Receiving Dose
- Consequence

(m) Leaking Source

- Leak test information

(n) Lost or Stolen Material

1. Nuclear Material

- Event
- Event Location
- Probable Disposition

2. Sealed Sources and Devices

- Type
- Manufacturer, Model No.
- Serial No.
- Disposition/Recovery

(o) Release of Material

- Form
- Event
- Location
- Activity (Curies)

(p) Events Involving Radiography

- Location
- Equipment description Manufacturer, Model No.
- Event

(q) Event Involving an Irradiator

(r) Events Involving Teletherapy

(s) Transportation Event

- Location
- Shippers name and address
- Package type
- Package Identification No.

(t) Regulatory reporting requirement (Indicate applicable licensee reporting requirement)

(u) Demographic information

(v) ABSTRACT: Include where, when, how, and why. (Describe the cause of the event(s), contributing factors, persons involved, consequences, and licensee corrective actions taken or planned.) Attach a copy of the licensee's 30 day report, where applicable.

1.9 MEDICAL MISADMINISTRATION (Basic Information)

This list is an option for Agreement States that choose not to enter event data electronically into the Nuclear Material Events Database (NMED). The information provided must be compatible with information needed for the NMED system and presented clearly in readable form.

(a) Licensee (Name, City and State)

(b) Agreement State ID No. (NYC-97-001) (MS-97-001), State ID, year, sequentially assigned ID number.

(c) Type of License (Broad scope, private practice medical, etc.)

(d) License No.

(e) This Item No. (Follow-up Report No. 01, 02, 03, etc.)

(f) Abnormal Occurrence (Y/N). See AO Criteria contained in NUREG-0090.

(g) Patient\Responsible Relative Notified (Y\N)

(h) 15 day Written Report Provided (Y\N)

(I) Date of Event

(j) Date of this Report

(k) Regulatory reporting requirement (Indicate applicable licensee reporting requirement)

(l) ABSTRACT:
Initial report: Include where, when, how, cause, provide as much information as is known at the time of the initial report).

Procedure/Study: Actual and intended

NOTE: Need to clearly show radiopharmaceuticals, as well as isotopes.

Isotope and dose involved: (i.e., 200 μCi of Iodine Hippurate I-131; 5 mCi of Iodine-125; 10 mCi of Iodine-131; 40 mCi of Cs-137; 2 mCi of Tc-99m; 5 mCi of P-32, etc. (clearly identify chemical and physical form).

Exposure: Intended and actual

Treatment plan: fractionations, if any.

Device (Equipment) involved: High Dose Rate Afterloader, Make and Model No. ____ (where applicable).

Systems: Computer program and developer, where applicable.

Referring Physician notified: (Y\N)

Patient notified: (Y/N)

Include information on all person(s) that may have been involved including employees, i.e. assistants, technicians, nurses, etc. Where applicable, describe the prescribed treatment plan and the actual treatments administered, including fractionations, include consequences. Provide an assessment of any expected effects on all those who were exposed, for unusual cases it may be necessary to include a medical consultant. Consultant used, identify. Describe licensees corrective actions.

Updated Information: provide any updated information in future reports, use the Original Item ID# (MS-97-001) and indicate on the cover page that it is updated information.

Demographic information (Description)

SECTION II

Abnormal Occurrence Guidelines and Criteria

2.0 ABNORMAL OCCURRENCE GUIDELINES AND CRITERIA

2.1 Introduction

This section presents the guidelines and criteria to be followed when assessing the significance of an event or occurrence to see if it meets the criteria established to identify an abnormal occurrence. Section 208 of the Energy Reorganization Act of 1974 (Public Law 93-438, 42 USC 5848) identified an abnormal occurrence (AO) as an unscheduled incident or event that the Commission determines to be significant from the standpoint of public health and safety. Section 208 of the Act also requires that the Commission inform Congress of any abnormal occurrences. The Agreement States support the NRC in their effort to keep Congress apprised of any significant events that may directly affect public health and safety by providing information on proposed abnormal occurrences that have occurred in their State.

2.2 Abnormal Occurrence Policy Information

The Commission submits a report to Congress identifying any abnormal occurrences. The Federal Reports Elimination and Sunset Act of 1995 requires that AOs be reported to Congress on an annual basis (see "Report to Congress on Abnormal Occurrences, Fiscal Year 1996," NUREG-0090, Vol. 19). Section 208 of the Act indicates that each report shall contain:

(1) The date and place of each occurrence;
(2) The nature and probable consequence of each occurrence;
(3) The cause or causes of each; and
(4) Any action taken to prevent recurrence.

As specified in Section 208, within 15 days of receiving information of each AO, the Commission shall provide as wide dissemination to the public as reasonably possible as soon as such information becomes available.

A final AO policy statement containing criteria for determining an AO was published in the *Federal Register* on December 19, 1996, (61 FR 67072). Revised AO criteria were published in the *Federal Register* on April 17, 1997 (62 FR 18820) to incorporate minor changes and to revise criterion III covering Fuel Cycle Licensees.

An incident or event will be considered an AO if it involves a major reduction in the degree of protection of the public health or safety. This type of incident or event would have a

moderate or severe impact on the public health or safety and could include, but need not be limited to the following:

(1) Moderate exposure to, or release of, radioactive material licensed by or otherwise regulated by the Commission;
(2) Major degradation of essential safety-related equipment; or
(3) Major deficiencies in design, construction, use of, or management controls for facilities or radioactive material licensed by or otherwise regulated by the Commission.

2.3 Agreement State Proposed AOs

Agreement State staff should screen events against the AO criteria and identify potential AO events as part their routine program to inform NRC of all events reported by Agreement licensees. In addition to routine reporting of significant and routine events to NRC, Agreement States are requested to prepare a special written report for potential abnormal occurrences. Agreement State staff should follow the guidelines for preparing AO write-ups contained in Section 2.5 of this "Handbook." When questions arise on a given event, it may sometimes be necessary for NRC to directly contact an Agreement State representative and request additional information.

2.4 Abnormal Occurrence Criteria (Appendix A, 62 FR 18822)

Criteria by types of events used to determine which incidents or events will be considered for reporting as AOs are as follows:

I. For All Licensees.

A. Human Exposure to Radiation from Licensed Material.

1. Any unintended radiation exposure[3] to an adult (any individual 18 years of age or older) resulting in an annual total effective dose equivalent (TEDE) of 250 millisievert (mSv) (25 rem) or more; or an annual sum of the deep dose equivalent (external dose) and committed dose equivalent (intake of radioactive material) to any individual organ or tissue other than the lens of the eye, bone marrow and the gonads, of 2500 mSv (250 rem) or more; or an annual dose equivalent to the lens of the eye, of 1 Sv (100 rem) or more; or an annual sum of the deep dose equivalent and committed dose equivalent to the bone marrow, and the gonads, of 1 Sv (100 rem) or more; or an annual shallow-dose equivalent to the skin or extremities of 2500 mSv (250 rem) or more.

2. Any unintended radiation exposure to any minor (an individual less than 18 years of age) resulting in an annual TEDE of 50 mSv (5 rem) or more, or to an embryo/fetus resulting in a dose equivalent of 50 mSv (5 rem) or more.

3. Any radiation exposure that has resulted in unintended permanent functional damage to an organ or a physiological system as determined by a physician.

B. Discharge or Dispersal of Radioactive Material from its Intended Place of Confinement.

1. The release of radioactive material to an unrestricted area in concentrations which, if averaged over a period of 24 hours, exceed 5000 times the values specified in Table 2 of Appendix B to 10 CFR Part 20, unless the licensee has

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An "unintended radiation exposure" includes any occupational exposure, exposure to the general public, or exposure as a result of a medical misadministration (as defined in §35.2) involving the wrong individual that exceeds the reporting values established in the regulations.

All other reported medical misadministrations will be considered for reporting as an AO under the criteria for medical licensees. In addition, unintended radiation exposures include any exposure to a nursing child, fetus, or embryo as a result of an exposure (other than an occupational exposure to an undeclared pregnant woman) to a nursing mother or pregnant woman above specified values.

demonstrated compliance with §20.1301 using §§20.1302(b)(1) or 20.1302(b)(2)(ii).

Radiation levels in excess of the design values for a package, or the loss of confinement of radioactive material resulting in one or more of the following: (a) a radiation dose rate of 10 mSv (1 rem) per hour or more at 1 meter (3.28 feet) from the accessible external surface of a package containing radioactive material; (b) a radiation dose rate of 50 mSv (5 rem) per hour or more on the accessible external surface of a package containing radioactive material and that meet the requirements for "exclusive use" as defined in 10 CFR 71.47; or (c) release of radioactive material from a package in amounts greater than the regulatory limits in 10 CFR 71.51(a)(2).

C. *Theft, Diversion, or Loss of Licensed Material, or Sabotage or Security Breach.*[6]

1. *Any lost, stolen, or abandoned sources that exceed 0.01 times the A_1 values, as listed in 10 CFR Part 71, Appendix A, Table A-1, for special form (sealed/nondispersible) sources, or the smaller of the A_2 or 0.01 times the A_1 values, as listed in Table A-1, for normal form (unsealed/dispersible) sources or for sources for which the form is not known. Excluded from reporting under this criterion are those events involving sources that are lost, stolen, or abandoned under the following conditions: sources abandoned in accordance with the requirements of 10 CFR 39.77(c); sealed sources contained in labeled, rugged source housings; recovered sources with sufficient indication that doses in excess of the reporting thresholds specified in AO criteria I.A.1 and I.A.2 did not occur during the time the source was missing; and unrecoverable sources lost under such conditions that doses in excess of the reporting thresholds specified in AO criteria I.A.1 and I.A.2 were not known to have occurred.*

2. *A substantiated case of actual or attempted theft or diversion of licensed material or sabotage of a facility.*

3. *Any substantiated loss of special nuclear material or any substantiated inventory discrepancy that is judged to be significant relative to normally expected performance, and that is judged to be caused by theft or diversion or by substantial breakdown of the accountability system.*

Information pertaining to certain incidents may be either classified or under consideration for classification because of national security implications. Classified information will be withheld when formally reporting these incidents in accordance with Section 208 of the Energy Reorganization Act of 1974, as amended. Any classified details regarding these incidents would be available to the Congress, upon request, under appropriate security arrangements.

4. *Any substantial breakdown of physical security or material control (i.e., access control containment or accountability systems) that significantly weakened the protection against theft, diversion, or sabotage.*

D. *Other Events (i.e., those concerning design, analysis, construction, testing, operation, use, or disposal of licensed facilities or regulated materials).*

1. *An accidental criticality [10 CFR 70.52(a)].*

2. *A major deficiency in design, construction, control, or operation having significant safety implications requiring immediate remedial action.*

3. *A serious deficiency in management or procedural controls in major areas.*

4. *Series of events (where individual events are not of major importance), recurring incidents, and incidents with implications for similar facilities (generic incidents) that create a major safety concern.*

II. *For Commercial Nuclear Power Plant Licensees.*

A. *Malfunction of Facility, Structures, or Equipment.*

. *Exceeding a safety limit of license technical specification (TS) [§50.36(c)].*

2. *Serious degradation of fuel integrity, primary coolant pressure boundary, or primary containment boundary.*

3. *Loss of plant capability to perform essential safety functions so that a release of radioactive materials, which could result in exceeding the dose limits of 10 CFR Part 100 or 5 times the dose limits of 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 19, could occur from a postulated transient or accident (e.g., loss of emergency core cooling system, loss of control rod system).*

B. *Design or Safety Analysis Deficiency, Personnel Error, or Procedural or Administrative Inadequacy.*

. *Discovery of a major condition not specifically considered in the safety analysis report (SAR) or TS that requires immediate remedial action.*

. *Personnel error or procedural deficiencies that result in loss of plant capability to perform essential safety functions so that a release of radioactive materials, which could result in exceeding the dose limits of 10 CFR Part 100 or 5 times the dose limits of 10 CFR Part 50, Appendix A, GDC 19, could*

occur from a postulated transient or accident (e.g., loss of emergency core cooling system, loss of control rod system).

III. *For Fuel Cycle Facilities.*

1. *A shutdown of the plant or portion of the plant resulting from a significant event and/or violation of a law, regulation, or a license/certificate condition.*

2. *A major condition or significant event not considered in the license/certificate that requires immediate remedial action.*

3. *A major condition or significant event that seriously compromises the ability of a safety system to perform its designated function that requires immediate remedial action to prevent a criticality, radiological or chemical process hazard.*

IV. *For Medical Licensees.*

A medical misadministration that:

(a) *Results in a dose that is (1) equal to or greater than 1 gray (Gy) (100 rad) to a major portion of the bone marrow, to the lens of the eye, or to the gonads, or (2) equal to or greater than 10 Gy (1000 rad) to any other organ; and*

(b) *Represents either (1) a dose or dosage that is at least 50 percent greater than that prescribed in a written directive or (2) a prescribed dose or dosage that (i) is the wrong radiopharmaceutical,[7] or (ii) is delivered by the wrong route of administration, or (iii) is delivered to the wrong treatment site, or (iv) is delivered by the wrong treatment mode, or (v) is from a leaking source(s).*

Guidelines for "Other Events of Interest."

The Commission may determine that events other than AOs may be of interest to Congress and the public and be included in an Appendix to the AO report as "Other Events of Interest." Guidelines for events to be included in the AO report for this purpose are items that may possibly be perceived by the public to be of health or safety significance. Such items would not involve a major reduction in the level of protection provided for public health or safety; therefore, they would not be reported as abnormal occurrences. An example is an event where upon final evaluation by an NRC Incident Investigation Team, or an Agreement State equivalent response, a determination is made that the event does not meet the criteria for an abnormal occurrence.

The wrong radiopharmaceutical as used in the AO criterion for medical misadministrations refers to any radiopharmaceutical other than the one listed in the written directive or in the clinical procedures manual.

2.5 *GUIDELINES FOR ABNORMAL OCCURRENCE WRITE-UPS*

All AO write-ups should be complete, up-to-date, and written using text that is understandable to non-technical readers. Please do not use bold or italics in writeups; use underline instead. Any special fonts will be added during the publishing stage by the Technical Publications Specialist using the Kodak Ektaprint Electronic Publishing System.

NOTE: Those Agreement States that already have INTERNET E-Mail capability may electronically send their AO information to OSP via Internet using WordPerfect or an ASCII text file. NRC is currently using WordPerfect 6.1. The file may be attached to an e-mail transmission. The OSP AO coordinator, Patricia Larkins, may be reached at (PML@NRC.GOV).

Margin notation - Indicate the Original ID No., State ID-YR..-ITEM NO. (XX-94-01).

First paragraph - State the AO criteria for the event by citing the appropriate section of the AO criteria.

Date and Place - Provide the date the event occurred, the licensees name, and the city and state address of the licensee.

Nature and Probable Consequences - Briefly explain what happened and what were the circumstances. Provide the specific details of the event, i.e., exposure (where applicable), source, indicate the specific isotope(s), quantity, dose (where applicable), treatment plan (where applicable), equipment, manufacturer and Model No. Describe any immediate actions taken by the licensee or the State (confirmatory action letter, special inspection, enforcement conference, enforcement action(s), etc.). The write-up should answer where, when, how, why, and efforts to prevent recurrence.

For occupational, medical, or public overexposures identify whether the person was notified. For medical misadministrations, include the intended and actual treatment plan, identify any health effects. Mention if a medical consultant has been contracted to review the event. Include the consultant's conclusions and identify the effects on the patient. Never mention any health effects on a patient without attributing the statement to the licensee or medical consultant. Indicate whether the primary physician was notified.

NRC policy states that all documents must be published in dual units (Metric and English).

Cause or Causes - Self explanatory

Action(s) taken to prevent recurrence - Briefly explain what actions were taken to prevent recurrence by the licensee, and indicate whether or not the State directed the licensee to take the specific action(s), i.e., was State satisfied with the licensee's corrective actions, if so, please indicate that the "state was satisfied with the following corrective actions taken by the licensee ...." or "the licensee has complied with the corrective actions recommended by the State as follows . . " Were there any enforcement actions, penalties, etc.?

Last paragraph - Indicate the status by stating whether the AO is closed or remains open waiting for additional significant information from the Agreement State licensee. An item should only be identified as open if the State expects additional significant action may take place that will be covered in a follow-up report. The new information contained in the follow-up report should be provided to NRC for inclusion in the AO report under the section entitled "Update to Previously Reported AOs."

The following pages contain two sample AO write-ups.

Fig. 2.1 SAMPLE INDUSTRIAL RADIOGRAPHY AO REPORT

State ID-Yr.-No.
(XX-97-01)

Industrial radiography overexposure at (Name of facility, City, State) location.

In accordance with the AO criteria an annual shallow-dose equivalent to the skin or extremities greater than 2500 mSv (250 rem) is considered an abnormal occurrence.

Date and Place: The Agency was notified on (**notification date**), by (Licensee), that a radiography overexposure had occurred on (**event date**), at (**facility, location (Catastate)**).

Nature and Probable Consequences: On (event date), at approximately 7:00 PM, a radiography trainer working for (Licensee) in (**facility, location, (City, State)**), experienced a source disconnect of a 96 curie iridium-192 radiography source, that resulted in an extremity exposure of at least 500 rem to the thumb and index finger of a radiographer's left hand. The radiography trainer was radiographing welds on a 12 inch pipe line in a five foot deep ditch at (Licensee), and began experiencing difficulty with the source exiting from and retracting into the camera earlier in the day. After completing a radiograph, while trying to retract the source to the shielded position, survey meter readings indicated a source disconnect. The radiographer got a one inch thick lead sheet from the radiography truck and covered the source in the guide tube. By this time it was dark. The radiographer helper rope off a larger area and stayed a distance from the source. He then asked the (Licensee) inspector to notify the radiography company RSO, but to tell him that everything was under control, and that the radiographer could handle the situation. As the trainer disconnected the guide tube, the source assembly fell into the mud at the bottom of a ditch. While picking up the source assembly from the mud with channel lock pliers, the source slipped. He instinctively reached for and straightened the source assembly (pigtail) with his hand, apparently touching the source in the process. He placed the pigtail into the camera, intending to place the source capsule in first. He noticed the survey meter reading high, indicating the source was outside of the camera. The radiographer then removed the source from the camera and placed it under the lead sheet. He then removed the lockbox from the camera, inserted the

Source\Quantity

Exposure

NOTE: Emphasis added [bold] to clarify specific information that should be included in the report

sheet. He then removed the lockbox from the camera, inserted the source end of the pigtail, replaced the lockbox and locked it. The source was now secured in the shielded position. The barricades were taken down, the equipment was loaded on the truck, and the crew returned to the office. The company did not notify the Agency of the disconnect.

About 10 days later, the radiographer started experiencing discomfort in his left thumb and index finger and visited a doctor for treatment on March 9, 1994, March 14, and April 1, 1994. On April 11, 1994, the RSO and the radiographer visited the Agency office and reported the incident. The Agency investigated the incident at this time. The radiographer's film badge reading was 1.06 rem whole body. An inspection of the camera was performed by the company RSO the day after the incident. The Licensee and the State Agency determined that the company had ordered two model #22 pigtails and sources from (Manufacturer, City, State), for the company's Gamma Century radiography cameras. (Manufacturer) inadvertently sent a model #22 and a Model #23 pigtail instead of the two model #22's ordered. The two models appear similar, but close examination reveal two differences. The model #22 is manufactured with 1/8 inch aircraft cable and a 3/4 inch connector, the model #23 is manufactured with teleflex cable, the same as the drive cable material, and a one inch connector. The model #23 is not made to be used in the Gamma century camera. The radiography company assumed the two pigtails sent to them were model #22's. The #23 was mistakenly placed in the Gamma century camera and is apparently the cause of the disconnect. The Agency investigation determined that the trainer had received at least a 1500 rem exposure to the thumb and index finger of the left hand. The (State) Radiation Control Program, in which the manufacturer was licensed, was informed of the incident and investigated the manufacturer's (Licensee) error in sending the two different pigtails to the radiography company.

Equipment\Device (Manuf.\Model No.)

Cause or Causes - The manufacturer's mistaken delivery of a pigtail model number different than the one ordered and the radiography company's assumption that the pigtails they received were the models they ordered, resulted in a pigtail being used in a camera for which it was not manufactured. The disconnect resulted from the difference in the length of the connectors between the two models. Also, the radiographer attempted an unauthorized recovery of the disconnected source. The radiographer was not trained in source recovery and had no previous experience with source disconnects.

Actions Taken to Prevent Recurrence

Licensee - Actions will be given at the enforcement conference.

Sate Agency - The Licensee and radiographer were cited for violations of the (State) Regulations for Control of Radiation. The Licensee was cited for the extremity exposure, unauthorized retrieval of a disconnected source, failure to immediately notify the Agency of the incident, and failure to notify the Agency in writing within thirty days of the incident. The radiographer was cited for unauthorized retrieval of a disconnected source. The incident has been referred for escalated enforcement.

Status

This file is (open\closed) in (State). The event will remain open for additional information from the State of (State).

Fig. 2.2 SAMPLE MEDICAL AO REPORT

State ID-YR.-NO.
(XX-9702)

Medical Brachytherapy Misadministration at
(Name of facility, City, State) location.

Criteria

In accordance with the AO criteria, administering a therapeutic dose that is at least 50 percent greater then the prescribed dose should be considered an abnormal occurrence.

Date and Place - The Agency was notified on **(Date)**, that a brachytherapy overexposure had occurred on **(Event** date(s)); at **Facility; City and State** location).

Procedure
Source(s)
Treatment plan
Device\Equipment

Nature and Probable Consequences - A 68-year-old woman with Stage II vaginal cancer was referred to the hospital's radiation therapy department for a gynecological brachytherapy procedure involving the afterloading of cesium-137 and iridium-192 sources. A plan was developed to deliver a total dose of 6000 centiGray (cGy) (6000 rad) by a combination of 4000 cGy (4000 rad) from an external beam (linear accelerator) and 2000 cGy (2000 rad) from vaginal implant therapy. The external beam therapy was completed on September 9, 1993. The patient was then evaluated and plans were made to complete the implantation portion of the treatment. The treatment plan for the implant therapy included calculations for the time required to deliver 6000 cGy (6000 rad). The dose already delivered by the external beam was not considered in the plan.

Actual vs. intended administration

The attending physician reviewed the dose calculations on October 9, the fourth day of the implant, and determined that the duration of the implant treatment was likely to have been too long. He immediately removed the implants. Calculations revealed that the patient received 4000 to 4500 cGy (4000 to 4500 rad) from the brachytherapy treatment. Two days later, on Monday October 11, the attending physician verified with the physics staff that his dose calculations were correct. The patient received a total dose of 8000-8500 cGy (8000-8500 rad), (4000 from external beam and (4000-4500 from the implant) rather than the 6000 cGy intended (4000 from external beam and 2000 from the implant). On October 11, the attending physician in radiation oncology reviewed the radiation therapy calculations and verified with staff the actual administered dose. A telephone report was made to the **[Identify State Health Department]** on October 12, 1993, and an on-site investigation by State staff was conducted on

NOTE: Emphasis added **[bold]** to clarify specific information that should be included in the report.

Ocober 14, written report from the licensee was submitted to the State agency on October 26. A committee of professionals convened to perform a quality review. As a result of a literature and standard practice review the committee concluded that the recommended treatment for Stage II vaginal carcinoma is generally in a range of 7000-7500 cGy (7000-7500 rad) total dose with an external dose of 4000-5000 cGy (4000-5000 rad) and delivery of the remaining dose by implant. Others have recommended up to a total dose of 8500 cGy (8500 rad). This patient while receiving more than her physician initially intended, did not receive a dose markedly beyond recommended treatment for her disease. The dose was within an acceptable range, therefore, it is not anticipated that any complications beyond those normally seen with treatment for this therapy will occur. However, the patient will be closely monitored for any complications and appropriate treatment will be provided.

Health effect to patient

The patient had been notified of the event by the physician on October 20. A letter confirming the discussion of the the event was also sent to the patient.

Patient notification

Cause or Causes - The reportable event was caused by a failure to account for the previously administered external beam therapy. The incident occurred due to lack of communication of the prior therapy during the planning of the brachytherapy treatment.

Actions Taken to Prevent Recurrence

Licensee - As soon as the licensee's management determined that a reportable event had occurred, they formed a committee of professionals not involved in the patient's care to conduct a quality assurance review. The committee concluded that the incident occurred due to lack of communication of the prior therapy during the planning of the brachytherapy treatment. They recommended that no brachytherapy be given without a signed, written prescription by the attending physician. The written prescription must contain information about all radiation therapy given to the patient. The medical center has adopted the committee's recommendations and has initiated training to the affected staff. This action should prevent a recurrence of a similar event.

State agency - The results of the on-site investigation by the State staff agrees with the findings of the licensee's quality assurance review. The licensee's proposal appears to be adequate to prevent recurrence.

Status

The State considers this item (open, closed).

Appendix

Glossary

DCS	The Document Control System (DCS) is an internal NRC automated document search and retrieval system, indexed by a unique identification (assession) No. for use by the staff of the NRC.
EN	The Event Notification (EN) system is an internal NRC automated event tracking system used by the NRC Operations Center to track information on incoming notifications of the occurrence of significant material events that have or may affect public health and safety. Significant material events are reported to the NRC Operations Center by NRC licensees, staff of the Agreement States, other Federal agencies, and the public. The EN's are published daily through Internet.
Gray	Gray (Gy) is the SI unit of absorbed dose. One gray is equal to an absorbed dose of 1 joule/kilogram (100 rads).
Metric Sys.	The metric system is now included in all Federal documents. All event reports should include the dual system of Units (SI) in the following order. First use the International System of Units (SI) with the English System unit equivalent following in parentheses. Spell out the first time it appears, continue with an abbreviation, (see examples below). 1000 centiGray (cGy) (1000 rad) the first time, and continue with 1000 cGy (1000 rad). 50 millisieverts (mSv) (5 rem) 730 megabecquerel (MBq) (20.4 mCi)
NMED	The Nuclear Materials Events Database (NMED), maintained by NRC, is a historical collection of incidents and events that have occurred throughout the United States involving the use of radioactive material covered under the Atomic Energy Act. This excludes events occurring at nuclear power plants.
NRC Ops Center	The NRC Operations Center in Rockville, MD, serves as the focal coordination point for communicating with NRC licensees, State agencies, and other Federal agencies about operating events in both the nuclear reactor and nuclear material industry. The Operations Center is staffed 24 hours a day by an NRC Headquarters Operations Officer (HOO), who is trained to receive, evaluate, and respond to events reported to the Operations Center.
PN	Events reports that appear to have health and safety significance or major public or media interest are summarized and presented in Preliminary

Notification (PN) reports. These reports are available to the public through Internet.

Rad — Rad is the special unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs/grams or 0.01 joule/kilogram (0.01 gray)

Rem — Rem is the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rem. is equal to the absorbed dose in rads multiplied by the quality factor (1 rem = 0.01 sievert).

Sievert — Sievert is the SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor (1 Sv = 100 rem.).

Reference Manual

The following is a list of NRC manuals and procedures that contain additional information on event response and abnormal occurrences. Additionally information is provided on the NRC Region contact for Agreement State issues, the Federal Radiological Emergency Response Plan (FRERP), and the Radiation Emergency Assistance Center (REACTS) along with a telephone number.

NRC Management Directives

8.1	Abnormal Occurrence Reporting Procedures
8.10	NRC Medical Event Assessment Program

NRC Inspection Manual (Series 1300, Incident Response)

1300	Incident Response Actions - Responsibility and Authority (84-080
1301	Response to Non-Emergency Incidents Involving Radioactive Material (96-022)
1302	Action Levels for Radiation Exposures and Contamination Associated with Material Events Involving Members of the Public (94-004)
1303	Requesting Emergency Acceptance of Radioactive Material by the U.S. Department of Energy (DOE) (95-009)
1330	Response to Transportation Accidents Involving Radioactive Materials (84-22)
1360	Use of Physician and Scientific Consultants in the Medical Consultant Program (94-013)

NRC Inspection Procedures Manual, (Series 8700, Material Safety Inspection)

87103	Inspection of Materials Licensees Involved in an Incident Bankruptcy Filing (97-008)

FRERP — The Commission is the lead federal agency for response to any event involving NRC-licensed Atomic Energy Act material under the Federal Radiological Emergency Response Plan (FRERP), which includes other federal agencies, i.e. Department of Energy (DOE), Environmental Protection Agency (EPA), Federal Emergency Response Administration (FEMA). FRERP covers any peacetime radiological emergency that has actual, potential or perceived radiological consequences within the United States.

REACTS — The Radiation Emergency Assistance Center/Training Site (REACTS), is a Department of Energy (DOE) resource headquartered in Oak Ridge, Tennessee. REACTS is available 24 hours a day to provide medical and radiological assistance either from the REACTS facility or the accident site. Additionally, REACTS maintains a listing of other professionals throughout the country who are recognized as having highly specialized expertise and equipment to manage a particular area of concern.

RSAO — The Regional State Agreements Officer (RSAO) is a designated staff member, in an NRC regional office, who serves as the point of contact for the region and the Office of State Programs regarding Agreement State radiation control programs, and who participates in technical reviews of Agreement State radiation control programs.

ATTACHMENT

8

DRC - MEDICAL MISADMINISTRATION REPORT

9.8

MEDICAL MISADMINISTRATION REPORT

TO: (Executive Secretary, Utah Radiation Control Board)	FROM: (License No., Name, Address, Phone No.)
William J. Sinclair, Director Utah Division of Radiation Control 168 North 1950 West P.O. Box 144850 Salt Lake City, Utah 84114-4850 (801)536-4250 VOX (801)533-4097 FAX	LICENSE NO. U T -

Referring Physician Name:		MONTH	DAY	YEAR
	EVENT DATE			
	WRITTEN REPORT DATE			

Phone Report Made		Physician Notified		Patient Notified		Event Record Filed	

		SODIUM IODINE, I-125 Or I-131, >30 MICROCURIES
		Wrong Patient
		Wrong Radiopharmaceutical
		Administered Dose Differs From Prescribed Dose By > 20% And Difference Exceeds 30 Microcuries
		THERAPEUTIC RADIOPHARMACEUTICAL DOSE, OTHER THAN I-125 Or I-131
		Wrong Patient
		Wrong Radiopharmaceutical
		Wrong Route Of Administration
		Administered Dose Differs From Prescribed Dose By > 20%
		STEREOTACTIC RADIOSURGERY (Gammaknife)
		Wrong Patient
		Wrong Treatment Site
		Administered Dose Differs From Prescribed Dose By More Than 10%
		TELETHERAPY
		Wrong Patient
		Wrong Mode Of Treatment
		Wrong Treatment Site
		Administered Dose Differs From Prescribed Dose By More Than 10% If There Are 3 Or Fewer Fractions Prescribed; Or When Weekly Calculated Administered Dose Exceeds Prescribed Dose By > 30%; Or When Calculated Total Administered Dose Differs From Prescribed Dose By > 20%
		BRACHYTHERAPY
		Wrong Patient
		Wrong Radionuclide
		Wrong Treatment Site
		Leaking Source
		One Or More Sources Not Removed At End Of Treatment
		Calculated Administered Dose Differs From Prescribed Dose By > 20%
		DIAGNOSTIC RADIOPHARMACEUTICAL DOSE, OTHER THAN QUANTITIES THAT EXCEED 30 MICROCURIES OF I-125 OR I-131, OR BOTH, WHEN THE PATIENT DOSE EXCEEDS 5 REM EFFECTIVE DOSE EQUIVALENT OR 50 REM ORGAN DOSE AND INVOLVES:
		Wrong Patient
		Wrong Radiopharmaceutical
		Wrong Route Of Administration
		Administered Dose Differs From Prescribed Dosage

Instructions: Complete the form by identifying the type of medical misadministration you are reporting. Responses for a phone report, physician notification, patient notification, and event record filing may be a yes or no response. On the reverse side of this form, write an abstract of the misadministration. Include a brief description of the event; why the event occurred; the effect on the patient; actions taken to prevent recurrence; whether the patient or the patient's responsible relative or guardian was informed, and if not, why not; and if the patient was notified, what information was provided to the patient.

SIGNATURE		DATE	

ABSTRACT

ATTACHMENT

9

NRC - FORM
565

EVENT REPORT

NRC FORM 565 (4-94) U. S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0178
EXPIRES: 04/30/97

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 1 HOUR. THIS INFORMATION IS REQUESTED TO ASSESS MATERIALS EVENTS AND EVALUATE ACTIONS NECESSARY TO PREVENT THEIR RECURRENCE. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0178), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

EVENT REPORT

LICENSEE	CITY AND STATE	ORIGINAL ITEM NUMBER
TYPE OF LICENSE *(i.e., Field Radiography, Private Practice Medical, etc.)*	LICENSE NUMBER	THIS ITEM NUMBER

ABNORMAL OCCURRENCE	FOLLOW-UP REPORT	ISOTOPE	TYPE OF ISOTOPE	DATE OF EVENT
☐ YES ☐ NO	☐ YES		☐ AEA MATERIAL ☐ ACCELERATOR PRODUCED ☐ NORM	DATE OF THIS REPORT

AMOUNT OF RADIOACTIVE MATERIAL *(If amount of material is below exempt quantity, do not complete this form)*

☐ < 1 MILLICI	☐ 100 MILLICI - < 1 CI	☐ 10 CI - 100 CI	☐ UNKNOWN
☐ 1 MILLICI - < 100 MILLICI	☐ 1 CI - < 10 CI	☐ > 100 CI	

EVENTS INVOLVING OVEREXPOSURE

NUMBER OF OVEREXPOSURES	TYPE OF INDIVIDUAL	EVENT LOCATION	DOSE TO	DOSE	RAD	REM
SOURCE OF RADIATION ☐ EXTERNAL ☐ INTERNAL ☐ BOTH	☐ EMPLOYEE ☐ MINOR EMPLOYEE ☐ EMBRYO/FETUS ☐ PUBLIC	☐ RESTRICTED AREA ☐ UNRESTRICTED AREA ☐ CONTROLLED AREA	☐ WHOLE BODY ☐ LENS OF EYE ☐ EXTREMITY ☐ SKIN ☐ ORGAN			

☐ LEAKING SOURCE

☐ LOST OR STOLEN MATERIAL

EVENT	EVENT LOCATION	PROBABLE DISPOSITION	
☐ LOST ☐ FOUND ☐ THEFT ☐ THEFT, WITH FORCE	☐ FIXED SITE ☐ TEMPORARY JOB SITE ☐ LICENSED VEHICLE ☐ COMMERCIAL CARRIER ☐ OTHER *(Specify)*	☐ WELL LOGGING RECOVERED SOURCE ☐ WELL LOGGING IRRETRIEVABLE SOURCE ☐ COMMERCIAL WASTE ☐ INCINERATOR ☐ SCRAP METAL	☐ UNKNOWN ☐ OTHER *(Specify)*

☐ RELEASE OF MATERIALS

FORM	EVENT	LOCATION
☐ SOLID ☐ LIQUID ☐ GAS	☐ SPILL ☐ TRANSPORTATION ☐ OTHER *(Specify)*	☐ RESTRICTED AREA ☐ UNRESTRICTED AREA ☐ CONTROLLED AREA

☐ EVENTS INVOLVING FACILITIES

☐ FIRE ☐ DAMAGE TO DEVICE ☐ EXPLOSION	☐ SPILL ☐ > 24-HOUR DENIAL OF ACCESS ☐ DAMAGE TO SAFETY EQUIPMENT	☐ OTHER *(Specify)*

☐ EVENTS INVOLVING GAUGES

TYPE	EVENT
☐ GENERAL LICENSE ☐ EXEMPT ☐ SPECIAL LICENSE ☐ FIXED ☐ PORTABLE	☐ SHUTTER ☐ MOISTURE/DENSITY GAUGE DAMAGE ☐ LOST/STOLEN ☐ OTHER *(Specify)*

☐ EVENTS INVOLVING RADIOGRAPHY

LOCATION	EVENT
☐ FIXED ☐ TEMPORARY JOB SITE	☐ SOURCE DISCONNECT ☐ SOURCE NOT RETURNED TO FULLY SHIELDED POSITION ☐ CABLE FAILURE ☐ FAILURE TO FOLLOW PROCEDURES

	MANUFACTURER	MODEL	SERIAL NUMBER
☐ EVENT INVOLVING AN IRRADIATOR			
☐ EVENTS INVOLVING TELETHERAPY			

ABSTRACT *(Include the cause of the event(s) and licensee corrective action. May be continued on the reverse side)*

ATTACHMENT

10

(PEF'S)

Performance Evaluation Factors

Attachment 10

4/98

PERFORMANCE EVALUATION FACTORS (PEF'S)

PEF's are subjective factors that aid in identification of the potential for degraded radiation safety performacne; assist inspectors in focusing on causes for degraded radiation safety performance; confirm and document inspectors' conclusions about licensee's radiation safety performance.

Licensee: _____ License Number: _____

Check each appropriate performance indicator that applies when if items of noncompliance are identified:

List of Performance Indicators

Lack of senior management involvement with the radiation safety program and/or Radiation Safety Officer (RSO) oversight	( )Y ( )N
RSO too busy with other assignments	( )Y ( )N
Insufficient staffing	( )Y ( )N
Radiation Safety Committee fails to meet or functions inadequately	( )Y ( )N
Inadequate consulting services or inadequate audits	( )Y ( )N
Users not familiar with safety procedures or license conditions	( )Y ( )N
Excessive missed surveillances	( )Y ( )N
Lack of Audits	( )Y ( )N
RSO not separated from responsibility for production activities	( )Y ( )N
Repeated failure to correct violations identified by consultant or licensee	( )Y ( )N
Failure to implement adequate corrective actions on previous violations	( )Y ( )N
Inability to readily retrieve records and documentation pertaining to licensed program	( )Y ( )N
Reportable events/misadministrations since last inspection	( )Y ( )N
Numerous diagnostic misadministrations	( )Y ( )N
Numerous repeat violations	( )Y ( )N
Financial instability of licensee	( )Y ( )N
Frequent resignation of staff	( )Y ( )N
Inability to perform all required surveys, tests, audits, etc. on time	( )Y ( )N
Lack of training documentation	( )Y ( )N
Failure to assess the performance of personnel training	( )Y ( )N
Allegations/Investigations since last inspection	( )Y ( )N
Licensee not inventorying radioactive materials	( )Y ( )N
Lack of structure to identify staff responsibilities	( )Y ( )N
Company subject to name change, developed into subsidiary, or transferred	( )Y ( )N
Failure to provide training to individuals before authorizing them to use licensed materials	( )Y ( )N
Radiation waste not being disposed of at same rate of generation	( )Y ( )N
Failure to retrain authorized users	( )Y ( )N
Inadequate RSO attention to radiation safety program	( )Y ( )N
Incomplete responses to previous identified violations	( )Y ( )N
No evidence licensee is capable of responding to radiological event	( )Y ( )N
Inadequate surveys	( )Y ( )N
RSO spends insufficient time at facility	( )Y ( )N
Identified violations similar to those previously identified	( )Y ( )N
Licensee not familiar with safety procedures, license requirements, URCR, or DOT regulations	( )Y ( )N

COMMENTS: _____

_____

PERFORMANCE INDICATORS
Page 2

Evaluation of Performance Indicators

Number of Performance Indicators identified: _____

Inspectors level of concern in licensee's potential for degraded safety performance:

___	No Concern	(< 2 PEF's)
___	Concern	(≥ 2 PEF's)
___	Significant Concern	(≥ 3 PEF's)
___	Great Concern	(≥ 4 PEF's)

Follow-up Actions Taken *(The type of follow-up action is at the discretion of the inspector.)*

___ None

___ Telephone Contacts

___ "Management paragraph"(1) added to Notice of Violation cover letter

___ Meeting with licensee management

___ Special inspection, tailored to a particular aspect(s) of the licensee's radiation safety program

___ Early follow-up inspection

___ Confirmatory action letters

___ Other

(1) *The Division of Radiation Control is (concerned, significantly concerned or greatly concerned) with the implementation of your program in the area of management control in that your corrective actions were not effective and resulted in the recurrence of violation(s). Consequently, your required response to this letter should describe those specific actions planned or taken to improve the effectiveness of the management control of your licensed operations, with particular emphasis on measures currently being taken to prevent further violations.*

APPENDIX III

INSPECTION OF AGREEMENT STATE LICENSEES

A. PURPOSE

Policy and guidelines for performing inspections of Agreement State licensees working under reciprocity.

B. INSPECTION

The regional office(s) that have Nuclear Regulatory Commission jurisdiction in the area(s) in which the Agreement State licensees will operate shall take the following action:

1. FREQUENCY

Inspections of Agreement State licensees operating under the general license in 10 CFR 150.20 should be conducted using the same provisions used for equivalent NRC-licensed activities, except as specifically defined in this chapter. These provisions include, but are not limited to, inspection processes and inspection reports as defined in NRC Manual Chapter 2800 (MC 2800). The inspection frequencies for reciprocity licensees are not subject to the provisions in MC 2800 and are not to be extended for good licensee performance.

The percentage of reciprocity licensees to be inspected each year by program code and priority should be as follows with priorities 1 through 3 as Core Inspections and the remaining priorities as non-Core Inspections:

Priority 1 program codes - 50 percent of licensees inspected each year

100 percent of all service licensees who perform teletherapy and panoramic irradiator source installations, changes, and removals are also to be inspected each year.

Priority 2 program codes - 50 percent of licensees inspected each year

Priority 3 program codes - 30 percent of licensees inspected each year

Priority 4 program codes - 25 percent of licensees inspected each year

All other program codes - 10 percent of licensees inspected each year

NOTE: The percentages of inspections of reciprocity licensees are based on the number of initial NRC Form 241 requests received for processing by each regional office.

NOTE: In cases where a licensee performs reciprocity activities in several regions, the region with the first opportunity to inspect the licensee at a work site or the home office should do so. The completed inspection should be recorded as a completion for the inspecting region. The inspecting region should notify the regional office responsible for the area in which the Agreement State licensee is located.

2. LOCATION

Inspections of Agreement State licensees operating under reciprocity in areas of NRC jurisdiction pose many difficulties such as short lead time and logistics. Therefore, to meet NRC's inspection goal, the following inspection scenarios, in decreasing preference from option a. to option d. should be followed for the inspection of reciprocity activities:

a. Conduct unannounced inspections of actual field work locations.

b. Conduct announced inspections of actual field work locations.

c. Conduct unannounced inspections of the licensee's home office after completion of reciprocity activities (if unable to inspect actual field work location) and after notifying the Agreement State.

d. Conduct announced inspections of the licensee's home office after completion of reciprocity activities (if unable to inspect actual field work location) and after notifying the Agreement State.

C. INSPECTION REPORTS AND ENFORCEMENT ACTION

1. Field notes (unless escalated enforcement action is anticipated) shall be prepared for all inspections of Agreement State licensee activities. The inspecting region should enter the inspection documentation into the Inspection Followup System, and enter any pertinent information (as described in the Reciprocity Tracking system (RTS) Users Manual) about inspections and escalated enforcement actions into the RTS.

Note: For assist inspections, follow the procedures in MC 2800.

Note: Inspections of the licensee's home office should be entered into the first entry for the licensee with one entry per inspection.

2. The official record copy of the inspection documentation with the authorized NRC Form 241 shall be assigned the appropriate Regulatory Information Distribution System (RIDS) code and sent to NUDOCS/RIDS for processing.

3. "General Policy and Procedure for NRC Enforcement Actions," NUREG-1600, shall be used as the policy and criteria for taking enforcement actions against the licensee.

4. Copies of the enforcement correspondence shall be sent to:

   a. The Agreement State authority issuing the license under which the Agreement State licensee is operating:

   b. The NRC regional office in which the Agreement State is located:

   c. Other distribution in accordance with existing procedures.

5. Obtain the next available inspection report number from the Inspection Report Tracking System and record it in the comment field in RTS.

END

POLICY ON INSPECTION REVIEWS

1. Written field reports will be used to outline the scope of a radiation safety inspection. Inspectors will use field reports to document observations and any apparent violations of applicable requirements. Compliance History (summary of violations since the initial inspection) will also accompany the report as well as be updated in the database. A routing sheet (see attachment) with the inspector's and peer reviewer's comments as well as their signature and date will be entered on the routing sheet.

2. Each inspection report will be reviewed by a second inspector before being submitted for the Sections Manager's signature and subsequent filing.

3. The Section Manager will maintain a log of completed inspections and shall perform a management review of approximately every tenth inspection.

4. Supervisory personnel will accompany each inspector on at least on inspection per year.

INSPECTION ROUTING SHEET

Licensee: _____ License #: UT _____

Insp. Type: _____ Supvsr Accomp: _____ DATE

1. Conducted by: _____
2. Prepared by: _____
3. Reviewed by: CLARK GWYN JULIE PHILIP _____

Reviewer's Comments: _____

Next Inspection: Next Insp. Type:

SUPERVISORY REVIEW: INSPECTIONS AND INCIDENTS

Conducted by: _____ Date: _____

Y	N	N/A	Opening with management
Y	N	N/A	Operations observed
Y	N	N/A	Non-compliance recorded
Y	N	N/A	NOV Letter drafted: Non-compliance correct
Y	N	N/A	Posting/Labeling reviewed
Y	N	N/A	Leak Test dates reviewed
Y	N	N/A	Dosimetry reviewed
Y	N	N/A	Radioactive materials inventory reviewed
Y	N	N/A	Bioassay review adequate
Y	N	N/A	Records review adequate [ ] slice included
Y	N	N/A	Quality assurance reviewed
Y	N	N/A	Radiation Safety Committee meetings reviewed
Y	N	N/A	Procedures reviewed
Y	N	N/A	Instruments adequate for scope of program
Y	N	N/A	Wipes and surveys adequate
Y	N	N/A	Instrumentation and procedures adequate
Y	N	N/A	Training adequate
Y	N	N/A	Instrumentation calibration adequate and timely
Y	N	N/A	ALARA being practiced
Y	N	N/A	Inspectors comments and recommendations in letter
Y	N	N/A	_____
Y	N	N/A	_____

General Statement of Policy and Procedure For DRC Enforcement Actions

Preface

The following statement of general policy and procedure explains the enforcement policy and procedures of the Division of Radiation Control (DRC) and the DRC staff (staff) in initiating enforcement actions, and of the Executive Secretary of the Utah Radiation Control Board in reviewing these actions. This statement is applicable to enforcement in matters involving the radiological health and safety of the public, including employees' health and safety and the environment. The Executive Secretary may deviate from this statement of policy and procedure as appropriate under the circumstances of a particular case.

I. Introduction and Purpose

The purpose of the DRC enforcement program is to support the DRC's overall safety mission in protecting the public and the environment. Consistent with that purpose, enforcement action should be used:

As a deterrent to emphasize the importance of compliance with requirements, and

To encourage prompt identification and prompt, comprehensive correction of violations.

Consistent with the purpose of this program, prompt and vigorous enforcement action will be taken when dealing with licensees, who do not achieve the necessary meticulous attention to detail and the high standard of compliance which the DRC expects.[1] Each enforcement action is dependent on the circumstances of the case and requires the exercise of discretion after consideration of this enforcement policy. In no case, however, will licensees who cannot achieve and maintain adequate levels of safety be permitted to conduct licensed activities.

For purposes of this policy statement, safety means avoiding undue risk, i.e., providing reasonable assurance of adequate protection for the public in connection with the use of radioactive materials. Compliance means meeting regulatory requirements. Appendix A to this policy statement describes the nexus between safety and compliance.

II. Statutory Authority and Procedural Framework

A. Statutory Authority

The DRC's enforcement jurisdiction is drawn from the Radiation Control Act of the Utah Code 1954, as amended. Section 19-3-108 of the Act authorizes the DRC to conduct inspections and investigations and to issue orders as may be necessary or desirable to protect health or to minimize danger to life or property. Section R313-14-15 of the Utah Administrative Code authorizes the DRC to revoke licenses under certain circumstances (e.g., for material false statements, in response to conditions that would have warranted refusal of a license on an original application, for a licensee's

failure to build or operate a facility in accordance with the terms of the permit or license, and for violation of a DRC rule). Section 19-3-109 authorizes the DRC to impose civil penalties not to exceed $5,000 per violation for the violation of certain specified licensing provisions of the Act, rules, orders, and license terms implementing these provisions, and for violations for which licenses can be revoked. Section 19-3-110 (2) authorizes the DRC to seek injunctive or other equitable relief for violation of regulatory requirements.

B. Procedural Framework

R313-14 of DRC's rules sets forth the procedures the DRC uses in exercising its enforcement authority. R313-14-15 sets forth the procedures for issuing notices of violation.

The procedure to be used in assessing civil penalties is set forth in R313-14-15. This rule provides that the civil penalty process is initiated by issuing a Notice of Violation and Proposed Imposition of a Civil Penalty. The licensee or other person is provided an opportunity to contest in writing the proposed imposition of a civil penalty. After evaluation of the response, the civil penalty may be mitigated, remitted, or imposed. An opportunity is provided for a hearing if a civil penalty is imposed. If a civil penalty is not paid following a hearing or if a hearing is not requested, the matter may be referred to the Utah Attorney General to institute a civil action.

Information concerning an order to institute a proceeding to modify, suspend, or revoke a license or to take other action against a licensee or other person subject to the jurisdiction of the Executive Secretary is set forth in R313-14-15. The licensee or any other person adversely affected by the order may request a hearing. The DRC is authorized to make orders immediately effective if required to protect the public health, safety, or interest, or if the violation is willful. In accordance with R313-14-15 (5) a Demand for Information (Demand) may be issued to a licensee or other person subject to the Executive Secretary's jurisdiction for the purpose of determining whether an order or other enforcement action should be issued. The Demand does not provide hearing rights, as only information is being sought. A licensee must answer a Demand.

III. Responsibilities

The Executive Secretary has been delegated the authority to approve or issue all escalated enforcement actions.[2]

In recognition that the regulation of nuclear activities in many cases does not lend itself to a mechanistic treatment, judgment and discretion must be exercised in determining the severity levels of the violations and the appropriate enforcement sanctions, including the decision to issue a Notice of Violation, or to propose or impose a civil penalty and the amount of this penalty, after considering the general principles of this statement of policy and the technical and regulatory significance of the violations and the surrounding circumstances.

With consultation or notification of the Executive Secretary, the DRC staff may depart, where

warranted in the public's interest, from this policy as provided in Section VII, "Exercise of Enforcement Discretion." The Executive Secretary shall approve all enforcement actions involving civil penalties or orders. The Executive will be consulted prior to taking action in the following situations:

(1) An action affecting a licensee's operation that requires balancing the public health and safety implications of not operating with the potential radiological or other hazards associated with continued operation;

(2) Any proposed enforcement action that involves a Severity Level I violation; and

(3) Any proposed enforcement action on which the Executive Secretary asks to be consulted.

IV. Severity of Violations

Regulatory requirements[2] have varying degrees of safety, or environmental significance. Therefore, the relative importance of each violation, including both the technical significance and the regulatory significance, is evaluated as the first step in the enforcement process. In considering the significance of a violation, the staff considers the technical significance, i.e., actual and potential consequences, and the regulatory significance. In evaluating the technical significance, risk is an appropriate consideration.

Consequently, for purposes of formal enforcement action, violations are normally categorized in terms of five levels of severity to show their relative importance. Severity Level I has been assigned to violations that are the most significant and Severity Level V violations are the least significant. Severity Level I and II violations are of very significant regulatory concern. In general, violations that are included in these severity categories involve actual or high potential impact on the public. Severity Level III violations are cause for significant regulatory concern. Severity Level IV violations are less serious but are of more than minor concern; i.e., if left uncorrected, they could lead to a more serious concern.

The Executive Secretary recognizes that there are other violations of minor safety or environmental concern which are below the level of significance of Severity Level IV violations. These minor violations are assigned to Severity Level V. To the extent such violations are described, they will be noted as violations of minor significance.

Appendix B provides examples and serves as guidance in determining the appropriate severity level for violations. However, the examples are neither exhaustive nor controlling. In addition, these examples do not create new requirements. Each is designed to illustrate the significance that the DRC places on a particular type of violation of DRC requirements. Each of the examples is predicated on a violation of a regulatory requirement.

The DRC reviews each case being considered for enforcement action on its own merits to ensure that the severity of a violation is characterized at the level best suited to the significance of the particular violation. In some cases, special circumstances may warrant an adjustment to the severity level categorization.

A. Aggregation of Violations

A group of Severity Level IV violations may be evaluated in the aggregate and assigned a single, increased severity level, thereby resulting in a Severity Level III problem, if the violations have the same underlying cause or programmatic deficiencies, or the violations contributed to or were unavoidable consequences of the underlying problem. Normally, Severity Level II and III violations are not aggregated into a higher severity level.

The purpose of aggregating violations is to focus the licensee's attention on the fundamental underlying causes for which enforcement action appears warranted and to reflect the fact that several violations with a common cause may be more significant collectively than individually and may therefore, warrant a more substantial enforcement action.

B. Repetitive Violations

The severity level of a Severity Level IV violation may be increased to Severity Level III, if the violation can be considered a repetitive violation.[14] The purpose of escalating the severity level of a repetitive violation is to acknowledge the added significance of the situation based on the licensee's failure to implement effective corrective action for the previous violation. The decision to escalate the severity level of a repetitive violation will depend on the circumstances, such as, but not limited to, the number of times the violation has occurred, the similarity of the violations and their root causes, the adequacy of previous corrective actions, the period of time between the violations, and the significance of the violations.

C. Willful Violations

Willful violations are by definition of particular concern to the Executive Secretary because the State's regulatory program is based on licensees acting with integrity and communicating with candor. Willful violations cannot be tolerated by either the Executive Secretary or a licensee. Licensees are expected to take significant remedial action in responding to willful violations commensurate with the circumstances such that it demonstrates the seriousness of the violation thereby creating a deterrent effect within the licensee's organization. Although removal of the person is not necessarily required, substantial disciplinary action is expected.

Therefore, the severity level of a violation may be increased if the circumstances surrounding the matter involve careless disregard of requirements, deception, or other indications of willfulness. The term "willfulness" as used in this policy embraces a spectrum of violations ranging from deliberate intent to violate or falsify to and including careless disregard for requirements. Willfulness does not include acts which do not rise to the level of careless disregard, e.g., inadvertent clerical errors in a document submitted to the DRC. In determining the specific severity level of a violation involving willfulness, consideration will be given to such factors as the position and responsibilities of the

person involved in the violation (e.g.,. licensee official[5] or non-supervisory employee), the significance of any underlying violation, the intent of the violator (i.e., careless disregard or deliberateness), and the economic or other advantage, if any, gained as a result of the violation. The relative weight given to each of these factors in arriving at the appropriate severity level will be dependent on the circumstances of the violation. However, if a licensee refuses to correct a minor violation within a reasonable time such that it willfully continues, the violation should be categorized at least at a Severity Level IV.

D. Violations of Reporting Requirements

The DRC expects licensees to provide complete, accurate, and timely information and reports. Accordingly, the severity level of a violation involving the failure to make a required report to the DRC will be based upon the significance of and the circumstances surrounding the matter that should have been reported. However, the severity level of an untimely report, in contrast to no report, may be reduced depending on the circumstances surrounding the matter. A licensee will not normally be cited for a failure to report a condition or event unless the licensee was actually aware of the condition or event that it failed to report. A licensee will, on the other hand, normally be cited for a failure to report a condition or event if the licensee knew of the information to be reported, but did not recognize that it was required to make a report.

V. Predecisional Enforcement Conferences

Whenever the DRC has learned of the existence of a potential violation for which escalated enforcement action appears to be warranted, the DRC may provide an opportunity for a predecisional enforcement conference with the licensee before taking enforcement action. The purpose of the conference is to obtain information that will assist the DRC in determining the appropriate enforcement action, such as: (1) a common understanding of facts, root causes and missed opportunities associated with the apparent violations, (2) a common understanding of corrective actions taken or planned, and (3) a common understanding of the significance of issues and the need for lasting comprehensive corrective action.

If the DRC concludes that it has sufficient information to make an informed enforcement decision, a conference will not normally be held. If a conference is not held, the licensee may be requested to provide a written response to describe the licensee's views on the apparent violations and their root causes and a description of planned or implemented corrective actions. However, if the DRC has sufficient information to conclude that a civil penalty is not warranted, it may proceed to issue an enforcement action without first obtaining the licensee's response.

During a predecisional enforcement conference, the licensee will be given an opportunity to provide information consistent with the purpose of the conference, including an explanation to the DRC of the immediate corrective actions (if any) that were taken following identification of the potential violation or nonconformance and the long-term comprehensive actions that were taken or will be taken to prevent recurrence. Licensees will be told when a meeting is a predecisional enforcement

conference.

A predecisional enforcement conference is a meeting between the DRC and the licensee. Conferences are normally held in the DRC offices and are normally open to public observation. Conferences will not normally be open to the public if the enforcement action being contemplated:

(1) Would be taken against an individual, or if the action, though not taken against an individual, turns on whether an individual has committed wrongdoing;

(2) Involves significant personnel failures where the DRC has requested that the individual(s) involved be present at the conference;

(3) Is based on the findings of a DRC Investigation report that has not been publicly disclosed; or

(4) Involves information which could be considered protected under the Government Records Access and Management Act;

In addition, conferences will not normally be open to the public if:

(5) The conference involves medical misadministrations or overexposures and the conference cannot be conducted without disclosing the exposed individual's name; or

(6) The conference will be conducted by telephone or the conference will be conducted at a relatively small licensee's facility.

Notwithstanding the above normal criteria for opening or closing conferences, they may either be open or closed to the public after balancing the benefit of the public's observation against the potential impact on the Executive Secretary's decision-making process in a particular case. The DRC will notify the licensee that the conference will be open to public observation and the DRC may issue a press release that a predecisional enforcement conference has been scheduled and that it is open to public observation.

The public attending open conferences may observe but may not participate in the conference. It is noted that the purpose of conducting open conferences is not to maximize public attendance, but rather to provide the public with opportunities to be informed of DRC activities consistent with the DRC's ability to exercise its regulatory and safety responsibilities. Therefore, members of the public will be allowed access to the DRC offices to attend open enforcement conferences. These procedures provide that visitors may be subject to personnel screening, that signs, banners, posters, etc., not larger than 18" be permitted, and that disruptive persons may be removed. The open conference will be terminated if disruption interferes with a successful conference. DRC's Predecisional Enforcement Conferences (whether open or closed) normally will be held at the DRC's offices and not in the vicinity of the licensee's facility.

For a case in which DRC staff finds that discrimination has occurred, the investigation report may be made public, subject to withholding certain information (i.e., after appropriate redaction), in which case the associated predecisional enforcement conference will normally be open to public observation. In a conference where a particular individual is being considered potentially responsible for the discrimination, the conference will remain closed. In either case (i.e., whether the conference is open or closed), the employee or former employee who was the subject of the alleged discrimination (hereafter referred to as "complainant") will normally be provided an opportunity to participate in the predecisional enforcement conference with the licensee/employer. This participation will normally be in the form of a complainant statement and comment on the licensee's presentation, followed in turn by an opportunity for the licensee to respond to the complainant's presentation. In cases where the complainant is unable to attend in person, arrangements will be made for the complainant's participation by telephone or an opportunity given for the complainant to submit a written response to the licensee's presentation. If the licensee chooses to forego an enforcement conference and, instead, responds to the DRC's findings in writing, the complainant will be provided the opportunity to submit written comments on the licensee's response.

Members of the public attending open conferences will be reminded that (1) the apparent violations discussed at predecisional enforcement conferences are subject to further review and may be subject to change prior to any resulting enforcement action and (2) the statements of views or expressions of opinion made by DRC employees at predecisional enforcement conferences, or the lack thereof, are not intended to represent final determinations or beliefs.

When needed to protect the public health and safety, escalated enforcement action, such as the issuance of an immediately effective order, will be taken before the conference. In these cases, a conference may be held after the escalated enforcement action is taken.

VI. Enforcement Actions

This section describes the enforcement sanctions available to the DRC and specifies the conditions under which each may be used. The basic enforcement sanctions are Notices of Violation, civil penalties, and orders of various types. As discussed further in Section VI.D, related administrative actions such as Confirmatory Action Letters and Demands for Information are used to supplement the enforcement program. In selecting the enforcement sanctions or administrative actions, the DRC will consider enforcement actions taken by other Federal or State regulatory bodies having concurrent jurisdiction, such as in transportation matters.

Usually, whenever a violation of DRC requirements is identified, enforcement action is taken. The nature and extent of the enforcement action is intended to reflect the seriousness of the violation involved. For the vast majority of violations, a Notice of Violation is the normal action.

However, circumstances regarding the violation findings may warrant discretion being exercised such that the DRC refrains from issuing a Notice of Violation or other enforcement action. (See

Section VII.B, "Mitigation of Enforcement Sanctions.")

A. Notice of Violation

A Notice of Violation is a written notice setting forth one or more violations of a legally binding requirement. The Notice of Violation normally requires the recipient to provide a written statement describing (1) the reasons for the violation or, if contested, the basis for disputing the violation; (2) corrective steps that have been taken and the results achieved; (3) corrective steps that will be taken to prevent recurrence; and (4) the date when full compliance will be achieved. The DRC may waive all or portions of a written response to the extent relevant information has already been provided to the DRC in writing or documented in a DRC inspection report. The DRC may require responses to Notices of Violation to be under oath. Normally, responses under oath will be required only in connection with Severity Level I, II, or III violations or orders.

The DRC uses the Notice of Violation as the usual method for formalizing the existence of a violation. Issuance of a Notice of Violation is normally the only enforcement action taken, except in cases where the criteria for issuance of civil penalties and orders, as set forth in Sections VI.B and VI.C, respectively, are met.

B. Civil Penalty

A civil penalty is a monetary penalty that may be imposed for violation of (1) certain specified licensing provisions of the Act or Administrative Rules or orders; or (2) any requirement for which a license may be revoked. Civil penalties are designed to deter future violations both by the involved licensee as well as by other licensees conducting similar activities and to emphasize the need for licensees to identify violations and take prompt comprehensive corrective action.

Civil penalties may be appropriate for Severity Level IV violations and are considered for Severity Level III violations. In addition, civil penalties will normally be assessed for Severity Level I and II violations.

Civil penalties are used to encourage prompt identification and prompt and comprehensive correction of violations, to emphasize compliance in a manner that deters future violations, and to serve to focus licensees' attention on violations of significant regulatory concern.

Although management involvement, direct or indirect, in a violation may lead to an increase in the civil penalty, the lack of management involvement may not be used to mitigate a civil penalty. Allowing mitigation in the latter case could encourage the lack of management involvement in licensed activities and a decrease in protection of the public health and safety.

1. Base Civil Penalty

The DRC imposes different levels of penalties for different severity level violations. Table 1 shows the base civil penalties for radioactive materials programs. The structure of this table generally takes into account the gravity of the violation as a primary consideration and the ability to pay as a secondary consideration. Regarding

the secondary factor of ability of licensees to pay the civil penalties, it is not the DRC's intention that the economic impact of a civil penalty be so severe that it puts a licensee out of business (orders, rather than civil penalties, are used when the intent is to suspend or terminate licensed activities) or adversely affects a licensee's ability to safely conduct licensed activities. The deterrent effect of civil penalties is best served when the amounts of the penalties take into account a licensee's ability to pay. In determining the amount of civil penalties for licensees for whom the table does not reflect the ability to pay or the gravity of the violation, the DRC will consider as necessary an increase or decrease on a case-by-case basis. Normally, if a licensee can demonstrate financial hardship, the DRC will consider payments over time, including interest, rather than reducing the amount of the civil penalty. However, where a licensee claims financial hardship, the licensee will normally be required to address why it has sufficient resources to safely conduct licensed activities and pay license and inspection fees.

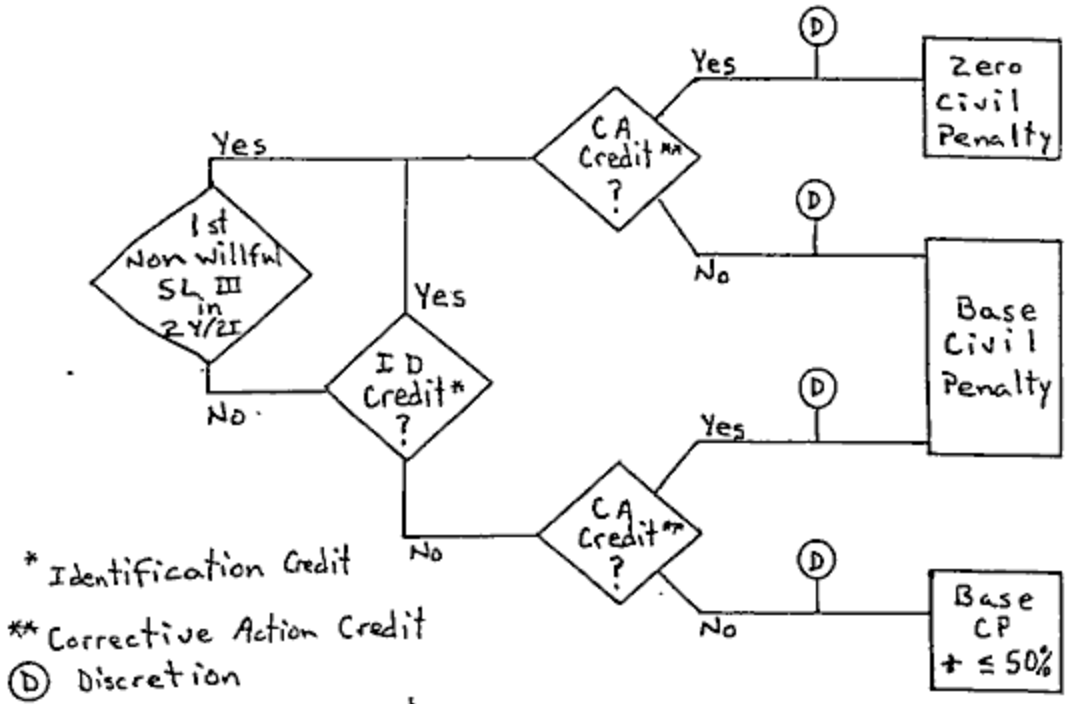
TABLE 1

Severity Level I	$5,000
Severity Level II	$4,000
Severity Level III	$2,500
Severity Level IV	$ 750
Severity Level V	$ 250

2. *Civil Penalty Assessment*

In an effort to (1) emphasize the importance of adherence to requirements and (2) reinforce prompt self-identification of problems and root causes and prompt and comprehensive correction of violations, the DRC reviews each proposed civil penalty on its own merits and, after considering all relevant circumstances, may adjust the base civil penalties shown in Table 1 as described below.

The civil penalty assessment process considers four decisional points: (a) whether the licensee has had any previous escalated enforcement action during the past 2 years or past 2 inspections, whichever is longer; (b) whether the licensee should be given credit for actions related to identification; (c) whether the licensee's corrective actions are prompt and comprehensive; and (d) whether, in view of all the circumstances, the matter in question requires the exercise of discretion. Although each of these decisional points may have several associated considerations for any given case, the outcome of the assessment process for each violation, absent the exercise of discretion, is limited to one of the following three results: no civil penalty, a base civil penalty, or a base civil penalty escalated by 50%. The flow chart presented below is a graphic representation of the civil penalty assessment process.



a. Initial Escalated Action

When the DRC determines that a non-willful Severity Level IV violation has occurred, and the licensee has not had any previous escalated actions during the past 2 years or 2 inspections, whichever is longer, the DRC will consider whether the licensee's corrective action for the present violation is reasonably prompt and comprehensive (see the discussion under Section VI.B.2.c, below). Using 2 years as the basis for assessment is expected to cover most situations, but considering a slightly longer or shorter period might be warranted based on the circumstances of a particular case. The starting point of this period should be considered the date when the licensee was put on notice of the need to take corrective action. For a licensee-identified violation or an event, this would be when the licensee is aware that a problem or violation exists requiring corrective action. For an DRC-identified violation, the starting point would be when the DRC puts the licensee on notice, which could be during the inspection, at the inspection exit meeting, or as part of post-inspection communication.

If the corrective action is judged to be prompt and comprehensive, a Notice of Violation normally should be issued with no associated civil penalty. If the corrective action is judged to be less than prompt and comprehensive, the Notice of Violation normally should be issued with a base civil penalty.

b. Credit for Actions Related to Identification

(1) If a Severity Level I or II violation or a willful Severity Level III violation has occurred--or if, during the past 2 years or 2 inspections, whichever is longer, the licensee has been issued at least one other escalated action--the civil penalty assessment should normally

consider the factor of identification in addition to corrective action (see the discussion under Section VI.B.2.c, below). As to identification, the DRC should consider whether the licensee should be given credit for actions related to identification.

In each case, the decision should be focused on identification of the problem requiring corrective action. In other words, although giving credit for *Identification* and *Corrective Action* should be separate decisions, the concept of *Identification* presumes that the identifier recognizes the existence of a problem, and understands that corrective action is needed. The decision on *Identification* requires considering all the circumstances of identification including:

(i) Whether the problem requiring corrective action was DRC-identified, licensee-identified, or revealed through an event[9];

(ii) Whether prior opportunities existed to identify the problem requiring corrective action, and if so, the age and number of those opportunities;

(iii) Whether the problem was revealed as the result of a licensee self-monitoring effort, such as conducting an audit, a test, a surveillance, a design review, or troubleshooting;

(iv) For a problem revealed through an event, the ease of discovery, and the degree of licensee initiative in identifying the root cause of the problem and any associated violations;

(v) For DRC-identified issues, whether the licensee would likely have identified the issue in the same time-period if the DRC had not been involved;

(vi) For DRC-identified issues, whether the licensee should have identified the issue (and taken action) earlier; and

(vii) For cases in which the DRC identifies the overall problem requiring corrective action (e.g., a programmatic issue), the degree of licensee initiative or lack of initiative in identifying the problem or problems requiring corrective action.

(2) Although some cases may consider all of the above factors, the importance of each factor will vary based on the type of case as

discussed in the following general guidance:

(i) **Licensee-Identified.** When a problem requiring corrective action is licensee-identified (i.e., identified before the problem has resulted in an event), the DRC should normally give the licensee credit for actions related to identification, regardless of whether prior opportunities existed to identify the problem.

(ii) **Identified Through an Event.** When a problem requiring corrective action is identified through an event, the decision on whether to give the licensee credit for actions related to identification normally should consider the ease of discovery, whether the event occurred as the result of a licensee self-monitoring effort (i.e., whether the licensee was "looking for the problem"), the degree of licensee initiative in identifying the problem or problems requiring corrective action, and whether prior opportunities existed to identify the problem.

Any of these considerations may be overriding if particularly noteworthy or particularly egregious. For example, if the event occurred as the result of conducting a surveillance or similar self-monitoring effort (i.e., the licensee was looking for the problem), the licensee should normally be given credit for identification. As a second instance, even if the problem was easily discovered (e.g., revealed by a large spill of liquid), the DRC may choose to give credit because noteworthy licensee effort was exerted in ferreting out the root cause and associated violations, or simply because no prior opportunities (e.g., procedural cautions, post-maintenance testing, quality control failures, readily observable parameter trends, or repeated or locked-in annunciator warnings) existed to identify the problem.

(iii) **DRC-Identified.** When a problem requiring corrective action is DRC-identified, the decision on whether to give the licensee credit for actions related to *Identification* should normally be based on an additional question: should the licensee have reasonably identified the problem (and taken action) earlier?

In most cases, this reasoning may be based simply on the ease

of the DRC inspector's discovery (e.g., conducting a walk through survey, observing in the facility, performing a confirmatory DRC radiation survey, or finding a safety device out of service). In some cases, the licensee's missed opportunities to identify the problem might include a similar previous violation, DRC notices, internal audits, or readily observable trends.

If the DRC identifies the violation but concludes that, under the circumstances, the licensee's actions related to *Identification* were not unreasonable, the matter would be treated as licensee-identified for purposes of assessing the civil penalty. In such cases, the question of *Identification* credit shifts to whether the licensee should be penalized for DRC's identification of the problem.

(iv) **Mixed Identification.** For "mixed" identification situations (i.e., where multiple violations exist, some DRC-identified, some licensee-identified, or where the DRC prompted the licensee to take action that resulted in the identification of the violation), the DRC's evaluation should normally determine whether the licensee could reasonably have been expected to identify the violation in the DRC's absence. This determination should consider, among other things, the timing of the DRC's discovery, the information available to the licensee that caused the DRC concern, the specificity of the DRC's concern, the scope of the licensee's efforts, the level of licensee resources given to the investigation, and whether the DRC's path of analysis had been dismissed or was being pursued in parallel by the licensee.

In some cases, the licensee may have addressed the isolated symptoms of each violation (and may have identified the violations), but failed to recognize the common root cause and taken the necessary comprehensive action. Where this is true, the decision on whether to give licensee credit for actions related to *Identification* should focus on identification of *the problem requiring corrective action* (e.g., the programmatic breakdown). As such, depending on the chronology of the various violations, the earliest of the individual violations might be considered missed opportunities for the licensee to have identified the larger problem.

(v) **Missed Opportunities to Identify.** Missed opportunities include prior notifications or missed opportunities to identify or prevent violations such as (1) through normal surveillances, audits, or quality assurance (QA) activities; (2) through prior notice i.e., specific DRC notification; or (3) through other reasonable indication of a potential problem or violation, such as observations of employees, and failure to take effective corrective steps. It may include findings of the DRC or the licensee made at other facilities operated by the licensee where it is reasonable to expect the licensee to take action to identify or prevent similar problems at the facility subject to the enforcement action at issue. In assessing this factor, consideration will be given to, among other things, the opportunities available to discover the violation, the ease of discovery, the similarity between the violation and the notification, the period of time between when the violation occurred and when the notification was issued, the action taken (or planned) by the licensee in response to the notification, and the level of management review that the notification received (or should have received).

The evaluation of missed opportunities should normally depend on whether the information available to the licensee should reasonably have caused action that would have prevented the violation. Missed opportunities is normally not applied where the licensee appropriately reviewed the opportunity for application to its activities and reasonable action was either taken or planned to be taken within a reasonable time.

In some situations the missed opportunity is a violation in itself. In these cases, unless the missed opportunity is a Severity Level III violation in itself, the missed opportunity violation may be grouped with the other violations into a single Severity Level III "problem." However, if the missed opportunity is the *only* violation, then it should not normally be counted twice (i.e., both as the violation and as a missed opportunity--"double counting") unless the number of opportunities missed was particularly significant.

The timing of the missed opportunity should also be considered. While a rigid time-frame is unnecessary, a 2-year period should generally be considered for consistency in

implementation, as the period reflecting relatively current performance.

(3) When the DRC determines that the licensee should receive credit for actions related to *Identification*, the civil penalty assessment should normally result in either no civil penalty or a base civil penalty, based on whether *Corrective Action* is judged to be reasonably prompt and comprehensive. When the licensee is *not* given credit for actions related to *Identification*, the civil penalty assessment should normally result in a Notice of Violation with either a base civil penalty or a base civil penalty escalated by up to 50%, depending on the quality of *Corrective Action*, because the licensee's performance is clearly not acceptable.

c. *Credit for Prompt and Comprehensive Corrective Action*

The purpose of the *Corrective Action* factor is to encourage licensees to (1) take the immediate actions necessary upon discovery of a violation that will restore safety and compliance with the license, rule(s), or other requirement(s); and (2) develop and implement (in a timely manner) the lasting actions that will not only prevent recurrence of the violation at issue, but will be appropriately comprehensive, given the significance and complexity of the violation, to prevent occurrence of violations with similar root causes.

Regardless of other circumstances (e.g., past enforcement history, identification), the licensee's corrective actions should always be evaluated as part of the civil penalty assessment process. As a reflection of the importance given to this factor, a DRC judgment that the licensee's corrective action has not been prompt and comprehensive will always result in issuing at least a base civil penalty.

In assessing this factor, consideration will be given to the timeliness of the corrective action (including the promptness in developing the schedule for long term corrective action), the adequacy of the licensee's root cause analysis for the violation, and, given the significance and complexity of the issue, the comprehensiveness of the corrective action (i.e., whether the action is focused narrowly to the specific violation or broadly to the general area of concern). Even in cases when the DRC, at the time of the enforcement conference, identifies additional peripheral or minor corrective action still to be taken, the licensee may be given credit in this area, as long as the licensee's actions addressed the underlying root cause and are considered sufficient to prevent recurrence of the violation and similar violations.

Normally, the judgment of the adequacy of corrective actions will hinge on whether the DRC had to take action to focus the licensee's evaluative and corrective process in order to obtain comprehensive corrective action. This will normally be judged at the time of the predecisional enforcement conference (e.g., by outlining substantive additional areas where corrective action is needed). Earlier informal discussions between the licensee and DRC inspectors or management may result in improved corrective action, but should not normally be a basis to deny credit for *Corrective Action*. For cases in which the licensee does not get credit for actions related to *Identification* because the DRC identified the problem, the assessment of the licensee's corrective action should begin from the time when the DRC put the licensee on notice of the problem. Notwithstanding eventual good comprehensive corrective action, if immediate corrective action was not taken to restore safety and compliance once the violation was identified, corrective action would not be considered prompt and comprehensive.

d. Exercise of Discretion

As provided in Section VII, "Exercise of Discretion," discretion may be exercised by either escalating or mitigating the amount of the civil penalty determined after applying the civil penalty adjustment factors to ensure that the proposed civil penalty reflects the DRC's concern regarding the violation at issue and that it conveys the appropriate message to the licensee. However, in no instance will a civil penalty for any one violation exceed $5,000 per day.

C. Orders

An order is a written DRC directive to modify, suspend, or revoke a license; to cease and desist from a given practice or activity; or to take such other action as may be proper (see R313-14-15(3). Orders may also be issued in lieu of, or in addition to, civil penalties, as appropriate for Severity Level I, II, III, or IV violations. Orders may be issued as follows:

1. License Modification orders are issued when some change in licensee equipment, procedures, personnel, or management controls is necessary.

2. Suspension Orders may be used:
   (a) To remove a threat to the public health and safety, common defense and security, or the environment;

   (b) To stop facility construction when,
      (i) Further work could preclude or significantly hinder the identification or correction of an improperly constructed safety-related system or component; or
      (ii) The licensee's quality assurance program implementation is not

adequate to provide confidence that construction activities are being properly carried out;

(c) When the licensee has not responded adequately to other enforcement action;

(d) When the licensee interferes with the conduct of an inspection or investigation; or

(e) For any reason not mentioned above for which license revocation is legally authorized.

Suspensions may apply to all or part of the licensed activity. Ordinarily, a licensed activity is not suspended (nor is a suspension prolonged) for failure to comply with requirements where such failure is not willful and adequate corrective action has been taken.

3. Revocation Orders may be used:
   (a) When a licensee is unable or unwilling to comply with DRC requirements;

   (b) When a licensee refuses to correct a violation;

   (c) When licensee does not respond to a Notice of Violation where a response was required; or

   (d) When a licensee refuses to pay an applicable fee under the Utah Radiaiton Control rules.

4. Cease and Desist Orders may be used to stop an unauthorized activity that has continued after notification by the DRC that the activity is unauthorized.

Unless a separate response is warranted pursuant to R313-14-15 (1), a Notice of Violation need not be issued where an order is based on violations described in the order. The violations described in an order need not be categorized by severity level.

Orders are made effective immediately, without prior opportunity for hearing, whenever it is determined that the public health, interest, or safety so requires, or when the order is responding to a violation involving willfulness. Otherwise, a prior opportunity for a hearing on the order is afforded. For cases in which the DRC believes a basis could reasonably exist for not taking the action as proposed, the licensee will ordinarily be afforded an opportunity to show why the order should not be issued in the proposed manner by way of a Demand for Information.

D. Related Administrative Actions

In addition to the formal enforcement actions, Notices of Violation, civil penalties, and orders, the DRC also uses administrative actions, such as Bullitins, Information Notices, Confirmatory Action

Letters, and Demands for Information to supplement its enforcement program. The DRC expects licensees to adhere to any obligations and commitments resulting from these actions and will not hesitate to issue appropriate orders to ensure that these obligations and commitments are met.

1. Bulletins and Information Notices are written notificaitons to groups of licensees identifying specific problems and calling for or recommending specific actions on their part.

2. Confirmatory Action Letters are letters confirming a licensee's agreement to take certain actions to remove significant concerns about health and safety or the environment.

3. Demands for Information are demands for information from licensees or other persons for the purpose of enabling the DRC to determine whether an order or other enforcement action should be issued.

VII. Exercise of Discretion

Notwithstanding the normal guidance contained in this policy, as provided in Section III, "Responsibilities," the DRC may choose to exercise discretion and either escalate or mitigate enforcement sanctions within the Executive Secretary's authority to ensure that the resulting enforcement action appropriately reflects the level of DRC concern regarding the violation at issue and conveys the appropriate message to the licensee.

A. Escalation of Enforcement Sanctions

The DRC considers violations categorized at Severity Level I, II, or III to be of significant regulatory concern. If the application of the normal guidance in this policy does not result in an appropriate sanction, the DRC may apply its full enforcement authority where the action is warranted. DRC action may include (1) escalating civil penalties, (2) issuing appropriate orders, and (3) assessing civil penalties for continuing violations on a per day basis, up to the statutory limit of $5,000 per violation, per day.

1. *Civil penalties.*
Notwithstanding the outcome of the normal civil penalty assessment process addressed in Section VI.B, the DRC may exercise discretion by either proposing a civil penalty where application of the factors would otherwise result in zero penalty or by escalating the amount of the resulting civil penalty to ensure that the proposed civil penalty reflects the significance of the circumstances and conveys the appropriate regulatory message to the licensee. The Executive Secretary will be notified if the deviation in the amount of the civil penalty proposed under this discretion from the amount of the civil penalty assessed under the normal process is more than 50% higher than the base civil penalty shown in Table 1. Examples when this discretion should be considered include, but are not limited to the following:

(a) Problems categorized at Severity Level I or II;

(b) Overexposures, or releases of radiological material in excess of DRC requirements;

(c) Situations involving particularly poor licensee performance, or involving willfulness;

(d) Situations when the licensee's previous enforcement history has been particularly poor, or when the current violation is directly repetitive of an earlier violation;

(e) Situations when the violation results in a substantial increase in risk, including cases in which the duration of the violation has contributed to the substantial increase;

(f) Situations when the licensee made a conscious decision to be in noncompliance in order to obtain an economic benefit; or

(g) Cases involving the loss of a source. In addition, unless the licensee self-identifies and reports the loss to the DRC, these cases should normally result in a civil penalty in an amount at least in the order of the cost of an authorized disposal of the material or of the transfer of the material to an authorized recipient.

2. *Orders.*
The DRC may, where necessary or desirable, issues orders in conjunction with or in lieu of civil penalties to achieve or formalize corrective actions and to deter further recurrence of serious violations.

3. *Assessment of Civil Penalties for Continuing Violations.*
In order to recognize the added technical safety significance or regulatory significance for those cases where a very strong message is warranted for a significant violation that continues for more than one day, the DRC may exercise discretion and assess a separate violation and attendant civil penalty up to the statutory limit of $5,000 for each occurrence the violation continues. The DRC may exercise this discretion if a licensee was aware or clearly should have been aware of a violation, or if the licensee had an opportunity to identify and correct the violation but failed to do so.

B. Mitigation of Enforcement Sanctions

The DRC may exercise discretion and refrain from issuing a civil penalty and/or a Notice of Violation, if the outcome of the normal process described in Sections VI.A and VI.B does not result in a sanction consistent with an appropriate regulatory message. In addition, even if the DRC exercises this discretion, when the licensee failed to make a required report to the DRC, a separate enforcement action will normally be issued for the licensee's failure to make a required report. The approval of the Executive Secretary is required for exercising discretion of the type described in Section VII.B.1.b where a willful violation is involved, and of the types described in Sections VII.B.2 through VII.B.5. Examples when discretion should be considered for departing from the normal approach in Sections VI.A and VI.B include, but are not limited to the following:

1. *Licensee-Identified Severity Level IV Violations.*

The DRC, with the approval of the Executive Secretary, may refrain from issuing a Notice of Violation for a Severity Level IV violation that is documented in an inspection report or official field notes and described therein as a Non-Cited Violation (NCV) provided that the documentation includes a brief description of the corrective action and that the violation meets all of the following criteria:

(a) It was identified by the licensee;

(b) It was not a violation that could reasonably be expected to have been prevented by the licensee's corrective action for a previous violation or a previous licensee finding that occurred within the past 2 years of the inspection at issue, or the period within the last two inspections, whichever is longer;

(c) It was or will be corrected within a reasonable time, by specific corrective action committed to by the licensee by the end of the inspection, including immediate corrective action and comprehensive corrective action to prevent recurrence;

(d) It was not a willful violation or if it was a willful violation;

(i) The information concerning the violation, if not required to be reported, was promptly provided to appropriate DRC personnel;

(ii) The violation involved the acts of a low-level individual (and not a licensee official as defined in Section IV.C);

(iii) The violation appears to be the isolated action of the employee without management involvement and the violation was not caused by lack of management oversight as evidenced by either a history of isolated willful violations or a lack of adequate audits or supervision

of employees; and

(iv) Significant remedial action commensurate with the circumstances was taken by the licensee such that it demonstrated the seriousness of the violation to other employees, thereby creating a deterrent effect within the licensee's organization. Although removal of the employee from licensed activities is not necessarily required, substantial disciplinary action is expected.

3. ***Violations Involving Old Design Issues.***
The DRC may refrain from proposing a civil penalty for a Severity Level II or III violation involving a past problem, such as in engineering, design, or installation, provided that the violation is documented in an inspection report or official field notes that includes a description of the corrective action and that it meets all of the following criteria:

(a) It was a licensee-identified as a result of its voluntary initiative;

(b) It was or will be corrected, including immediate corrective action and long term comprehensive corrective action to prevent recurrence, within a reasonable time following identification (this action should involve expanding the initiative, as necessary, to identify other failures caused by similar root causes); and

(c) It was not likely to be identified (after the violation occurred) by routine licensee efforts such as normal surveillance or quality assurance (QA) activities.

In addition, the DRC may refrain from issuing a Notice of Violation for a Severity Level II, III, or IV violation that meets the above criteria provided the violation was caused by conduct that is not reasonably linked to present performance (normally, violations that are at least 3 years old) and there had not been prior notice so that the licensee should have reasonably identified the violation earlier. This exercise of discretion is to place a premium on licensees initiating efforts to identify and correct subtle violations that are not likely to be identified by routine efforts before degraded safety systems are called upon to work.

4. ***Violations Identified Due to Previous Enforcement Action.***
The DRC may refrain from issuing a Notice of Violation or a proposed civil penalty for a violation that is identified after the DRC has taken enforcement action, provided that the violation is documented in an inspection report or official field notes that includes a description of the corrective action and that it meets all of the following criteria:

(a) It was licensee-identified as part of the corrective action for the previous enforcement action;

(b) It has the same or similar root cause as the violation for which enforcement action was issued;

(c) It does not substantially change the safety significance or the character of the regulatory concern arising out of the initial violation;

(d) It was or will be corrected, including immediate corrective action and long term comprehensive corrective action to prevent recurrence, within a reasonable time following identification; and

(e) It would not be categorized at Severity Level I.

5. *Violations Involving Special Circumstances.*
Notwithstanding the outcome of the normal enforcement process addressed in Section VI.A or the normal civil penalty assessment process addressed in Section VI.B, the DRC may reduce or refrain from issuing a civil penalty or a Notice of Violation for a Severity Level II, III, IV, or V violation based on the merits of the case after considering the guidance in this statement of policy and such factors as the age of the violation, the technical and regulatory significance of the violation, the clarity of the requirement, the appropriateness of the requirement, the overall sustained performance of the licensee has been particularly good, and other relevant circumstances, including any that may have changed since the violation. This discretion is expected to be exercised only where application of the normal guidance in the policy is unwarranted. In addition, the DRC may refrain from issuing enforcement action for violations resulting from matters not within a licensee's control, such as equipment failures that were not avoidable by reasonable licensee quality assurance measures or management controls. Generally, however, licensees are held responsible for the acts of their employees and contractors. Accordingly, this policy should not be construed to excuse personnel or contractor errors.

VIII. Public Disclosure of Enforcement Actions

Enforcement actions and licensees' responses, in accordance with the Government Records Access and Management Act, II, are publicly available for inspection. In addition, press releases may be issued for orders and civil penalties and they should be issued at the same time the order or proposed imposition of the civil penalty is issued. In addition, press releases may be issued when a proposed civil penalty is withdrawn or substantially mitigated by some amount. Press releases are not normally issued for Notices of Violation that are not accompanied by orders or proposed civil penalties.

IX. Reopening Closed Enforcement Actions

If significant new information is received or obtained by DRC which indicates that an enforcement sanction was incorrectly applied, consideration may be given, dependent on the circumstances, to reopening a closed enforcement action to increase or decrease the severity of a sanction or to correct the record. Reopening decisions will be made on a case-by-case basis, are expected to occur rarely, and require the specific approval of the Executive Secretary.

Appendix A: Safety and Compliance

As commonly understood, safety means freedom from exposure to danger, or protection from harm. In a practical sense, an activity is deemed to be safe if the perceived risks are judged to be acceptable. In the context of DRC's regulatory program, safety means avoiding undue risk or, stated another way, providing reasonable assurance of adequate protection for the public in connection with the use of radioactive materials.

The definition of compliance is much simpler. Compliance simply means meeting applicable regulatory requirements. The relationship between compliance and safety is discussed below.

* Safety is the fundamental regulatory objective, and compliance with DRC requirements plays a fundamental role in giving the DRC confidence that safety is being maintained. DRC requirements, including technical specifications, other license conditions, orders, and rules, have been designed to ensure adequate protection--which corresponds to "no undue risk to public health and safety"--through acceptable design, construction, operation, maintenance, modification, and quality assurance measures. In the context of risk-informed regulation, compliance plays a very important role in ensuring that key assumptions used in underlying risk and engineering analyses remain valid.

* Adequate protection is presumptively assured by compliance with DRC requirements. Circumstances may arise, however, where new information reveals, for example, that an unforeseen hazard exists or that there is a substantially greater potential for a known hazard to occur. In such situations, the DRC has the authority to require licensee action above and beyond existing rules to maintain the level of protection necessary to avoid undue risk to public health and safety.

* The DRC has the authority to exercise discretion to permit continued operations--despite the existence of a noncompliance--where the noncompliance is not significant from a risk perspective and does not, in the particular circumstances, pose an undue risk to public health and safety. When non-compliances occur, the DRC must evaluate the degree of risk posed by that non-compliance to determine if specific immediate action is required. Where needed to ensure adequate protection of public health and safety, the DRC may demand immediate licensee action, up to and including a shutdown or cessation of licensed activities. In addition, in determining the appropriate action to be taken, the DRC must evaluate the non-compliance both in terms of its direct safety and regulatory significance and by assessing whether it is part of a pattern of non-compliance (i.e., the degree of pervasiveness) that can lead to the determination that licensee control processes are no longer adequate to ensure protection of the public health and safety. Based on the DRC's evaluation, the appropriate action could include refraining from taking any action, taking specific enforcement action, issuing orders, or providing input to other regulatory actions or assessments, such as increased oversight (e.g., increased inspection).

* Since some requirements are more important to safety than others, the Executive Secretary should use a risk-informed approach when applying DRC resources to the oversight of licensed activities (this includes enforcement).

Appendix B: Enforcement Examples

This appendix provides examples of violations as guidance in determining the appropriate severity level for violations.

Health Physics (R313-15)

This section provides examples of violations in each of four severity levels as guidance in determining the appropriate severity level for violations in the area of health physics, R313-15.[8]

A. *Severity Level I* - Violations involving for example:

1. A radiation exposure during any year of a worker in excess of 25 rems total effective dose equivalent, 75 rems to the lens of the eye, or 250 rads to the skin of the whole body, or to the feet, ankles, hands or forearms, or to any other organ or tissue;
2. A radiation exposure over the gestation period of the embryo/fetus of a declared pregnant woman in excess of 2.5 rems total effective dose equivalent;
3. A radiation exposure during any year of a minor in excess of 2.5 rems total effective dose equivalent, 7.5 rems to the lens of the eye, or 25 rems to the skin of the whole body, or to the feet, ankles, hands or forearms, or to any other organ or tissue;
4. An annual exposure of a member of the public in excess of 1.0 rem total effective dose equivalent;
5. A release of radioactive material to an unrestricted area at concentrations in excess of 50 times the limits for members of the public as described in R313-15-302(2)(b)(I); or
6. Disposal of licensed material in quantities or concentrations in excess of 10 times the limits of R313-15-1003.

B. *Severity Level II* - Violations involving for example:

1. A radiation exposure during any year of a worker in excess of 10 rems total effective dose equivalent, 30 rems to the lens of the eye, or 100 rems to the skin of the whole body, or to the feet, ankles, hands or forearms, or to any other organ or tissue;
2. A radiation exposure over the gestation period of the embryo/fetus of a declared pregnant woman in excess of 1.0 rem total effective dose equivalent;
3. A radiation exposure during any year of a minor in excess of 1 rem total effective dose equivalent; 3.0 rems to the lens of the eye, or 10 rems to the skin of the whole body, or to the feet, ankles, hands or forearms, or to any other organ or tissue;
4. An annual exposure of a member of the public in excess of 0.5 rem total effective dose equivalent;
5. A release of radioactive material to an unrestricted area at concentrations in excess of 10 times the limits for members of the public as described in R313-15-302(2)(b)(I) (except when operation up to 0.5 rem a year has been approved by the Executive Secretary under R313-15-301(3));
6. Disposal of licensed material in quantities or concentrations in excess of five times the limits of R313-15-1003; or
7. A failure to make an immediate notification as required by R313-15-1202 (1)(a) or (1)(b).

C. *Severity Level III* - Violations involving for example:

1. A radiation exposure during any year of a worker in excess of 5 rems total effective dose equivalent, 15 rems to the lens of the eye, or 50 rems to the skin of the whole body or to the feet, ankles, hands or forearms, or to any other organ or tissue;

2. A radiation exposure over the gestation period of the embryo/fetus of a declared pregnant woman in excess of 0.5 rem total effective dose equivalent (except when doses are in accordance with the provisions of R313-15-208(4));

3. A radiation exposure during any year of a minor in excess of 0.5 rem total effective dose equivalent; 1.5 rems to the lens of the eye, or 5 rems to the skin of the whole body, or to the feet, ankles, hands or forearms, or to any other organ or tissue;

4. A worker exposure above regulatory limits when such exposure reflects a programmatic (rather than an isolated) weakness in the radiation control program;

5. An annual exposure of a member of the public in excess of 0.1 rem total effective dose equivalent (except when operation up to 0.5 rem a year has been approved by the Executive Secretary under R313-15-301(3));

6. A release of radioactive material to an unrestricted area at concentrations in excess of two times the effluent concentration limits referenced in R313-15-302(2)(b)(I) (except when operation up to 0.5 rem a year has been approved by the Executive Secretary under R313-15-301(3));

7. A failure to make a 24-hour notification required by R313-15-1202(2) or an immediate notification required by R313-15-1201(1)(a)(I);

8. A substantial potential for exposures or releases in excess of the applicable limits in R313-15-1001 through 15-1301 whether or not an exposure or release occurs;

9. Disposal of licensed material not covered in Severity Levels I or II;

10. A release for unrestricted use of contaminated or radioactive material or equipment that poses a realistic potential for exposure of the public to levels or doses exceeding the annual dose limits for members of the public, or that reflects a programmatic (rather than an isolated) weakness in the radiation control program;

11. Conduct of licensee activities by a technically unqualified person;

12. A significant failure to control licensed material; or.

13. A breakdown in the radiation safety program involving a number of violations that are related (or, if isolated, that are recurring) that collectively represent a potentially significant lack of attention or carelessness toward licensed responsibilities.

D. *Severity Level IV* - Violations involving for example:

1. Exposures in excess of the limits of R313-15-201, 207, or 208 not constituting Severity Level I, II, or III violations;

2. A release of radioactive material to an unrestricted area at concentrations in excess of the limits for members of the public as referenced in R313-15-302(2)(b)(I) (except when operation up to 0.5 rem a year has been approved by the Executive Secretary under R313-15-301(3));

3. A radiation dose rate in an unrestricted or controlled area in excess of 0.002 rem in any 1 hour (2 millirem/hour) or 50 millirems in a year;

4. Failure to maintain and implement radiation programs to keep radiation exposures as low as is reasonably achievable;

5. Doses to a member of the public in excess of any EPA generally applicable environmental radiation standards, such as 40 CFR Part 190;

6. A failure to make the 30-day notification required by R313-15-1201(1)(a)(ii) or 1203(1);

7. A failure to make a timely written report as required by R313-15-1201(2), 1204, or 1206;

8. A failure to report an exceedance of the dose constraint established in R313-15-101(4) or a failure to take corrective action for an exceedance, as required by R313-15-101(4); or

9. Any other matter that has more than a minor safety, health, or environmental significance.

Transportation

This section provides examples of violations in each of the four severity levels as guidance in determining the appropriate severity level for violations in the area of DRC transportation requirements[2].

A. *Severity Level I* - Violations involving for example:

1. Failure to meet transportation requirements that resulted in loss of control of radioactive material with a breach in package integrity such that the material caused a radiation exposure to a member of the public and there was clear potential for the public to receive more than 0.1 rem to the whole body;

2. Surface contamination in excess of 50 times the DRC limit; or

3. External radiation levels in excess of 10 times the DRC limit.

B. *Severity Level II* - Violations involving for example:

1. Failure to meet transportation requirements that resulted in loss of control of radioactive material with a breach in package integrity such that there was a clear potential for the member of the public to receive more than 0.1 rem to the whole body;

2. Surface contamination in excess of 10, but not more than 50 times the DRC limit;

3. External radiation levels in excess of five, but not more than 10 times the DRC limit; or

4. A failure to make required initial notifications associated with Severity Level I or II violations.

C. *Severity Level III* - Violations involving for example:

1. Surface contamination in excess of five but not more than 10 times the DRC limit;

2. External radiation in excess of one but not more than five times the DRC limit;

3. Any noncompliance with labeling, placarding, shipping paper, packaging, loading, or other requirements that could reasonably result in the following:

(a) A significant failure to identify the type, quantity, or form of material;

(b) A failure of the carrier or recipient to exercise adequate controls; or

(c) A substantial potential for either personnel exposure or contamination above regulatory limits or improper transfer of material;

4. A failure to make required initial notification associated with Severity Level III violations; or

5. A breakdown in the licensee's program for the transportation of licensed material

involving a number of violations that are related (or, if isolated, that are recurring violations) that collectively reflect a potentially significant lack of attention or carelessness toward licensed responsibilities.

D. *Severity Level IV* - Violations involving for example:

1. A breach of package integrity without external radiation levels exceeding the DRC limit or without contamination levels exceeding five times the DRC limits;
2. Surface contamination in excess of but not more than five times the DRC limit;
3. A failure to register as an authorized user of an NRC-Certified Transport package;
4. A noncompliance with shipping papers, marking, labeling, placarding, packaging or loading not amounting to a Severity Level I, II, or III violation;
5. A failure to demonstrate that packages for special form radioactive material meets applicable regulatory requirements;
6. A failure to demonstrate that packages meet DOT Specifications for 7A Type A packages; or
7. Other violations that have more than minor safety or environmental significance.

Materials Operations

This section provides examples of violations in each of the four severity levels as guidance in determining the appropriate severity level for violations in the area of fuel cycle and materials operations.

A. *Severity Level I* - Violations involving for example:

1. Radiation levels, contamination levels, or releases that exceed 10 times the limits specified in the license;
2. A system designed to prevent or mitigate a serious safety event not being operable when actually required to perform its design function;
3. A nuclear criticality accident;
4. A failure to follow the procedures of the quality management program, required by R313-32-32, that results in a death or serious injury (e.g., substantial organ impairment) to a patient;
5. A safety limit or the application being exceeded; or
6. Significant injury or loss of life due to a loss of control over licensed or certified activities, including chemical processes that are integral to the licensed or certified activity, whether radioactive material is released or not.

B. *Severity Level II* - Violations involving for example:

1. Radiation levels, contamination levels, or releases that exceed five times the limits specified in the license;
2. A system designed to prevent or mitigate a serious safety event being inoperable;
3. A substantial programmatic failure in the implementation of the quality management program required by R313-32-32 that results in a misadministration; or

4. The potential for a significant injury or loss of life due to a loss of control over licensed activities, including chemical processes that are integral to the licensed activity, whether radioactive material is released or not.

C. *Severity Level III* - Violations involving for example:

1. A failure to control access to licensed materials for radiation protection purposes as specified by DRC requirements;

2. Possession or use of unauthorized equipment or materials in the conduct of licensee activities which degrades safety;

3. Use of radioactive material on humans where such use is not authorized;

4. Conduct of licensed activities by a technically unqualified or uncertified person;

5. A substantial potential for exposures, radiation levels, contamination levels, or releases, including releases of toxic material caused by a failure to comply with DRC rules, from licensed or certified activities in excess of regulatory limits;

6. Substantial failure to implement the quality management program as required by R313-32-32 that does not result in a misadministration; failure to report a misadministration; or programmatic weakness in the implementation of the quality management program that results in a misadministration;

7. A breakdown in the control of licensed activities involving a number of violations that are related (or, if isolated, that are recurring violations) that collectively represent a potentially significant lack of attention or carelessness toward licensed responsibilities;

8. A failure, during radiographic operations, to have present at least two qualified individuals or to use radiographic equipment, radiation survey instruments, and/or personnel monitoring devices as required by R313-36;

9. A failure to receive required DRC approval prior to the implementation of a change in licensed activities that has radiological or programmatic significance, such as, a change in ownership; lack of an RSO or replacement of an RSO with an unqualified individual; a change in the location where licensed activities are being conducted, or where licensed material is being stored where the new facilities do not meet the safety guidelines; or a change in the quantity or type of radioactive material being processed or used that has radiological significance;

10. A significant failure to meet Executive Secretary requirements including a failure to notify the DRC as required by rule or license condition, substantial failure to meet Executive Secretary's standards, failure to conduct and/or complete Executive Secretary activities in accordance with rule or license condition, or failure to meet required schedules without adequate justification;

11. A system designed to prevent or mitigate a serious safety event:

(a) Not being able to perform its intended function under certain conditions (e.g., safety system not operable unless utilities available, materials or components not according to specifications); or

(b) Being degraded to the extent that a detailed evaluation would be required to determine its operability;

12. Changes in parameters that cause unanticipated reductions in margins of safety; or

13. A failure, during radiographic operations, to stop work after a pocket dosimeter is found

to have gone off-scale, or after an electronic dosimeter reads greater than 200 mrem, and before a determination is made of the individual's actual radiation exposure.

D. *Severity Level IV* - Violations involving for example:

1. A failure to maintain patients hospitalized who have cobalt-60, cesium-137, or iridium-192 implants or to conduct required leakage or contamination tests, or to use properly calibrated equipment;

2. Other violations that have more than minor safety or environmental significance;

3. Failure to follow the quality management (QM) program, including procedures, whether or not a misadministration occurs, provided the failures are isolated, do not demonstrate a programmatic weakness in the implementation of the QM program, and have limited consequences if a misadministration is involved; failure to conduct the required program review; or failure to take corrective actions as required by R313-32-32; or

4. A failure to keep the records required by R313-32-32 or R313-32-33.

Miscellaneous Matters

This section provides examples of violations in each of the four severity levels as guidance in determining the appropriate severity level for violations involving miscellaneous matters.

A. *Severity Level I* - Violations involving for example:

1. Inaccurate or incomplete information that is provided to the DRC (a) deliberately with the knowledge of a licensee official that the information is incomplete or inaccurate, or (b) if the information, had it been complete and accurate at the time provided, likely would have resulted in regulatory action such as an immediate order required by the public health and safety;

2. Incomplete or inaccurate information that the DRC requires be kept by a licensee that is (a) incomplete or inaccurate because of falsification by or with the knowledge of a licensee official, or (b) if the information, had it been complete and accurate when reviewed by the DRC, likely would have resulted in regulatory action such as an immediate order required by public health and safety considerations; or

3. Information that the licensee has identified as having significant implications for public health and safety or the common defense and security ("significant information identified by a licensee") and is deliberately withheld from the Executive Secretary.

B. *Severity Level II* - Violations involving for example:

1. Inaccurate or incomplete information that is provided to the DRC (a) by a licensee official because of careless disregard for the completeness or accuracy of the information, or (b) if the information, had it been complete and accurate at the time provided, likely would have resulted in regulatory action such as a show cause order or a different regulatory position;

2. Incomplete or inaccurate information that the DRC requires be kept by a licensee which is (a) incomplete or inaccurate because of careless disregard for the accuracy of the information on the part of a licensee official, or (b) if the information, had it been complete and accurate when

reviewed by the DRC, likely would have resulted in regulatory action such as a show cause order or a different regulatory position; or

3. "Significant information identified by a licensee" and not provided to the Executive Secretary because of careless disregard on the part of a licensee official;

C. *Severity Level III* - Violations involving for example:

1. Incomplete or inaccurate information that is provided to the DRC (a) because of inadequate actions on the part of licensee officials but not amounting to a Severity Level I or II violation, or (b) if the information, had it been complete and accurate at the time provided, likely would have resulted in a reconsideration of a regulatory position or substantial further inquiry such as an additional inspection or a formal request for information;

2. Incomplete or inaccurate information that the DRC requires be kept by a licensee that is (a) incomplete or inaccurate because of inadequate actions on the part of licensee officials but not amounting to a Severity Level I or II violation, or (b) if the information, had it been complete and accurate when reviewed by the DRC, likely would have resulted in a reconsideration of a regulatory position or substantial further inquiry such as an additional inspection or a formal request for information; or

3. A failure to provide "significant information identified by a licensee" to the Executive Secretary and not amounting to a Severity Level I or II violation;

D. *Severity Level IV* - Violations involving for example:

1. Incomplete or inaccurate information of more than minor significance that is provided to the DRC but not amounting to a Severity Level I, II, or III violation;

2. Information that the DRC requires be kept by a licensee and that is incomplete or inaccurate and of more than minor significance but not amounting to a Severity Level I, II, or III violation.

1. This policy primarily addresses the activities of DRC licensees and applicants for DRC licenses. Therefore, the term "licensee" is used throughout the policy.

2. The term "escalated enforcement action" as used in this policy means a Notice of Violation or civil penalty for any Severity Level I, II, or III violation (or problem) or any order based upon a violation.

3. The term "requirement" as used in this policy means a legally binding requirement such as a statute, rule, license condition, technical specification, or order.

4. The term "repetitive violation" or "similar violation" as used in this policy statement means a violation that reasonably could have been prevented by a licensee's corrective action for a previous violation normally occurring (1) within the past 2 years of the inspection at issue, or (2) the period within the last two inspections, whichever is longer.

5. The term "licensee official" as used in this policy statement means a first-line supervisor or above, a licensed individual, a radiation safety officer, or an authorized user of licensed material whether or not listed on a license. Notwithstanding an individual's job title, severity level

categorization for willful acts involving individuals who can be considered licensee officials will consider several factors, including the position of the individual relative to the licensee's organizational structure and the individual's responsibilities relative to the oversight of licensed activities and to the use of licensed material.

6. An "event," as used here, means (1) an event characterized by an active adverse impact on equipment or personnel, readily obvious by human observation or instrumentation, or (2) a radiological impact on personnel or the environment in excess of regulatory limits, such as an overexposure, a release of radioactive material above DRC limits, or a loss of radioactive material. For example, an equipment failure discovered through a spill of liquid, a loud noise, the failure to have a system respond properly, or an annunciator alarm would be considered an event; a system discovered to be inoperable through a document review would not. Similarly, if a licensee discovered, through quarterly dosimetry readings, that employees had been inadequately monitored for radiation, the issue would normally be considered licensee-identified; however, if the same dosimetry readings disclosed an overexposure, the issue would be considered an event.

7. Discretion is not warranted when a licensee identifies a violation as a result of an event where the root cause of the event is obvious or the licensee had prior opportunity to identify the problem but failed to take action that would have prevented the event. Discretion may be warranted if the licensee demonstrated initiative in identifying the violation's root cause.

8. Personnel overexposures and associated violations incurred during a life-saving or other emergency response effort will be treated on a case-by-case basis.

9. Some transportation requirements are applied to more than one licensee involved in the same activity such as a shipper and a carrier. When a violation of such a requirement occurs, enforcement action will be directed against the responsible licensee which, under the circumstances of the case, may be one or more of the licensees involved.

NRC INSPECTION MANUAL NMSS/URB

MANUAL CHAPTER 2801

URANIUM MILL AND 11e.(2) BYPRODUCT MATERIAL DISPOSAL SITE AND FACILITY INSPECTION PROGRAM

2801-01 PURPOSE

This chapter establishes the safety inspection program for uranium mills and 11e.(2) byproduct material disposal sites and facilities (11e.(2) sites) licensed and regulated under 10 CFR Part 40 including mills authorized to take 11e.(2) byproduct material. The disposal sites include both commercial disposal facilities and sites associated with licensed uranium mills. Included in the program are inspection procedures related to all phases of activities: construction and pre-operations, operations, and reclamation/closure. Procedures presented cover those facilities licensed and regulated in their entirety by NRC. The primary purpose of the inspection program is to obtain sufficient information through observations, personnel interviews, independent measurements, and review of facility records and procedures, to ascertain, in a timely manner, whether facility operations and radiological and non-radiological programs regulated by the U.S. Nuclear Regulatory Commission conform with regulatory requirements and the conditions of the applicable license. As a result, the inspection program determines that uranium mills and 11e.(2) sites are managed throughout their entire life cycle in a manner that provides protection from radioactivity to employees, members of the public, and the environment.

2801-02 OBJECTIVES

02.01 To establish general policy and priorities for the inspection of uranium mills and 11e.(2) byproduct material disposal sites.

02.02 To establish a uniform process for the inspection of uranium mills and 11e.(2) byproduct material disposal sites.

02.03 To define specific requirements for inspection of uranium mills and 11e.(2) byproduct material disposal sites.

2801-03 DEFINITIONS

03.01 11e.(2) Byproduct Material, as defined in Section 11 of the Atomic Energy Act of 1954, as amended, means tailings or waste produced by the extraction of uranium or thorium from any ore processed primarily for its source material content.

03.02 Closure, as defined in Appendix A to 10 CFR Part 40, means the activities, after operations, to decontaminate and decommission the buildings and site used to produce byproduct materials and reclaim the tailings and/or waste disposal area(s). Also, commonly referred to as decommissioning or reclamation.

03.03 Decommission, as defined in 10 CFR 40.4, means to remove safely from service and reduce residual radioactivity to a level that permits release of the property for unrestricted use and termination of the license. Would include remediation of the disposal area to be deeded to the Department of Energy.

03.04 Decommissioning Plan, as defined in Appendix A to Part 40, for the purposes of Criterion 6A, means the plan detailing activities to accomplish reclamation of the tailings or waste disposal area in accordance with the technical criteria of Appendix A. In practice, the Decommissioning Plan usually details the demolition and/or cleanup of the mill buildings and large equipment, tanks, etc. The plan for stabilization of the tailings and/or waste disposal areas and cleanup of contaminated soil is often referred to as the Reclamation Plan.

03.05 Operation, for a mill is the process of extracting uranium from ore. For an 11e.(2) disposal facility, it is receipt and emplacement of 11 e.(2) byproduct material.

03.06 Performance-Based License (PBL), allows the licensee to make changes to the facility without prior NRC approval if certain conditions are met. These conditions are specified in the performance-based license condition contained in the PBL. Consistent with the regulatory reduction effort initiated by the staff in 1994, the staff is currently issuing all new and renewed operating licenses as performance-based.

2801-04 PROGRAM APPLICABILITY

This program has been developed to respond to needs for inspection procedures related to construction, pre-operation, operations, and reclamation/closure for sites licensed by NRC. Where 11e.(2) byproduct material disposal sites are operating under Agreement State regulation, it is expected that responsibility for regulation and inspection activities at those sites will continue to reside with the Agreement States. It is noted that existing inspection procedures from other NRC programs can be applied, in full or in part, to many aspects of uranium mill and 11e.(2) byproduct material disposal site inspections, and that additional inspection procedures specific to disposal technology, and on-site activity can be developed and employed incrementally, as needed. Tables 1 and 2 provide a listing of procedures that are currently available and include comments concerning their applicability. Minimum and normal frequencies of inspection are listed; adoption of the minimum frequency of inspection should be tailored to both the level of site activity and to the performance of the licensee.

2801-05 PROGRAM DESCRIPTION

05.01 General. The inspection program for sites specifically licensed for 11e.(2) byproduct material disposal, and for uranium mills has been divided into three parts. The parts are designed to be responsive to the various inspection needs during the different phases of facility life: construction/pre-operations, operations, and reclamation/closure. Each phase of the inspection program varies with respect to applicable inspection procedures, inspection frequency, and degree to which a given procedure may be applied. The inspection programs for each phase are discussed in narrative form in Section 2801-08. Tables 1 and 2 present information for the pre-operations, operations, and closure phases.

This chapter identifies requirements for the inspection of the health, safety, and environmental aspects of licensee activities. The inspector should be completely familiar with the current regulatory requirements and commitments associated with the license. These include the comparable parts of title 10, U.S. Code of Federal Regulations, the license application, applicable guides, and other codes to which licensees may commit by reference. In the case that Nuclear Regulatory Commission guidance documents are updated after a license or amendment is issued, the licensee is generally only committed to follow the original guidance. Thus, the particular revision of the guidance to which the licensee has been committed is of importance.

The scope of inspection procedures (IPs), taken as a whole, is not intended to be limited to only those elements discussed in the procedures. The descriptions and examples contained in the procedures are provided primarily for illustrative purposes, as examples of things that should be examined. Examination of other safety-significant activities not expressed or implied in a procedure is left to the

inspector's judgment, in consideration of the relative degree of safety risk posed by the subject activity.

The environmental aspects of the activities relate to those license conditions that have been placed on the operation by the Nuclear Regulatory Commission as a result of reviews conducted under the authority of the National Environmental Policy Act. Environmental inspections would be conducted at the same time as health and safety inspections.

05.02 Adjustments. The program provides regional offices the flexibility to adjust the frequencies of inspections, within the various program areas, based on an evaluation of the inspection findings and enforcement experience with a particular licensee. Alternate frequencies of inspection for various procedures are specified in Tables 1 and 2. The lower frequency specified is the minimum frequency to which the inspection may be reduced by the regional office. The higher frequency of inspection specified for the procedure shall be the normal inspection frequency for the program. There is no maximum frequency expressed in Tables 1 and 2. It is expected that any level of effort (i.e., frequency of inspection) above that specified as the normal frequency would be established at a level commensurate with whatever is needed to resolve identified problems and their importance to safety.

05.03 Performance-Based License. At sites operating under a PBL, the inspector should ensure that changes authorized under the PBL do not erode the basis for NRC's licensing decision. In evaluating the changes made to the facility, inspectors should recognize that the reviews conducted by the licensee's evaluation panel are not reviews of safety nor environmental acceptability. Rather, the evaluation panel reviews under the PBL are a determination of whether the proposed changes require prior NRC review. Licensees are obligated to ensure that any change considered to the facility should be safe and environmentally acceptable. Then the evaluation panel is responsible for determining if the proposed changes need to be submitted to NRC. There will be circumstances where the licensee finds that the proposed changes are acceptable; however, the change may still require an NRC review.

As a general set of guidelines, those changes that will require NRC review include changes to:

1) Those things described in the application or subsequent submittals that would reduce the safety basis of the facility;

2) Procedures conditioned in the license or outlined, summarized, or included in the application; and

3) Things specifically conditioned in the license.

Additional guidance on the inspection of PBL activities undertaken by licensees can be found in IP 37001, "10 CFR 50.59 Safety Evaluation Program." Although this IP is applicable to 10 CFR Part 50 licenses, the basic philosophy and inspection process can be adopted to PBLs since the PBL concept was derived from 10 CFR 50.59.

2801-06 REVIEW OF EVENTS

All inspections should include, as appropriate, a review of licensee reportable and non-reportable events that involve contamination, releases, equipment malfunctions, or other similar events that have generic significance. The review should cover corrective actions taken by the licensee and follow-up actions taken to prevent recurrence. In the case of reports received by NRC involving radiological health and safety, the region is responsible for determining the seriousness of the reported incident and whether an immediate reactive inspection is necessary. When such reports involve programmatic areas normally addressed by Headquarters programs, the region shall confer with Headquarters, to jointly determine what response, if any, is required, including whether the NRC response should include personnel from the Headquarters.

Non-reportable events are those determined by the licensee to fall outside criteria requiring them to be reported to NRC. Although, these events are not reported formally to NRC, licensees occasionally may contact regional staff informally to describe the event and explain it is not required to be reported. Still, licensees are often required, through license conditions or commitments, to maintain records of non-reportable events onsite. Non-reportable events should be examined during inspections, to determine appropriate corrective actions or follow-up to preclude recurrence: these events may involve safety issues that should be followed up by the Occupational Safety and Health Administration, Mine Safety and Health Administration, and existing or potential operational difficulties not otherwise reportable, such as biointrusion in disposal units, erosion or sloughing of trench walls, or uncontrolled wind erosion. Additional guidance on non-reportable events is contained in individual inspection procedures.

2801-07 INDEPENDENT INSPECTION EFFORT

Each inspector should spend some onsite inspection time performing independent inspection effort. The amount of time spent should be commensurate with the level of risk, the complexity of the facility, and the degree to which inspection resources have already been committed to significant safety and environmental issues that have already been identified in the facility. This effort may include more in-depth

inspection in selected technical areas than that normally called for by the formal procedures. The major objective of this effort should be to gain increased understanding of potential safety and environmental hazards of particular activities of interest, such as those that may have been involved in a series of recent non-reportable events.

Comparison of the findings from this type of effort with the licensee's findings may uncover unresolved safety and environmental questions, improper maintenance practices, and other problems that may not be discovered through other means. Discovered hazards outside the scope of Nuclear Regulatory Commission IPs or Nuclear Regulatory Commission regulatory authority should be conveyed to the licensee at the exit interview (as set forth in IP 88002), described to regional management during debriefing, and included in the formal inspection report. In cases where regulatory jurisdiction for the observed potential hazard is clear, the finding shall be reported to the responsible agency for action (i.e., State, Mine Safety and Health Administration, Environmental Protection Agency, etc.). In all cases where the finding involves a potential effect on radiological health and safety, the finding shall be followed during subsequent inspections until the licensee has addressed the concern. However, special follow-up inspections solely on the basis of Mine Safety and Health Administration issues are not required unless the potential hazard also directly involves radiological health or safety.

2801-08 RANDOM SELECTION AND EXAMINATION OF RECORDS

Many of the inspection procedures normally require the inspector to select certain types of records at random for closer examination. However, random selection is not always required. The inspector may seek out certain records of interest when so inclined.

Random selection is a technique that recognizes the fact that the Nuclear Regulatory Commission does not have the resources to inspect every detail of plant. The Nuclear Regulatory Commission inspection program is predicated on the fact that the licensee is ultimately responsible for the safety of the licensed facility. Random selection, where specified in a procedure, allows the inspector to sample specific aspects of the licensee's safety and environmental program to be studied at a level of detail that would be impractical if exercised uniformly across the entire safety program. When random selection in a procedure is specified, the inspector should select records corresponding to activities that relate to the Nuclear Regulatory Commission's regulatory role, such as effluent monitoring records or ground-water restoration records. Also included should be records required to be retained for later decommissioning.

To reasonably verify that activities are conducted safely and in an environmentally acceptable manner, the inspector also should randomly select personnel for interviews. The extent and depth to which random selections or examinations are

needed are left to the inspector's judgment, depending on how satisfied the inspector is that operational and safety safeguards procedures are being followed uniformly.

2801-09 REGIONAL RESPONSIBILITY FOR LICENSEES

The responsibility for inspection resides with the regional office in which the licensee operation is located. For efficiency in resource use, the regional office may request another regional office or Headquarters to assist in the conduct of inspections when specialized technical expertise is needed and is not available within the responsible region. In some cases, a region may wish to transfer all or part of the inspection responsibility to another region or to Headquarters. These arrangements may be made with mutual agreement between the offices involved. If a permanent transfer of total inspection responsibility is involved, the affected regional offices should ensure that the appropriate changes are made to the computerized license data file by informing the Office of Nuclear Material Safety and Safeguards of the change in inspection responsibility for the license and requesting a change in the file. The regional office assuming inspection responsibility will be credited with the caseload in budgeting and allocating resources.

2801-10 INSPECTION DURING VARIOUS PHASES OF FACILITY LIFE

10.01 Part I - Inspection During the Construction and Pre-Operational Phase

a. Purpose. The purpose of this instruction is to provide guidance for planning and conducting inspections during the construction/pre-operations phase of facility life. Activities encompassed during the construc-tion/pre-operations phase of a uranium mill or disposal site include disposal trench construction: liner placement: observation and verification of placement and compaction of cover materials: equipment use: fire protection program (equipment and training procedures):, and compliance with applicable construction specifications requirements in accordance with applicable management controls and quality assurance procedures. Activities encompassed during start-up of a mill that has been on stand-by, would include equipment operation/function and safety.

b. Implementation. This inspection program begins on issuance of the license, or license amendment to restart the mill, and continues until the site begins active receipt and disposal of waste, or processing of ore at a mill. Situations may arise in which inspection requirements specified for other phases may apply concurrently with those specified here for the pre-operational phase. For example, certain

requirements contained under Parts I and II may apply in the construction, pre-operational checks, and start-up of a major modification to the site.

The uranium mill or 11e.(2) byproduct material disposal site pre-operational inspection program is defined by selection from among the list of procedures in Table 1. The areas covered during an inspection need not be limited only to those elements discussed in the procedures, but may need to include examination of other activities not expressly delineated or covered in existing procedures. In such cases, the inspector must exercise good professional judgment in modifying the inspection and in identifying to the program office the possible need for development of supplemental guidance. Conformance with the principles of reducing radiation exposure to as low as is reasonably achievable (ALARA) should be a principal concern at all times.

For the normal inspection frequency, each procedure should be executed for each specific frequency. In practice, part or all of the procedure element may need to be examined during each inspection visit.

During inspections, emphasis should be placed on physical examinations, observation of conduct of operations, independent measurements, and personnel interviews. Attention should be directed toward the availability of written procedures, the degree to which they are being followed, and the state of training of on-site personnel. Effort should be concentrated on areas of perceived concern (highest safety risk) and site activities performed since the last inspection.

Review of records should involve only a sampling of those records important to safety of personnel and the general public. For example, if the organizational structure has not changed with respect to personnel and assigned functions and responsibilities, the inspector should not pursue the subject of organization in any detail, unless there is reason to believe that such is not the case. Discretion in such areas is left to the inspector's judgement.

c. Regulatory Considerations. The inspector should be familiar with current license requirements; previous inspection reports; applicable codes, standards and guides; and the following regulations:

10 CFR Part 19, "Notices, Instructions, and Reports to

Workers: Inspection and Investigations."

10 CFR Part 20, "Standards for Protection against Radiation."

10 CFR Part 21, "Reporting of Defects and Noncompliance."

10 CFR Part 40, "Domestic Licensing of Source Material."

10 CFR Part 61.82. "Commission Inspection of Land Disposal Facilities (Commercial Disposal Only)."

d. Guidance for Use of Inspection Procedures during the Pre-Operational Phase. The inspection procedures indicated in Table 1 for the construction/pre-operations phase are applicable to inspections conducted at uranium mills and 11e.(2) byproduct material disposal sites during construction/pre-operations. The inspection staff can determine the applicable elements of each procedure by reviewing the procedure, the facility license, and reports of previous inspections.

10.02 Part II - Inspection during the Operations Phase

a. Purpose. The purpose of this instruction is to provide guidance for planning and conducting inspections during the operations phase of the facility. Activities encompassed during the operations phase include receipt and handling of incoming 11e.(2) byproduct material, or the processing of ore and packaging of yellowcake; emplacement of the 11e.(2) byproduct material for disposal; radiation safety and environmental monitoring activities; and records management.

b. Implementation. This inspection program begins on issuance of the facility license, or a license amendment to allow a uranium mill on stand-by to restart, and continues until the facility ceases active receipt of materials and/or disposal of waste. Situations may arise in which inspection requirements specified for other phases may apply concurrently with those specified here for the operations phase. For example, certain requirements contained under Parts I and III may apply in the operations, or start-up of a facility.

The uranium mill or 11e.(2) byproduct material disposal site operations inspection program is defined by selection from among the list of procedures in Table 2. The areas covered during an inspection need not be limited only to those elements discussed in the procedures, but may need to include examination of other activities not expressly delineated or covered in existing procedures. In such cases, the inspector must exercise good professional judgment in modifying the inspection and in identifying to the program office the possible need for development of supplemental guidance. Conformance with the principles of ALARA should be a principal concern at all times.

For the normal inspection frequency, each procedure should be executed for each specific frequency. In practice, part or all of the procedure element may need to be examined during each inspection visit. Emphasis should be placed on physical examinations, observation of conduct of operations, independent measurements, and personnel interviews. Attention should be directed toward the availability of written procedures, the degree to which they are being followed, and the state of training of on-site personnel. Effort should be concentrated on areas of perceived concern (highest safety risk) and licensee activities conducted since the last inspection.

Review of records should otherwise involve only a sampling of those records important to safety of personnel and the general public. For example, if the organizational structure has not changed with respect to personnel and assigned functions and responsibilities, the inspector should not pursue the subject of organization in any detail, unless there is reason to believe that such is not the case. Discretion in such areas is left to the inspector's judgment.

c. Regulatory Considerations. The inspector should be familiar with current license requirements; previous inspection reports; applicable codes, standards and guides; and the following regulations:

10 CFR Part 19, "Notices, Instructions, and Reports to Workers:

Inspection and Investigations."

10 CFR Part 20, "Standards for Protection against Radiation."

10 CFR Part 21, "Reporting of Defects and Noncompliance."

10 CFR Part 40, "Domestic Licensing of Source Material."

10 CFR Part 61.80, "Maintenance of Records, Reports, and Transfers."

10 CFR Part 61.82, "Commission Inspection of Land Disposal Facilities

(Commercial Disposal Only)

d. Guidance for Use of Inspection Procedures During Operations. The inspection procedures indicated in Table 2 for the Operations Phase are applicable to inspections conducted at uranium mills and 11e.(2) byproduct material disposal sites, including mills authorized for disposal of in-situ leach facility waste and other 11e.(2) byproduct material. The inspection staff can determine the applicable elements of each procedure by reviewing the procedure, the facility license, and reports of previous inspections. Inspectors should also refer to applicable portions of Regulatory Guides 4.14, 8.22, and 8.30, for details.

10.03 Part III - Inspection During the Reclamation/Closure Phase.

a. Purpose. The purpose of this instruction is to provide guidance for planning and conducting inspections during the period of reclamation/closure of a uranium mill site or 11e.(2) byproduct material disposal site. In some cases, as specifically allowed or required by license condition, some closure activities may occur for some parts of a facility during the operations phase. The purpose of the inspection is to verify, by field observations and review of licensee records, that decontamination of soil, sediment, surface waters, and ground-water, as well as reclamation of the disposal cell, are being performed in accordance with NRC-approved plans.

b. Implementation. This program is initiated when the licensee begins implementation of any portion of the approved reclamation/decommissioning plan. The foundation for planning and scheduling inspections will thus be the licensee's progress in implementing the reclamation plan (construction schedule). The criteria for inspections will be license conditions and applicable regulations, some of which will directly address reclamation activities. In many cases, portions of the reclamation plan may be implemented for part of a site while active operations continue elsewhere on site. In these cases, the appropriate portions of this program should be implemented in conjunction with the operations inspection program. The reclamation plan itself, as amended during site operation and approved by NRC, should be reviewed by the regional office to determine if procedural or scheduling modifications are necessary to enable planning of an efficient inspection program. The inspection program continues in effect until the licensee has implemented all elements of the reclamation plan, the license is terminated, and the title to the land is transferred to the U.S. Department of Energy for long-term surveillance and maintenance.

The 11e.(2) byproduct material disposal site, or uranium mill reclamation and decommissioning inspection program is also defined by selection from among the list of procedures in Table 2. The areas covered during an inspection need not be limited only to those elements discussed in the procedures, but may need to include examination of other activities not expressly delineated or covered in existing procedures. In such cases, the inspector must exercise good professional judgment in modifying the inspection and in identifying to the program office the possible need for development of supplemental guidance. Conformance with the principles of ALARA should be a principal concern at all times.

For inspections during site remediation/closure (includes licensee performing cleanup verification measurements), each procedure should be executed for each specific frequency. In practice, part or all of the procedure element may need to be examined during each inspection visit. Emphasis should be placed on physical examinations, observation of conduct of operations, limited independent measurements (e.g., split samples), and personnel interviews. Attention should be directed toward the availability of the licensee's written procedures, the degree to which they are being followed, and the state of training of on-site personnel. Effort should be concentrated on areas of perceived concern. Discretion in such areas is left to the inspector's judgment in consultation with Headquarters staff (project manager, technical reviewers).

A confirmatory survey may be performed as an audit of the licensee's final survey results, to independently confirm that the report is accurate and representative of site conditions, but is only necessary if there is significant doubt regarding the licensee's final survey results. A confirmatory survey will be performed if one or more of the following apply to decommissioning of the site: 1) repeated violations, with the inclusion of a "management paragraph"; 2) issuance of an order; 3) failure to take short-term corrective measures; 4) event requiring a reactive inspection; 5) limited financial and technical viability of the licensee; and 6) significant problems identified with the reclamation plan or final survey data.

c. Regulatory Considerations. The inspector should be especially familiar with current license requirements; previous inspection reports; applicable codes, standards and guides; and the following regulations:

10 CFR Part 20, "Standards for Protection against Radiation."

10 CFR Part 40, "Domestic Licensing of Source Material."

10 CFR Part 61.82, "Commission Inspection of Land Disposal

Facilities (Commercial Disposal Only)."

d. Guidance for Use of Inspection Procedures During Closure The inspection procedures indicated in Table 2 are applicable, as noted, to inspections conducted at 11e.(2) byproduct material disposal sites, or uranium mills during closure. The most applicable procedure is under development and will be entitled, "Decommissioning Inspection Procedure for Uranium Mill Sites." The inspection staff can determine the applicable elements of each procedure by reviewing the procedure, the facility license, and the licensee's closure (reclamation) plan.

END

Attachments:

Table 1. Inspection Procedures Applicable to Pre-Operational Inspection of a Uranium Mill or 11e.(2) Byproduct Material Disposal Site

Table 2. Inspection Procedures Applicable to Inspection of a Uranium Mill or 11e.(2) Byproduct Material Disposal Site during Operations and

Closure

TABLE 1 - INSPECTION PROCEDURES APPLICABLE TO PRE-OPERATIONAL INSPECTION OF A URANIUM MILL OR 11e (2) BYPRODUCT MATERIAL DISPOSAL SITE

Procedure Number	Procedure Title	Inspection Frequency Mininfum Normal	Applicability of Procedure to the Inspection
30703	Management Entrance/Exit Interview	Each Each Inspection Inspection	The general principles of the procedure are applicable.
36100	10 CFR Part 21 Inspection at Nuclear Power Reactors	As As Necessary Necessary	Inspectors should be sensitive to the underlying principle driving this procedure.
37001	10 CFR 50.59 Safety Evaluation Program	As As Necessary Necessary	As applicable to implementation of performance-based license (PBL) since the PBL concept was derived from 10 CFR 50.59.
88001	Construction Review	Annual Key Construction Milestones	Applicable to the inspection of engineering and construction aspects.
88005	Management Organization and Construction	Annual Annual	Inspector should subscribe to the general principles established in this procedure.
88045	Environmental Protection	Annual Twice per Year	License conditions will specify offsite monitoring and sampling locations, frequencies, and applicable limits on levels and concentrations of radioactivity.
92701	Follow-up	As As Necessary Necessary	Generic procedure applicable.
92702	Follow-up on Violations/Deviations	As As Necessary Necessary	Generic procedure applicable.
92703	Confirmatory Action Letters	As As Necessary Necessary	Generic procedure applicable.
XXXXX	In Situ Leach (ISL) Facilities Programs	Annual Twice per Year	Applicable to the operating aspects generic to uranium mills and in-situ leach facilities.

TABLE 2 - INSPECTION PROCEDURES APPLICABLE TO INSPECTION OF A URANIUM MILL SITE OR 11e (2) BYPRODUCT MATERIAL DISPOSAL SITE DURING OPERATIONS AND CLOSURE

OPERATIONS PHASE CLOSURE PHASE

Procedure Number	Procedure Title	Inspection Frequency Minimum Normal	Applicability of the Procedure	Inspection Frequency Minimum Normal	Applicability of the Procedure
30703	Management Entrance/Exit Interview	Each Each Inspection Inspection	The general principles established in this procedure should be followed	As As Necessary Necessary	The general principles established in this procedure should be followed.
37001	10 CFR 50 59 Safety Evaluation Program	As As Necessary Necessary	As applicable to implementation of performance-based license (PBL) since the PBL concept was derived from 10 CFR 50.59.	As As Necessary Necessary	As applicable to implementation of performance-based license (PBL) since the PBL concept was derived from 10 CFR 50.59.
83822	Radiation Protection	Annual Twice per Year	This procedure is applicable in its entirety.	Each Each Inspection Inspection	Initially, the entire procedure should be followed to determine that the approved program is being implemented and to establish the potential for exposures. Subsequent inspections can be tailored to concentrate on identified areas of risk.
83890	Closeout Inspection and Survey	N/A N/A	N/A	Final Inspection	Use this procedure in conjunction with the new decommissioning procedure.
86740	Inspection of Transportation Activities	Annual Twice per Year	The procedure should be used to confirm compliance for yellowcake or byproduct shipments.	As As Necessary Necessary	Use the procedure only if source or byproduct material is transported off-site.
88001	On-Site Construction	Annual Twice per Year	This procedure is for the engineering and construction aspects of a disposal cell and implementation requires the assistance of Headquarters staff	As Needed As Needed	Key activities to be inspected are construction of the radon barrier and the erosion protection layer of the disposal cell.
88005	Management Organization and Controls	Annual Annual	This procedure is generally applicable. Section 03.05, Q/A Programs should be supplemented with guidance (e.g., NMSS Handbook)	Annual Annual	Inspections should determine if the approved procedures are being implemented, and if NMSS is properly involved with any changes made to a procedure.
88010	Operator Training/Retraining	Every Other Annual Year	This procedure is applicable to mill and disposal sites	Every Other Annual Year	This procedure is applicable to mill and disposal sites
88020	Operations Review	Annual Twice per Year	Some sections of this procedure apply.	Annual	See Sections 02 01b, "Inspection of Tailings Dam" and 02 02, "Housekeeping".

TABLE 2 - INSPECTION PROCEDURES APPLICABLE TO INSPECTION OF A URANIUM MILL SITE OR 11e.(2) BYPRODUCT MATERIAL DISPOSAL SITE DURING OPERATIONS AND CLOSURE

OPERATIONS PHASE CLOSURE PHASE

Procedure Number	Procedure Title	Inspection Frequency Minimum Normal	Applicability of the Procedure	Inspection Frequency Minimum Normal	Applicability of the Procedure
88025	Maintenance and Surveillance Testing	Annual Twice per Year	This procedure is for reactors, but some generally applicable points.	Annual Twice per Year	This procedure applicable only to emergency utility services and general maintenance.
88035	Radioactive Waste management	Annual Twice per Year	Sections 02 01 to 02.06 are generally applicable. The procedure needs to be updated to refer to sections of new 10 CFR Part 20.	Annual Twice per Year	Sections 02.01 to 02.07 of this procedure are generally applicable.
88045	Environmental Protection	Annual Twice per Year	This procedure is applicable in its entirety.	Annual Twice per Year	This procedure is applicable in its entirety. The potential for off-site releases will be less during closure, but must still be inspected.
88050	Emergency Preparedness	Every 2 Every 2 years years	This procedure is generally applicable. Discretion is required regarding the degree to which all requirements are inspected against as the severity of an emergency at a disposal site is much less than that at an operating mill, or other fuel cycle facilities.	Every 2 Every 2 years years	The fire protection and prevention program must be inspected. The frequency and depth of inspection depend on the type of facility and the methods of reclamation.
88104	Decommissioning Inspection Procedure for Fuel Cycle Facilities	N/A N/A	N/A	Every Every Inspection Inspection	Portions of this procedure are applicable to mill and disposal sites, but IP 88XXX is specific for uranium mill sites.
92701	Follow-up	As As Necessary Necessary	This procedure is generally applicable.	As As Necessary Necessary	This procedure is generally applicable.

TABLE 2 - INSPECTION PROCEDURES APPLICABLE TO INSPECTION OF A URANIUM MILL SITE OR 11e (2) BYPRODUCT MATERIAL DISPOSAL SITE DURING OPERATIONS AND CLOSURE

OPERATIONS PHASE CLOSURE PHASE

Procedure Number	Procedure Title	Inspection Frequency Minimum Normal	Applicability of the Procedure	Inspection Frequency Minimum Normal	Applicability of the Procedure
92702	Follow-up on Corrective Actions for Violations and Deviations	As As Necessary Necessary	This procedure is generally applicable.	As As Necessary Necessary	This procedure is generally applicable.
90703	Follow-up of Confirmatory Letters	As As Necessary Necessary	This procedure is generally applicable.	As As Necessary Necessary	This procedure is generally applicable.
93001	OSHA Interface Activities	As As Necessary Necessary	This procedure is applicable.	As As Necessary Necessary	This procedure is applicable.
XXXXX	In-Situ Leach (ISL) Facilities Program	Annual Twice per Year	Applicable to the operating aspects generic to uranium mills and in-situ leach facilities	Annual Twice per Year	Applicable to the closure aspects generic to uranium mills and in-situ leach facilities.
88XXX	Decommissioning Inspection Procedure for Uranium Mills	N/A N/A	N/A	As As Necessary Necessary	This procedure is applicable in its entirety.

NRC INSPECTION MANUAL NMSS/URB

INSPECTION PROCEDURE 87654

URANIUM MILL SITE DECOMMISSIONING INSPECTION

PROGRAM APPLICABILITY: 2801

87654-01 INSPECTION OBJECTIVES

To determine if licensed decommissioning programs are being conducted in accordance with Nuclear Regulatory Commission requirements specified in individual licenses and the regulations. To provide assurance that uranium mill site decommissioning activities are being performed appropriately to demonstrate compliance with the decommissioning regulations and guidelines, and in accordance with the approved reclamation plan. This procedure supplements Inspection Procedure (IP) 88104 and provides details specific to decommissioning uranium mill sites. This procedure is also applicable to 11e.(2) byproduct disposal sites licensed by the NRC that are not associated with a uranium mill; however, the inspector should confirm the regulatory requirements for the site as indicated in the site license.

87654-02 INSPECTION REQUIREMENTS

A determination of compliance with NRC requirements will be based on direct

observation of work activities, interviews with workers, demonstrations by workers performing tasks regulated by NRC, independent measurements of radiation conditions at the facility, and review of licensee records. The inspector should refer to Inspection Manual Chapters (IMCs) 2602, 2605, and 2801 for general policies and guidance.

The scope of the inspection of licensed activities will be commensurate with the scope and status of the licensee's decommissioning program and with previous inspection efforts. A primary decommissioning activity to be addressed is soil cleanup and cleanup verification to demonstrate compliance with Criterion 6(6) of 10 CFR Part 40, Appendix A (most mill buildings are buried in the disposal cell). However, inspection of the implementation of other radiological decommissioning requirements in Criterion 6, such as measurement of radon flux and gamma levels from the disposal cell cover, may be necessary and should be coordinated with the Headquarters health physicist. Ground-water compliance will be evaluated against Criteria 5B, 5C, 5D, 5E, 5G, and 13. Surface reclamation (includes disposal cell construction) compliance will be evaluated against Criteria 4 and 6, and is discussed in Inspection Procedure (IP) 88001. Applicable portions of 10 CFR 40.42, such as the requirements for timely decommissioning, may need to be addressed, therefore the NRC Project Manager should be consulted when the site inspection plan is being developed.

This IP should be used as a checklist when developing a site-specific decommissioning inspection plan. The decommissioning inspection plan should not duplicate the normal inspection for radiation protection and environmental monitoring, but emphasize observation of key decommissioning activities being performed. If possible, implementation of this procedure should be initiated early in the decommissioning phase, to identify any program deficiencies and to gain confidence in the licensee's performance.

02.01 Preparation. The inspector should allow adequate time to prepare for the inspection. Preparation will include reviewing documents, making travel arrangements, coordinating with appropriate staff, notifying appropriate State agencies, and selecting necessary equipment. In particular, the inspector shall identify whether any license amendments have been issued since the last inspection, or whether the licensee has informed NRC of any major program changes since the last inspection. The inspector shall also review any event files to determine if the licensee had any incidents or events since the last inspection.

02.02 Entrance Briefing. When the inspector arrives at the licensee's facility, he/she will inform an available senior management representative of the purpose and scope of the inspection.

02.03 General Overview

a. Organization. Interview cognizant licensee representatives about the current organization of the program. Examine the licensee's organization with respect to changes that have occurred in personnel, functions, responsibilities and authorities since the previous inspection. Identify the reporting relationship and management structure between the licensee's executive management and the Radiation Safety Officer (RSO).

b. Scope of Program. Interview cognizant personnel to determine the scope of licensed activities, site status, staff size, etc.

c. Management Oversight. In the course of interviewing cognizant personnel, determine if management oversight is sufficient to provide the licensee staff with adequate resources and authority to administer the licensed program.

1. RSO - Determine whether the RSO has sufficient authority, and fulfills the appropriate duties commensurate with the size and scope of licensed activities.

2. Audits - Verify that audits are performed as required. Verify that the results of the audit are reviewed and addressed.

3. Determine that individuals who perform and/or supervise licensed activities are qualified and perform an appropriate level of supervision, as required by the license or regulations.

d. Decommissioning Activities. The inspection should be scheduled so that decommissioning activities can be observed, unless it is to be the final decommissioning inspection (after the Final Survey Report submitted and reviewed). Licensee decommissioning staff should be interviewed and relevant records on decommissioning activities reviewed.

e. Site Orientation Tour. A brief site tour should be made. General observations should be noted on the condition of the facility and the licensed activities being performed.

02.04 Equipment and Procedures. Review the equipment and procedures used for decommissioning the site to determine if appropriate and approved equipment and methods were followed.

02.05 Final Survey. Verify the accuracy and reliability of the licensee's final survey data by reviewing the methods used and the final survey data.

02.06 Quality Assurance/Quality Control. Verify the adequacy of the licensee's quality assurance and control program.

02.07 Data Reduction and Management. Verify the way field data is documented and processed.

02.08 Personnel Training. Verify that appropriate training and instructions were/are given. Through discussions with workers, verify that licensee personnel understand and implement the established decommissioning procedures.

02.09 Confirmatory Survey. The survey by the inspector should include gamma scans (and alpha scans if applicable) and soil analysis using methods similar to those approved for use by the licensee. The inspector's survey data is used as an indication of whether or not the licensee properly implemented the approved procedures and complied with the decommissioning criteria.

02.10 Ground Water. Verify that the ground-water monitoring and/or corrective program is being conducted (1) in compliance with Appendix A of 10 CFR 40 and (2) as required by applicable license conditions. Verify that the ponds are being monitored for leakage into the ground water as required by applicable license conditions.

02.11 Exit Meeting. When the inspection is over, there should be an exit meeting with the most senior licensee representative present, to discuss the preliminary inspection findings.

02.12 Post-Inspection Actions. After the inspection, the inspector shall summarize the findings with his/her supervisor. The inspector shall also contact Headquarters staff when any pertinent issues are raised during the inspection, when inspection findings impact on any licensing actions, or to give feedback on how the licensee has addressed recent licensing actions.

The inspection report should document what activities were observed, summarize the interviews with licensee personnel, and clearly indicate the evaluation of the licensee's decommissioning program.

03.01 Preparation. Before the inspection, the inspector should be familiar with the guidance listed in the Appendix of this IP and a review of the following should be performed.

a. Operating History. Review the history of each license to identify what types of work activities were performed, the types of buildings that existed, and the geographical location of each. Review the results of past operational radiological surveys that were used to demonstrate radiological control of the uranium mill.

b. Waste Disposal Practices and Radioactivity Releases. Verify waste disposal outside the tailings cell. Consider the potential for, or evidence of, contamination from spills, or other releases of radioactive material (such as haul routes) to compare with the soil cleanup boundary.

c. Environmental Monitoring Data. Verify operational soil sampling, airborne emissions, and ground-water monitoring data, specifically for evidence of radiological contamination. Verify effectiveness of effluent controls, particularly during drying and packaging operations, and when air was exhausted from the yellowcake stack. Determine area where airborne contamination would likely be deposited.

d. Results of Previous Surveys. Verify the results of scoping, characterization, and remedial action support (excavation control) surveys performed by the licensee. Review the results of previous surveys for justification of the classification of mill site areas (e.g., mill site boundaries versus windblown areas). In particular, review data for the areas adjacent to the remediation of windblown contamination.

e. Remedial Actions. Review the specific procedures that were used to decontaminate the process facilities and/or land areas. Consider the potential for incomplete remediation based on these remedial action techniques, particularly the potential for the remedial actions to produce areas of localized contamination within verification grids that were not represented in the gamma scan average value. Determine if the licensee has identified the need to remediate radionuclides other than radium-226 (Ra-226).(e.g., beneath acidic raffinate ponds) where thorium-230 (Th-230) could migrate farther than Ra-226 or where uranium ore residue or yellowcake contamination could be located.

f. Guidelines Established. Review the guidelines that the licensee is using for indoor and outdoor areas and verify how the stated guidelines are being implemented:(e.g., use of surrogate measurements, presence of multiple contaminants, averaging conditions, and hot spots).

g. Records. Review the site's previous inspection history, license conditions, and licensee's submittals concerning decommissioning, and the Technical Evaluation Reviews for the related amendments, to be aware of follow-up inspection items, commitments made by the licensee, and assumptions or conclusions, made by licensing staff, related to decommissioning.

h. Background Reference Areas. Identify the value that NRC licensing staff approved as the site Ra-226 soil background. Determine if any recent information might require a review of the background value to determine that its use for soil cleanup is adequate to protect long-term health and safety (e.g., soil cleanup extended into background locations).

03.02 Entrance Briefing. No specific guidance required.

03.03 General Overview. No specific guidance required.

03.04 Equipment and Procedures. The inspector shall verify the gamma surveys done by the licensee by reviewing the following:

a. Instruments. Review the basis for the selection of instruments (e.g., based on potential contaminants and their associated radiations, types of media (soil, sludge, etc.) to be verified, and detection sensitivities). Typically, sodium iodide (NaI) scintillation detectors are used for land area surveys.

b. Sensitivity. Review documentation pertaining to instrumentation sensitivity, particularly licensee statements to the effect that instrumentation will be sufficient to detect radiological contamination. The detection sensitivity should be below the appropriate guideline values. Also, verify the instrument scan sensitivity for exterior scan surveys (NUREG-1575, Section 6.4). Check the scan sensitivity in terms of the gamma soil cleanup guideline.

c. Gamma-Radium Correlation. Confirm that the licensee checked the correlation of Ra-226 concentration to gamma levels during verification, and that an acceptable correlation was obtained.

d. Methods. Verify the methods/procedures for exposure rate measurements and gamma scans, unless these were reviewed with the Reclamation Plan. If possible, observe if the measurements and scans are performed according to the procedures and good health physics practices, such that reliable data are produced.

e. Calibration. Verify the procedures for instrument calibration: (e.g., use of appropriate radionuclide calibration sources, source geometry, and appropriate consideration of environmental conditions). Check the calibration date of survey meters.

f. Check-out. Review the operational check-out of survey instrumentation. Verify frequency of operational checks (both to calibration source and background) and if instrument response fell within predetermined acceptance criteria.

The inspector should verify the surface scans of buildings and equipment by reviewing the following:

a. Instruments. Review the basis for the selection of instruments: (e.g., based on potential contaminants and their associated radiations, surface types to be verified, and detection sensitivities). Typically, Geiger Muller, gas proportional, or zinc sulfide detectors are used for building surface contamination surveys. Verify the energy dependence of the measurement instrument and determine if the licensee has appropriately addressed this issue. Remember that beta detectors are more sensitive to for "old" yellowcake than alpha detectors.

b. Sensitivity. Review documentation pertaining to instrumentation sensitivity, particularly licensee statements to the effect that instrumentation will be sufficient to detect radiological contamination. The detection sensitivity should be below the appropriate guideline values. Verify the instrument scan sensitivity for both the interior and exterior scan surveys of building surfaces (NUREG-1575, Section 6.4).

c. Equations. Review the licensee's minimum detectable contamination equation for direct measurements on building surfaces and the conversion of counts to activity (should use the 4 efficiency factor).

d. Calibration. Verify the procedures for instrument calibration, e.g., appropriate radionuclide calibration sources, source geometry, and appropriate consideration of surface and environmental conditions.

e. Methods. Verify the method for exposure rate measurements, unless it was part of the Reclamation Plan. Normally, measurements are done 1 meter (3 feet) from the floor and at least 1 meter (3 feet) from a corner.

f. Check-out. Review the operational check-out of survey instrumentation. Verify frequency of operational checks (both to calibration source and background) and if

instrument response fell within predetermined acceptance criteria.

03.05 Final Survey. The inspector should verify the level of survey coverage for structures and land areas, based on the area classification (e.g., mill site or windblown area; affected or unaffected). The inspector should review the licensee's procedures for performing surface activity measurements and scans on building surfaces, for performing soil sampling, and ground-surface scanning. When possible, the inspector should observe implementation of the procedures to determine if the procedure is followed and performed in a manner reflecting good health physics practices. In particular, review the following:

a. Measurements. Determine whether the type, location, and number of measurements and/or samples per area are sufficient to provide a good representation of the radiological contamination. NUREG/CR-5849 should be consulted for general guidance.

b. Boundaries. Ensure that the boundaries of the windblown areas have been appropriately determined (review gamma data and perform spot-check gamma scans), and that any potential subsurface radioactive material deposits have been addressed.

c. Follow-up. Determine the use of investigation levels for measurements results and if the licensee performed appropriate follow-up actions. For example, soil samples should be collected if the NaI scintillation detector readings exceed a specified investigation level.

d. Sample and Analytical Procedures. Verify the licensee's sample collection and preparation techniques and equipment; (e.g., mixing, drying, geometries used for gamma spectrometry on soil samples, ingrowth period for Ra-226 progeny, etc.). Review the licensee's analytical procedures for radiological analyses, particularly the analysis of soil samples by gamma spectrometry. If a contract laboratory was used, those procedures should be available for review, including sample chain-of-custody procedures.

e. Meters. Review the protocol the licensee uses to interpret the gamma spectrometry results, particularly the radionuclide peaks used to identify various contaminants. Check for drift checks, energy calibration, control charts, duplicate sample counts, split samples with outside laboratory, etc. Determine whether the survey meters and gamma spectrometer are maintained and operated in accordance with the manufacturer's recommendations and good health physics practices.

f. Replaced Data. Review survey results for those areas where additional investigations have been conducted. If initial survey data have been replaced or supplemented as a result of the investigation, ensure that the replacement data are annotated in the final report. The annotation is intended to alert the reviewer that

the initial data have been replaced.

g. Survey data. Select a portion of completed survey data and review data for compliance with procedures and final survey plan. Review the documentation for scan surveys to determine how the licensee identified and investigated any elevated readings during the scan survey. Review survey results for specific processing areas that have been remediated, including buried raffinate lines, evaporation ponds, etc. Determine if results demonstrate compliance with guidelines and whether any modifications to the general survey approach were necessary.

03.06 Quality Assurance/Quality Control

a. Laboratory. Review the licensee's on-site laboratory and/or licensee's contracted off-site laboratory quality assurance/quality control procedures, including duplicates, blanks, and matrix spikes. Determine the frequency of analysis for each of the quality control (QC) checks. Determine whether the laboratory participates in cross-check of performance evaluation programs, such as those offered by the Environmental Monitoring Laboratory and the U.S. Environmental Protection Agency.

b. Final Data. Review the final survey report data and discuss with the Headquarters health physicists, to ensure that the items listed below are adequately addressed either in the report or in the licensee's records:

1. QC sampling and direct measurements, along with associated acceptance criteria and corrective actions.

2. Verification of survey measurement data (i.e., data quality assessment to determine adequacy of the collected data, for the intended use). Examples of data quality assessment include verification that the collected data are applicable to the statistical model used to reduce the data, and other data quality indicators, including completeness, comparability, representativeness, precision, and accuracy.

3. Testing of computer calculations by manual calculation.

03.07 Data Reduction and Management

a. Program Review. Perform a program review to determine if the licensee has set up a data reduction process with criteria stated in procedures, and if the licensee's computer software has data reduction features in the analysis, counting, and data

reporting.

b. Spot Check. Select a completed survey data package, the data reduction procedure, and verify implementation by performing the data reduction process under the direction of the licensee.

1. Trace the path of data from their generation in the field or laboratory, to their final use.

2. Review any checklist forms used for preventing loss of data during data reduction.

3. Ensure that data reduction analysis information are reflected in the final survey results.

03.08 Personnel Training. Review the qualifications and training for survey technicians and other project personnel. If possible, question technicians about their knowledge of procedures and the frequency or detail of their training.

03.09 Confirmatory Survey. Verify the need for a confirmatory survey based on the criteria in IMC 2801. A confirmatory survey by the inspector and/or NRC contractor should only be necessary if there is significant doubt regarding the licensee's final survey results. The extent of the survey (e.g., gamma survey and soil analysis) should be determined with input from the Headquarters health physicist who reviewed the Final Survey Report. Confirmatory analysis of archived soil samples may be included.

03.10 Ground Water. Verify that ground-water quality data were collected at the correct locations and frequency, as required by the license (NRC-approved radiological environmental monitoring program), were analyzed for the right constituents, and were verified to make a determination against established detection or compliance standards, as appropriate. Confirm that if ground-water quality data indicated detection or compliance standards (including compliance standards set by Alternative Concentration Limits) were exceeded, that the licensee appropriately notified NRC and took appropriate sampling and, if necessary, corrective actions. Visually verify that compliance wells are correctly located with respect to the most recent NRC-approved locations. If applicable, verify that ground-water corrective action programs were conducted in a timely manner. Also, verify that wells and boreholes that must be sealed under the approved reclamation plan, were correctly sealed and abandoned.

Visually verify that: (1) there are no failures or breaks in impoundment embankments, (2) that there are no obvious tears in impoundment liners, and (3) that there are no springs and seeps around impoundment embankments. If applicable, visually verify that the impoundment leak-detection and impoundment water-level monitoring systems are in place and operational. Verify that the licensee is conducting the appropriate level of visual inspections of impoundment integrity. If applicable, verify that the impoundment leak detection system is being monitored at an appropriate frequency and for the correct indicator parameters. Verify that appropriate monitoring, cleanup, corrective actions, and regulatory notifications were taken when impoundment fluids were found in the impoundment ground-water leak-detection system.

03.11 Exit Meeting. When the inspection is over, there should be an exit meeting with the most senior licensee representative present at the facility (see IP 30703 for details). If a senior management representative is unavailable for the exit meeting, the inspector may hold a preliminary exit meeting with appropriate staff on site.

03.12 Post Inspection Actions. The inspector will review his or her inspection findings with his or her supervisor and discuss violations, items of concern, and unresolved items in sufficient depth for management to make appropriate decisions regarding enforcement actions, referral to other State and Federal agencies, and decisions on the scheduling of future inspections of the licensee's facility.

The inspector should also discuss inspection findings with the appropriate Headquarters staff to inform the staff about how the licensee has addressed (or failed to address) special license amendments or recent licensing actions. Licensing information requested by the licensee should also be discussed with the Headquarters staff.

Inspectors should be aware that NRC has entered into several memoranda of understanding, with other Federal agencies, that outline agreements on items such as exchange of information and evidence in criminal proceedings. The inspector should ensure that the exchange of information relevant to inspection activities is made in accordance with the appropriate memorandum of understanding.

87654-05 REFERENCES

The following NRC IMCs and related IPs should be used for guidance, in part, for the

decommissioning inspection:

- IMC 1230 "Quality Assurance Program for Radiological Confirmatory Measurements"
- IMC 2602 "Decommissioning Inspection Program for Fuel Cycle Facilities and Materials Licensees"
- IMC 2605 "Decommissioning Procedures for Fuel Cycle and Materials Licensees"
- IMC 2801 "Uranium Mill and 11e.(2) Byproduct Material Disposal Site and Facility Inspection Program" [revised August 1997]
- IP 30703 "Management Entrance/Exit Interview"
- IP 88001 "Construction Review"
- IP 88104 "Decommissioning Inspection Procedure for Fuel Cycle Facilities"

Applicable portions of the following NRC documents should be used for guidance:

- Draft BTP "Site Characterization for Decommissioning" November 1994, NRC, NMSS/DWM
- NUREG-1505 "A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys" Draft, August 1995 (only Section 4)
- NUREG-1506 "Measurement Methods for Radiological Surveys in Support of New Decommissioning Criteria" Draft, August 1995 (Sections 2 to 4)
- NUREG-1507 "Minimum Detectable Concentrations with Typical Radiation Survey

Instruments for Various Contaminants and Field Conditions" Draft, August 1995

- NUREG-1575 "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)" Draft, December 1996 (particularly Sections 5.5 and 6.0)

- NUREG/CR-5849 "Manual for Conducting Radiological Surveys in Support of License Termination" Draft 1992

- NUREG/BR-0241 "NMSS Handbook for Decommissioning Fuel Cycle and Materials Licensees" March 1997

END

U.S. NUCLEAR REGULATORY COMMISSION

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REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 3.11.1

OPERATIONAL INSPECTION AND SURVEILLANCE OF EMBANKMENT RETENTION SYSTEMS FOR URANIUM MILL TAILINGS

A. INTRODUCTION

Each licensee who processes or refines uranium ores in a milling operation is required by §20.1 of 10 CFR Part 20, "Standards for Protection Against Radiation," to make every reasonable effort to maintain radiation exposures and releases of radioactive materials in effluents to unrestricted areas as low as is reasonably achievable, taking into account the state of technology and the economics of improvements in relation to benefits to the public health and safety. In addition, 40 CFR Part 190, "Environmental Radiation Standards for Nuclear Power Operations," requires that the maximum annual radiation dose to individual members of the public resulting from fuel cycle operations be limited to 25 millirems to the whole body and to all organs except the thyroid, which must be limited to 75 millirems. Liquid and solid wastes (tailings) generated by the uranium milling operation contain radioactive materials in excess of the discharge limits and are generally confined by an embankment retention system.

Regulatory Guide 3.11, "Design, Construction, and Inspection of Embankment Retention Systems for Uranium Mills," describes a general basis for inspection of an embankment retention system. This guide, a supplement to Regulatory Guide 3.11, describes in greater detail a basis acceptable to the NRC staff for developing an appropriate inservice inspection and surveillance program for earth and rockfill embankments used to retain uranium mill tailings. It results from review and action on a number of specific cases and reflects the latest general approaches to the problem. The NRC staff will review any alternative methods to determine their acceptability.

B. DISCUSSION

The milling of uranium ores results in the production of large volumes of liquid and solid wastes (tailings). These tailings are usually stored behind man-made retaining structures, following the practice of the non-uranium mining industry. Unlike most non-uranium mine tailings, uranium mill tailings contain concentrations of radioactive materials in excess of the allowable discharge limits (Ref. 1). Furthermore, the most significant radioactive element in the tailings is radium-226, which has a half-life of about 1600 years (Ref. 2). Therefore, it is necessary to confine those tailings to prevent or control their release to the environment not only during the operating life of the mill but also for generations after milling operation has ceased. The embankment, foundation, and abutments need to be stable to prevent the uncontrolled release of the retained water or semifluid tailings. Seepage from the tailing pond, which contains dissolved radium and other toxic substances (Ref. 2), needs to be controlled under normal and severe operating conditions to prevent the possibility of unacceptable contamination of the groundwater or nearby streams. Wind and water erosion of the tailings needs to be prevented during and after the milling operation.

Therefore, the design and construction of these facilities require a high degree of professional engineering performance. The foundation of the dam should be stable and should be capable of carrying the weight of the structure. The dam should be safe under the application of external forces such as those resulting from earthquakes. The reservoir area should be water retentive and free of the possibilities of dangerous slides. Dams and

associated facilities should be maintained in good working condition throughout their operating lives. Operation and surveillance through the years should be conducted in such a manner that any changes in their structural, hydraulic, and foundation conditions can be detected promptly and corrections made.

Statistics of water retention dam failures, based on the sum of operation years of a regional group of dams (Ref. 3), show a frequency of one failure every 1500 to 1800 dam-years. Statistics of uranium mill tailing retention dam failures show a frequency of one failure every 40 dam-years (Ref. 4).

Causes of latent danger inherent in such works arise from site conditions, hydrologic and hydraulic features, types and qualities of the structures, operation and maintenance, and influence of the environment (Refs. 3, 5, 6, and 7). Of these causes, the majority lie within the boundaries of modern technology and can be avoided. Most failures have resulted from gradually worsening defects (due to design, construction, operation, or lack of maintenance) that were either undiscovered or misjudged. Table 1 lists the reported tailing accidents from 1959 through 1977.

The design and construction of tailing retention structures have, in the past, been based largely on mining experience, with little use of design concepts. These empirical approaches have resulted in various mining dam mishaps and failures (Refs. 8 and 9). The latest advances in geotechnical engineering, together with engineering experience and knowledge available in the field of water storage dams, can be used in the design and construction of tailing retention dams. However, the retention systems may not always perform as expected, construction may be defective, and foundations may need further treatment after a period of operation. To detect such behavior deviations, regular surveillance is essential.

The weakening of a dam or its foundation may become apparent only after many years of safe operation. Painstaking monitoring and analysis of performance data are necessary to ensure detection of adverse conditions. Each structure, as well as each site, has its own characteristics and its own susceptibilities to problems, and the surveillance program should be tailored to account for these.

Thorough physical examination is an essential part of the surveillance program. The optimal frequency of inspections depends on the size and condition of the facilities, the character of the foundation, the regional geological setting, and the consequences of failure in jeopardizing human life and inflicting property damage.

Before the start of tailing disposal, it is important that records of piezometer levels (including seasonal fluctuations, groundwater quality, ground elevations, and background radioactivities at the site) be compiled so that comparison can be made with the effects of the impoundment. As soon as the tailing disposal begins, the inspection and maintenance program for structures and operating equipment needs to be initiated. This program includes regular patrol of the dam and its abutments, observations and estimates of seepage flows, piezometric levels related to pond levels, structural and foundation movements, sampling of groundwater, and examination of slurry transport and decant pipelines. Attention also needs to be focused on inspection and data collection during relatively rapid changes in reservoir water surface elevations. Emergency discharge and diversion channels need to be examined for any conditions that may impose constraints on their function.

The operation of the slurry transport pipelines seems to be relatively simple, but the frequent ruptures of the pipelines (Ref. 10) indicate that close monitoring needs to be performed during operation. A certain degree of segregation occurs, with the coarse sand fraction of the tailings tending to settle at the bottom portion of the pipe. On relatively steep downslopes, the coarse sand fraction cascades down and, in the process, abrades the pipe wall. When air is entrained in the pipeline, the pulp velocity increases as a result of the reduced cross-sectional area of the pulp flow and results in relatively fast wear on the pipe wall. Regular pipe-wall-thickness determinations will enable various remedial measures to be adopted to alleviate the situation.

Inspection personnel need to be carefully selected. It is important that they be practical, dedicated diagnosticians who examine thoroughly every clue during their scrutiny of the behavior of these facilities. They need to be trained to be able to recognize and assess signs of possible distress or abnormality and to recommend appropriate mitigating measures.

C. REGULATORY POSITION

This guide applies to those systems or portions of systems whose failure could cause releases of radiological effluents in excess of the limits given in 10 CFR Part 20. Inservice inspection and surveillance should be performed at regular intervals to check the condition of the retention systems and associated facilities and to evaluate their structural safety and operational adequacy. A detailed, systematic inspection and surveillance program should consist of, but not necessarily be limited to, the following:

1. Engineering Data Compilation

Engineering data[1] related to the design, construction, and operation of the tailing retention systems should be collected and, to the extent practicable, included in the initial inspection report. These data should include the following items, where available and appropriate:

a. General Project Data

(1) Regional vicinity map showing the project location and the upstream and downstream drainage areas.

(2) As-built drawings and photographs of important project features, including details of decant systems and typical installation of instrumentation (e.g., sectional views and material zoning and foundation stratification, final top and bottom elevation, gradation and properties of materials placed in installation).

b. Hydrologic and Hydraulic Data

(1) Drainage area and basin characteristics.

(2) Storage for tailings and surcharge capacities for floods and rate of slurry inflow.

(3) Elevation of the maximum design pool and freeboard height.

(4) Outlet facility characteristics (location, type, dimensions, and elevation).

c. Foundation data and geological features, including boring logs, geological maps, profiles, and cross sections.

d. Properties of embankment and foundation materials, including results of laboratory tests and field tests, and assumed design material properties.

e. Pertinent construction photographs and records, including construction control tests, dewatering method and construction problems, alterations, modifications, and maintenance repairs.

f. Contingency plan, including a plan for the regulation of pond water elevation under normal conditions and during flood events or other emergency conditions.

g. Principal design assumptions and analyses, including hydrologic and hydraulic analyses, stability and stress analyses, and seepage and settlement analyses.

h. Special license conditions and discussion on how these conditions have been met.

2. Onsite Inspection Program

The onsite inspection program of the retention system should be established and conducted in a systematic manner to minimize the possibility of overlooking any significant features. A detailed checklist should be developed and followed to document the observations of each significant geotechnical, structural, and hydraulic feature, including electrical and mechanical control equipment.

The use of photographs for comparison of previous and present conditions should be included as a part of the inspection program.

The inspection should include appropriate features and items, including, but not limited to, the following:

a. Daily Inspection

(1) Decant systems should be examined for any evidence of clogging of the intake; corrosion, cracking, or crushing of decant pipes; and erosion at the discharge point. The character and quantity of water flowing into the inlet and flowing out of the discharge should be compared for evidence of cracks or open joints.

(2) Effluent from underdrain pipes should be examined for evidence of clogging, cracking, and erosion.

(3) Pond water elevations should be examined and recorded to ensure that minimum freeboard is maintained.

(4) The slurry transport system should be examined for any evidence of obstruction of the pipes or pumps due to sand clogging or ice accumulation. The pipe couplings should be examined for leakage of slurry.

(5) The retention dam should be visually inspected for signs of cracking, slumping, movement, or concentration of seepage.

b. Monthly Inspection

(1) Air particulate samples should be collected in accordance with Regulatory Guide 4.14, "Measuring, Evaluating, and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Airborne Effluents from Uranium Mills," at site boundaries near the mill tailing retention system to determine the concentration of radon-222.

(2) Slurry transport pipes should be examined using an ultrasonic device at designated critical locations (i.e., bends, slope changes) for pipe wear.

[1]Most engineering data (as presented in accordance with Section 2.5.6 of Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants") are readily available in documents filed for mill license application. A detailed reference or the original documents kept at the project site should be adequate

(3) Diversion channels should be examined for channel bank erosion, bed aggradation or degradation and siltation, obstruction to flow, undesirable vegetation, or any unusual or inadequate operational behavior.

c. Quarterly Inspection

(1) Embankment Settlement. The top of the embankment and downstream toe areas should be examined and surveyed for any evidence of unusual localized or overall settlement or depressions.

(2) Embankment Slope Conditions. Embankment slopes should be examined and surveyed for irregularities in alignment and variance from originally constructed slopes, unusual changes from original crest alignment and elevation, evidence of movement at or beyond the toe, erosions, and surface cracks that indicate movement.

(3) Seepage. The downstream face of abutments, embankment slopes and toes, embankment-structure contacts, and the downstream valley areas should be examined for evidence of existing or past seepage, springs, and wet or boggy areas.

(4) Slope Protection. The slope protection should be examined for erosion-formed gullies and wave-formed notches and benches. The adequacy of slope protection against waves and surface runoff that may occur at the site should be evaluated. The condition of vegetative or any other type protective covers should be evaluated, when pertinent.

(5) Emergency Discharge Facility. The emergency discharge facility examination should cover the structures and features, including spillway bulkheads, culverts, retaining walls, and wing walls of diversion channels, for any condition that may impose operational constraints on their functioning.

(6) Surface Water and Groundwater. Surface water and groundwater should be examined in accordance with Regulatory Guide 4.14 for radionuclides and other toxic materials.[2]

(7) Safety and Performance Instrumentation.[3] All installed instrumentation such as flow-monitoring weirs, survey monuments, settlement plates or gages, and piezometers should be examined and tested for proper functioning. The available records and readings of these instruments should be reviewed to detect any unusual performance or distress of the structure.

(8) Operation and Maintenance Features. The maintenance of operating facilities and features (such as pumps and valves) that pertain to the safety of the retention system should be examined to determine the adequacy and quality of the maintenance procedures followed in maintaining the dam and facilities in safe operating condition.

(9) Postconstruction Changes. Data should be collected on changes such as land development or large-scale tree cutting in the watershed area above the facility that have occurred since project construction and that might influence the safety of the project.

d. Special Inspection

Unscheduled inspections should be performed after the occurrence of significant earthquakes, tornadoes, floods, intense local rainfalls, or other unusual events.

3. Technical Evaluation

An evaluation of the existing conditions of the retention system should be made annually unless significant changing conditions or more frequent observation dictate earlier evaluation. The evaluation should include the assessment of the hydraulic and hydrologic capacities,[4] water quality, and structural stability based on the changes or affected parameters.

4. Inspection Report

A report should be prepared to present the results of each technical evaluation and the inspection data accumulated since the last report. These documents should be kept at the project site for reference purposes, should be available for inspection by regulatory authorities, and should be retired only on termination of the project. Any abnormal hazardous conditions observed during the inspection should be reported immediately to the NRC staff.

5. Inspection Personnel

Inspections and evaluations should be planned and conducted under the direction of experienced professional personnel also thoroughly familiar with the investigation, design, construction, and operation of these types of facilities. At each facility, this individual should ensure that all field inspectors are trained to be able to recognize and assess signs of possible distress or abnormality.

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[2] In addition to long-term quarterly monitoring, surface water and groundwater samples should be collected in accordance with Regulatory Guide 4.14 immediately at the downstream (hydraulically) locations of the tailing retention system each month for a year prior to operation to determine the concentration of natural uranium, thorium-230, radium-226, and other toxic chemicals.

[3] Immediately following installation or the discovery of any unusual condition, all instrumentation needs more frequent readings than quarterly (e.g., daily or weekly) until the patterns of the structural behaviors are stabilized

[4] If additional storage capacity is needed, NRC should be notified a year in advance.

REFERENCES

1. S.R. Borrowman and P.T. Brooks, "Radium Removal from Uranium Ores and Mill Tailings," Bureau of Mines, U.S. Department of Interior, 1975.

2. "Use of Uranium Mill Tailings for Construction Purposes," Hearings Before the Subcommittee on Raw Materials of the Joint Committee on Atomic Energy of the U.S. Congress, October 28 and 29, 1971.

3. E. Gruner, "Classification of Risk," Proceedings of International Congress on Large Dams, Madrid, 1973, Vol. 1, pp. 55-68.

4. "Summary of Tailing Slurry Release--1972-1977," report prepared by Teknekron, March 1978.

5. E.S. Smith, "Tailing Disposal--Failures and Lessons," Proceedings of the First International Tailing Symposium, Tucson, Arizona, November 1972.

6. A.O. Babb and T.W. Mermel, "Catalog of Dam Disasters, .Failures, and Accidents," Bureau of Reclamation, U.S. Department of Interior, 1968.

7. "Lessons from Dam Incidents, USA," ASCE/USCOLD report, 1973.

8. R. Dobrey and L. Alvarez, "Seismic Failures of Chilean Tailings Dams," ASCE Journal of the Soil Mechanics and Foundations Div., November 1967.

9. W.A. Wahler and D.P. Schlick, "Main Refuse Impoundments in the U.S.," Proceedings of the International Congress on Large Dams, Mexico City, 1976.

10. R.C. Salazar and R.I. Gonzales, "Design, Construction, and Operation of the Tailing Pipelines and Underwater Tailing Disposal System of Atlas Consolidated Mining and Development Corporation in the Philippines," Proceedings of the First International Tailing Symposium, Tucson, Arizona, November 1972.

BIBLIOGRAPHY

"Recommended Guidelines for Safety Inspection of Dams," Federal Register, Vol. 39, No. 168, August 28, 1974, pp. 31334-31346.

"Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures," EM 1110-2-100, Corps of Engineers, Department of the Army, 1973.

"Model Law for State Supervision of Safety of Dams and Reservoirs," U.S. Committee on Large Dams, 1969.

"Statutes and Regulations Pertaining to Supervision of Dams and Reservoirs," Department of Water Resources, State of California, 1974.

National Dam Safety Act, Public Law 92-367, 86 Stat. 506 and 507, August 8, 1972.

"Engineering and Design Manual--Coal Refuse Disposal Facilities," U.S. Department of Interior, MESA. Prepared by D'Appolonia Consulting Engineers, Inc.

"Guidance for Planning of Inspection Programs for Dams," USAEC Technical Guide 1.H. 1, November 1971.

"Inspection, Maintenance, and Rehabilitation of Old Dams," ASCE, 1974.

TABLE 1

URANIUM MILL TAILINGS RELEASES
1959-1977

DATE	MILL AND LOCATION	TYPE OF INCIDENT	REMARKS
8/19/59	Union Carbide Green River, UT	Tailing Dike Failure	Tailings dam washed out; ca. 15,000 T sands lost to Browns Wash and Green River due to flash flood; no increase in dissolved Ra was noted in river.
8/22/60	Kerr-McGee Shiprock, NM	Raffinate Pond Dike Failure	240,000 gal of raffinate released into San Juan River; ~ 50 x 10^{-8} μCi/ml Ra-226; river samples collected several days after release showed no increase in Ra-226 background; river at Medicine Hat (100 mi downstream of plant) showed 0.36 x 10^{-9} μCi/ml Ra-226 on 8/30/60.
12/6/61	Union Carbide Maybell, CO	Tailing Dike Failure	Ca. 500 T solids released from tailings area; 200 T reached unrestricted area; no liquid reached any flowing stream. "The presence of these tailings (offsite) does not constitute a hazard, as there are no persons living in the area, nor is there any drinking water taken from surface or ground water in the near vicinity."
6/11/62	Mines Development, Inc. Edgemont, SD	Tailing Dike Failure	200 T solids washed into Cottonwood Creek and some carried 25 mi into Angostura Reservoir.
8/17/62	Atlas-Zinc Minerals Mexican Hat, UT	Slurry Pipeline Rupture	Est. 280 T solids + 240 T liquids released from broken tailings discharge line into draw 1.5 mi from San Juan River. Calculated concentration of river water would have been below 10 CFR Part 20 maximum permissible concentration.
6/16/63	Utah Construction Riverton, WY	Tailing Dike Precautionary Release	Material released by 2-ft drainage cut made to prevent cresting due to heavy rains; material released below 10 CFR Part 20 values.
11/17/66	VCA Shiprock, NM	Raffinate Line Failure	Est. 16,000 gal of liquid lost because of break in raffinate line; material spread over 1/4 acre; break occurred 1 mi from San Juan River with some small amount reaching river.
2/6/67	Atlas Corp. Moab, UT	Auxiliary Decant Line Failure	Overflow from main tailings pond overflowed aux. decant system; 440,000 gal lost; average Ra-226 concentration was 5.5 x 10^{-8} μCi/ml.
7/2/67	Climax Uranium Grand Junction, CO	Tailing Dike Failure	Dike failure of unapproved retention system released ca. 1-10 acre-ft of waste liquid into Colorado River; no indication that Ra conc. in river exceeded 10 CFR Part 20 limits.

TABLE 1 (Continued)

URANIUM MILL TAILINGS RELEASES
1959-1977

DATE	MILL AND LOCATION	TYPE OF INCIDENT	REMARKS
11/23/68	Atlas Corp. Moab, UT	Slurry Pipeline Rupture	35,000 gal of tailings slurry lost; effluent flowed down drywash and then 1/2 mile to Colorado River; riverflow sufficient to give 10,000:1 dilution; most solids settled out in drywash; measurement of river downstream of plant immediately after release and at 4-hr intervals in 24 hr following release showed U, Ra-226, Th-230 below 10 CFR Part 20 limits.
2/16/71	Petrotomics Shirley Basin, WY	Secondary Tailing Dike Failure	2,000 gal of liquid lost to unrestricted area; break in dike of effluent sump; spill frozen in place.
3/23/71	Western Nuclear Jeffrey City, WY	Tailing Line-Dike Failure	Break in sand tails slurry line caused a dike failure allowing sand tails to flow for 2 hr into natural basin adjacent to tailings site on licensee's property; fence extended to make this area restricted.
2/5/77	United Nuclear-Homestake Partners Grants, NM	Slurry Pipeline Rupture	Tailings slurry pipeline ruptured due to high pressure buildup in a frozen line. The slurry released eroded a "V" cut in the dam face, which led to the escape of approximately 50,000 tons of solids and slimes and somewhere between 2 million and 8 million gal of liquid. All material released was confined to company property.
4/77	Western Nuclear, Inc. Jeffrey City, WY	Failure of Tailing Pond Embankment	Tailings slurry overtopped the embankment due to insufficient freeboard space; considerably less slope than the requisite 3 horizontal to 1 vertical; and a loss in structural integrity occasioned by the melting of snow that was interspersed with fill used to construct the embankment. Approximately 2 million gal of liquid tailings (55 yd^3 of solids) were released. The grind mill and mill yard were completely covered, but no material was released to unrestricted areas.
9/26/77 9/27/77	United Nuclear Church Rock, NM	Release from Tailings Slurry Line	In the process of flushing tailings lines, it was discovered that a 2-inch water line had insufficient pressure to flush out plug. The line was uncoupled and roughly 1/4 ton of tails ran out of the line. With the line still uncoupled, flushing was inadvertently initiated again, resulting in the release of 4,000 gal of flush water and an additional ton of tailings. Approximately 1 ton of solids and slurries and 900 gal of liquid entered the watercourse. The liquid flowing to the watercourse was almost entirely mine water, a portion of which had not been treated (i.e., high in uranium and radium values).

U.S. NUCLEAR REGULATORY COMMISSION

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REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

Regulatory Guide 3.51
(Task RH 802-4)

CALCULATIONAL MODELS FOR ESTIMATING RADIATION DOSES TO MAN FROM AIRBORNE RADIOACTIVE MATERIALS RESULTING FROM URANIUM MILLING OPERATIONS

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

August 4, 1982

ERRATA

Regulatory Guide 3.51, March 1982

CALCULATIONAL MODELS FOR ESTIMATING RADIATION DOSES TO MAN FROM AIRBORNE RADIOACTIVE MATERIALS RESULTING FROM URANIUM MILLING OPERATIONS

Table 3, "Inhalation Dose Conversion Factors," on page 31 of this guide has the following typographical errors:

1. Under "Uranium Ore Dust," the ^{238}U bone dose value in the second row of the first column should read 7.29E+01 instead of 7.92E+01.

2. Under "Coarse Tailings Particulates," the first value for ^{226}Ra for the whole body dose should read 3.90E+01 instead of 4.90E+01.

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FIGURES

*See Table 12.

A. INTRODUCTION

The NRC staff is required to make analyses of radiation doses to the public, or individual members thereof, resulting from the radioactive effluents from uranium mills for the following purposes:

1. Evaluating compliance with 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations,"

2. Evaluating compliance with the "as low as is reasonably achievable" (ALARA) criterion embodied in 10 CFR Part 20, "Standards for Protection Against Radiation," and

3. Evaluating overall radiological impact as part of the complete environmental impact assessment required by the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190, 83 Stat. 852).

This regulatory guide describes basic features of calculational models used by the NRC staff for such evaluations and suggests values for various parameters used in the estimation of radiation doses to man from uranium milling operations. Specifically, this guide addresses the calculation of radiation doses to man from previously estimated environmental radioactivity concentrations in air. The environmental radioactivity concentrations in air required for this calculation result from extensive and detailed analyses of effluent release rates and atmospheric dispersion phenomena.

Information on the approach used for estimating source terms is included in the Final Generic Environmental Impact Statement on Uranium Milling, NUREG-0706 (Ref. 1). The methodology used by the staff for calculating atmospheric dispersion is documented in the MILDOS code user's manual, NUREG/CR-2011 (Ref. 2).

B. DISCUSSION

This guide describes models used by the NRC staff to estimate the radiological impacts resulting from uranium mills for the purpose of evaluating compliance with 40 CFR Part 190 and 10 CFR Part 20 and of assessing overall environmental radiological impacts in accordance with NEPA.

1. URANIUM MILL SOURCE TERMS

A uranium mill, unlike other types of fuel cycle facilities, goes through phases in its life cycle in which both the composition and the magnitude of its radioactive emissions (and associated impacts) vary greatly. For this reason, the NRC staff will perform impact evaluations for each individual mill at different phases of its existence. The three principal uranium mill life-cycle phases discussed in this guide are (1) operational (milling), (2) tailings pile drying and stabilization, and (3) reclamation.

Typically, a uranium mill will operate for a period of years during which there will be radon and particulate releases from the ore storage pile, the mill itself, and the tailings disposal area. During this operational period, both particulate and radon releases from the tailings pile may be somewhat curtailed by maintaining the pile at least partially under water. Mechanical sprinkler systems or chemical stabilizing agents may also be used to inhibit the suspension in air of radioactive tailings dust by the wind.

When actual milling ceases, the tailings pile is normally allowed to dry by natural evaporation until it is ready for stabilization. When the tailings are wet, there are essentially no particulate releases from the tailings pile. However, as the tailings pile dries, releases of radon and particulates from this source may increase, reaching their maximum prior to implementation of measures required to achieve long-term stabilization. After stabilization and reclamation of the tailings area, there should be no further radioactive particulate releases. However, small quantities of radon may continue to diffuse upward from the tailings and may be released to the atmosphere. These continuing radon releases, though small, are likely to persist for tens of thousands of years.

Depending on the specific details of the site, facility, effluent controls, and stabilization program, maximum individual particulate exposure could occur either during the last year of actual milling or the last year prior to stabilization of the tailings. Maximum individual doses due to radon releases are likely to occur during the last year prior to stabilization.

The radioactive isotopes comprising uranium mill radioactivity releases are mostly those belonging to the ^{238}U and ^{235}U decay series. The ^{235}U series radionuclides amount to less than 5 percent of total releases and are routinely

disregarded because of their insignificant contribution to overall radiological impact.

2. CRITICAL EXPOSURE PATHWAYS

Three exposure pathways of concern for airborne releases from uranium mills are (1) inhalation of airborne radioactive material, (2) ingestion of vegetable and animal products contaminated via deposition, and (3) direct external exposure to radiation emitted by airborne activity and activity deposited on ground surfaces. Liquid exposure pathways are not usually of concern because there are usually no discharges to surface water of liquid effluents. Liquid pathways may exist, however, and methodology similar to that used in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," should be used for evaluating intakes via the liquid pathway. However, ingestion dose factors from Table 6 should be used in converting intakes to doses.

All individual exposure pathways of significance will be evaluated at locations where the exposure pathway and a dose receptor actually exist at the time the analysis is made. Also, the applicant may take into account any real phenomena or actual exposure conditions that may be present. Such conditions could include actual values for agricultural productivity, dietary habits and food sources, occupancy times, measured environmental transport factors, or similar values determined for a specific site. However, if the analysis is based on existing conditions and if potential changes in land use and food pathways could result in significantly higher exposures, the applicant should provide reasonable assurance that a monitoring and surveillance program will be performed on a regular and continuing basis to determine if such changes have occurred.

3. REQUIRED DOSE ESTIMATES

3.1 Individual Doses

Evaluations of the dose received by an exposed individual are made to satisfy the requirements of both 40 CFR Part 190 and 10 CFR Part 20. The Environmental Protection Agency (EPA) regulation, 40 CFR Part 190, speaks to

individual radiation doses from all pathways and all nuclear power and fuel cycle facilities combined, except that exposure from radon and its daughters need not be included. The NRC regulation, 10 CFR Part 20, includes a requirement to keep all radiation exposures "as low as is reasonably achievable" (ALARA). ALARA is a general concept that has not to date been interpreted in the form of numerical design objectives for uranium mills as it has been for light-water-cooled nuclear reactors (see Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criteria 'As Low As Is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities"). However, a case-by-case evaluation will be made to ensure that doses are kept as low as is reasonably achievable. ALARA evaluations will address all releases, including radon and its daughters, and will consider population doses as well as individual doses.

For the purpose of evaluating compliance with 40 CFR Part 190, the whole body and organ doses to any individual for all pathways combined and from all activity releases except radon and its daughters are evaluated for (1) the last year of actual mill operation and (2) the last year prior to tailings pile reclamation. These evaluations are adequate for assessing ALARA compliance except that exposure to radon and its daughters should be included and radon and daughter exposure for the first year after tailings pile reclamation should also be evaluated. Postreclamation exposure to radon and its daughters should be evaluated at the location of greatest radon concentration where unrestricted land use after mill decommissioning may be permitted.

Exposed individuals are characterized by food consumption, occupancy, and other uses of the region in the vicinity of the mill site. All physiological and metabolic parameters for the exposed individuals are assumed to have those characteristics that represent the averages for the various age groups in the general population. Although specific individuals will almost certainly display dietary, recreational, and other living habits considerably different from those suggested here and actual physiological and metabolic parameters may vary considerably, the NRC staff considers the use of these reference values to be acceptable because the actual physiological and metabolic characteristics of specific individuals cannot usually be determined. Applicants are encouraged to use information and data applicable to a specific region or site when possible.

When site-specific information and data are used, their origin or derivation should be documented for the NRC staff's review.

In this guide, the term "dose" is used instead of the more precise term "dose equivalent." When applied to the evaluation of internal deposition of radioactivity, the term "dose," as used here, includes the prospective dose component arising from retention in the body beyond the period of environmental exposure, i.e., the committed dose equivalent. The committed dose equivalent is evaluated over a period of 50 years.

The committed dose equivalent per unit intake, either by inhalation or ingestion, usually varies by age as well as by organ. For the purpose of calculating collective (population) doses, the population has been assumed to be composed of four age groups: infants (0 to 1 year), children (1 to 11 years), teenagers (11 to 17 years), and adults (17 years and older). Four sets of ingestion-dose conversion factors are presented in this guide, one for each of these four age groups. Available data are not sufficient to permit the calculation of age-specific dose conversion factors for inhalation exposure, and adult dose conversion factors are assumed to apply for all age groups for this exposure pathway.

3.2 Population Doses

Evaluations of population doses resulting from uranium milling operations are required to satisfy NEPA requirements for assessing the total environmental impact associated with the operation of each facility. Calculated estimates of resulting population doses therefore need to reflect, insofar as practicable, the overall radiological impact of each uranium mill over the duration of its existence.

For a typical uranium mill, the total radiological impact is composed of the impacts of the three major phases of its existence: the operational phase, the prereclamation phase, and the postreclamation phase. The first two phases may involve substantial releases of radon gas and particulates but are of relatively short duration. The postreclamation phase involves only small releases of radon, but these releases may persist for periods of tens of thousands of years. For each phase, the average annual radiological impact will be estimated by the NRC staff using the following basic procedure:

1. Annual average releases over the duration of the particular mill phase will be estimated for each radionuclide.

2. The radiological impact resulting from 1 year of average releases will be evaluated in terms of population dose using the EPA concept of "environmental dose commitment" (Ref. 3). The environmental dose commitment will be evaluated for a period of 100 years following release as per the procedure used by EPA in setting the standards in 40 CFR Part 190.

The total dose commitments for the operational and prereclamation phases will be calculated by multiplying the annual population dose commitments by the number of years the mill is expected to be in each phase. The sum of these two products represents an approximation of the combined radiological impact of the facility prior to tailings pile reclamation. The annual population dose commitments from postreclamation radon releases are also calculated and represent the continuously recurring impact of this residual activity source.

Consideration of particulate releases will generally be limited geographically to the area within 80 km (50 mi) of the mill site. Within this area, exposure pathways requiring assessment include all those considered in the evaluation of maximum individual exposure. Outside the 80-km (50-mi) radius, only radon and daughters require consideration and these are treated separately from particulate releases (see Regulatory Position 3.2).

4. USE OF THIS GUIDE

Present NRC staff practice with regard to the calculation of radioactive emission rates from uranium milling facilities involves the characterization of such releases by radionuclide, particle size, and density (Ref. 1). The data required as input for use of the calculational models described in this guide consist of annual average air concentrations resulting directly from such releases at specific locations (not including resuspended air concentrations of radioactive materials previously deposited on ground surfaces). The required input air concentrations for a particular location are denoted in this guide by the symbol C_{adip} (in pCi/m^3), where the subscripts indicate air concentration (a), direct (d), radionuclide (i), and particle size (p). Direct air concentrations required are those for values of the subscripts i and p as identified and defined in Table 1.

The primary calculational tool employed by the staff in performing radiological impact evaluations of uranium milling operations is the MILDOS code (Ref. 2), a modified version of the Argonne National Laboratory Uranium Dispersion and Dosimetry (UDAD) Code (Ref. 4). As used by the NRC staff, the MILDOS code has only five primary radionuclides in the ^{238}U decay chain that are treated explicitly as source terms. These radionuclides are ^{238}U, ^{230}Th, ^{226}Ra, ^{210}Pb, and ^{222}Rn. Release rates for these radionuclides are required for each potential onsite source (for particle sizes 1 through 4 in Table 1). For ^{222}Rn daughters, which grow in during transport of ^{222}Rn from the site, the resulting ingrowth concentrations (particle size 5 in Table 1) are also required. These ^{222}Rn daughters include ^{218}Po, ^{214}Pb, ^{214}Bi, ^{210}Pb, and ^{210}Po. The dosimetry model accounts for releases and ingrowth of other radionuclides, using assumptions of secular equilibrium.

Appendix A identifies and describes the various other site-specific information and data routinely used by the NRC staff in performing radiological impact assessments for uranium milling facilities. Appendix B provides a more detailed discussion of the method used in this guide for calculating environmental dose commitments. Appendix C provides a detailed explanation of the derivation of the radon dose conversion factor used in this guide.

C. REGULATORY POSITION

Equations and other data by which the NRC staff will estimate radiation exposure for individuals and the population in general from uranium mills are presented below. These equations are appropriate for the exposure pathways that the staff routinely considers in its evaluations. In addition, other pathways that may be present because of unique conditions at a specific site should be considered if they are likely to provide a significant contribution to total dose. A pathway is considered significant if a conservative evaluation yields an additional dose increment of more than 10 percent of the total from all other pathways considered in this guide.

1. CONCENTRATIONS IN ENVIRONMENTAL MEDIA

As discussed in Section B.4, annual average direct air concentrations are required as input data for use in the equations that follow. These equations

yield resulting concentrations in environmental media of interest, including total ground surface concentrations, air concentrations, and concentrations in edible vegetation, meat, and milk. These concentration calculations are explicitly performed only for certain radionuclides of the ^{238}U decay chain. Concentrations in environmental media of other radionuclides of the chain are inferred from those for which concentrations are explicitly calculated.

The basic calculational procedure first involves treatment of the direct air concentrations to obtain ground surface concentrations and resuspended air concentrations. Resuspension of radioactive materials deposited on ground surfaces is not treated as a loss mechanism for ground concentrations. For this reason, deposition of resuspended air concentrations onto ground surfaces is not considered. Resuspended particulate concentrations in air are added to the airborne concentrations arising directly from the source to obtain total air concentrations. The calculated total air concentrations are then used to obtain total deposition rates onto vegetation (resuspension losses of activity deposited on vegetation are assumed to be accounted for by the application of a weathering half-life). Total deposition rates and ground concentrations are used to compute concentrations in various vegetation types, including hay and forage. Radionuclide concentrations in hay and animal forage are initial inputs for the calculation of radionuclide concentrations in meat and milk ingested by man. This basic calculational process, the resulting environmental media concentrations, and the exposure pathways for which they are used are indicated schematically in Figure 1.

1.1 Radionuclide Accumulation on the Ground

Radionuclide ground concentrations are computed from the calculated airborne particulate concentrations arising directly from onsite sources (not including air concentrations resulting from resuspension). Resuspended particulate concentrations are not considered for evaluating ground concentrations. The direct deposition rate of radionuclide i is calculated, using the following relationship:

$$D_{di} = \sum_{p} C_{adip} V_p \qquad (1)$$

where

C_{adip} is the calculated direct air concentration of radionuclide i in particle size p in pCi/m^3;

D_{di} is the resulting direct deposition rate of radionuclide i in pCi/m^2 per sec; and

V_p is the deposition velocity of particle size p in m/sec (see Table 1).

The concentration of radionuclide i on a ground surface due to constant deposition at the rate D_{di} over time interval t is obtained from

$$C_{gi}(t) = D_{di}\left[\frac{1 - \exp[-(\lambda_i + \lambda_e)t]}{\lambda_i + \lambda_e}\right] \qquad (2)$$

where

$C_{gi}(t)$ is the calculated ground surface concentration of radionuclide i at time t in pCi/m^2;

t is the time interval over which deposition has occurred in sec;

λ_e is the assumed rate constant for environmental loss in sec^{-1}; and

λ_i is the radioactive decay constant* for radionuclide i in sec^{-1}.

The environmental loss constant λ_e corresponds to an assumed half-time for loss of environmental availability of 50 years (Ref. 1). This parameter accounts for downward migration in soil and loss of availability due to chemical binding. It is assumed to apply to all radionuclides deposited on the ground.

*Radiological decay constants employed by the NRC staff are obtained from data given in Reference 5.

Ground concentrations are explicitly computed only for ^{238}U, ^{230}Th, ^{226}Ra, and ^{210}Pb. For all other radionuclides, the ground concentration is assumed equal to that of the first parent radionuclide for which the ground concentration is explicitly calculated. For ^{210}Pb, ingrowth from deposited ^{226}Ra can be significant. The concentration of ^{210}Pb on the ground due to ^{226}Ra deposition is calculated by the staff, using the standard Bateman equation and ignoring the very-short-lived daughter radionuclides. This is equivalent to assuming that ^{226}Ra decays directly to ^{210}Pb. Using i = 6 for ^{226}Ra and i = 12 for ^{210}Pb (see Table 1), the following equation is obtained:

$$C_{g12}(Pb \leftarrow Ra) = \frac{\lambda_{12} D_{d6}}{\lambda_6^*} \left[\frac{1 - e^{-\lambda_{12}^* t}}{\lambda_{12}^*} + \frac{e^{-\lambda_6^* t} - e^{-\lambda_{12}^* t}}{\lambda_6^* - \lambda_{12}^*} \right] \qquad (3)$$

where

$C_{g12}(Pb \leftarrow Ra)$ is the incremental ^{210}Pb ground concentration resulting from ^{226}Ra deposition in pCi/m^2; and

λ_n^* is the effective rate constant for loss by radioactive decay and migration of a ground-deposited radionuclide and is equal to $\lambda_n + \lambda_e$ in sec^{-1}.

1.2 Total Air Concentrations

For use of the models described in this guide, air concentrations arising directly from onsite sources are required for each receptor location as a function of particle size (for particulates). Direct air concentrations are assumed to include the effects of depletion by deposition (particulates) or ingrowth and decay in transit (for radon and its daughters). In order to compute inhalation doses, the total air concentration of each radionuclide at each location (as a function of particle size) is computed as the sum of the direct air concentration and the resuspended air concentration:

$$C_{aip}(t) = C_{adip} + C_{arip}(t) \qquad (4)$$

where

C_{adip} is the calculated direct air concentration of radionuclide i in particle size p in pCi/m^3;

$C_{aip}(t)$ is the calculated total air concentration of radionuclide i in particle size p at time t in pCi/m^3; and

$C_{arip}(t)$ is the calculated resuspended air concentration of radionuclide i in particle size p at time t in pCi/m^3.

The resuspended air concentration is computed using a time-dependent and particle-size-dependent resuspension factor, which, for deposits of age t years, is defined by

$$R_p(t) = (0.01/V_p)10^{-5}\ e^{-\lambda_R t} \quad (\text{for } t \leq 1.82 \text{ yr}) \qquad (5a)$$

$$R_p(t) = (0.01/V_p)10^{-9} \quad (\text{for } t > 1.82 \text{ yr}) \qquad (5b)$$

where

$R_p(t)$ is the ratio of the resuspended air concentration to the ground concentration for a ground deposit of age t yr for particle size p in m^{-1};

λ_R is the assumed decay constant of the resuspension factor (equivalent to a 50-day half-life), 5.06 yr^{-1};

0.01 is the deposition velocity for the particle size for which the initial resuspension factor value is 10^{-5}/m in m/sec;

10^{-5} is the initial value of the resuspension factor for particles with a deposition velocity of 0.01 m/sec in m^{-1};

10^{-9} is the terminal value of the resuspension factor for particles with a deposition velocity of 0.01 m/sec in m^{-1}; and

1.82 is the time required to reach the terminal resuspension factor in yr.

The basic formulation of the above expression for the resuspension factor, the initial and final values, and the assigned decay constant derive from experimental observations (Ref. 1). The decrease with age primarily accounts for agglomeration with other larger particles. The inverse relationship to deposition velocity physically accounts for decreased resuspendibility of larger particles; mathematically, it eliminates mass balance problems for the 35-μm particle size. Based on this formulation, the resuspended air concentration is given by

$$C_{arip}(t) = 0.01 C_{adip} 10^{-5} \left[\frac{1 - \exp[-(\lambda_i^* + \lambda_R)(t - a)]}{(\lambda_i^* + \lambda_R)} + 10^{-4}\ \delta(t)\ \frac{\exp[-\lambda_i^*(t - a)] - \exp(-\lambda_i^* t)}{\lambda_i^*} \right] (3.156 \times 10^7) \quad (6)$$

where

- a is equal to $(t - 1.82)$ if $t > 1.82$ and is otherwise equal to zero in yr;
- $\delta(t)$ is zero if $t \leq 1.82$ and is unity otherwise, dimensionless;
- λ_i^* is the effective removal constant for radionuclide i on soil in yr^{-1}; and
- 3.156×10^7 is the number of seconds per year.

Equation 6 yields the resuspended air concentration of radionuclide i in particle size p because of deposition over time span t in years. Total air concentrations are computed using Equations 6 and 4 (in that order) for all particulates in particle sizes 1 through 4 as given in Table 1. Particulate daughters of ^{222}Rn (particle size 5 in Table 1) are not assumed to be depleted because of deposition and are also not assumed to resuspend.

1.3 Vegetation Concentrations

As illustrated in Figure 1, vegetation concentrations are derived from ground concentrations and total deposition rates. Total deposition rates are given by the following summation:

$$D_i = \sum_p C_{aip} V_p \quad (7)$$

where

- D_i is the total deposition rate, including deposition of resuspended activity, of radionuclide i in pCi/m^2 per sec.

Concentrations of released particulate materials can be environmentally transferred to the edible portions of vegetables or to hay or pasture grass consumed by animals by two mechanisms--direct foliar retention and root uptake. Five categories of vegetation are treated by the staff. They are edible above-ground vegetables, potatoes, other edible below-ground vegetables, pasture grass, and hay. Vegetation concentrations are computed using the following equation:

$$C_{vi} = D_i F_r E_v \left[\frac{1 - \exp(-\lambda_w t_v)}{Y_v \lambda_w} \right] + C_{gi} \frac{B_{vi}}{p} \qquad (8)$$

where

B_{vi} is the soil-to-plant transfer coefficient for radionuclide i and vegetation type v (pCi/kg(wet) plant per pCi/kg(dry) soil);

C_{vi} is the resulting concentration of radionuclide i in vegetation v in pCi/kg(wet weight);

E_v is the fraction of the foliar deposition reaching edible portions of vegetation v, dimensionless;

F_r is the fraction of the total deposition retained on plant surfaces, 0.2, dimensionless;

p is the assumed soil areal density for surface mixing, 240 kg(dry weight)/m^2;

t_v is the assumed duration of exposure while vegetation v is growing in sec;

Y_v is the assumed yield density of vegetation v in kg(wet weight)/m^2; and

λ_w is the decay constant accounting for weathering losses (equivalent to a 14-day half-life), 5.73×10^{-7} sec^{-1}.

The value of E_v is assumed to be 1.0 for all above-ground vegetation and 0.1 for all below-ground vegetables (Ref. 6). The value of t_v is taken to be 60 days, except for pasture grass for which a value of 30 days is assumed. The yield density Y_v is taken to be 2.0 kg/m^2, except for pasture grass for which a value of 0.75 kg/m^2 is applied. Values of the soil-to-plant transfer coefficients B_{vi} are provided in Table 2.

1.4 Meat and Milk Concentrations

Radioactive materials can be deposited on grasses, hay, or silage that are eaten by meat animals that are in turn eaten by man. The equation used to estimate radionuclide concentrations in meat is

$$C_{bi} = QF_{bi}(F_{pg}C_{pgi} + F_hC_{hi}) \quad (9)$$

where

C_{bi} is the resulting average concentration of radionuclide i in meat in pCi/kg;

C_{hi} is the concentration of radionuclide i in hay (or other stored feed) in pCi/kg(wet weight);

C_{pgi} is the concentration of radionuclide i in pasture grass in pCi/kg(wet weight);

F_{bi} is the feed-to-meat transfer coefficient for radionuclide i in pCi/kg per pCi/day ingested (see Table 2);

F_{pg},F_h are the fractions of the total annual feed requirement assumed to be satisfied by pasture grass or locally grown stored feed (hay), respectively, dimensionless; and

Q is the assumed feed ingestion rate, 50 kg(wet weight)/day (Ref. 6).

The equation used to estimate milk concentrations from cows ingesting contaminated feed is

$$C_{mi} = QF_{mi}(F_{pg}C_{pgi} + F_hC_{hi}) \quad (10)$$

where

C_{mi} is the resulting average concentration of radionuclide i in milk in pCi/L; and

F_{mi} is the feed-to-milk transfer coefficient for radionuclide i in pCi/L per pCi/day ingested (see Table 2).

1.5 Concentrations at Different Times

Maximum doses to individuals are calculated for the last year of mill operation and for the last year prior to tailings pile reclamation. This section explains the procedures used by the NRC staff to obtain annual average environmental media concentrations for these years.

In order to estimate average environmental media concentrations during the final year of actual mill operation, for an operational lifetime of T_o years, the value of the time variable t appearing in Equations 2, 3, 4, and 6 is set equal to T_o (in appropriate units). The resulting concentration values are those predicted for the end of the final year of operation and are assumed to represent average values existing over that year.

Environmental concentrations existing during the final prereclamation year result from postoperational releases and residual contamination due to releases during the period of mill operation. Because direct air concentrations from operational releases vanish, environmental concentrations due to operational releases at the time of reclamation arise only from residual ground and resuspended air concentrations. Ground concentrations at the end of the milling period are calculated using Equations 2 and 3, with the value of t set to T_o, the operational lifetime. Residual ground concentrations at the end of the final prereclamation year are then determined by

$$C_{gi}(T_d) = C_{gi}(T_o)\exp[-\lambda_i^*(T_d)] \qquad (11)$$

where

$C_{gi}(T_d)$ is the residual ground concentration of radionuclide i resulting from operational releases at the end of the T_d-year drying period in pCi/m^2;

$C_{gi}(T_o)$ is the ground concentration of radionuclide i at the time of mill shutdown in pCi/m^2; and

T_d is the duration of time required to dry the tailings pile prior to reclamation per yr.

Residual resuspended air concentrations resulting from operational releases are determined at the end of the final prereclamation year by

$$C_{arip}(T_d) = 0.01 C_{adip} 10^{-9} \exp[-\lambda_i^*(T_d)] \times \left[\frac{1 - \exp(-\lambda_i^* T_o)}{\lambda_i^*}\right] (3.156 \times 10^7) \quad (12)$$

where

C_{adip} is the direct air concentration of radionuclide i in particle size p resulting from operational releases in pCi/m^3; and

$C_{arip}(T_d)$ is the residual resuspended air concentration of radionuclide i in particle size p resulting from operational releases at the end of the T_d-year drying period in pCi/m^3.

Ground and resuspended air concentrations resulting from postoperational releases at the end of the final prereclamation year are calculated using Equations 2, 3, 4, and 6 with the value of t equal to T_d. These concentrations are then incremented by the residual concentrations due to operational releases. These residual concentrations are calculated using Equations 11 and 12 to obtain the required totals. Total air concentrations and concentrations in vegetation, meat, and milk are then calculated from the total ground and resuspended air concentrations.

2. DOSE CALCULATIONS FOR INDIVIDUALS

Doses to individuals are calculated for inhalation, external exposure to air and ground concentrations, and ingestion of vegetables, milk, and meat. Internal doses are calculated using dose conversion factors that yield the 50-year committed dose equivalent, i.e., the entire dose received over a period of 50 years following either inhalation or ingestion. The annual doses are actually the 50-year committed dose equivalents resulting from a 1-year exposure period. The 1-year exposure period is taken to be the year when environmental concentrations resulting from plant operations are expected to be at their highest level.

2.1 Inhalation Doses

Inhalation doses are calculated from the total radionuclide concentration in air, including resuspended material. The inhalation dose conversion factors for radioactive particulate materials used in this analysis are presented in Table 3. With the exception of the dose conversion factors presented for "mass average lung," these dose conversion factors have been computed by Argonne National Laboratory's UDAD computer code (Ref. 4) in accordance with the Task Group Lung Model (TGLM) of the International Commission on Radiological Protection (Ref. 7). Dose conversion factors for the mass average lung have been computed by mass-averaging the UDAD-calculated dose conversion factors for the four regions of the TGLM: nasopharyngeal, tracheobronchial, pulmonary, and lymph. Ordinarily, the dose computed specifically for the pulmonary region is reported or presented as the "lung" dose. For the principal lung dose contributors (uranium and thorium), doses computed for the mass average lung are slightly higher than those calculated for the pulmonary region. The net overall effect, considering all radionuclides, is thus a slight increase in the reported lung dose.

In addition to the physical characteristics of the particulate matter involved, use of the TGLM demands the assignment of a solubility class, denoted by Y (years, slowly soluble or insoluble), W (weeks, moderately soluble), or D (days, quite soluble). Solubility classifications have been assigned on the basis of experimental data reported and summarized by Kalkwarf in NUREG/CR-0530 (Ref. 8). These data indicate that thorium, lead, and polonium are 100% class Y in ore, yellowcake, or tailings dusts. Radium was determined to be best characterized by the split-solubility classification 10% class D, 90% class Y. Uranium in ore dust was determined to be 100% class W; uranium solubility for tailings dusts was not analyzed and is assumed to be class Y. Data for uranium in yellowcake were mixed and showed a pronounced dependence on the specific source of the yellowcake sample. Results reported by Kalkwarf indicate a split-solubility classification is appropriate, and on review of those results (particularly those given on page 55 of Reference 8), the staff has assumed uranium in yellowcake to be 50% class D and 50% class Y. The computed inhalation dose conversion factors are given in Table 3.

Doses to the bronchial epithelium from ^{222}Rn and short-lived daughters are computed based on the assumption of indoor exposure with 100% occupancy.

The dose conversion factor for bronchial epithelium exposure from ^{222}Rn is derived as follows (see Appendix C for detailed basis):

1. 1 pCi/m^3 ^{222}Rn in outdoor air will yield an average indoor concentration of about 5 x 10^{-6} Working Level (WL).*
2. Continuous exposure to 1 WL = 25 cumulative working-level months (WLM) per year.
3. 1 WLM = 5000 mrem (Ref. 9).

Therefore,

$$1 \text{ pCi/m}^3\ ^{222}Rn \times \left(5 \times 10^{-6} \frac{\text{WL}}{\text{pCi/m}^3}\right) \times \left(25 \frac{\text{WLM}}{\text{WL}}\right)$$

$$\times \left(5000 \frac{\text{mrem}}{\text{WLM}}\right) = 0.625 \text{ mrem}$$

and the ^{222}Rn bronchial epithelium dose conversion factor is taken to be 0.625 mrem/yr per pCi/m^3.

Inhalation doses are computed by the staff by use of the following equation:

$$d_j(\text{inh}) = \sum_{ip} C_{aip} DCF_{ijp}(\text{inh}) \qquad (13)$$

where

$d_j(\text{inh})$ is the inhalation dose to organ j in mrem/yr; and

$DCF_{ijp}(\text{inh})$ is the inhalation dose conversion factor for radionuclide i, organ j, and particle size p in mrem/yr per pCi/m^3.

2.2 External Doses

External doses resulting from exposure to air and ground activity concentrations are computed, using the dose conversion factors presented in Table 4 and assuming 100 percent occupancy at a given location. Indoor exposure is assumed to occur 14 hours per day at a dose rate of 70 percent of the outdoor

*One WL concentration is defined as any combination of short-lived radioactive decay products of ^{222}Rn per liter of air that will release 1.3 x 10^5 MeV of alpha-particle energy during their radioactive decay to ^{210}Pb.

dose rate, which is equivalent to a dose reduction factor for structural shielding of 0.825. The following equation is used by the staff to calculate external doses:

$$d_j(\text{ext}) = 0.825 \sum_i C_{ai} DCF_{ij}(\text{cld}) + C_{gi} DCF_{ij}(\text{gnd}) \qquad (14)$$

where

C_{ai} is the total air concentration of radionuclide i in pCi/m^3;

$d_j(\text{ext})$ is the external dose to organ j in mrem/yr;

$DCF_{ij}(\text{cld})$ is the dose conversion factor for cloud exposure from radionuclide i to organ j in mrem/yr per pCi/m^3;

$DCF_{ij}(\text{gnd})$ is the dose conversion factor for ground exposure from radionuclide i to organ j in mrem/yr per pCi/m^2; and

0.825 is the effective reduction factor because of structural shielding for indoor exposure periods.

2.3 Ingestion Doses

Ingestion doses are routinely calculated for ingestion of vegetables and meat (beef, unprocessed pork, and lamb). Milk ingestion doses are also computed if that pathway exists at the time of licensing. Ingestion doses are based on environmental concentrations established using Equations 8, 9, and 10, ingestion rates given in Table 5, and dose conversion factors given in Table 6. Ingestion doses from vegetable consumption are computed under the assumption that an average of 50 percent of the initial activity will be lost in food preparation (Ref. 6), usually involving washing, peeling, boiling, etc. The following equation is used to compute the annual radionuclide intake via ingestion:

$$I_{ik} = U_{mk} C_{mi} + U_{bk} C_{bi} + 0.5 \sum_v U_{vk} C_{vi} \qquad (15)$$

where

I_{ik} is the activity ingestion rate of radionuclide i by an individual in age group k in pCi/yr;

U_{mk}, U_{bk} are milk (in L/yr) and meat (in kg/yr) ingestion rates for an individual in age group k;

U_{vk} is the ingestion rate of vegetable category v for age group k in kg(wet weight)/yr; and

0.5 is the fraction of vegetable activity remaining after food preparation, dimensionless.

Ingestion doses are then computed by

$$d_{jk}(ing) = \sum_i I_{ik} DCF_{ijk}(ing) \qquad (16)$$

where

$d_{jk}(ing)$ is the ingestion dose for organ j of an individual in age group k in mrem/yr; and

$DCF_{ijk}(ing)$ is the ingestion dose conversion factor for radionuclide i in organ j of an individual in age group k in units of mrem/pCi ingested.

2.4 Individual Dose Totals

Individual doses are calculated by the NRC staff for purposes of evaluating compliance with 10 CFR Part 20 and 40 CFR Part 190. For evaluating compliance with 40 CFR Part 190, dose contributions from ^{222}Rn and daughters are excluded. Total doses to individuals are calculated for both purposes using the following equation, which sums the dose contributions from inhalation, external dose, and ingestion:

$$d_{jk}(tot) = d_j(inh) + d_j(ext) + d_{jk}(ing) \qquad (17)$$

where

$d_{jk}(tot)$ is the total dose to organ j of an individual in age group k from all exposure pathways in mrem/yr.

To evaluate compliance with 40 CFR Part 190, the staff will compute total doses to appropriate individual receptors, using the above equation and all other models, data, and assumptions described in this guide, except that--

1. all dose contributions from radiation emitted by ^{222}Rn, ^{218}Po, ^{214}Pb, ^{214}Bi, and ^{214}Po will be excluded, and

2. all dose contributions from radiation emitted by ^{210}Pb, ^{210}Bi, and ^{210}Po formed by decay of released ^{222}Rn will be excluded.

With reference to Table 1 of this guide, the dose contributions eliminated for the purpose of evaluating compliance with 40 CFR Part 190 include those due to any radiation emitted by (a) radionuclides for which i = 7, 8, 9, 10, or 11 and (b) radionuclides present in particle size category p = 5 (radon daughters). The staff will add to dose totals computed for evaluating compliance with 40 CFR Part 190 any known significant doses resulting from any other light-water-cooled nuclear power generating or fuel cycle facilities, as appropriate (excluding doses from ^{222}Rn and its daughters as stipulated above and excluding doses from any radioactive materials released by nuclear or other facilities or operations not included under 40 CFR Part 190).

3. POPULATION DOSE CALCULATIONS

Population doses are calculated, using the environmental dose commitment concept with an integrating period of 100 years (Ref. 3). Under this approach, radiological impacts for a given release of activity are integrated over a time interval of 100 years following the release. The 100-year environmental dose commitment resulting from average release rates over a 1-year period is computed for (1) the period of actual uranium milling and (2) the period of time after the cessation of milling during which tailings are allowed to dry prior to final stabilization and reclamation. The NRC staff's rationale for the selection and use of a 100-year integrating period and the staff's technique for computing environmental dose commitments are addressed in Appendix B to this guide.

Population doses resulting from particulate and radon releases are evaluated over the general region of the facility site for the first two phases of the mill life cycle: operational (milling) and prereclamation. For these two time intervals and for the postreclamation era, annual population dose commitments resulting from transcontinental dispersion of ^{222}Rn are also evaluated.

3.1 Regional Population Doses

Population doses resulting from environmental radioactivity concentrations in the region of the site are evaluated for all exposure pathways considered in the evaluation of maximum individual doses; other pathways should also be considered if they are likely to result in an increase of more than 10 percent to the total result. Regional population dose commitments are generally computed on the basis of the population and agricultural productivity within a distance of 80 km (50 mi). Individual localized population centers lying beyond this distance should also be considered if their inclusion would increase the population dose estimates by more than 10 percent.

3.1.1 Inhalation and External Doses

Inhalation and external doses are computed by the NRC staff, using the identical models, equations, data, and assumptions as previously described for individual dose calculations in Regulatory Positions 1 and 2 of this guide. The procedure for calculating regional population doses from those pathways is to (1) divide the geographical site region into segments by radius and direction, (2) establish average individual doses within each segment, (3) multiply these individual doses by the estimated population lying within each segment, and (4) sum over all segments.

The population distribution required is that projected for the final year of mill operation. The appropriate population projection should be presented for each segment formed by radii extending outward from the site and bisecting the 16 compass directions (forming 22.5° sectors) and concentric circles drawn at distances of 1, 2, 3, 4, 5, 10, 20, 30, 40, 50, 60, 70, and 80 km. The 13 circles and 16 radii then form a grid composed of 192 individual segments. Average doses over the population within each segment are computed by the NRC staff along the segment directional centerline at a distance midway between the inner and outer boundaries of each annulus.

The population dose in the site region from inhalation and external exposure pathways is computed by the staff using the following equation:

$$M_j(\text{inh} + \text{ext}) = 10^{-3} \sum_s P_s[d_{js}(\text{inh}) + d_{js}(\text{ext})] \qquad (18)$$

where

$d_{js}(ext)$ is the average external dose to organ j in segment s in mrem/yr;

$d_{js}(inh)$ is the average inhalation dose to organ j in segment s in mrem/yr;

$M_j(inh+ext)$ is the resulting population dose from inhalation and external exposure pathways in rem/yr;

P_s is the population residing in segment s; and

10^{-3} is the conversion factor from millirem to rem.

3.1.2 Food Ingestion Doses

Collective population doses from food ingestion are calculated on the basis of the region's agricultural productivity rather than its population. This is because the total population dose from food pathways is proportional to the total quantity of radionuclides in all food produced in the region rather than the number of people exposed. The model employed by the NRC staff considers population doses resulting from radioactive contamination of vegetable, meat, and milk products produced in the region. For population dose calculations, the vegetable category includes fruit and grain crops as well. The procedure followed by the staff to compute food ingestion doses is similar to that used for inhalation and external doses and is composed of the following procedural steps:

1. The site region is divided into segments and each segment is assigned a productivity rate for each food category (vegetables, meat, and milk in kg/yr per km^2);

2. The average activity concentrations for each food type are computed and multiplied by the segment productivity factor and by the segment area;

3. Total activity content of the regional food production is then determined by summing over the segments; and

4. Population doses are determined assuming that all food produced in the region is consumed by a population with the same age distribution as the U.S. population.

Agricultural productivity data required for use in this analysis are generally available on a county-by-county basis for a relatively recent year.

The available raw data should be projected forward in time to provide a reasonable estimate of productivity during the final year of mill operation. If other means are not available, the NRC staff considers it acceptable to assume that regional agricultural productivity will remain in constant proportion to the U.S. population. Should other site-specific data not be available, the staff will rely on the statewide average productivity data presented in Table 7. The following equation is used to obtain segment average radionuclide concentrations in vegetables:

$$C_{vis}(avg) = \sum_{v} W_{vs} C_{vis} \qquad (19)$$

where

C_{vis} is the average concentration of radionuclide i in vegetable type v produced in segment s in pCi/kg(wet weight);

$C_{vis}(avg)$ is the average concentration of radionuclide i averaged over all types of vegetables in segment s in pCi/kg; and

W_{vs} is the weighting factor for vegetable type v in segment s (fraction of total production), dimensionless.

When relying on the state-average production data given in Table 7, the NRC staff will use values of W_v that have been selected to roughly correspond to the fractions of the three vegetable types in the average diet. From Reference 1, these W_v values are 0.78 for above-ground vegetables, 0.20 for potatoes, and 0.02 for other below-ground vegetables.

The gross activity content of the regional food production for each food type (vegetables, meat, or milk) is obtained by

$$Q_{fi} = \sum_{s} G_{fs} A_s C_{fis} \qquad (20)$$

where

A_s is the area of segment s in km^2;

C_{fis} is the concentration of radionuclide i in food category f in segment s in pCi/kg(wet weight);

G_{fs} is the productivity factor for food f in segment s in kg/yr per km^2; and

Q_{fi} is the gross activity content of radionuclide i in food f in pCi/yr.

Since the food produced may be eaten at different rates by different age groups and since ingestion dose conversion factors are also age dependent, it is necessary to establish the fractions of the Q_{fi} values determined by Equation 20 that are ingested by the various age groups. The following relationship applies:

$$F_{fk} = \frac{F_{pk}U_{fk}}{\sum_{k} F_{pk}U_{fk}} \qquad (21)$$

where

F_{fk} is the fraction of the production of food type f ingested by individuals in age group k, dimensionless;

F_{pk} is the fraction of the regional population belonging to age group k, dimensionless; and

U_{fk} is the average consumption rate in kg/yr or L/yr (for milk or other liquids) of food type f for an individual in age group k (see Table 8 for values). In the absence of suitable site-specific information, the NRC staff will assume average consumption rates for the population at large as given in Table 8 and population age fractions and fractional consumption rates as given in Table 9.

Using values obtained from Equations 20 and 21, total population ingestion doses from all food categories are calculated by

$$M_j(ing) = 10^{-3} \sum_{fik} E_f Q_{fi} F_{fk} DCF_{ijk}(ing) \qquad (22)$$

where

E_f is a factor to account for activity remaining after food preparation, dimensionless; and

$M_j(ing)$ is the resulting regional population dose from food ingestion for organ j in rem/yr.

The value of E_f is assumed to be 0.5 for vegetables and 1.0 for meat and milk. Fractions of the population belonging to the various age groups used in Equation 20 are determined from U.S. census data in the absence of site-specific information (see Table 9 for values).

3.2 Continental Population Doses

Substantial contributions to the total population dose may arise from the transport of released ^{222}Rn across the North American continent. Formation of long-lived ^{210}Pb from ^{222}Rn may result in both inhalation and ingestion doses not only to people in the United States, but to people in Canada and Mexico as well (Ref. 10). In order to estimate population doses occurring beyond the immediate region of the site, the staff makes use of the data presented in Table 10. These data consist of estimates of population doses resulting from 1,000-Ci releases of ^{222}Rn from four specific locations in the western United States. The location closest to the mill site should be used. The population doses provided are those that would have resulted from releases during calendar year 1978, including doses to Canadian and Mexican populations, and are based on the use of the environmental dose commitment concept with an integrating period of 100 years.

For projected releases of ^{222}Rn in future years, resulting population doses are computed by assuming those doses to be proportional to the U.S. population (use the population data provided in Table 11). The anticipated annual ^{222}Rn release in kCi is multiplied by the appropriate population doses from Table 10, and these results are then multiplied by the ratio of the projected U.S. population for the year of release to the 1978 U.S. population.

3.3 Total Population Dose Commitments

Population doses over the site region and the North American continent are computed on an annual basis for the operational (milling), prereclamation (pile drying), and postreclamation phases. The total radiological impact due to emissions during the first two phases is estimated by multiplying the annual

impacts by the durations and summing. Total annual impacts for each of the three phases are obtained by

$$M_j = M_j(\text{inh} + \text{ext}) + M_j(\text{ing}) + M_j(\text{Rn}) \qquad (23)$$

where

M_j is the annual committed population dose to organ j in rem/yr; and

$M_j(\text{Rn})$ is the annual continental population dose from ^{222}Rn and its daughters to organ j in rem/yr.

Total impacts over the first two phases are obtained by

$$M_j(\text{m\&d}) = T_o M_j(\text{m}) + T_d M_j(\text{d}) \qquad (24)$$

where

$M_j(\text{d})$ is the annual committed population dose to organ j during the drying phase in rem/yr;

$M_j(\text{m})$ is the annual committed population dose to organ j during the milling phase in rem/yr;

$M_j(\text{m\&d})$ is the aggregate committed population dose to organ j over the milling and drying phases in rem; and

T_o, T_d are the durations of the operational and pile-drying phases, respectively, in yr.

The calculation, compilation, and presentation of these population doses is considered by the NRC staff to represent a reasonably complete description of the radiological impact incurred by the operation of a typical uranium mill.

D. IMPLEMENTATION

The models specified in this guide are being used by the NRC staff in evaluating radiological impact in connection with applications for uranium mill licenses and renewals.

Table 1

ISOTOPES AND PARTICLE SIZES FOR WHICH DIRECT AIR CONCENTRATIONS (C_{adip} VALUES) ARE REQUIRED AS INPUT DATA

Particle Size Group*	Diameter Range, μm	Mean Diameter, μm	Density, g/cm³	Unit Density Activity--Median Aerodynamic Equivalent Diameter (AMAD), μm	Deposition Velocity, m/sec
p = 1	-	1.0	8.9	3.0	1.0×10^{-2}
p = 2	-	1.0	2.4	1.5	1.0×10^{-2}
p = 3	1 to 10	5.0	2.4	7.75	1.0×10^{-2}
p = 4	10 to 80	35.0	2.4	54.0	8.82×10^{-2}
p = 5	-	0.3	1.0	0.3	0.3×10^{-2}

		Particle Size Group Index**				
i	Radionuclide	p = 1	p = 2	p = 3	p = 4	p = 5
1	uranium-238	C & R	C & R	C & R	C & R	-
2	thorium-234	se	se	se	se	-
3	protactinium-234	se	se	se	se	-
4	uranium-234	se	se	se	se	-
5	thorium-230	C & R	C & R	C & R	C & R	-
6	radium-226	C & R	C & R	C & R	C & R	-
7	radon-222***	se	se	se	se	-
8	polonium-218	se	se	se	se	C & R
9	lead-214	se	se	se	se	C & R
10	bismuth-214	se	se	se	se	C & R
11	polonium-214	se	se	se	se	se
12	lead-210	C & R	C & R	C & R	C & R	C & R
13	bismuth-210	se	se	se	se	C & R
14	polonium-210	se	se	se	se	C & R

* Particle size groups are assigned to effluents as follows: p = 1 for yellowcake dust; p = 2, 3, or 4 for fugitive ore and tailings dusts; p = 5 for ^{222}Rn air ingrowth concentrations of particulate daughters.

** The entry "C & R" indicates that the particular C_{adip} value is explicitly calculated by the staff and required as input for use of the models, equations, and data described in this guide. The entry "se" indicates that radionuclide is assumed to be in secular equilibrium with the next-higher-up parent for which the direct air concentration is explicitly calculated.

*** The air concentration of ^{222}Rn is also calculated by the staff and is required as input for use of this guide; ^{222}Rn gas is not assigned a particle size.

Table 2

ENVIRONMENTAL TRANSFER COEFFICIENTS*

	Transfer Coefficent			
	U	Th	Ra	Pb
Plant/Soil (B_{vi})				
(pCi/kg plant - wet weight)/(pCi/kg soil - dry weight)				
Edible Above Ground	2.5×10^{-3}	4.2×10^{-3}	1.4×10^{-2}	4.0×10^{-3}
Potatoes	2.5×10^{-3}	4.2×10^{-3}	3.0×10^{-3}	4.0×10^{-3}
Other Below Ground	2.5×10^{-3}	4.2×10^{-3}	1.4×10^{-2}	4.0×10^{-3}
Pasture Grass	2.5×10^{-3}	4.2×10^{-3}	1.8×10^{-2}	2.8×10^{-2}
Stored Feed (Hay)	2.5×10^{-3}	4.2×10^{-3}	8.2×10^{-2}	3.6×10^{-2}
Beef/Feed (F_{bi})				
(pCi/kg per pCi/day)	3.4×10^{-4}	2.0×10^{-4}	5.1×10^{-4}	7.1×10^{-4}
Milk/Feed (F_{mi})				
(pCi/L per pCi/day)	6.1×10^{-4}	5.0×10^{-6}	5.9×10^{-4}	1.2×10^{-4}

*Sources for these data include References 11-14.

Table 3

INHALATION DOSE CONVERSION FACTORS

	Conversion Factor, mrem/yr per pCi/m³					
Radon Decay Products						
Particle Size = 0.3 micron Density = 1.0 g/cm³ AMAD = 1.0 microns	^{210}Pb	^{210}Po				
Whole Body	7.46E+00	1.29E+00				
Bone	2.32E+02[a]	5.24E+00				
Kidney	1.93E+02	3.87E+01				
Liver	5.91E+01	1.15E+01				
Mass Average Lung	6.27E+01	2.66E+02				
Yellowcake Dust						
Particle Size = 1.0 micron Density = 8.9 g/cm³ AMAD = 3 microns	^{238}U	^{234}U	^{230}Th	^{226}Ra	^{210}Pb	^{210}Po
Whole Body	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bone	1.66E+02	1.81E+02	4.90E+03	3.58E+02	1.45E+02	2.43E+00
Kidney	3.78E+01	4.30E+01	1.37E+03	1.26E+00	1.21E+02	1.79E+01
Liver	0.0	0.0	2.82E+02	4.47E-02	3.69E+01	5.34E+00
Mass Average Lung	1.07E+3	1.21E+3	2.37E+03	4.88E+03	5.69E+02	3.13E+02
Uranium Ore Dust						
Particle Size = 1.0 micron Density = 2.4 g/cm³ AMAD = 1.5 microns	^{238}U	^{234}U	^{230}Th	^{226}Ra	^{210}Pb	^{210}Po
Whole Body	4.32E+00	4.92E+00	1.66E+02	3.09E+01	4.36E+00	4.71E-01
Bone	7.92E+01	7.95E+01	5.95E+03	3.09E+02	1.35E+02	1.92E+00
Kidney	1.66E+01	1.89E+01	1.67E+03	1.09E+00	1.13E+02	1.42E+01
Liver	0.0	0.0	3.43E+02	3.87E-02	3.45E+01	4.22E+00
Mass Average Lung	1.58E+02	1.80E+02	3.22E+03	6.61E+03	7.72E+02	4.20E+02
Fine Tailings Particulates						
Particle Size = 5.0 microns Density = 2.4 g/cm³ AMAD = 7.75 microns	^{238}U	^{234}U	^{230}Th	^{226}Ra	^{210}Pb	^{210}Po
Whole Body	1.16E+00	1.32E+00	1.01E+02	4.00E+01	4.84E+00	7.10E-01
Bone	1.96E+01	2.14E+01	3.60E+03	4.00E+02	1.50E+02	2.89E+00
Kidney	4.47E+00	5.10E+00	1.00E+03	1.41E+00	1.25E+02	2.13E+01
Liver	0.0	0.0	2.07E+02	4.97E-02	3.83E+01	6.36E+00
Mass Average Lung	1.24E+03	1.42E+03	1.38E+03	2.84E+03	3.30E+02	1.88E+02
Coarse Tailings Particulates						
Particle Size = 35.0 microns Density = 2.4 g/cm³ AMAD = 54 microns	^{238}U	^{234}U	^{230}Th	^{226}Ra	^{210}Pb	^{210}Po
Whole Body	7.92E-01	9.02E-01	5.77E+01	4.90E+01	4.43E+00	7.28E-01
Bone	1.34E+01	1.46E+01	2.07E+03	3.90E+02	1.38E+02	2.96E+00
Kidney	3.05E+00	3.47E+00	5.73E+02	1.38E+00	1.15E+02	2.19E+01
Liver	0.0	0.0	1.19E+02	4.85E-02	3.51E+01	6.52E+00
Mass Average Lung	3.33E+02	3.80E+02	3.71E+02	7.64E+02	8.70E+01	5.75E+01

[a] Read 2.32E+02 as $2.32 \times 10^2 = 232$.

Table 4

DOSE CONVERSION FACTORS FOR EXTERNAL EXPOSURE

Radionuclide	Dose Factor for External Dose from Air Concentrations mrem/yr per pCi/m^3	
	Skin	Whole Body*
^{238}U	1.05E-05**	1.57E-06
^{234}Th	6.63E-05	5.24E-05
^{234m}Pa	8.57E-05	6.64E-05
^{234}U	1.36E-05	2.49E-06
^{230}Th	1.29E-09	3.59E-06
^{226}Ra	6.00E-05	4.90E-05
^{222}Rn	3.46E-10	2.83E-06
^{218}Po	8.18E-07	6.34E-07
^{214}Pb	2.06E-03	1.67E-03
^{214}Bi	1.36E-02	1.16E-02
^{214}Po	9.89E-07	7.66E-07
^{210}Pb	4.17E-05	1.43E-05

Radionuclide	Dose Factor for External Dose from Ground Concentrations mrem/yr per pCi/m^2	
	Skin	Whole Body*
^{238}U	2.13E-06	3.17E-07
^{234}Th	2.10E-06	1.66E-06
^{234m}Pa	1.60E-06	1.24E-06
^{234}U	2.60E-06	4.78E-07
^{230}Th	2.20E-06	6.12E-07
^{226}Ra	1.16E-06	9.47E-07
^{222}Rn	6.15E-08	5.03E-08
^{218}Po	1.42E-08	1.10E-08
^{214}Pb	3.89E-05	3.16E-05
^{214}Bi	2.18E-04	1.85E-04
^{214}Po	1.72E-08	1.33E-08
^{210}Pb	6.65E-06	2.27E-06

*Doses to internal body organs are assumed to be the same as computed for the whole body.
**Read as 1.05 x 10^{-5} or 0.0000105.

Table 5

FOOD CONSUMPTION RATES USED FOR CALCULATING DOSES TO INDIVIDUALS

	Ingestion Rate by Age Group,* kg/yr			
	Infant	Child	Teen	Adult
Vegetables (Total)	-	47.8	76.1	105.
Edible Above Ground	-	17.3	28.9	39.9
Potatoes	-	27.2	42.2	60.4
Other Below Ground	-	3.3	5.0	5.0
Meat (Beef, Fresh Pork, and Lamb)	-	27.6	44.8	78.3
Milk (L/yr)	208.0	208.0	246.0	130.0

*All data are taken from Reference 6. Ingestion rates are averages for typical farm households. No allowance is routinely credited for portions of year when locally grown or home-grown food may not be available.

Table 6

INGESTION DOSE CONVERSION FACTORS

		Internal Dose Conversion Factor by Organ and Age, mrem per pCi ingested							
Age Group	Organ	^{238}U	^{234}U	^{234}Th	^{230}Th	^{226}Ra*	^{210}Pb	^{210}Bi	^{210}Po
Infant	Wh. Bod	3.33E-04	3.80E-04	2.00E-08	1.06E-04	1.07E-02	2.38E-03	3.58E-07	7.41E-04
	Bone	4.47E-03	4.88E-03	6.92E-07	3.80E-03	9.44E-02	5.28E-02	4.16E-06	3.10E-03
	Liver	0	0	3.77E-08	1.90E-04	4.76E-05	1.42E-02	2.68E-05	5.93E-03
	Kidney	9.28E-04	1.06E-03	1.39E-07	9.12E-04	8.71E-04	4.33E-02	2.08E-04	1.26E-02
Child	Wh. Bod	1.94E-04	2.21E-04	9.88E-09	9.91E-05	9.87E-03	2.09E-03	1.69E-07	3.67E-04
	Bone	3.27E-03	3.57E-03	3.42E-07	3.55E-03	8.76E-02	4.75E-02	1.97E-06	1.52E-03
	Liver	0	0	1.51E-08	1.78E-04	1.84E-05	1.22E-02	1.02E-05	2.43E-03
	Kidney	5.24E-04	5.98E-04	8.02E-08	8.67E-04	4.88E-04	3.67E-02	1.15E-04	7.56E-03
Teenager	Wh. Bod	6.49E-05	7.39E-05	3.31E-09	6.00E-05	5.00E-03	7.01E-04	5.66E-08	1.23E-04
	Bone	1.09E-03	1.19E-03	1.14E-07	2.16E-03	4.09E-02	1.81E-02	6.59E-07	5.09E-04
	Liver	0	0	6.68E-09	1.23E-04	8.13E-06	5.44E-03	4.51E-06	1.07E-03
	Kidney	2.50E-04	2.85E-04	3.81E-08	5.99E-04	2.32E-04	1.72E-02	5.48E-05	3.60E-03
Adult	Wh. Bod	4.54E-05	5.17E-05	2.13E-09	5.70E-05	4.60E-03	5.44E-04	3.96E-08	8.59E-05
	Bone	7.67E-04	8.36E-04	8.01E-08	2.06E-03	4.60E-02	1.53E-02	4.61E-07	3.56E-04
	Liver	0	0	4.71E-09	1.17E-04	5.74E-06	4.37E-03	3.18E-06	7.56E-04
	Kidney	1.75E-04	1.99E-04	2.67E-08	5.65E-04	1.63E-04	1.23E-02	3.83E-05	2.52E-03

*Adult whole body and bone dose conversion factors for ^{226}Ra have been obtained from Reference 6 and are based on applicable models and data from Reference 15. ^{226}Ra whole body and bone dose conversion factors for other age groups have been computed by assuming the same proportion to adult whole body and bone dose factors as given in Reference 16. All other dose conversion factors are directly from Reference 16.

Table 7

AVERAGE AGRICULTURAL PRODUCTIVITY FACTORS FOR VARIOUS STATES

State	State-Average Productivity,* kg/yr per km^2		
	Vegetables	Meat	Milk
Arizona	580	1,040	1,130
Colorado	2,800	3,200	1,400
Idaho	14,200	2,000	3,400
Montana	1,800	2,000	370
Nevada	18	510	230
New Mexico	280	1,150	460
South Dakota	2,400	6,400	3,600
Texas	1,200	5,300	2,100
Utah	370	790	1,800
Washington	10,700	1,600	6,000
Wyoming	320	1,400	230

*Data presented are based on a staff survey and analysis of available data on agricultural productivity for 1973.

Table 8

FOOD CONSUMPTION RATES USED FOR CALCULATING DOSES TO POPULATIONS

Food Category	Average Consumption Rates,* kg/yr) Infants	Children	Teens	Adults
Vegetable Pathway				
Berries and Tree Fruit	0	54.1	63.9	49.2
Fresh Vegetables**				
1. Potatoes	0	27.2	42.3	60.4
2. Other root veg.	0	3.4	5.0	5.0
3. Leafy vegetables	0	5.8	9.4	13.9
4. Other above-ground vegetables	0	11.4	19.5	26.0
Processed Vegetables				
1. Potatoes	0	2.3	3.6	5.2
2. Other root veg.	0	0.9	1.4	1.4
3. Leafy vegetables	0	0.4	0.6	0.8
4. Other above-ground vegetables	0	14.4	24.6	32.8
Grain, Rice, and Wheat	0	118.2	136.2	90.8
Total Vegetables	0	238.1	306.5	285.5
Meat Pathway				
Beef and Lamb**	0	21.8	35.9	64.0
Unprocessed Pork**	0	5.9	8.9	14.3
Poultry and Processed Pork	0	21.0	33.2	49.6
Total Meat	0	48.7	78.0	127.9
Milk Pathway (L/yr)				
Fresh Milk**	207.6	207.6	246.0	129.6
Milk Products	0	27.2	45.4	46.7
Total Milk	207.6	234.8	291.4	176.3

*All data are taken from Reference 6 and are representative of average consumption rates by individuals at farm residences.

**These food categories are evaluated for individual doses from ingestion pathways.

Table 9

AGE DISTRIBUTION OF POPULATION, AVERAGE AND PER CAPITA CONSUMPTION RATES, AND FRACTIONS USED IN THE ABSENCE OF SITE-SPECIFIC DATA

Age Group	Fraction of Population*	Average Total Consumption Rates,** kg/yr		
		Vegetables	Meat	Milk
Infants	0.0179	0	0	207.6
Children	0.1647	238.1	48.7	234.8
Teenagers	0.1957	306.5	78.0	291.4
Adults	0.6217	285.5	127.9	176.3

	Fraction of Regional Production Ingested by Each Age Group		
Age Group	Vegetables	Meat	Milk
Infants	0	0	0.0178
Children	0.1418	0.0780	0.1850
Teenagers	0.2167	0.1485	0.2728
Adults	0.6415	0.7735	0.5244

*Age fractions given reflect average values for the entire U.S. population indicated by 1970 census data, as reported in Reference 17.

**Consumption rates given are from Table 8 and are not those used for, or appropriate to, the calculation of maximum individual doses.

Table 10

CONTINENTAL POPULATION DOSES PER kCi OF ^{222}Rn RELEASED IN 1978

	Population Dose Resulting from a 1-kCi Release of ^{222}Rn During 1978, organ-rem*			
Release Site	Bronchial Epithelium	Whole Body	Pulmonary Lung	Bone
Casper, Wyoming	56.	8.8	2.0	120.
Falls City, Texas	72.	5.8	1.6	77.
Grants, New Mexico	52.	8.2	1.8	110.
Wellpinit, Washington	43.	9.0	1.7	120.
Average	56.	8.0	1.8	110.

*Values given are based on data reported in Reference 10 and amended for inclusion in Reference 1. Exposure pathways considered include inhalation and ingestion. Isotopes considered include ^{222}Rn and its short-lived daughters, ^{210}Pb, ^{210}Bi, and ^{210}Po. A 100-year integrating period was used in the application of the environmental dose commitment concept.

Table 11

PROJECTED POPULATION OF THE UNITED STATES, 1978-2100

Year	Projected U.S. Population, millions*	Year	Projected U.S. Population, millions*
1978	218.4	1992	247.4
1979	220.2	1993	249.3
1980	222.2	1994	251.1
1981	224.2	1995	252.8
1982	226.3	1996	254.4
1983	228.5	1997	255.9
1984	230.7	1998	257.5
1985	232.9	1999	258.9
1986	235.1	2000	260.4
1987	237.2	2025	287.5
1988	239.4	2050	291.1
1989	241.5	2075	291.9
1990	243.5	2100	293.0
1991	245.5		

* Population projections through the year 2000 are from Reference 18. Later projections were obtained from Reference 10 and are based on a predicted growth rate obtained from Reference 19.

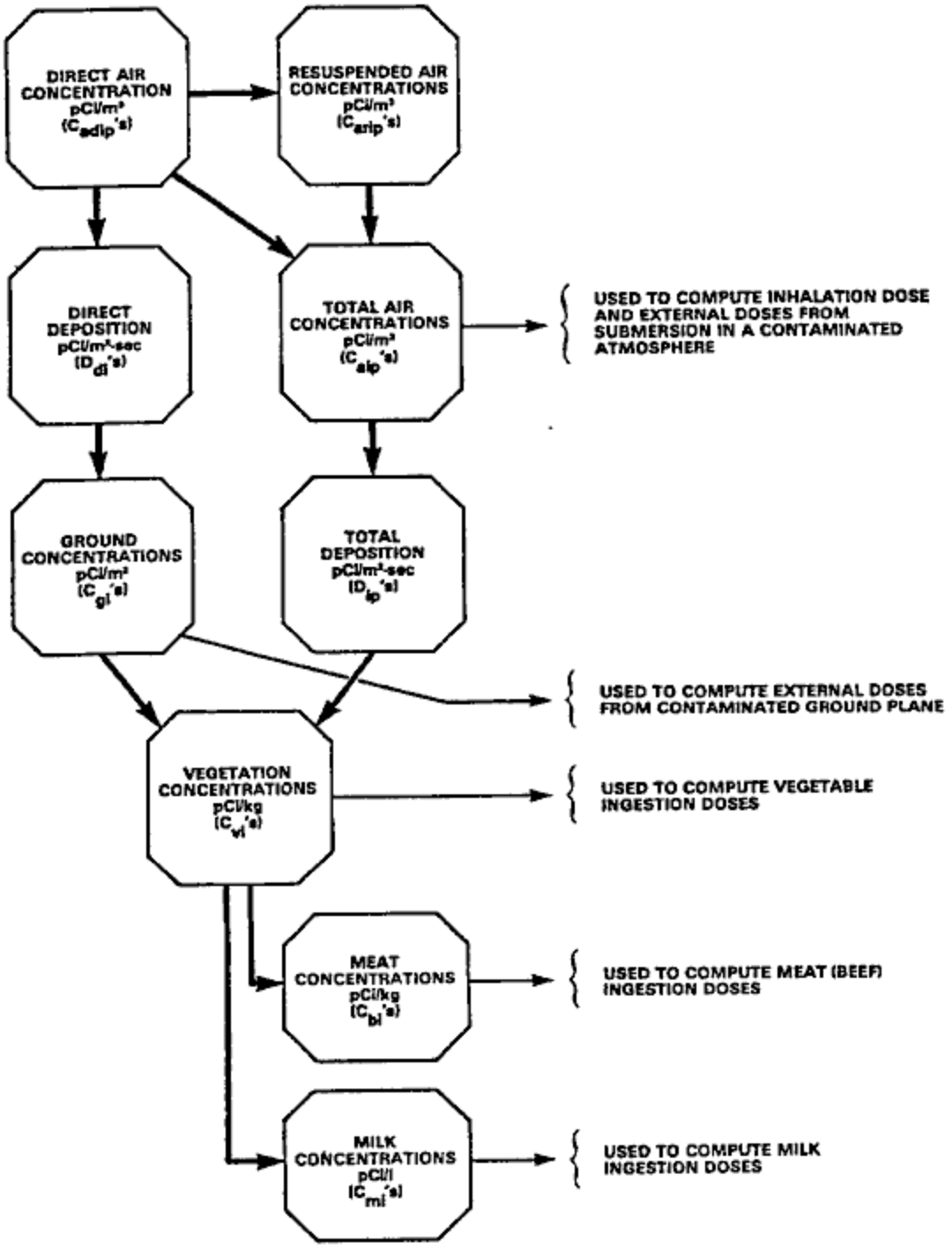

Figure 1. Schematic Diagram of Information Flow and Use For Dose Calculations

Table 12

CONVERSION FACTORS INTO SI UNITS

	Old Units*	New SI Units	Conversion Factor from Old to New Unit
Activity Concentrations (Environmental)			
Airborne Particulates and Gas	$pCi \cdot m^{-3}$	$Bq \cdot m^{-3}$	3.70E-02
Liquids (Water, Milk, etc.)	$pCi \cdot L^{-1}$	$Bq \cdot L^{-1}$	3.70E-02
Solids (Soil, Sediment, Vegetation, Food Stuff, etc.)	$pCi \cdot kg^{-1}$	$Bq \cdot kg^{-1}$	3.70E-02
Activity Concentrations (Effluent) Gas (Air)	$(\mu Ci \cdot mL^{-1})$**	$Bq \cdot m^{-3}$	3.70E+10
Liquid	$(\mu Ci \cdot mL^{-1})$**	$Bq \cdot L^{-1}$	3.70E+07
Exposure Rate (Environmental)	$\mu R \cdot h^{-1}$	$C \cdot kg^{-1} \cdot h^{-1}$	2.58E-10
Absorbed Dose	mrad	Gy	1.00E-05
Dose Equivalent	mrem	Sv	1.00E-05
Dose Equivalent Rate (Commitment)	$mrem \cdot yr^{-1}$	$Sv \cdot yr^{-1}$	1.00E-05

*Sanctioned for temporary use.
**Adopted because of established convention and use in maximum permissible concentration (MPC) tabulations.

REFERENCES*

1. U.S. Nuclear Regulatory Commission (USNRC), Office of Nuclear Materials Safety and Safeguards, "Final Generic Environmental Impact Statement on Uranium Milling," NUREG-0706, September 1980.

2. D. L. Strenge and T. J. Bander, "MILDOS--A Computer Program for Calculating Environmental Radiation Doses from Uranium Recovery Operations," USNRC Report NUREG/CR-2011 (PNL-3767), April 1981.

3. Environmental Protection Agency, "Environmental Radiation Dose Commitment: An Application to the Nuclear Power Industry," EPA Report EPA-520/4-73-002, 1974.

4. M. H. Momeni, Y. Yuan, and A. J. Zielen, "The Uranium Dispersion and Dosimetry (UDAD) Code," USNRC NUREG/CR-0553.

5. D. C. Kocher, "Nuclear Decay Data for Radionuclides Occurring in Routine Releases from Nuclear Fuel Cycle Facilities," USNRC Report ORNL/NUREG/TM-102, August 1977.

6. J. F. Fletcher and W. L. Dotson (compilers), "HERMES - A Digital Computer Code for Estimating Regional Radiological Effects from the Nuclear Power Industry," Hanford Engineering Development Laboratory, HEDL-TME-71-168, December 1971.

7. International Commission on Radiological Protection Task Group on Lung Dynamics, "Deposition and Retention Models for Internal Dosimetry of the Human Respiratory Tract," Health Physics 12:181, 1966.

8. D. R. Kalkwarf, "Solubility Classification of Airborne Products from Uranium Ores and Tailings Piles," USNRC Report NUREG/CR-0530, January 1979.

*NUREG-series reports are available at current rates through the GPO Sales Program, ATTN: Sales Manager, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, or from the National Technical Information Service, Springfield, Virginia 22161.

9. National Academy of Sciences--National Research Council, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," Report of the Advisory Committee on the Biological Effects of Ionizing Radiation (BEIR), U.S. Government Printing Office, 1972.

10. C. C. Travis et al., "A Radiological Assessment of Radon-222 Released from Uranium Mills and Other Natural and Technologically Enhanced Sources," Oak Ridge National Laboratory Report ORNL/NUREG-55, USNRC Report NUREG/CR-0573, 1979.

11. Y. C. Ng et al., "Prediction of the Maximum Dosage to Man from the Fallout of Nuclear Devices, Handbook for Estimating the Maximum Internal Dose from Radionuclides Released to the Biosphere," U.S. Atomic Energy Commission (USAEC) Report UCRL-50163, Part IV, 1968.

12. R. S. Booth et al., "A Systems Analysis Methodology for Predicting Dose to Man from a Radioactivity Contaminated Terrestrial Environment," Proceedings of the Third National Symposium on Radioecology, USAEC Report CONF-710501, Oak Ridge, Tenn., pp. 877-893, 1971.

13. R. J. Garner, "Transfer of Radioactive Materials from the Terrestrial Environment to Animals and Man," CRC Press, Cleveland, Ohio, 1972.

14. L. L. McDowell-Boyer et al., "Review and Recommendations of Dose Conversion Factors and Environmental Transport Parameters for ^{210}Pb and ^{226}Ra," Oak Ridge National Laboratory Report ORNL/NUREG-56, USNRC Report NUREG/CR-0574, 1979.

15. International Commission on Radiological Protection, "Recommendations of the International Commission on Radiological Protection," ICRP Publication 10A, Pergamon Press, New York, 1971.

REFERENCES (Continued)

16. G. R. Hoenes and J. K. Soldat, "Age-Specific Radiation Dose Commitment Factors for a One-Year Chronic Intake," Battelle Pacific Northwest Laboratories, USNRC Report NUREG-0172, November 1977.

17. U.S. Environmental Protection Agency, "Environmental Analysis of the Uranium Fuel Cycle, Part II - Nuclear Power Reactors," EPA Report EPA-520/9-73-003-C, November 1973.

18. U.S. Bureau of the Census, "Projections of the Population of the United States: 1977-2050," Current Population Reports Series P-25, No. 704, U.S. Government Printing Office, Washington, D.C. 20402, 1977.

19. "Development of the Methodology Relevant to U.N. Global Projections," paper presented to the Ad Hoc Group of Experts on Demographic Projection, U.N. Fund for Public Activities, Population Division, New York, 7-11 November 1977.

SYMBOLS

Symbol	Description
a	Equal to $(t - 1.82)$ if $t > 1.82$ and otherwise equal to zero in yr
A_s	Area of segment s in km^2
B_{vi}	Soil-to-plant transfer coefficient for radionuclide i and vegetation type v, (pCi/kg(wet) plant per pCi/kg(dry) soil)
C_{adip}	Calculated direct air concentration of radionuclide i in particle size p resulting from operational releases in pCi/m^3
C_{ai}	Total air concentration of radionuclide i in pCi/m^3
$C_{aip}(t)$	Calculated total air concentration of radionuclide i in particle size p at time t in pCi/m^3
$C_{arip}(t)$	Calculated resuspended air concentration of radionuclide i in particle size p at time t in pCi/m^3
$C_{arip}(T_d)$	Residual resuspended air concentration of radionuclide i in particle size p resulting from operational releases at the end of the T_d-year drying period in pCi/m^3
C_{bi}	Resulting average concentration of radionuclide i in meat in pCi/kg
C_{fis}	Concentration of radionuclide i in food category f in segment s in pCi/kg(wet weight)
$C_{gi}(t)$	Calculated ground surface concentration of radionuclide i at time t in pCi/m^2
$C_{gi}(T_d)$	Residual ground concentration of radionuclide i resulting from operational releases at the end of the T_d-year drying period in pCi/m^2
$C_{gi}(T_o)$	Ground concentration of radionuclide i at the time of mill shutdown in pCi/m^2
$C_{g12}(Pb \leftarrow Ra)$	Incremental ^{210}Pb ground concentration resulting from ^{226}Ra deposition in pCi/m^2
C_{hi}	Concentration of radionuclide i in hay (or other stored feed) in pCi/kg(wet weight)
C_{mi}	Resulting average concentration of radionuclide i in milk in pCi/L

SYMBOLS (Continued)

C_{pgi}	Concentration of radionuclide i in pasture grass in pCi/kg (wet weight)
C_{vi}	Resulting concentration of radionuclide i in vegetation v in pCi/kg(wet weight)
C_{vis}	Average concentration of radionuclide i in vegetable type v produced in segment s in pCi/kg(wet weight)
$C_{vis}(avg)$	Average concentration of radionuclide i averaged over all types of vegetables in segment s in pCi/kg(wet weight)
$DCF_{ij}(cld)$	Dose conversion factor for cloud exposure from radionuclide i to organ j in mrem/yr per pCi/m^3
$DCF_{ij}(gnd)$	Dose conversion factor for ground exposure from radionuclide i to organ j in mrem/yr per pCi/m^2
$DCF_{ijk}(ing)$	Ingestion dose conversion factor for radionuclide i in organ j of an individual in age group k in mrem/pCi ingested
$DCF_{ijp}(inh)$	Inhalation dose conversion factor for radionuclide i, organ j, and particle size p in mrem/yr per pCi/m^3
D_{di}	Resulting direct deposition rate of radionuclide i in pCi/m^2 per sec
D_i	Total deposition rate, including deposition of resuspended activity, of radionuclide i in pCi/m^2 per sec
$d_j(ext)$	External dose to organ j in mrem/yr
$d_j(inh)$	Inhalation dose to organ j in mrem/yr
$d_{jk}(ing)$	Ingestion dose for organ j of an individual in age group k in mrem/yr
$d_{jk}(tot)$	Total dose to organ j of an individual in age group k from all exposure pathways in mrem/yr
$d_{js}(ext)$	Average external dose to organ j in segment s in mrem/yr
$d_{js}(inh)$	Average inhalation dose to organ j in segment s in mrem/yr
E_f	Factor to account for activity remaining after food preparation, dimensionless
E_v	Fraction of the foliar deposition reaching edible portions of vegetation v, dimensionless

SYMBOLS (Continued)

F_{bi}	Feed-to-meat transfer coefficient for radionuclide i, in pCi/kg per pCi/day ingested (see Table 2)
F_{fk}	Fraction of the production of food type f ingested by individuals in age group k, dimensionless
F_{mi}	Feed-to-milk transfer coefficient for radionuclide i in pCi/L per pCi/day ingested (see Table 2)
F_{pg}, F_h	Fractions of the total annual feed requirement assumed to be satisfied by pasture grass or locally grown stored feed (hay), respectively, dimensionless
F_{pk}	Fraction of the regional population belonging to age group k, dimensionless
F_r	Fraction of the total deposition retained on plant surfaces, 0.2, dimensionless
G_{fs}	Productivity factor for food f in segment s in kg/yr per km^2
I_{ik}	Activity ingestion rate of radionuclide i by an individua in age group k in pCi/yr
M_j	Annual committed population dose to organ j in rem/yr
$M_j(d)$	Annual committed population dose to organ j during the drying phase in rem/yr
$M_j(ing)$	Resulting regional population dose from food ingestion for organ j in rem/yr
$M_j(inh + ext)$	Resulting population dose from inhalation and external exposure pathways in rem/yr
$M_j(m)$	Annual committed population dose to organ j during the milling phase in rem/yr
$M_j(m\&d)$	Aggregate committed population dose to organ j over the milling and drying phases in rem
$M_j(Rn)$	Annual continental population dose from ^{222}Rn and its daughters to organ j in rem/yr
p	Assumed soil areal density for surface mixing, 240 kg(dry weight)/m^2
P_s	Population residing in segment s
Q	Assumed feed ingestion rate at 50 kg(wet weight)/day

SYMBOLS (Continued)

Q_{fi}	Gross activity content of radionuclide i in food f in pCi/yr
$R_p(t)$	Ratio of the resuspended air concentration to the ground concentration for a ground deposit of age t yr for particle size p in m^{-1}
t	Time interval over which deposition has occurred in sec
T_d	Duration of time required to dry the tailings pile prior to reclamation in yr
T_o	Duration of the operational phase in yr
t_v	Assumed duration of exposure while vegetation v is growing in sec
U_{fk}	Average consumption rate of food type f for an individual in age group k (see Table 8 for values) in L/yr or kg/yr
U_{mk}, U_{bk}	Milk (in L/yr) and meat (in kg/yr) ingestion rates for an individual in age group k
U_{vk}	Ingestion rate of vegetable category v for age group k, in kg(wet weight)/yr
V_p	Deposition velocity of particle size p in m/sec (see Table 1)
W_{vs}	Weighting factor for vegetable type v in segment s (fraction of total production), dimensionless
Y_v	Assumed yield density of vegetation v, in kg/m^2 (wet weight)
$\delta(t)$	Zero if $t \leq 1.82$ and unity otherwise, dimensionless
λ_e	Assumed rate constant for environmental loss in sec^{-1}
λ_i	Radioactive decay constant for radionuclide i in sec^{-1}
λ_i^*	Effective removal constant for radionuclide i on soil in yr^{-1}
λ_n^*	Effective rate constant for loss by radioactive decay and migration of a ground-deposited radionuclide and equal to $\lambda_n + \lambda_e$ in sec^{-1}
λ_R	Assumed decay constant of the resuspension factor (equivalent to a 50-day half-life), 5.06 yr^{-1}
λ_w	Decay constant accounting for weathering losses (equivalent to a 14-day half-life), 5.73×10^{-7} sec^{-1}

VALUES OF CONSTANTS

Terminal value of the resuspension factor for particles with a deposition velocity of 0.01 m/sec	$10^{-9}m^{-1}$
Initial value of the resuspension factor for particles with a deposition velocity of 0.01 m/sec	$10^{-5}m^{-1}$
Deposition velocity for the particle size for which the initial resuspension factor value is $10^{-5}/m$	0.01m/sec
Fraction of vegetable activity remaining after food preparation, dimensionless	0.5
Effective reduction factor because of structural shielding for indoor exposure periods	0.825
Time required to reach the terminal resuspension factor	1.82 yr

APPENDIX A

SITE-SPECIFIC INFORMATION AND DATA USED BY THE NRC STAFF IN PERFORMING RADIOLOGICAL IMPACT EVALUATIONS FOR URANIUM MILLING OPERATIONS

Table A-1 lists and partially describes most of the information and data commonly used by the NRC staff in performing its uranium mill radiological impact evaluations. All the data detailed in Table A-1 are not always available on a site-specific basis, in which case the staff will employ conservative estimates or assumptions. In some situations, the data identified in Table A-1 may not be adequate, so the staff will attempt to secure additional information. This situation may arise, for instance, when operations at more than one site are involved and the staff is required to evaluate combined impacts. In most cases, however, provision of the data identified in Table A-1 allows the staff to completely fulfill its responsibilities with regard to the preparation of a thorough, knowledgeable, and technically sound radiological impact evaluation.

Table A-1

PLANT, PLANT OPERATIONS, METEOROLOGICAL, AND ENVIRONMENTAL DATA ROUTINELY USED BY THE NRC STAFF IN PERFORMING RADIOLOGICAL IMPACT EVALUATIONS

I. PHYSICAL PLANT DATA

A. Detailed site plot plan (overlaid on topographic map with scale and true north arrow) clearly identifying all locations of--

1. Site property boundaries
2. Raw ore storage pads
3. Primary crushers
4. Secondary crushers
5. Crushed ore storage areas
6. Ore grinders
7. Yellowcake dryer and yellowcake dryer stack*
8. Yellowcake packaging area and exhaust stack
9. Tailings impoundments and their boundaries
10. Any heap leach piles and their boundaries
11. Restricted area boundaries if different from site property boundaries
12. Fences

B. Plant operations data

1. General data

a. Ore processing rates for all crushers and grinders, MT/d; hr/d and d/yr operational
b. Raw ore grade, % U_3O_8 by weight, average and range
c. Fractions of uranium, thorium, radium, and lead in raw ore expected to flow through to tailings
d. Expected yellowcake purity, % U_3O_8 by weight, average and range, MT/yr produced
e. Expected calendar years of initial ore milling, final ore milling, and completion of tailings area reclamation

* Part of the input to the NRC staff's impact assessment computer code consists of X, Y, and Z coordinates for various release and receptor locations. The staff routinely determines these coordinates with respect to the topographic elevation at the location of the yellowcake dryer stack. A list of all such locations should be given in the radiological assessment.

Table A-1 (Continued)

2. Ore storage data

   a. Areas of each pile or bin complex, m^2
   b. Ore storage masses
   c. Ore grades, % U_3O_8 by weight
   d. Antidusting measures routinely implemented
   e. Anticipated dusting rates, MT/yr
   f. Anticipated ^{222}Rn releases, Ci/yr
   g. Fractions of input ore sent to storage

3. Crushing, grinding data

   a. Description of ventilation air filtration equipment
   b. Design efficiency of exhaust filters
   c. Minimum efficiencies of exhaust filters
   d. Filter testing procedure and schedule if applicable
   e. Fraction of time filters not operational or used
   f. Any measured effluent concentrations
   g. Stack heights and airflows
   h. Anticipated release rates, kg/hr or kg/MT yellowcake processed
   i. Anticipated ^{222}Rn release rate, Ci/yr
   j. Fractions of ore throughput reaching filters as dust

4. Yellowcake drying and packaging data

   a. Processing rates, MT/hr, for drying and packaging if different
   b. Hr/d and d/yr drying and packaging operations are carried out
   c. Description of all ventilation air filtration equipment with design, expected, and minimum efficiencies
   d. Filtration equipment testing procedures and frequencies
   e. Any measured effluent concentrations
   f. Stack heights and airflows
   g. Anticipated release rates, kg/hr, for the dryer stack, the packaging area ventilation exhaust, and any yellowcake storage area ventilation exhausts
   h. Annual yellowcake yield, MT/yr

5. Tailings impoundment system (including evaporation or settling ponds) data

   a. Complete physical, chemical, hydrological, and radiological description
   b. Total area, surface areas expected to be under water, saturated, moist, and dry (indicate surface moisture contents used as basis of estimates)

Table A-1 (Continued)

c. Description of antidusting measures routinely implemented and their expected effectiveness
d. Anticipated dusting rates for saturated, moist, and dry surface areas, g/m^2 per sec
e. Anticipated ^{222}Rn release rates for underwater, saturated, moist, and dry surface areas, Ci/yr per m^2
f. Estimated drying time required prior to initiation of reclamation procedures and basis
g. Estimated time required to stabilize and reclaim after drying and basis
h. Postreclamation estimated ^{222}Rn release rate, Ci/yr per m^2, and basis

II. METEOROLOGICAL DATA

A. Joint frequency data

1. National Weather Service (NWS) station data

a. Locations of all NWS stations within 80 km (50 mi)
b. Available joint frequency distribution data by wind direction, wind speed, and stability class (3-dimensional numerical array)
c. Period of record by month and year
d. Height of data measurement

2. Onsite meteorological data

a. Location and heights of instrumentation
b. Description of instrumentation
c. Minimum of 1 full year of onsite joint frequency distribution data broken down by wind direction, wind speed, and stability class (3-dimensional array) with a joint data recovery of 90 percent or more

B. Miscellaneous data

1. Annual average mixing depth heights
2. Description (general) of regional climatology, particularly including frequencies and durations of extreme wind speeds

III. ENVIRONMENTAL DATA

A. A detailed topographic map of the area within 8 km (5 mi) of the site showing the locations of all--

1. Site boundaries
2. Lands owned, leased, or otherwise controlled (including mill site claims) by the applicant

Table A-1 (Continued)

3. Lands privately owned
4. Lands under the jurisdiction of the U.S. Bureau of Land Management
5. Lands otherwise publicly held
6. Lands useable and available for grazing
7. Private residences or other structures used by the general public
8. Vegetable or other crops, identified by type
9. Private, public, and industrial water wells and natural springs
10. Milk animals (cows or goats)

B. Regional data (within 80 km)

1. Population distributions by direction (16) and radius (for 1, 2, 3, 4, 5, 10, 20, 30, 40, 50, 60, 70, and 80 km) for a recent year (no earlier than 1970), for the last year of expected milling (approximate), and for the last year prior to completion of tailings area reclamation (approximate) with expected age group fractions (if available)

2. Available county food production data, kg/yr, for vegetables (by type and totals), meat (all types), and milk; any available future predictions by local governmental, industrial, or institutional organizations

APPENDIX B

STAFF METHODOLOGY FOR THE COMPUTATION OF 100-YEAR ENVIRONMENTAL DOSE COMMITMENTS

A primary objective of the NRC staff's radiological impact analysis is to estimate the aggregate radiological impact of the evaluated facilities. In attempting to achieve this goal, the staff employs the concept of environmental dose commitment (EDC) and uses an integrating period of 100 years. In adopting this general calculational approach, the staff has also endeavored to select and employ a specific calculational scheme suitable for routine use, both by the NRC staff and by uranium milling license applicants. The specific technique used by the staff is, for this reason, greatly simplified but somewhat less comprehensive in comparison with other published approaches for EDC computation. This appendix describes the staff's technique for EDC evaluation and addresses the rationale for selecting a 100-year integrating period.

Ordinarily, to compute maximum individual doses, the staff uses environmental concentrations calculated for the final year of the particular phase of milling operations. The duration of the operational (milling) phase is most often estimated to be 15 to 20 years, while drying of tailings piles in the prestabilization phase may require from 2 to 5 years or slightly longer. The lengths of these time intervals define the value of the time variable "t" that appears in Equations 2, 3, 4, and 6 of Regulatory Position 1, Concentrations in Environmental Media, of this guide.

The staff technique for evaluating regional population EDCs for an integrating period of 100 years following activity release involves artificially setting the value of t to 101 years. The specific procedural steps taken by the staff in the calculation of 100-year EDCs are then as otherwise described in Regulatory Positions 1 and 3 and as follows:

1. Obtain all necessary input direct air concentrations, as identified in Table 1 of the guide, for average release rates (by radionuclide) over the time interval of the phase being evaluated.

2. Evaluate all required environmental media concentrations by means of the equations provided for this purpose in Regulatory Position 1, using a value of 101 years for the variable t appearing in Equations 2, 3, 4, and 6.

3. Based on the environmental media concentrations computed for t = 101 years, using appropriate population, agricultural, and other data as described in Regulatory Position 3, calculate the regional population doses for all exposure pathways for an exposure period of 1 year.

4. Sum the computed doses, as appropriate, over all exposure pathways.

These calculational procedures actually result in the computation of the population dose commitments resulting from a 1-year exposure period to environmental concentrations existing during the 101st year of releases at the constant rates employed. The similarity of this result to the desired EDC (the population dose commitments resulting from a 100-year period of exposure to environmental concentrations resulting from constant releases over a 1-year time period) is illustrated in Table B-1, which provides a comparison of staff and conventional methodologies for EDC computation. This table has been organized to display the component parts of each calculational method. Line-by-line equivalence of these component parts can be readily demonstrated under conditions of constant population, population distribution, and agricultural productivity in the site region.

The staff has elected to use the approach described, rather than the more conventional approach, and a 100-year integrating period, primarily for the following reasons:

1. The major exposure pathways are dominated by doses resulting from airborne activity, which decreases rapidly in the absence of a continuing source (the resuspension factor has a half-life of about 50 days);

2. The major dose impact of ground concentrations arises from the food ingestion pathways, which depend on estimates of agricultural productivity (forecast data for food productivity in specific areas are rare and are considered to be potentially unreliable);

3. Inordinate computational difficulties are involved in routinely taking into account growth trends not amenable to description by very simple mathematical functions; and

4. The vast majority of resulting population exposure results from environmental concentrations at distances between 20 and 80 km (32 and 50 mi) from the site at which routine atmospheric dispersion calculations cannot generally yield results with sufficient accuracy to justify accounting for minor perturbations.

Table B-1

COMPARISON OF STAFF AND CONVENTIONAL TECHNIQUES FOR ENVIRONMENTAL DOSE COMMITMENT CALCULATION

	NRC Staff EDC Calculational Technique* (Defined as population dose commitments resulting from a 1-year period of exposure to environmental concentrations present during the 101st year of constant releases)			Conventional EDC Calculational Technique (Defined as population dose commitments resulting from a 100-year period of exposure to environmental concentrations resulting from constant releases over a 1-year period)		
Line	Exposure Interval, yr	Release Interval, yr	Average Time Difference, yr	Exposure Interval, yr	Release Interval, yr	Average Time Difference, yr
1	100 - 101	100 - 101	0	0 - 1	0 - 1	0
2	"	99 - 100	1	1 - 2	"	1
3	"	98 - 99	2	2 - 3	"	2
4	"	97 - 98	3	3 - 4	"	3
5	"	96 - 97	4	4 - 5	"	4
6	"	95 - 96	5	5 - 6	"	5
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
94	"	7 - 8	93	93 - 94	"	93
95	"	6 - 7	94	94 - 95	"	94
96	"	5 - 6	95	95 - 96	"	95
97	"	4 - 5	96	96 - 97	"	96
98	"	3 - 4	97	97 - 98	"	97
99	"	2 - 3	98	98 - 99	"	98
100	"	1 - 2	99	99 - 100	"	99
101	"	0 - 1	100	100 - 101	"	100

*This table has been purposely organized to portray a line-by-line similarity between staff and conventional EDC computation methods. Computation by both methods is broken down into component parts that, under conditions described in the text, can be shown to be mathematically identical.

APPENDIX C

RADON DOSE CONVERSION FACTOR

The basis on which the NRC staff has relied for its radon daughter inhalation dose conversion factor consists of the following major component parts:

1. The indoor working level (WL) concentration resulting from an outdoor ^{222}Rn concentration of 1 pCi/m^3 is approximately 5.0×10^{-6} WL.

2. The number of cumulative working level months (WLM) exposure per year for an average individual at a constant concentration of one WL is 25 WLM/yr.

3. The committed dose equivalent to the bronchial epithelium (basal cell nuclei of segmented bronchi) per unit WLM exposure is 5000 mrem (5 rem).

These component parts enter into the following equation, which yields the ^{222}Rn inhalation dose conversion factor used by the staff:

$$\frac{5.0 \times 10^{-6} \text{ WL}}{\text{pCi/m}^3} \times \frac{25 \text{ WLM/yr}}{\text{WL}} \times \frac{5000 \text{ mrem}}{\text{WLM}} = \frac{0.625 \text{ mrem/yr}}{\text{pCi/m}^3}$$

Each of the three components identified above are derived from the following sources and data:

1. 5×10^{-6} WL per pCi/m^3 of ^{222}Rn is established by the assumed indoor air concentration ratios for ^{222}Rn, ^{218}Po, ^{214}Pb, and ^{214}Bi of 1.0/0.90/0.51 and 0.35. These concentration ratios and the derived conversion factor are representative of conditions in a reasonably well-ventilated structure (Refs. 1 and 2 for Appendix C).

2. 25 WLM/yr per WL concentration is derived from the assumption that an average individual's average breathing rate will be about 50 percent of that of a working miner. A WLM is defined, in terms of exposure to a working miner, as one month's occupational exposure to a 1-WL concentration. This assumed breathing rate would result in an average individual receiving about

0.5 WLM as a result of the same length of exposure to air at a 1-WL concentration. The following relationship applies:

$$(8760 \text{ hr/yr}) \times \frac{12 \text{ WLM/yr-WL}}{40 \text{ hr/wk} \times 52 \text{ wk/yr}} \times 0.5 = 25 \text{ WLM/yr-WL}$$

3. Five rem/WLM is the value derived from applying a quality factor (QF) of 10 for alpha radiation to convert from rad to rem (Refs. 1, 2, and 3 of Appendix C) to the figure of 0.5 rad/WLM as reported in the BEIR Report (page 148 of Ref. 3 of Appendix C).

The NRC staff considers the above basis for its ^{222}Rn inhalation dose conversion factor to be both sound and reasonable. The staff acknowledges that radon dosimetry is extremely complex and strongly influenced by assumed environmental and biological conditions. In view of the large variations induced by rather small changes in the assumed free-ion fraction, relative equilibrium, thickness of the intervening tissue and mucous layers, etc., the staff has endeavored to use physical, environmental, and other data reasonably representative of average conditions.

REFERENCES FOR APPENDIX C

1. Environmental Protection Agency, "Potential Radiological Impact of Airborne Releases and Direct Gamma Radiation to Individuals Living Near Inactive Uranium Mill Tailings Piles," EPA Report EPA-520/1-76-001, January 1976.

2. Environmental Protection Agency, "Environmental Analysis of the Uranium Fuel Cycle, Part I--Fuel Supply," EPA Report EPA-520/9-73-003-B, October 1973.

3. National Academy of Sciences--National Research Council, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," Report of the Advisory Committee on the Biological Effects of Ionizing Radiations (BEIR), November 1972.

VALUE/IMPACT STATEMENT

1. PROPOSED ACTION

1.1 Description

The proposed action consists of the development and publication of a routine methodology for assessing the radiological impacts of routine radioactive releases from uranium mills. These radiological impacts include doses to exposed individuals, doses to the population within an 80-km (50-mi) radius, doses to the population of the entire United States, and doses to the population of the North American Continent. Evaluations made using the published methodology would serve several regulatory and licensing purposes for which the methodology must be suitable. These purposes include evaluating compliance with 40 CFR Part 190 and NRC regulations, evaluating impacts of releases as part of the overall ALARA evaluation, and evaluation of environmental impacts to meet NEPA requirements.

1.2 Need

Radiological impact evaluations for routine releases from uranium mills have been carried out in the past, and numerous new and repeat evaluations will probably be required in the future. Past evaluations have been prepared by NRC personnel or by personnel from national laboratories under contract. These assessments have lacked a uniformity of approach and purpose for numerous reasons, the most important being the absence of a standardized routine procedure. Other reasons include, but are not limited to, the evolution of new models, techniques, and data; the development of new concerns requiring new methods of analysis; and the problems associated with having evaluations prepared by different groups of people. This situation needed to be corrected. The proposed action includes the publication of state-of-the-art analytical models, including environmental transport models and data, models and data for human dosimetry, and appropriate data for receptor characteristics. An example

of the problems to be addressed by this effort is the evaluation of the long-term time-integrated impact of mill tailings piles, heretofore assessed by NRC only in terms of the impact during a single year.

1.3 Value/Impact

1.3.1 NRC

The document conveying the results of the proposed action will be a useful tool and should result in substantial benefits to NRC. These include upgrading the quality of future evaluations, particularly with regard to uniformity, completeness, and the application of more up-to-date methods and data. Other benefits will include greater flexibility in personnel assignments and reduced allocations of personnel time to completing evaluations.

1.3.2 Other Government Agencies

Other agencies will have available a reliable reference document explaining NRC's evaluation techniques. If evaluations can be conducted more uniformly, other agencies concerned with radiological and health impacts would benefit from these evaluations as they become more familiar with a routine approach and require less time to review NRC evaluations.

1.3.3 Industrial and Public Interest Groups

Clearly predictable impacts on these groups include the costs involved in familiarizing themselves with the proposed regulatory guide. Benefits will be derived from more easily predicting and understanding the results of NRC evaluations. Some differences from past evaluation techniques have been incorporated in this guide, but based on public comment, the degree and effects of such alterations appear to be minimal.

1.3.4 Public

The public will derive a benefit from the availability of a reference document explaining NRC evaluation techniques, and a further benefit will be derived from the increase in quality of NRC evaluations and subsequent licensing decisions and regulatory requirements.

2. TECHNICAL APPROACH

The technical approach to be used is based in part on contract work prepared by staffs of the Argonne National Laboratory, the Pacific Northwest Laboratory, and the Oak Ridge National Laboratory. This approach reflects techniques currently being adopted for use in review of uranium milling license applications and license renewal applications by the Office of Nuclear Material Safety and Safeguards. Comments on the technical approach were solicited by the issuance of Draft Regulatory Guide RH 802-4 for public comment. The comments received were evaluated and modifications were made to the guide where appropriate.

3. PROCEDURAL APPROACH

In its preliminary value/impact assessment, the staff considered several procedural approaches for carrying out the proposed action and selected the publication of a regulatory guide.

4. STATUTORY CONSIDERATIONS

4.1 NRC Authority

The product document establishes routine procedures by which NRC will evaluate radiological impacts of routine airborne releases from uranium mills. These evaluations will be and are being used in "as low as is reasonably achievable" determinations to evaluate compliance with NRC regulations, to evaluate compliance with EPA's 40 CFR Part 190 regulation, and to evaluate environmental impacts as part of NRC's overall NEPA determination.

4.2 Need for NEPA Assessment

The proposed action on calculational models did not require an environmental impact statement as it was not "a major Commission action significantly affecting the quality of the environment" as detailed in paragraph 51.5(a)(10) of 10 CFR Part 51.

5. RELATIONSHIP TO OTHER EXISTING OR PROPOSED REGULATIONS OR POLICIES

No potential conflicts with other agencies have been identified. However, the proposed regulatory guide will be a principal tool in the implementation of EPA regulation 40 CFR Part 190. Implementation of 40 CFR Part 190 is an NRC responsibility.

There is some possibility that backfitting requirements may result from implementation of 40 CFR Part 190. Such possible requirements will not result from the proposed action, but rather from the EPA regulation.

6. SUMMARY AND CONCLUSIONS

Guidance on routine procedures for evaluating the radiological impact of routine airborne releases of radioactive material from uranium mills should be developed and published in a regulatory guide.

U.S. NUCLEAR REGULATORY COMMISSION

May 1986

REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 3.56
(Task CE 309-4)

GENERAL GUIDANCE FOR DESIGNING, TESTING, OPERATING, AND MAINTAINING EMISSION CONTROL DEVICES AT URANIUM MILLS

A. INTRODUCTION

Regulations applicable to uranium milling are contained in 10 CFR Part 20, "Standards for Protection Against Radiation," and in 10 CFR Part 40, "Domestic Licensing of Source Material."

Paragraph 20.1(c) of 10 CFR Part 20 states that licensees should make every reasonable effort to keep radiation exposures, as well as releases of radioactive material to unrestricted areas, as low as is reasonably achievable. Paragraph 20.105(c) of 10 CFR Part 20 requires that licensees engaged in uranium fuel cycle operations subject to the provisions of 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations," comply with that part. Part 190 of Title 40 requires that the maximum annual radiation dose to individual members of the public resulting from fuel cycle operations be limited to 25 millirems to the whole body and to all organs except the thyroid, which must be limited to 75 millirems. Criterion 8 of Appendix A to 10 CFR Part 40 requires that milling operations be conducted so that all airborne effluent releases are reduced to levels as low as is reasonably achievable.

Air in the immediate vicinity of such uranium milling operations as ore crushing, ore grinding, and yellowcake drying and packaging frequently contains radioactive materials in excess of that permissible for release to unrestricted areas. Emission control devices are installed in ventilation systems of uranium mills to limit releases of these radioactive materials to the environment.

General guidance for filing an application for an NRC source material license authorizing uranium milling operations is provided in § 40.31 of 10 CFR Part 40. An applicant for a new license or renewal of an existing license for a uranium mill is required by § 40.31 to provide detailed information on the proposed equipment, facilities, and procedures at the installation. This information is used by the NRC to determine whether the applicant's proposed equipment, facilities, and procedures are adequate to protect the health and safety of the public and and to determine if they will significantly affect the quality of the environment. Calculations by the NRC of the environmental impact from the proposed uranium milling operations are based on the estimated rate of production of radioactive airborne particulates adjusted to reflect the removal efficiency of the emission control devices installed in the plant ventilation systems. This requires reliable information on the efficiency of these devices. It also requires reliable information on the production of airborne radioactive particulates during the proposed operations.

Section 40.65 of 10 CFR Part 40 requires mill operators to submit semiannual reports to the NRC specifying the quantity of each of the principal radionuclides released to unrestricted areas in gaseous effluents. This information may be used by the NRC to estimate maximum potential annual radiation doses to the public resulting from effluent releases and thereby determine compliance with paragraphs 20.1(c) and 20.105(c) of 10 CFR Part 20 and with Criterion 8 of Appendix A to 10 CFR Part 40. The quantity of radionuclides released is based on scheduled sampling of effluents discharged into exhaust stacks. The reliability of these data for estimating radiation exposures depends on maintaining uniform operation of the emission control devices during the reporting time interval because these effluents are not continuously sampled.

All emission control devices used in uranium mill ventilation systems need to perform reliably under expected operating conditions to meet the objectives discussed above. This guide describes procedures acceptable to the NRC staff for designing, testing, operating, and maintaining these emission control devices to ensure the reliability of their performance.

Any information collection activities mentioned in this regulatory guide are contained as requirements in 10 CFR Parts 20 or 40, which provide the regulatory basis for this guide. The information collection requirements in 10 CFR Parts 20 and 40 have been cleared under OMB Clearance Nos. 3150-0014 and 3150-0020, respectively.

B. DISCUSSION

The milling of uranium ores results in the production of airborne particulates containing uranium and its daughters in several areas of a typical uranium mill. These areas encompass (1) ore storage, handling, and crushing, (2) ore grinding, leaching, and concentrating processes; (3) yellowcake precipitation, drying, and packaging, and (4) miscellaneous mill locations such as maintenance shops, laboratories, and general laundries. Milling operations must be conducted so that all airborne effluent releases are reduced to levels as low as is reasonably achievable (ALARA). The primary means of accomplishing this is the control of emissions at the source.

The most significant sources of radioactive airborne particulates occur in ore handling and crushing areas and in yellowcake drying and packaging areas. These sources are generally controlled by separate ventilation systems in each area that remove these airborne particulates through local hoods, hooded conveyor belts, etc., into emission control devices where they are removed from the air streams. The cleaned air is then discharged by fans into the atmosphere through local exhaust stacks.

Emission control devices are available in a wide range of designs to meet variations in air cleaning requirements. Degree of removal required, quantity and characteristics of the contaminant to be removed, and conditions of the air stream all have a bearing on the device selected for any given application. Emission control devices used at ore crushing and grinding operations include bag or fiber filters (baghouses), orifice or baffle scrubbers, and wet impingement scrubbers. Water spray systems are also used at these operations to minimize the generation of dust. Wet impingement scrubbers or venturi scrubbers are generally employed at yellowcake drying and packaging areas.

All emission control devices used in a uranium mill ventilation system need to be designed for reliable performance under the expected operating conditions. Initial testing and proper maintenance are primary factors in ensuring the reliability of these components. Periodic testing during operation to verify the efficiency of these components is another important means of ensuring reliability. Built-in features that will facilitate convenient in-place testing of these devices are important in ventilation system design.

Emission control devices used in a uranium mill ventilation system need to be sufficiently instrumented to measure and monitor their operating characteristics. Frequent checks of all significant operating parameters are necessary to determine whether or not conditions are within a range prescribed to ensure that this equipment is operating consistently near peak efficiency. When checks indicate that the equipment is not operating within this range, it is necessary to take action to restore parameters to the prescribed range. To ensure that timely actions are taken, instrumentation is often supplemented by audible alarms that are preset to signal when prescribed operating range limits are exceeded. When the required actions cannot be taken without shutdown and repair of this equipment, it will be necessary to suspend milling operations that are the source of the emissions until corrective actions have been taken. Criterion 8 of Appendix A to 10 CFR Part 40 requires suspension of yellowcake drying and packaging operations as soon as practicable when shutdown and repair of the emission control system is necessary. The installation of automatic shutdown instrumentation on processes and systems at which operating parameters on emission control devices may exceed acceptable limits could prevent excessive releases that may result from continuous operations under these circumstances, e.g., those associated with the production of yellowcake. The installation of backup or redundant emission control systems would permit continuous operation during repair and maintenance of the primary system.

A preventive maintenance program is important for emission control devices used in uranium mill ventilation systems. A program designed to identify deficiencies in operation of these devices so that corrective action can be taken to reduce the frequency of off-normal operation can provide a measure of confidence in the operating characteristics of these devices. This program may require periodic updating to reflect actual in-plant experience, equipment manufacturers' guidelines, and NRC guidance. For example, a preventive maintenance program can consist of the equipment supplier's recommendations supplemented by provisions derived from the licensee's own routine inspection and maintenance records.

The key to proper maintenance of emission control devices is frequent inspection. It is important that a regular program of inspection be established and followed and records be kept of all inspections and the resulting maintenance. Inspection intervals will depend on the type of emission control device, the manufacturer's recommendation, and the process area where the unit is installed. These inspections need to be performed as frequently as experience shows to be necessary but not less than annually.

Considerable maintenance time can be expended on trouble shooting and correction of malfunctions of emission control devices. The ability to locate and correct malfunctioning components of these devices requires a thorough understanding of the system.

Throughout the manufacturing industry, there are many models of each type emission control device used at uranium mills. These models range in size in order to meet the different air capacity needs at the mills. In addition, some design features of each manufacturer are unique. Accordingly, the specific design and the testing, operating, and maintenance procedures for each model are beyond the scope of this guide. General guidance is presented, however, for each type of emission control device based on typical models in present-day use. Background information for this guidance can be found in the Bibliography. The licensee may substitute procedures based on specific operating parameters of the model in use at the facility for those described in this guide.

1. DESIGN AND OPERATION

1.1 Bag or Fabric Filters (Baghouses)

Bag or fabric filters, usually in the form of baghouses, remove particulates from a gas stream by filtering the airborne particulates (by impaction or diffusion) through a porous flexible fabric made of a woven or felted material. These collected particles form a structure of their own, supported by the filter, and have the ability to intercept and retain other particles. The increase in retention efficiency is accompanied by an increase in pressure drop through the filter. The baghouses are equipped with one of several automatic cleaning mechanisms for periodically dislodging collected material from filter components to prevent excessive resistance to the gas flow (i.e., excessive pressure drop) that would otherwise develop. The dislodged material settles in storage hoppers before the filter components are placed back on stream. The automatic cleaning cycle can be initiated by either a differential pressure switch or a timer, which may be interlocked with the main fan motor for the baghouse.

The cleaning mechanisms employed in baghouses are based on either mechanical shaking of the filter components or pneumatic vibration of these components by high-pressure air applied in reverse flow, reverse jet, or reverse pulse modes. The effectiveness of these compressed air systems depends on maintaining a sufficient reservoir of compressed air at the pressure specified by the baghouse manufacturer. Higher pressures than specified could cause failure of the filter fabric, while lower pressures can result in poor filter cleaning. These problems are minimized by pressure-regulating devices used in the compressed air systems.

The most critical parameter to be observed during baghouse operation is the pressure drop. Proper operation of the baghouse requires, at a minimum, maintaining the differential pressure of this device in the correct range specified by the manufacturer. A manometer or a differential-pressure gauge and transmitter are usually provided for this purpose. This instrumentation is often supplemented by an audible alarm system designed to signal and alert mill operators when prescribed differential-pressure ranges are exceeded. Lower differential pressures indicate potential deficiencies such as damaged filters or other air bypass channels that should be corrected. Higher differential pressures indicate that cleaning operations are inadequate. This can be corrected by increasing the frequency of the automatic cleaning cycle through adjustment of the differential-pressure switch or timer of the baghouse installation.

1.2 Wet Scrubbers

Wet scrubbers remove particulates from a gas stream by effecting intimate contact between the gas stream and a scrubbing liquor, usually water. The basic operations that take place within a wet scrubber are (1) saturation of the incoming gas, (2) contacting and capture of the particulates in the scrubbing liquor, and (3) separating the entrained particulate-laden liquid from the gas stream. The basic types of wet scrubbers are distinguished by the mechanisms used for transfer of particulates from the gas stream to the liquid stream. Most scrubber systems require some type of treatment and disposal of the particulate-laden scrubbing liquor.

Several water spray systems may be used in wet scrubber operations. Water from the main water spray system is directed either into a screen or throat to contact the particulate-laden gas stream. In applications where inlet gas temperatures are inordinately high, preconditioning of the incoming gas to the scrubber may be necessary to provide adequate humidity and thereby maintain particulate collection efficiency. This may be accomplished by use of an auxiliary water spray system upstream of the scrubber particulate scavenging area. Where particulate buildup is likely to occur in the entrainment separator, a wash system may be necessary to avoid this condition. The wash system is usually composed of low-pressure spray nozzles using recycled scrubbing liquor or fresh water for cleansing.

Orifice, wet impingement, or venturi wet scrubbers are generally used in uranium mill ventilation systems. In orifice-type wet scrubbers, the gas stream is made to impinge upon a surface of scrubbing water and is then passed through various constrictions where its velocity may be increased and where greater liquid-particulate interaction may occur. The gas stream finally discharges through a chamber section where entrained droplets are disengaged. In wet impingement scrubbers, the gas stream is wetted with water from low-pressure spray nozzles in the scrubber inlet and then passed through perforated plates at high velocity to impinge on baffle plates or vanes where liquid droplets containing particulate matter coalesce and drain to a sump. Solid particles are washed to the sump by either intermittent or continuous sprays. Prior to exiting from the scrubber, the gas stream passes through an entrainment separator to remove entrained liquid droplets. In a venturi scrubber, the gas stream flows through a throatlike passage where the gas is accelerated in velocity. The scrubbing liquor is

added at or ahead of the venturi throat and is sheared into fine droplets by the high-velocity gas stream, resulting in liquid-particulate interaction. The gas and liquor droplets then pass through a cyclone separator where entrained droplets containing particulate matter are removed from the gas stream.

Although each type of scrubber discussed above has unique design features, their collection efficiencies are influenced in similar ways by incremental changes in certain common operating parameters, principally gas and liquid flow as well as pressure drop. A decrease in either the gas or liquid flow rate could result in insufficient gas cleaning. Collection efficiency can also diminish if the liquid-to-gas flow rate ratio falls below design values. An increase in pressure drop across the scrubber will enhance the collection efficiency for the same size distribution and concentration of particulates in the gas stream. Proper operation of these wet scrubbers requires monitoring of these parameters to determine that they are within ranges prescribed to ensure equipment performance consistently near optimum collection efficiency. Instrumentation used to monitor these parameters is often supplemented by audible alarm systems designed to signal and alert mill operators of the need for corrective action when prescribed operating ranges are exceeded. In some cases automatic control systems with interlocks may be necessary. For example, the scrubber fan could be interlocked to shut down in the event of an indication of water flow failure. These circumstances would require suspending particulate-producing processes in the ventilation zone serviced by the scrubber until corrective action could be taken or switching to a redundant scrubber unit.

Daily operational data summaries on baghouse and wet scrubber performance are useful in providing a continuous record of performance of these devices. Other formats that contain equivalent information such as recorder charts can also be used for this purpose. Criterion 8 of Appendix A to 10 CFR Part 40 requires that checks of all parameters that determine the efficiency of yellowcake stack emission control equipment operation be made and logged hourly. In addition, data from checks made of all operating parameters necessary to enable timely identification of malfunctions can be of value in ensuring proper operation of baghouses and wet scrubbers and in updating preventive maintenance programs for these devices to reflect actual operating experience.

2. MAINTENANCE

2.1 Bag or Fabric Filters (Baghouses)

The frequency of needed maintenance for baghouses can be determined from manufacturers' recommendations and operating experience. In order of decreasing frequency, the principal baghouse components requiring maintenance are (1) filter bags, (2) flow controls, (3) hoppers, and (4) cleaning mechanisms. Symptoms of potential operating problems requiring corrective maintenance are almost always one of the following: (1) excessive emissions, (2) short filter bag life, and (3) high pressure drop. These symptoms may indicate malfunctioning in more than one component. For example, high pressure drop may be attributable to difficulties with the filter bag cleaning mechanism, low compressed air pressure, high humidity, weak shaking action, loose filter bag tension or excessive reentrainment of dust. Many other factors can cause excessive pressure drop, and several options are usually available for appropriate corrective action.

2.2 Wet Scrubbers

The major maintenance problems with wet scrubbers are (1) excessive buildup of solids in the wet/dry zones and entrainment separator, (2) plugged water spray nozzles, (3) abrasion in areas of high velocity such as throats and orifices, and (4) corrosion on scrubber vessel internal surfaces. A buildup of solids often occurs around the wet/dry interfaces of ducts where the gas stream contacts the wetted scrubber housing. Instrumentation such as liquid and gas pressure indicators can exhibit rapid solids buildup and therefore require regular cleaning to ensure proper system operation and performance. Increased pressure drop, reduced gas flow, and subsequent system malfunction are all possible consequences of a buildup of solids in the entrainment separator. Water spray nozzles frequently wear or clog, which produces an uneven liquid pattern and requires their replacement. Venturi and impingement scrubbers tend to show signs of abrasion in areas downstream of gas and liquid acceleration. Corrosion can occur from the high moisture and airborne liquid incident on components, in particular where protective liners may have deteriorated.

A regular schedule of routine inspection of key components and operating parameters is an essential ingredient of a maintenance program for ensuring the reliability of performance of typical baghouses and wet scrubbers. Examples of some typical maintenance activities for baghouses and wet scrubbers used at uranium mills are presented in Appendices A and B, respectively. These activities are in addition to those procedures recommended by manufacturers for routine lubrication, inspection, and replacement of component parts.

3. TESTING

To ensure proper selection of emission control devices, it is necessary for potential users to supply manufacturers with a list of specifications for the given application, including gas flow rates, liquid flow rates (where scrubbers are under consideration), temperature, pressure, pressure drop, concentration of particulates, particle size distribution, emission levels, and collection efficiency. The manufacturers, in turn, should design and supply these devices based on test data already available for prototype equipment used under similar circumstances.

If relevant test data are not available, it is generally advisable for the manufacturer and potential user to run mutually agreed-upon pilot plant or prototype tests with a gas stream typical of the gas stream to be cleansed to ensure that proper equipment is supplied to meet the desired collection efficiency. After installation of the device, it may be tested in place to confirm its particulate removal efficiency. Periodic in-place testing will ensure continued effectiveness of the device. In this way, reliable data will be available to the licensee for estimating the environmental impact of uranium milling operations before and after the commencement of operations.

Collection efficiency for baghouses and wet scrubbers used in uranium mills is usually based on inlet and outlet particulate concentrations in a dry gas corrected to standard temperature and pressure. Inlet and outlet particulate concentrations are preferably sampled simultaneously if practicable. The procedure of choice for determination of particulate concentrations is described in Method 5, "Determination of Particulate Emissions From Stationary Sources," of Appendix A to 40 CFR Part 60, "Standards of Performance for New Stationary Sources." In this procedure, particulate matter is withdrawn isokinetically from the gas stream and collected on a glass fiber filter maintained in a prescribed elevated temperature range. The particulate mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after removal of uncombined water. If a preoperational in-place determination of collection efficiency is desired, a procedure mutually acceptable to the user and manufacturer may be used.

4. QUALITY ASSURANCE

Components of uranium mills do not require a formal quality assurance program; however, particular quality assurance requirements may be imposed by the NRC as license conditions if deemed necessary to protect health. A quality assurance program for emission control devices need only be an extension of the overall quality assurance program usually submitted by an applicant for a license to ensure that the emission control devices are designed and the testing, operating, and maintenance procedures are implemented to maintain uniform operation of these devices within prescribed ranges under expected operating conditions.

C. REGULATORY POSITION

Emissions from milling operations must be controlled so that all airborne effluent releases are reduced to levels as low as is reasonably achievable. An important means of accomplishing this is by means of emission control devices in mill ventilation systems. The design and the testing, operating, and maintenance procedures for these emission control devices should ensure that these devices are operating consistently near peak operational efficiency.

1. DESIGN AND OPERATION

In addition to the requirement in Criterion 8 of Appendix A to 10 CFR Part 40 that requires checks to be made and logged hourly of all parameters that determine the efficiency of yellowcake stack emission control equipment operation, other emission control devices should be sufficiently instrumented to monitor all operating parameters necessary to enable timely identification of malfunctions. Consideration should be given to centralizing equipment instrumentation and controls, where feasible, to facilitate ease of changing and evaluating operating parameters.

Instrumentation may be supplemented by audible alarms that are preset to signal when prescribed operating range limits are exceeded.

Consideration should be given to installation of automatic shutdown instrumentation on processes and systems so that, when operating parameters on emission control devices exceed preset limits, operations would cease.

Equipment used in the emission control system should be clearly marked to allow easy identification. Up-to-date system drawings should be available to identify the location of valves and instruments. A record of system modification or changes should also be available.

Consideration should be given to keeping records of operating data in order to evaluate system performance and to provide a basis for establishing or modifying a preventive maintenance program.

Written procedures should be available for equipment operation and for operator actions if malfunctions occur. Checkoff lists should be considered for complex or infrequent modes of operation. Some operational procedures that may be considered for typical baghouses and wet scrubbers used at uranium mills are presented in Appendix C.

Equipment operators should be instructed in the function of each device and its operating characteristics. They should also be made aware of consequences of malfunctions and misoperation as well as of corrective measures that may be taken by the operator.

Equipment operators should be made aware of modifications to the equipment, changes in procedures, and problems encountered during system operation.

2. MAINTENANCE

A preventive maintenance program should be developed and implemented to sustain proper equipment performance and to reduce unscheduled repairs. Inspections should be performed at least annually, more frequently if necessary, on all components.

In the development of the maintenance program, consideration should be given to the type of emission control device, the manufacturer's recommendations, and the process at which the unit is installed. This program may require periodic updating to reflect onsite maintenance experience.

Schedules and written procedures should be available for maintenance work. Maintenance personnel should be trained in the implementation of maintenance procedures. They should be trained to recognize the symptoms that indicate potential problems, to determine the cause of the difficulty, and to remedy it with the help, if necessary, of the manufacturer or other outside resource.

3. TESTING

Emission control devices should be tested in place at least annually to verify collection efficiency. Collection efficiency for baghouses and wet scrubbers used in uranium mills should be based on inlet and outlet radioactive particulate concentrations in a dry gas corrected to standard temperature and pressure. Inlet and outlet (radioactive or uranium) particulate concentrations should be sampled simultaneously, if practicable.

The test should be performed in accordance with Method 5 of Appendix A to 40 CFR Part 60 or an acceptable equivalent.

If a preoperational in-place determination of collection efficiency is desired, a procedure mutually acceptable to the user and manufacturer may be used.

4. QUALITY ASSURANCE

The overall quality assurance program submitted by an applicant for a license should include provisions for (1) documentation, review, and evaluation of design, testing, operating, and maintenance data for emission control devices and (2) timely initiation of corrective actions necessary to maintain uniform operation of these devices within prescribed ranges under expected operating conditions.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plans for using this regulatory guide.

Except in those cases in which an applicant or licensee proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the methods described in this guide will be used by the NRC staff in evaluating procedures for designing, testing, operating, and maintaining emission control devices used at uranium mills.

BIBLIOGRAPHY

American Industrial Hygiene Association, *Air Pollution Manual, Part II–Control Equipment*, American Industrial Hygiene Association, Detroit, Mich., pp. 16-18, 46-56, 70-75, 129-135, 1968.

American National Standards Institute, "Fundamentals Governing the Design and Operation of Local Exhaust Systems," American National Standard ANSI Z9.2-1979, Sections 6 and 9, New York, NY, 1980.

Cross, F. L., and H. E. Hesketh, *Handbook for the Operation and Maintenance of Air Pollution Control Equipment*, Technomic Publishing Co., Inc., Westport, Conn., Chapters 2 and 6, 1975.

Industrial Gas Cleaning Institute, "Operation and Maintenance of Fabric Collectors," Publication No. F-3, 1972.*

Industrial Gas Cleaning Institute, "Basic Types of Wet Scrubbers," Publication No. WS-3, 1980.*

Theodore, L., and A. J. Buonicore, *Air Pollution Control Equipment: Selection, Design, Operation and Maintenance*, Prentice-Hall, Inc., Englewood Cliffs, N.J., Chapters 8 and 9, 1983.

U.S. Environmental Protection Agency, "Handbook–Industrial Guide for Air Pollution Control," EPA-625/6-78-004, Chapter 7, 1978.

U.S. Environmental Protection Agency, "Management and Technical Procedures for Operation and Maintenance of Air Pollution Control Equipment," EPA-905/2-79-002, Sections 3 and 5, 1979.

*Available from the Industrial Gas Cleaning Institute, Inc., 700 N. Fairfax Street, Alexandria, VA 22314.

APPENDIX A

TYPICAL MAINTENANCE ACTIVITIES FOR BAGHOUSES

COMPONENT	ACTIVITIES
Baghouse Housing	• Inspect exhaust from filters for visible dust. • Inspect gasketing on filter housing to ensure against leakage.
Compressed Air System	• Inspect for air leakage (low pressure) and check valves.* • Check alignment of air pulse holes with center of bag filters.*
Dust Collection Hopper	• Inspect for dust and debris buildup in ducts to hopper. • Rod out dust buildup on all accessible hopper surfaces. • Check operation of the discharge mechanism.
Manometer	• Inspect for blockage.
Filter Bags	• Inspect individual filter bags and attachment hardware.

*Activities applicable to pulse or jet baghouses. The remainder are applicable to all baghouses.

APPENDIX B

TYPICAL MAINTENANCE ACTIVITIES FOR WET SCRUBBERS

COMPONENT	ACTIVITIES
Scrubber Body	• Inspect for wear, particularly in areas downstream of gas and liquid acceleration. • Inspect for corrosion on all scrubber internal surfaces. • Inspect for excessive buildup, in particular in the wet/dry zone.
Nozzles	• Inspect for buildup and damage.
Entrainment Separator	• Check operation. • Inspect structural supports for integrity.
Pumps	• Inspect pumps for wear, seal water, packing, and smooth operation.
Instruments	• Inspect the condition of all instruments with regard to solids buildup.

APPENDIX C

TYPICAL OPERATIONAL SURVEILLANCE PROGRAM FOR EMISSION CONTROL DEVICES

EMISSION CONTROL DEVICE	SURVEILLANCE ACTIVITY
Baghouses	• Monitoring differential pressure. Adjusting timer or differential-pressure switch to adjust frequency of automatic cleaning cycle as needed. • Monitoring differential-pressure alarm lights in control area. • Monitoring compressed air pressure gauge on high-pressure air system. • Monitoring air flow instrumentation in control area.
Wet Scrubbers	• Monitoring differential pressure. • Monitoring differential-pressure alarm lights in control area. • Monitoring air flow instrumentation and alarm lights in control area. • Monitoring water flowmeters. • Monitoring water pressure alarm lights in control area. • Monitoring control area process control indicator lights for possible process shutdown in the event of water flow failures at preconditioning sprays or at the scrubber.

VALUE/IMPACT STATEMENT

The NRC staff performed a value/impact assessment to determine the proper procedural approach for providing guidance on designing, testing, operating, and maintaining emission control devices at uranium mills. The assessment resulted in a decision to develop a regulatory guide describing procedures for designing, testing, operating, and maintaining emission control devices at uranium mills. The results of this assessment were included in a draft regulatory guide on this subject, CE. 309-4, that was issued for public comment in May 1985. Comments received from the public and additional NRC staff review have shown no need to change the value/impact statement published with the proposed regulatory guide. Therefore, the value/impact statement published with the proposed guide is still applicable. A copy of the draft regulatory guide (identified by its task number, CE 309-4) and its associated value/impact statement is available for inspection and copying for a fee at the NRC Public Document Room at 1717 H Street NW., Washington, DC.

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REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 4.14

RADIOLOGICAL EFFLUENT AND ENVIRONMENTAL MONITORING AT URANIUM MILLS

A. INTRODUCTION

Uranium mill operators are required by Nuclear Regulatory Commission (NRC) regulations and license conditions to conduct radiological effluent and environmental monitoring programs. Regulations applicable to uranium milling are contained in 10 CFR Part 20, "Standards for Protection Against Radiation," and Part 40, "Domestic Licensing of Source Material." For example, § 40.65, "Effluent Monitoring Reporting Requirements," of 10 CFR Part 40 requires the submission to the Commission of semiannual reports containing information required to estimate doses to the public from effluent releases.

Information on radiation doses and the radionuclides in a mill's effluents and environment both prior to and during operations is needed by the NRC staff:

1. To estimate maximum potential annual radiation doses to the public resulting from effluent releases.

2. To ascertain whether the regulatory requirements of the NRC (including 10 CFR Part 20 dose limits, release limits, and the "as low as is reasonably achievable" requirement), mill license conditions, and the requirements of 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations," have been met.

3. To evaluate the performance of effluent controls, including stabilization of active and inactive tailings piles.

4. To evaluate the environmental impact of milling operations, both during operations and after decommissioning.

5. To establish baseline data to aid in evaluation of decommissioning operations or decontamination following any unusual releases such as a tailings dam failure.

This guide describes programs acceptable to the NRC staff for measuring and reporting releases of radioactive materials to the environment from typical uranium mills.

The programs described in this guide are not requirements. Licensing requirements are determined by the NRC staff on a case-by-case basis during individual licensing reviews. Individual applicants or licensees may propose alternatives for new or existing monitoring programs that need not necessarily be consistent with this guide. The justification for such alternatives will be reviewed by the NRC staff, and the acceptability of proposed alternatives will be determined on a case-by-case basis during individual licensing reviews. For example, it is anticipated that operational monitoring programs that do not include at least three continuous air samples at the site boundary will include more extensive stack sampling and more sampling locations than are described in this guide as well as meteorological data and additional environmental monitoring requirements.

B. DISCUSSION

The radiation dose an individual receives can be determined only if the radionuclides to which an individual is exposed are known. Therefore, monitoring programs should provide accurate information on the specific radionuclides in effluents from a mill, its ore piles, and its tailings retention system and in the surrounding environment.

Methods of sampling and analysis for the radionuclides associated with uranium milling are discussed in sources listed in the bibliography. The listing of these documents is not meant to be all inclusive, nor does it constitute an endorsement by the NRC staff of all of the methods in all of the listings. Rather, these listings are provided as sources of information to aid the licensee in developing a monitoring program.

The sampling program described below is divided into two parts: preoperational monitoring and operational

* The substantial number of changes in this revision has made it impractical to indicate the changes with lines in the margin.

monitoring. Preoperational data is submitted to the NRC as part of the application process. Operational data is reported as required by § 40.65 of 10 CFR Part 40 and specific license conditions and at times of license renewal.

C. REGULATORY POSITION

1. PREOPERATIONAL MONITORING

An acceptable preoperational monitoring program is described below and summarized in Table 1. At least twelve consecutive months of data, including complete soil sampling, direct radiation, and radon flux data, should be submitted to the NRC staff prior to any major site construction. A complete preoperational report with twelve consecutive months of data should be submitted prior to beginning milling operations. Prior to the start of local mining operations, if possible, monitoring data, including airborne radon measurements, should be submitted to the NRC staff.

Applicants may propose alternatives to this preoperational program. However, equivalent alternatives should be proposed for the operational program so that the programs remain compatible.

1.1 Preoperational Sampling Program

1.1.1 Air Samples

Air particulate samples should be collected continuously at a minimum of three locations at or near the site boundary. If there are residences or occupiable structures within 10 kilometers of the site, a continuous outdoor air sample should be collected at or near the structure with the highest predicted airborne radionuclide concentration due to milling operations and at or near at least one structure in any area where predicted doses exceed 5 percent of the standards in 40 CFR Part 190. A continuous air sample should also be collected at a remote location that represents background conditions at the mill site; in general, a suitable location would be in the least prevalent wind direction from the site and unaffected by mining or other milling operations.

Normally, filters for continuous ambient air samples are changed weekly or more often as required by dust loading.

The sampling locations should be determined according to the projected site and milling operation. Preoperational sampling locations should be the same as operational locations. The following factors should be considered in determining the sampling locations: (1) average meteorological conditions (windspeed, wind direction, atmospheric stability), (2) prevailing wind direction, (3) site boundaries nearest to mill, ore piles, and tailings piles, (4) direction of nearest occupiable structure (see footnotes of Tables 1 and 2), and (5) location of estimated maximum concentrations of radioactive materials.

Samples should be collected continuously, or for at least one week per month, for analysis of radon-222. The sampling locations should be the same as those for the continuous air particulate samples.

1.1.2 Water Samples

Samples of ground water should be collected quarterly from at least three sampling wells located hydrologically down gradient from the proposed tailings area, at least three locations near other sides of the tailings area, and one well located hydrologically up gradient from the tailings area (to serve as a background sample). The location of the ground-water sampling wells should be determined by hydrological analysis of the potential movement of seepage from the tailings area, and the basis for choosing these locations should be presented when data is reported. Wells drilled close to the tailings for the specific purpose of obtaining representative samples of ground water that may be affected by the mill tailings are preferable to existing wells.

Ground-water samples should also be collected quarterly from each well within two kilometers of the proposed tailings area that is or could be used for drinking water, watering of livestock, or crop irrigation.

Samples of surface water should be collected quarterly from each onsite water impoundment (such as a pond or lake) and any offsite water impoundment that may be subject to seepage from tailings, drainage from potentially contaminated areas, or drainage from a tailings impoundment failure.

Samples should be collected at least monthly from streams, rivers, any other surface waters or drainage systems crossing the site boundary, and any offsite surface waters that may be subject to drainage from potentially contaminated areas or from a tailings impoundment failure. Any stream beds that are dry part of the year should be sampled when water is flowing. Samples should be collected at the site boundary or at a location immediately downstream of the area of potential influence.

1.1.3 Vegetation, Food, and Fish Samples

Forage vegetation should be sampled at least three times during the grazing season in grazing areas in three different sectors having the highest predicted airborne radionuclide concentration due to milling operations.

At least three samples should be collected at time of harvest or slaughter or removal of animals from grazing for each type of crop (including vegetable gardens) or livestock raised within three kilometers of the mill site.

Fish (if any) samples should be collected semiannually from any bodies of water that may be subject to seepage or surface drainage from potentially contaminated areas or that could be affected by a tailings impoundment failure.

1.1.4 Soil and Sediment Samples

Prior to initiation of mill construction (and if possible prior to mining), one set of soil samples should be collected as follows:

a. Surface-soil samples (to a depth of five centimeters) should be collected using a consistent technique at 300-

meter intervals in each of the eight compass directions out to a distance of 1500 meters from the center of the milling area. The center is defined as the point midway between the proposed mill and the tailings area.

b. Surface-soil samples should also be collected at each of the locations chosen for air particulate samples.

c. Subsurface samples (to a depth of 1 meter) should be collected at the center of the milling area and at a distance of 750 meters in each of the four compass directions.

Soil sampling should be repeated for each location disturbed by site excavation, leveling, or contouring.

One set of sediment samples should be collected from the same surface-water locations as described in Section 1.1.2. For surface water passing through the site, sediment should be sampled upstream and downstream of the site. Samples should be collected following spring runoff and in late summer, preferably following an extended period of low flow. In each location, several sediment samples should be collected in a traverse across the body of water and composited for analysis.

1.1.5 Direct Radiation

Prior to initiation of mill construction (and if possible prior to mining), gamma exposure rate measurements should be made at 150-meter intervals in each of the eight compass directions out to a distance of 1500 meters from the center of the milling area. Measurements should also be made at the sites chosen for air particulate samples.

Measurements should be repeated for each location disturbed by site excavation, leveling, or contouring.

Gamma exposure measurements should be made with passive integrating devices (such as thermoluminescent dosimeters), pressurized ionization chambers, or properly calibrated portable survey instruments.

Direct radiation measurements should be made in dry weather, not during periods following rainfall or when soil is abnormally wet.

1.1.6 Radon Flux Measurements

Radon-222 flux measurements should be made in three separate months during normal weather conditions in the spring through the fall when the ground is thawed. The measurements should be made at the center of the milling area and at locations 750 and 1500 meters from the center in each of the four compass directions. Measurements should not be taken when the ground is frozen or covered with ice or snow or following periods of rain.

1.2 Analysis of Preoperational Samples

Air particulate samples should be analyzed for natural uranium, thorium-230, radium-226, and lead-210.

Air samples collected for radon should be analyzed for radon-222.

The results of analyses of air samples should be used to determine the radionuclide concentrations for the sampling locations.

All ground-water samples collected near the tailings area should be analyzed for dissolved natural uranium, thorium-230, radium-226, polonium-210, and lead-210. Ground-water samples from sources that could be used as drinking water for humans or livestock or crop irrigation should also be analyzed for suspended natural uranium, thorium-230, radium-226, polonium-210, and lead-210.

Surface-water samples from water impoundments should be analyzed quarterly for natural uranium, thorium-230, and radium-226 and semiannually for lead-210 and polonium-210. The samples should be analyzed separately for dissolved and suspended radionuclides.

Surface-water samples from flowing surface water should be analyzed monthly for natural uranium, thorium-230 and radium-226 and semiannually for lead-210 and polonium-210. The samples should be analyzed separately for dissolved and suspended radionuclides.

The results of analyses of water samples should be used to determine the radionuclide concentrations for the sampling locations.

Vegetation, food, and fish (edible portion) samples should be analyzed for natural uranium, thorium-230, radium-226, lead-210, and polonium-210.

All soil samples should be analyzed for radium-226. Soil samples collected at air particulate sampling locations and ten percent of all other soil samples (including at least one subsurface set) should be analyzed for natural uranium, thorium-230, and lead-210. Analysis of extra soil samples may be necessary for repeat samples collected at locations disturbed by site excavation, leveling, or contouring.

Sediment samples should be analyzed for natural uranium, thorium-230, radium-226, and lead-210.

2. OPERATIONAL MONITORING

An acceptable monitoring program to be conducted during construction and after the beginning of milling operations is described below and summarized in Table 2. The results of this program should be summarized quarterly and submitted to NRC semiannually pursuant to § 40.65 of 10 CFR Part 40. An acceptable reporting format is shown in Table 3.

2.1 Operational Sampling Program

2.1.1 Stack Sampling

Effluents from the yellowcake dryer and packaging stack should be sampled at least quarterly during normal operations. The sampling should be isokinetic, representative,

and adequate for determination of the release rates and concentrations of uranium. The sampling should also be adequate for the determination of release rates and concentrations of thorium-230, radium-226, and lead-210 if this data cannot be obtained from other sources.

Other stacks should be sampled at least semiannually. The samples should be representative (not necessarily isokinetic) and adequate for the determination of the release rates and concentrations of uranium, thorium-230, radium-226, and lead-210.

All stack flow rates should be measured at the time of sampling.

2.1.2 Air Samples

Air particulate samples should be collected continuously at (1) a minimum of three locations at or near the site boundary, (2) the residence or occupiable structure within 10 kilometers of the site with the highest predicted airborne radionuclide concentration, (3) at least one residence or occupiable structure where predicted doses exceed 5 percent of the standards in 40 CFR Part 190, and (4) a remote location representing background conditions. The sampling locations should be the same as those for the preoperational air samples (see Section 1.1.1). The sampling should be adequate for the determination of natural uranium, thorium-230, radium-226, and lead-210.

Normally, filters for continuous ambient air samples are changed weekly or more often as required by dust loading.

Samples should be collected continuously at the same locations, or for at least one week per month, for analysis of radon-222.

2.1.3 Water Samples

Samples of ground water should be collected from at least three sampling wells located hydrologically down gradient from the tailings area and from one background well located hydrologically up gradient. The samples should be collected monthly through the first year of operation and quarterly thereafter from the same downslope and background wells that were used for preoperational samples (see Section 1.1.2).

Samples should be collected at least quarterly from each well within two kilometers of the tailings area that is or could be used for drinking water, watering of livestock, or crop irrigation.

Samples should be collected at least quarterly from each onsite water impoundment (such as a pond or lake) and any offsite water impoundment that may be subject to seepage from tailings, drainage from potentially contaminated areas, or drainage from a tailings impoundment failure.

Samples should be collected at least monthly from any surface water crossing the site boundary and offsite streams or rivers that may be subject to drainage from potentially contaminated areas or from a tailings impoundment failure. Stream beds that are dry part of the year should be sampled when water is flowing. Operational samples should be collected upstream and downstream of the area of potential influence.

Any unusual releases (such as surface seepage) that are not part of normal operations should be sampled.

.2.1.4 Vegetation, Food, and Fish Samples

Where a significant pathway to man is identified in individual licensing cases, vegetation, food, and fish samples should be collected as described below.

Forage vegetation should be sampled at least three times during the grazing season in grazing areas in three different sectors having the highest predicted airborne radionuclide concentration due to milling operations.

At least three samples should be collected at the time of harvest or slaughter or removal of animals from grazing for each type of crop (including vegetable gardens) or livestock raised within three kilometers of the mill site.

Fish (if any) samples should be collected semiannually from any bodies of water that may be subject to seepage or surface drainage from potentially contaminated areas or that could be affected by a tailings impoundment failure.

2.1.5 Soil and Sediment Samples

Surface-soil samples should be collected annually using a consistent technique at each of the locations chosen for air particulate samples as described in Section 2.1.2.

Sediment samples should be collected annually from the surface-water locations described in Section 2.1.3.

2.1.6 Direct Radiation

Gamma exposure rates should be measured quarterly at the sites chosen for air particulate samples as described in Section 2.1.2. Passive integrating devices (such as thermoluminescent dosimeters), pressurized ionization chambers, or properly calibrated portable survey instruments should be used (see Regulatory Guide 4.13).

2.2 Analysis of Operational Samples

Samples from the yellowcake dryer and packaging stack should be analyzed for natural uranium. Samples should also be analyzed for thorium-230, radium-226, and lead-210 if this data cannot be obtained from other sources such as isotopic analysis of yellowcake product. Samples from other stacks should be analyzed for natural uranium, thorium-230, radium-226, and lead-210.

Air particulate samples should be analyzed for natural uranium, thorium-230, radium-226, and lead-210.

Air samples collected for radon should be analyzed for radon-222.

The results of analyses of air samples should be used to determine the radionuclide release rates for the stacks and the radionuclide concentrations for the stacks and other sampling locations.

Water samples should be analyzed for natural uranium, thorium-230, radium-226, polonium-210, and lead-210.

Ground-water samples from sources not expected to be used as drinking water should be analyzed for dissolved radionuclides. Ground-water samples from sources that could be used as drinking water for humans or livestock and all surface-water samples should be analyzed separately for dissolved and suspended radionuclides. These results should be used to determine radionuclide concentrations for ground water and natural bodies of water.

All vegetation, food, and fish (edible portion) samples should be analyzed for radium-226 and lead-210.

All soil samples should be analyzed for natural uranium, radium-226, and lead-210.

All sediment samples should be analyzed for natural uranium, thorium-230, radium-226, and lead-210.

3. QUALITY OF SAMPLES

Provisions should be made to ensure that representative samples are obtained by use of proper sampling equipment, proper locations of sampling points, and proper sampling procedures (see bibliography).

Air samples may be composited for analysis if (1) they are collected at the same location and (2) they represent a sampling period of one calendar quarter or less. Air samples should not be composited if (1) they represent a sampling period of more than one calendar quarter, (2) they are from different sampling locations, or (3) the samples are to be analyzed for radon-222.

Samples collected for analysis of radon-222 should be analyzed quickly enough to minimize decay losses.

Samples other than air samples should not be composited.

4. SOLUBILITY OF AIRBORNE RADIOACTIVE MATERIAL

Table II of Appendix B, "Concentrations in Air and Water Above Natural Background," to 10 CFR Part 20 lists separate values for soluble and insoluble radioactive materials in effluents. In making comparisons between airborne effluent concentrations and the values given in Table II of Appendix B to 10 CFR Part 20, the maximum permissible concentrations for insoluble materials should be used.

5. LOWER LIMIT OF DETECTION

The lower limits of detection for stack effluent samples should be 10% of the appropriate concentration limits listed in Table II of Appendix B to 10 CFR Part 20.

The lower limits of detection for analysis of other samples should be as follows:

U-natural, Th-230, Ra-226 in air	1×10^{-16} μCi/ml
Pb-210 in air	2×10^{-15} μCi/ml
Rn-222	2×10^{-10} μCi/ml
U-natural, Th-230, Ra-226 in water	2×10^{-10} μCi/ml
Po-210 in water	1×10^{-9} μCi/ml
Pb-210 in water	1×10^{-9} μCi/ml
U-natural, Th-230, Ra-226, Pb-210 in soil and sediment (dry)	2×10^{-7} μCi/g
U-natural, Th-230 in vegetation, food, and fish (wet)	2×10^{-7} μCi/kg
Ra-226 in vegetation, food, and fish (wet)	5×10^{-8} μCi/kg
Po-210, Pb-210 in vegetation, food, and fish (wet)	1×10^{-6} μCi/kg

Obviously, if the actual concentrations of radionuclides being sampled are higher than the lower limits of detection indicated above, the sampling and analysis procedures need only be adequate to measure the actual concentrations. In such cases, the standard deviation estimated for random error of the analysis should be no greater than 10% of the measured value.

An acceptable method for calculating lower limits of detection is described in the appendix to this guide.

6. PRECISION AND ACCURACY OF RESULTS

6.1 Error Estimates

The random error associated with the analysis of samples should always be calculated. The calculation should take into account all significant random uncertainties, not merely counting error.

If the analyst estimates that systematic errors associated with the analysis are significant relative to the random error, the magnitude of the systematic error should be estimated.

6.2 Calibration

Individual written procedures should be prepared and used for specific methods of calibrating all sampling and measuring equipment, including ancillary equipment. The procedures should ensure that the equipment will operate with adequate accuracy and stability over the range of its intended use. Calibration procedures may be compilations

of published standard practices, manufacturers' instructions that accompany purchased equipment, or procedures written in-house. Calibration procedures should identify the specific equipment or group of instruments to which the procedures apply.

To the extent possible, calibration of measuring equipment should be performed using radionuclide standards certified by the National Bureau of Standards or standards obtained from suppliers who participate in measurement assurance activities with the National Bureau of Standards (see Regulatory Guide 4.15).

Calibrations should be performed at regular intervals, at least semiannually, or at the manufacturer's suggested interval, whichever is more frequent. Frequency of calibration should be based on the stability of the system. If appropriate, equipment may be calibrated before and after use instead of at arbitrarily scheduled intervals. Equipment should be recalibrated or replaced after any repairs or whenever it is suspected of being out of adjustment, excessively worn, or otherwise damaged and not operating properly. Functional tests, i.e., routine checks performed to demonstrate that a given instrument is in working condition, may be performed using sources that are not certified by the National Bureau of Standards.

6.3 Quality of Results

A continuous program should be prepared and implemented for ensuring the quality of results and for keeping random and systematic uncertainties to a minimum. The procedures should ensure that samples and measurements are obtained in a uniform manner and that samples are not changed prior to analysis because of handling or because of their storage environment. Tests should be applied to analytical processes, including duplicate analysis of selected effluent samples and periodic cross-check analyses with independent laboratories (see Regulatory Guide 4.15).

7. RECORDING AND REPORTING RESULTS

This section provides guidelines for recording all results. Reports submitted to NRC should be prepared using these guidelines and the format shown in Table 3 of this guide.

7.1 Sampling and Analysis Results

7.1.1 Air and Stack Samples

For each air or stack sample, the following should be recorded:

1. Location of sample.
2. Dates during which sample was collected.
3. The concentrations of natural uranium, thorium-230, radium-226, lead-210, and radon-222 for all samples except stack samples.
4. The cconcentration of natural uranium, thorium-230, radium-226, and lead-210 for stack effluent samples.
5. The percentage of the appropriate concentration limit as shown in Table II of Appendix B to 10 CFR Part 20.
6. The estimated release rate of natural uranium, thorium-230, radium-226, and lead-210 for stack effluent samples.
7. The flow rate of each stack.

7.1.2 Liquid Samples

For each liquid sample, the following should be recorded:

1. Location of sample.
2. Type of sample (ground or surface water).
3. Date of sample collection.
4. The concentrations of natural uranium, thorium-230, radium-226, polonium-210, and lead-210. (If separate analyses were conducted for dissolved and suspended radionuclides, report each result separately.)

7.1.3 Other Samples

For other samples, the following should be recorded:

1. Location of sample.
2. Date of sample collection.
3. Type of sample (vegetation, soil, radon-222 flux, gamma exposure rate, etc.).
4. Analytical result (radionuclide concentration, gamma exposure rate, radon flux rate, etc.).

7.1.4 Error Estimates

Reported results should always include estimates of uncertainty. The magnitude of the random error of the analysis to the 95% uncertainty level should be reported for each result. If significant, an estimate of the magnitude of the systematic error should also be reported.

7.2 Supplemental Information

The following information should be included in each monitoring report submitted to NRC:

1. Name of facility, location, docket number, and license number.
2. Description of sampling equipment and discussion of how sampling locations were chosen.

3. Description of sampling procedures, including sampling times, rates, and volumes.

4. Description of analytical procedures.

5. Description of calculational methods.

6. Discussion of random and systematic error estimates, including methods of calculation and sources of systematic error.

7. The values of the lower limits of detection, along with a description of the calculation of the lower limit of detection.

8. The values of maximum permissible concentration from Table II of Appendix B to 10 CFR Part 20 used in any calculations.

9. Discussion of the program for ensuring the quality of results.

10. Description of calibration procedures.

11. Discussion of any unusual releases, including the circumstances of the release and any data available on the quantities of radionuclides released.

7.3 Units

Radionuclide quantities should be reported in curies. Radionuclide concentrations should be reported in microcuries per milliliter for air and water, microcuries per gram for soil and sediment, and microcuries per kilogram for vegetation, food, or fish. Direct radiation exposure rates should be reported in milliroentgens per calendar quarter. Radon flux rates should be reported in picocuries per square meter per second. Stack flow rates should be reported in cubic meters per second. (In the International System of Units, a curie equals 3.7×10^{10} becquerels, a microcurie equals 3.7×10^{4} becquerels, and a milliliter equals 10^{-6} cubic meters.)

Estimates of random error should be reported in the same units as the result itself. Estimates of systematic error should be reported as a percentage of the result.

Note: The Commission has discontinued the use in 10 CFR Part 20 of the special curie definitions for natural uranium and natural thorium (39 FR 23990, June 28, 1974). Reports to the Commission should use units consistent with this change.

7.4 Significant Figures

Results should not be reported with excessive significant figures, so that they appear more certain than they actually are. The reported estimate of error should contain no more than two significant figures. The reported result itself should have the same number of decimal places as the reported error.

7.5 Format

Reports should be submitted according to the format shown in Table 3.

The term "not detected," "less than the lower limit of detection (LLD)," or similar terms should never be used. Each reported result should be a value and its associated error estimate, including values less than the lower limit of detection or less than zero.

TABLE 1

PREOPERATIONAL RADIOLOGICAL MONITORING PROGRAM FOR URANIUM MILLS

Type of Sample	Sample Collection				Sample Analysis	
	Number	Location	Method	Frequency	Frequency	Type of Analysis
AIR						
Particulates	Three	At or near the site boundaries	Continuous[a]	Weekly filter change or more frequently as required by dust loading	Quarterly composites of weekly samples	Natural uranium, Ra-226, Th-230, and Pb-210
	One	At or close to the nearest[b] residence(s) or occupiable offsite structure(s) (if within 10 km of site)	Continuous	Weekly filter change or more frequently as required by dust loading	Quarterly composites of weekly samples	Natural uranium, Ra-226, Th-230, and Pb-210
	One	At a control or background location remote from site[c]	Continuous	Weekly filter change or more frequently as required by dust loading	Quarterly composites of weekly samples	Natural uranium, Ra-226, Th-230, and Pb-210
Radon Gas[d]	Five or more	Same locations as for air particulates	Continuous or at least one week per month representing about the same period each month	Continuous	Each sample or continuous	Rn-222
WATER						
Ground Water[e]	Six or more	Wells located around future tailings disposal area. At least three wells hydrologically down gradient from disposal area. At least three located on other sides of tailings disposal area.[f]	Grab	Quarterly	Quarterly	Dissolved natural uranium, Ra-226, Th-230, Pb-210, and Po-210
	One from each well	Wells within 2 km of tailings disposal area that are or could be used for potable water supplies, watering of livestock, or crop irrigation.	Grab	Quarterly	Quarterly	Dissolved and suspended natural uranium, Ra-226, Th-230, Pb-210, and Po-210
	One	Well located hydrologically up gradient from tailings disposal area to serve as control or background location.	Grab	Quarterly	Quarterly	Dissolved natural uranium, Ra-226, Th-230, Pb-210, and Po-210

TABLE 1 (Continued)

PREOPERATIONAL RADIOLOGICAL MONITORING PROGRAM FOR URANIUM MILLS

Type of Sample	Sample Collection				Sample Analysis	
	Number	Location	Method	Frequency	Frequency	Type of Analysis
Surface Water[9]	One from each body of water	Large permanent onsite water impoundments or offsite impoundments that may be subject to direct surface drainage from potentially contaminated areas or that could be affected by a tailings impoundment failure.	Grab	Quarterly	Quarterly	Suspended and dissolved natural uranium, Ra-226 and Th-230
					Semiannually	Suspended and dissolved Pb-210 and Po-210
Surface Water	One from each body of water	Surface waters passing through the site(n) or offsite surface waters that may be subject to drainage from potentially contaminated areas or that could be affected by a tailings impoundment failure.	Grab	Monthly	Monthly	Suspended and dissolved natural uranium, Ra-226, Th-230
					Semiannually	Suspended and dissolved Pb-210 and Po-210
VEGETATION, FOOD, AND FISH						
Vegetation	Three	Grazing areas near the site in different sectors that will have the highest predicted air particulate concentrations during milling operations.	Grab	Three times during grazing season	Three times	Natural uranium, Ra-226, Th-230, Pb-210, and Po-210
Food	Three of each type	Crops, livestock, etc. raised within 3 km of mill site	Grab	Time of harvest or slaughter	Once	Natural uranium, Ra-226, Th-230, Pb-210, and Po-210
Fish	Each body of water	Collection of fish (if any) from lakes, rivers, and streams in the site environs that may be subject to seepage or direct surface runoff from potentially contaminated areas or that could be affected by a tailings impoundment failure	Grab	Semiannually	Twice	Natural uranium, Ra-226, Th-230, Pb-210, and Po-210

TABLE 1 (Continued)

PREOPERATIONAL RADIOLOGICAL MONITORING PROGRAM FOR URANIUM MILLS

Type of Sample	Sample Collection				Sample Analysis	
	Number	Location	Method	Frequency	Frequency	Type of Analysis
SOIL AND SEDIMENT						
Surface Soil[k]	Up to forty	300-meter intervals to a distance of 1500 meters in each of 8 directions from center of milling area	Grab	Once prior to site construction. Repeat for location disturbed by excavation, leveling, or contouring	Once	All samples for Ra-226, 10% of samples natural uranium, Th-230, and Pb-210
Surface Soil	Five or more	At same locations used for collection of air particulate samples.	Grab	Once prior to site construction	Once	Natural uranium, Ra-226, Th-230, and Pb-210
Subsurface Soil Profile[l]	Five	At center reference location and at distances of 750 meters in each of 4 directions.	Grab	Once prior to site construction. Repeat for locations disturbed by construction.	Once	Ra-226 (all samples) Natural uranium, Th-230, and Pb-210 (one set of samples)
Sediment[m]	Two from each stream	Up and downstream of surface waters passing through site or from offsite surface waters that may be subject to direct runoff from potentially contaminated areas or that could be affected by a tailings impoundment failure	Grab	Once following spring runoff and late summer following period of extended low flow	Twice	Natural uranium, Ra-226, Th-230, and Pb-210
	One from each water impoundment	Onsite water impoundments (lakes, ponds, etc), or offsite impoundments that may be subject to direct surface runoff from potentially contaminated areas or that could be affected by tailings impoundment failure	Grab	Once prior to site construction	Once	Natural uranium, Ra-226, Th-230, and Pb-210
DIRECT RADIATION	Up to eighty	150-meter intervals to a distance of 1500 meters in each of 8 directions from center of milling area or at a point equidistant from milling area[i] and tailings disposal area.		Once prior to site construction. Repeat for areas disturbed by site preparation or construction.	Once	Gamma exposure rate, using passive integrating device such as TLD, pressurized ionization chamber, or properly calibrated portable survey instrument.

TABLE 1 (Continued)

PREOPERATIONAL RADIOLOGICAL MONITORING PROGRAM FOR URANIUM MILLS

Type of Sample	Sample Collection				Sample Analysis	
	Number	Location	Method	Frequency	Frequency	Type of Analysis
	Five or more	At same locations used for collection of particulate samples		Once prior to site construction	Once	Gamma exposure rate, using passive integrating device, pressurized ionization chamber, or properly calibrated portable survey instrument.
RADON FLUX[n]	Up to ten	At center reference location and at distances of 750 and 1500 meters in each of 4 directions.		One sample during each of three months.	Each sample	Radon-222 flux

TABLE 2

OPERATIONAL RADIOLOGICAL MONITORING PROGRAM FOR URANIUM MILLS

Type of Sample	Sample Collection				Sample Analysis	
	Number	Location	Method	Frequency	Frequency	Type of Analysis
STACKS						
Particulates	One for each stack	Yellowcake dryer and packaging stack(s)	Isokinetic	Quarterly	Each sample	Natural uranium, Th-230, Ra-226, and Pb-210 if not available from other sources. Measure stack flow rate semiannually.
Particulates	One for each stack	Other stacks	Representative grab	Semiannually	Each sample	Natural uranium Th-230, Ra-226, and Pb-210. Measure stack flow.
AIR						
Particulates	Three	Locations at or near the site boundaries and in different sectors that have the highest predicted concentrations of airborne particulates(b)	Continuous(a)	Weekly filter change, or more frequently as required by dust loading	Quarterly composite, by location, of weekly samples	Natural uranium, Ra-226, Th-230, and Pb-210
	One or more	At the nearest residence(s) or occupiable structure(s)	Continuous	Weekly filter change, or more frequently as required by dust loading	Quarterly composite, by location, of weekly samples	Natural uranium, Ra-226, Th-230, and Pb-210
	One	Control Location(s)(c)	Continuous	Weekly filter change, or more frequently as required by dust loading	Quarterly composite, by location, of weekly samples	Natural uranium, Ra-226, Th-230, and Pb-210
Radon Gas	Five or more	Same locations as for air particulates	Continuous or at least one week per month(d)	At least one week per calendar month representing approximately the same period each month	Monthly	Rn-222
WATER						
Ground Water	Three or more	Hydrologically down gradient and relatively close to the tailings impoundment(f)	Grab	Monthly (first year) Quarterly (after first year)	Monthly (first year) Quarterly (after first year)	Dissolved natural uranium, Ra-226, Th-230, Pb-210, and Po-210(e)
	At least one control sample	Hydrologically up gradient (i.e., not influenced by seepage from tailings)	Grab	Quarterly	Quarterly	Dissolved natural uranium, Ra-226, Th-230, Pb-210 and Po-210

TABLE 2 (Continued)

OPERATIONAL RADIOLOGICAL MONITORING PROGRAM FOR URANIUM MILLS

Type of Sample	Sample Collection				Sample Analysis	
	Number	Location	Method	Frequency	Frequency	Type of Analysis
	One from each well	Each well used for drinking water or watering of livestock or crops within 2 km of the tailings impoundment	Grab	Quarterly	Quarterly	Dissolved and suspended natural uranium, Ra-226, Th-230, Pb-210, and Po-210
Surface Water	Two from each water body	Surface waters passing through the mill site or offsite surface waters that are sufficiently close to the site to be subject to surface drainage from potentially contaminated areas or that could be influenced by seepage from the tailings disposal area.(h) One sample collected upstream of mill site and one sample collected at the downstream site boundary or at a location immediately downstream of location of potential influence	Grab	Quarterly	Quarterly	Dissolved and suspended natural uranium, Ra-226, Th-230, Pb-210, and Po-210(g)
	One from each water body	Large water impoundments (i.e., lakes, reservoirs) near the mill site that are sufficiently close to the site to be subject to drainage from potentially contaminated areas or that could be influenced by seepage from the tailings disposal area.	Grab	Quarterly	Quarterly	Dissolved and suspended natural uranium, Ra-226, Th-230, Pb-210, and Po-210
VEGETATION, FOOD, AND FISH						
Vegetation or Forage(o)	Three or more	From animal grazing areas near the mill site in the direction of the highest predicted airborne radionuclide concentrations	Grab	Three times during grazing season	Each sample	Ra-226 and Pb-210

TABLE 2 (Continued)

OPERATIONAL RADIOLOGICAL MONITORING PROGRAM FOR URANIUM MILLS

Type of Sample	Sample Collection				Sample Analysis	
	Number	Location	Method	Frequency	Frequency	Type of Analysis
Food	Three of each type	Crops, livestock, etc. raised within 3 km of mill site	Grab	Time of harvest or slaughter	Once	Ra-226 and Pb-210
Fish	Each body of water	Collection of fish (if any) from lakes, rivers, and streams in the site environs that may be subject to seepage or direct surface runoff from potentially contaminated areas or that could be affected by a tailings impoundment failure	Grab	Semiannually	Twice	Ra-226 and Pb-210
SOIL AND SEDIMENT						
Soil	Five or more	Same as for air particulate samples[k]	Grab	Annually	Annually	Natural uranium, Ra-226, and Pb-210
Sediment	One or two from each water body	Same as surface water samples[m]	Grab	Annually	Annually	Natural uranium, Th-230, Ra-226, and Pb-210
DIRECT RADIATION	Five or more	Same as for air particulate samples	Continuous passive integrating device	Quarterly change of passive dosimeters	Quarterly	Gamma exposure rate

Footnotes for Tables 1 and 2:

(a) Continuous collection means continuous sampler operation with filter change weekly or as required by dust loading, whichever is more frequent.

(b) The term "nearest" as used here means the location with the highest predicted airborne radionuclide concentrations during milling operations.

(c) Care should be taken in selection of the control sampling location so that it is representative of the site conditions. In general, a location in the least prevalent wind direction from the site should provide a suitable location for a control sampling site.

(d) Various methods are acceptable; for example: (1) Continuous collection of a gaseous air sample with samples being changed about every 48 hours for a 1-week period or (2) continuous sampling.

(e) If the sample contains appreciable suspended material, it should be filtered as soon as possible following collection through a membrane filter and the filtrate acidified to 1% hydrochloric acid.

(f) The location of the ground-water sampling wells should be determined by a hydrological analysis of the potential movement of seepage from the tailings disposal area. In general, the objective is to place monitor wells in all directions around the tailings area with the emphasis on the down gradient locations.

(g) Surface-water samples to be analyzed for dissolved and suspended fractions should be filtered as soon as possible following collection through a membrane filter and the filtrate acidified to 1% hydrochloric acid.

(h) Natural drainage systems (dry washes) that carry surface runoff from the site following a precipitation event should be sampled following the event but at a frequency not greater than monthly.

(i) The milling area refers to the area that includes ore storage pads, mill buildings, and other processing areas.

(j) Thermoluminescent dosimeters should contain two or more chips or otherwise provide for two readings per exposure period (see Regulatory Guide 4.13).

(k) Surface soil samples should be collected using a consistent technique to a depth of 5 cm.

(l) Subsurface soil profile samples should be collected to a depth of one meter. Samples should be divided into three equal sections for analysis.

(m) Several samples should be collected at each location and composited for a representative sample.

(n) Radon exhalation measurements should not be taken during periods when the ground is frozen or covered with ice or snow or following periods of rain. It is recommended that these measurements be taken in the spring through the fall during normal weather conditions.

(o) Vegetation or forage sampling need be carried out only if dose calculations indicate that the ingestion pathway from grazing animals is a potentially significant exposure pathway (an exposure pathway should be considered important if the predicted dose to an individual would exceed 5% of the applicable radiation protection standard).

TABLE 3[a]

SAMPLE FORMAT FOR REPORTING MONITORING DATA

1. STACK SAMPLES

For each sample analyzed, report the following information:

a. Date sample was collected
b. Location of sample collection
c. Stack flow rate (m^3/sec)

Radionuclide	Concentration (μCi/ml)	Error Estimate[b] (μCi/ml)	Release Rate (Ci/qr)	Error Estimate (Ci/qr)	LLD[c] (μCi/ml)	% MPC[c]
U-nat						
Th-230						
Ra-226						
Pb-210						

2. AIR SAMPLES

For each sample analyzed, report the following information:

a. Date sample was collected
b. Location of sample collection

Radionuclide	Concentration (μCi/ml)	Error Estimate (μCi/ml)	LLD (μCi/ml)	% MPC
U-nat				
Th-230				
Ra-226				
Pb-210				
Rn-222				

[a] This table illustrates format only. It is not a complete list of data to be reported. (See text of guide and Tables 1 and 2.)

[b] Error estimate should be calculated at 95% uncertainty level, based on all sources of random error, not merely counting error. Significant systematic error should be reported separately. See Sections 6.1, 7.1.4, and 7.3.

[c] All calculations of lower limits of detection (LLD) and percentages of maximum permissible concentration (MPC) should be included as supplemental information.

TABLE 3 (Continued)

SAMPLE FORMAT FOR REPORTING MONITORING DATA

3. LIQUID SAMPLES

For each sample analyzed, report the following information:

a. Date sample was collected
b. Location of sample collection
c. Type of sample (for example: surface, ground, drinking, stock, or irrigation)

Radionuclide	Concentration (μCi/ml)	Error Estimate (μCi/ml)	LLD (μCi/ml)
U-nat (dissolved)			
U-nat (suspended)[d]			
Th-230 (dissolved)			
Th-230 (suspended)[d]			
Ra-226 (dissolved)			
Ra-226 (suspended)[d]			
Pb-210 (dissolved)			
Pb-210 (suspended)[d]			
Po-210 (dissolved)			
Po-210 (suspended)[d]			

4. VEGETATION, FOOD, AND FISH SAMPLES

For each sample analyzed, report the following information:

a. Date sample was collected
b. Location of sample collection
c. Type of sample and portion analyzed

Radionuclide	Concentration (μCi/kg wet)	Error Estimate (μCi/kg)	LLD (μCi/kg)
U-nat			
Th-230			
Ra-226			
Pb-210			
Po-210			

[d] Not all samples must be analyzed for suspended radionuclides. See Sections 1.2 and 2.2 of this guide.

TABLE 3 (Continued)

SAMPLE FORMAT FOR REPORTING MONITORING DATA

5. SOIL AND SEDIMENT SAMPLES

For each sample analyzed, report the following information:

a. Date sample was collected
b. Location of sample collection
c. Type of sample and portion analyzed

Radionuclide	Concentration (pCi/g)	Error Estimate (pCi/g)	LLD (pCi/g)
U-nat			
Th-230			
Ra-226			
Pb-210			
Po-210			

6. DIRECT RADIATION MEASUREMENTS

For each measurement, report the dates covered by the measurement and the following information:

Location	Exposure Rate (mR/qr)	Error Estimate (mR/qr)

7. RADON FLUX MEASUREMENTS

For each measurement, report the dates covered by the measurement and the following information:

Location	Flux (pCi/m²-sec)	Error Estimate (pCi/m²-sec)

BIBLIOGRAPHY

ANSI N13.1-1969, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities," American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018.

ANSI N13.8-1973, "Radiation Protection in Uranium Mines," American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018.

ANSI N14.10-1974, "Specification and Performance of Onsite Instrumentation for Continuously Monitoring Radioactivity in Effluents," American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018.

Cavallo, L.M. et al., "Needs for Radioactivity Standards and Measurements in Different Fields," *Nuclear Instruments and Methods*, Vol. 112, 1973, pp. 5-18.

"Environmental Radioactivity Surveillance Guide," ORP-SID-72-2, U.S. Environmental Protection Agency, Washington, D.C., 1972.

"Environmental Surveillance for Fuel Fabrication Plants," BNWL-1973, Battelle Pacific Northwest Laboratories, Richland, Washington, 1973.

Friedland, Stephen S. and Lyle Rathbun, "Radon Monitoring: Uranium Mill Field Experience with a Passive Detector," presented to IEEE Nuclear Science Symposium, San Francisco, California, October 1979.

Fuchs, N. A., "Sampling of Aerosols," *Atmospheric Environment*, Vol. 9, 1975, pp. 697-707.

George, A.C. and A.J. Breslin, "Measurements of Environmental Radon with Integrating Instruments," presented at the Atomic Industrial Forum Uranium Mill Monitoring Workshop, Albuquerque, N.M., 1977.

George, A.C., A.J. Breslin, and S.F. Guggenheim, "A Cumulative Environmental Radon Monitor," Proceedings of Ninth Midyear Health Physics Symposium, Denver, Colorado, 1976.

Gibson, W.M., *The Radiochemistry for Lead*, NAS-NS 3040, National Academy of Sciences-National Research Council, 1961.

Grindler, J.E., *The Radiochemistry of Uranium*, NAS-NS 3050, National Academy of Sciences-National Research Council, 1962.

"A Guide for Environmental Radiological Surveillance at ERDA Installations," ERDA 77-24, Department of Energy, Washington, D.C., 1977.

Handbook of Radiochemical Analytical Methods, EPA-680/4-75-001, USEPA, 1975.

Harley, John H., editor, *HASL Procedures Manual*, HASL-300, USERDA, revised annually.

Hyde, E.K., *The Radiochemistry of Thorium*, NAS-NS 3004, National Academy of Sciences-National Research Council, 1960.

Instrumentation for Environmental Monitoring, Lawrence Berkeley Laboratory, LBL-1, Vol. 3, updated periodically, Berkeley, California.

Kirby, H.W., and M.L. Salutsky, *The Radiochemistry of Radium*, NAS-NS 3057, National Academy of Sciences-National Research Council, 1964.

May, K. R., N. P. Pomeroy, and S. Hibbs, "Sampling Techniques for Large Windborne Particles," *Journal of Aerosol Science*, Vol. 7, 1976, pp. 53-62.

McCurdy, D. E., K. J. Schiager, and E. D. Flack, "Thermoluminescent Dosimetry for Personal Monitoring of Uranium Miners," *Health Physics*, Vol. 17, 1969, pp. 415-422.

Methods for Air Sampling and Analysis, American Public Health Association, Washington, D.C., 1977.

Operational Health Physics, Proceedings of the Ninth Midyear Topical Symposium of the Health Physics Society, Central Rocky Mountain Chapter, Health Physics Society, P.O. Box 3229, Boulder, Colorado 80303, 1976.

Percival, D.R., and D.B. Martin, "Sequential Determination of Radium-226, Radium-228, Actinium-227, and Thorium Isotopes in Environmental and Process Waste Samples," *Analytical Chemistry*, Vol. 46, 1974, pp. 1742-1749.

Radioassay Procedures for Environmental Samples, 999-RH-27, U.S. Public Health Service, Washington, D.C., 1967.

Regulatory Guide 4.5, "Measurements of Radionuclides in the Environment–Sampling and Analysis of Plutonium in Soil," USNRC, May 1974.

Regulatory Guide 4.13, "Performance, Testing, and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Applications," USNRC, July 1977.

Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations)–Effluent Streams and the Environment," USNRC, December 1977.

Shearer, S.D., Jr., and C.W. Sill, "Evaluation of Atmospheric Radon in the Vicinity of Uranium Mill Tailings," *Health Physics*, Vol. 17, 1969, pp. 77-88.

Sill, C.W., "An Integrating Air Sampler for Determination of Radon-222," *Health Physics*, Vol. 16, 1969, pp. 371-377.

Sill, C.W., "Simultaneous Determination of U-238, U-234, Th-230, Ra-226, and Pb-210 in Uranium Ores, Dusts, and Mill Tailings," *Health Physics*, Vol. 33, 1977, pp. 393-404.

Sill, C.W., and C.P. Willis, "Radiochemical Determination of Lead-210 in Uranium Ores and Air Dusts," *Analytical Chemistry*, Vol. 49, 1977, pp. 302-306.

Sill, C.W., "Determination of Thorium and Uranium Isotopes in Ores and Mill Tailings by Alpha Spectrometry," *Analytical Chemistry*, Vol. 49, 1977, pp. 618-621.

Sill, C.W., et al., "Simultaneous Determination of Alpha-Emitting Nuclides of Radium Through Californium in Soil," *Analytical Chemistry*, Vol. 46, 1974, pp. 1725-1737.

Sill, C.W., and R.L. Williams, "Radiochemical Determination of Uranium and the Transuranium Elements in Process Solutions and Environmental Samples," *Analytical Chemistry*, Vol. 41, 1969, pp. 1624-1632.

Sill, C.W., "Separation and Radiochemical Determination of Uranium and the Transuranium Elements Using Barium Sulfate," *Health Physics*, Vol. 17, 1969, pp. 89-107.

Standard Methods for the Examination of Water and Wastewater, 13th Edition, American Public Health Association, 1971.

Wedding, J.B., A.R. McFarland, and J.E. Cermak, "Large Particle Collection Characteristics of Ambient Aerosol Samplers," *Environmental Science and Technology*, Vol. II, pp. 387-390, 1977.

Workshop on Methods for Measuring Radiation In and Around Uranium Mills, Atomic Industrial Forum Program Report, Vol. 3, No. 9, Atomic Industrial Forum, Inc., Washington, D.C., 1977.

Wrenn, M.E. and H. Spitz, "Design of a Continuous Digital-Output Environmental Radon Monitor," *IEEE Transactions on Nuclear Science*, NS-22, 1975.

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APPENDIX

LOWER LIMIT OF DETECTION

For the purposes of this guide, the Lower Limit of Detection (LLD) is defined as the smallest concentration of radioactive material sampled that has a 95% probability of being detected, with only a 5% probability that a blank sample will yield a response interpreted to mean that radioactive material is present. (Radioactive material is "detected" if it yields an instrument response that leads the analyst to conclude that activity above the system background is present.)

For a particular measurement system (which may include radiochemical separation):

$$LLD = \frac{4.66\, S_b}{3.7 \times 10^4\, EVY \exp(-\lambda \Delta t)}$$

where

LLD is the lower limit of detection (microcuries per milliliter);

S_b is the standard deviation of the instrument background counting rate (counts per second);

3.7×10^4 is the number of disintegrations per second per microcurie;

E is the counting efficiency (counts per disintegration);

V is the sample volume (milliliters);

Y is the fractional radiochemical yield (when applicable);

λ is the radioactive decay constant for the particular radionuclide; and

Δt is the elapsed time between sample collection and counting.

The value of S_b used in the calculation of the LLD for a particular measurement system should be based on the actual observed variance of the instrument background counting rate rather than an unverified theoretically predicted variance.

Since the LLD is a function of sample volume, counting efficiency, radiochemical yield, etc., it may vary for different sampling and analysis procedures. Whenever there is a significant change in the parameters of the measurement system, the LLD should be recalculated.*

*For a more complete discussion of the LLD, see "HASL Procedures Manual," John H. Harley, editor, USERDA, HASL-300 (revised annually) and Currie, L.A., "Limits for Qualitative Detection and Quantitative Determination--Application to Radiochemistry," *Anal. Chem.* 40, 1968, pp. 586-93, and Donn, J. J. and R. L. Wolke, "The Statistical Interpretation of Counting Data from Measurements of Low-Level Radioactivity," *Health Physics*, Vol. 32, 1977, pp. 1-14.

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BIOASSAY AT URANIUM MILLS

A. INTRODUCTION

Section 20.108, "Orders Requiring Furnishing of Bioassay Services," of 10 CFR Part 20, "Standards for Protection Against Radiation," states that, where necessary or desirable in order to aid in determining the extent of an individual's exposure to concentrations of radioactive material, the NRC may incorporate appropriate provisions in any license directing the licensee to make available to the individual appropriate bioassay services. Paragraphs 20.103(a)(1) and 20.103(a)(2) require licensees to limit intakes of materials such as uranium by individuals in restricted areas to the limits specified in Appendix B to 10 CFR Part 20. As specified in paragraph 20.103(a)(3), compliance with these limits must be determined through air sampling and, as appropriate, through bioassays.

Paragraph 20.103(b)(2) permits licensees to make allowance for the use of respiratory protection equipment in determining the magnitude of intake provided such equipment is used as stipulated in paragraphs 20.103(c) through (g). These paragraphs require the licensee to perform bioassays, as appropriate, to evaluate individual exposure and to assess the protection actually provided. Respiratory protection devices do not always offer efficient protection. If a device is defective, is inappropriate for the particular contaminant involved, does not fit the wearer properly, or is carelessly put in place, the wearer may unknowingly receive a significant inhalation exposure. Therefore, if the potential intake was sufficiently large, bioassay procedures should be performed to determine whether such devices were in fact effective.

This guide describes a bioassay program acceptable to the NRC staff for uranium mills (and applicable portions of uranium conversion facilities where the possibility of exposure to yellowcake dust exists), including exposure conditions with and without the use of respiratory protection devices.

Any information collection activities mentioned in this regulatory guide are contained as requirements in 10 CFR Part 20, which provides the regulatory basis for this guide. The information collection requirements in 10 CFR Part 20 have been cleared under OMB Clearance No. 3150-0014.

B. DISCUSSION

This guide is based on information from the references, public comments received on the versions published in July 1978 and January 1987, data submitted by the milling industry, and an analysis by the staff of the Office of Nuclear Regulatory Research (NUREG-0874, "Internal Dosimetry Model for Applications to Bioassay at Uranium Mills," Ref. 1). Information acquired in the future may result in revisions to this guide; in particular, if bioassay results accumulated over a sufficiently long period of time indicate that workers at uranium mills are being adequately protected from airborne uranium by means of ventilation equipment and effective air sampling programs, the guide may be revised accordingly.

C. REGULATORY POSITION

1. DEFINITIONS

Recent solubility studies have revealed notable differences in the dissolution rates of yellowcake produced under different thermal conditions. For the purpose of this guide, the following distinction is made:

a. Low-fired yellowcake is defined as yellowcake dried at temperatures less than 400° C.

b. High-fired (calcined) yellowcake is defined as yellowcake dried at temperatures of 400° C or more.

Two important areas in a uranium mill where workers are exposed to uranium are defined as follows:[1]

a. Ore-dust areas, under normal conditions, are defined as those areas beginning with the transfer of ore from the ore pad to the crusher through the final thickening stage of the leaching operation.

b. Yellowcake areas are defined as those areas that contain uranium extracted from the ore in a solution form from the ion exchange or solvent extraction stage through final packaging.

2. WORKING CONDITIONS UNDER WHICH BIOASSAYS SHOULD BE PERFORMED

Routine bioassays are considered by the NRC staff to be necessary for workers (1) routinely exposed to airborne yellowcake or directly involved in maintenance tasks in which yellowcake dust may be produced or (2) routinely exposed to airborne uranium ore dust. Baseline urinalysis bioassays should be performed for each worker prior to initial assignments for such work. Bioassays should be performed if there is any reason to suspect an inhalation exposure exceeding that resulting from exposure to an average yellowcake concentration[2] of 10^{-10} μCi/mL (3.7×10^{-6} Bq/mL) for a 40-hour workweek or to an average ore-dust concentration of 10^{-10} μCi/mL (3.7×10^{-6} Bq/mL) (based on the concentration of gross alpha activity in air) for a period of 1 calendar quarter; if respiratory protection is used to maintain inhalation exposures below these quantities, bioassay should be performed to verify the effectiveness of the respirators.

3. TYPES OF BIOASSAY

Urinalysis should be performed to monitor exposures to uranium in ore dust as well as in yellowcake as they clear from the kidney before elimination renders them undetectable. In vivo thorax measurements should be made to detect the presence of (1) the more insoluble yellowcake component and (2) uranium in ore dust in the lung when air-sampling results indicate an exposure exceeding that resulting from exposure to such materials at an average concentration of 10^{-10} μCi/mL (3.7×10^{-6} Bq/mL) (based on the concentration of gross alpha activity in air) in a period of 1 calendar quarter.

4. FREQUENCY

4.1 General Considerations

The prescribed frequency of urinalysis and in vivo lung measurements is a function of the dissolution rates of the inhaled ore dust or yellowcake in the lungs. Workers in the yellowcake concentrate areas may be exposed to transient levels of airborne uranium that may cause chemical damage to the kidney. Therefore, urinalysis should be performed with sufficient frequency to detect such exposures before elimination from the body renders them undetectable. Guidance on selecting appropriate frequencies is available in NUREG-0874 (Ref. 1). The applicant may use the simplified system of frequencies and action levels presented in this guide.

4.2 Urinalysis for Workers from Yellowcake Areas

Specimens from workers, regardless of whether or not respiratory protection devices were used, should be collected and evaluated at least once per month, and additional special specimens should be collected and evaluated if for any reason an inhalation exposure exceeding that resulting from an exposure to an average yellowcake concentration of 10^{-10} μCi/mL (3.7×10^{-6} Bq/mL) for a 40-hour workweek is suspected or air sampling data are not available.

4.3 Urinalysis for Workers from Ore-Dust Areas Exclusively

Specimens from workers, regardless of whether or not respiratory protection devices were used, should be collected and evaluated at least once per month, and additional special specimens should be collected and evaluated if for any reason an inhalation exposure exceeding that resulting from an exposure to an average ore-dust concentration of 10^{-10} μCi/mL (3.7×10^{-6} Bq/mL) (based on the concentration of gross alpha activity in air) for a period of 1 calendar quarter is suspected.

4.4 In Vivo Lung (Thorax) Measurements

The lung counting procedure should be capable of detecting (at the lower limit of detection (LLD)) 9 nCi (330 Bq) or less of uranium in the lungs.

When urinalysis results call for in vivo measurements (see Section 5), they should be performed as quickly as possible to determine if corrective measures are required.

When air monitoring or exposure calculations call for in vivo measurements (see Section 3), they should be performed as quickly as practicable but no later than 3 months after such indication.

4.5 Measurement Detection Limits

The measurement sensitivity for urine analyses should be such that the LLD (for a probability of 0.05 for a Type I or a Type II statistical error) is 5 μg of uranium per liter of urine or

[1] If these definitions do not apply to a specific milling operation, the applicant may submit different definitions for consideration.

[2] The 1×10^{-10} μCi/mL (3.7×10^{-4} Bq/mL) value is not exactly consistent with the 0.2 mg/m³ concentration limit for soluble uranium in Footnote 4 of Appendix B to 10 CFR Part 20 because of the rounding off of values in Appendix B. Since the 1×10^{-10} μCi/mL limit is more restrictive, this value has been used in the calculation of all the action levels (weekly and quarterly) in this guide. For compliance purposes, Footnote 4 to Appendix B sets the weekly limit for soluble uranium compounds, which can be converted to radiological units using the specific activity of natural uranium (6.77×10^{-7} Ci/g or 2.5×10^{4} Bq/g). As now defined in 10 CFR Part 20, the curie of natural uranium differs from the original definition in ICRP-2 (Ref. 2). The present definition of the curie of natural uranium in 10 CFR Part 20 refers to the total activity of all uranium isotopes in the natural uranium mixture. When natural uranium is defined to be 0.711% by weight ^{235}U and the ^{234}U is assumed to be in secular equilibrium with ^{238}U, 1 Ci of natural uranium is composed of 0.489 Ci ^{234}U, 0.0225 Ci ^{235}U, and 0.489 Ci ^{238}U. Actual percentages of ^{235}U may be 0.711 ±0.1%.

less (see Appendix A for an example of the determination of LLD). The LLD for uranium counting in vivo should be 9 nCi (330 Bq) or less of uranium in the lungs.

5. ACTION BASED ON BIOASSAY RESULTS

Bioassay results should be promptly and carefully reviewed by qualified personnel, and appropriate action should be taken if the results exceed preselected levels. The corrective actions to be taken depend on the amount of uranium detected. Action levels and actions in Tables 1 and 2 are acceptable as a basis for a uranium mill bioassay program. Proposals for other action levels and actions from an applicant will be considered on a specific-case basis if accompanied by a description of how the information in NUREG-0874 (Ref. 1) was used to derive those different criteria.

It should be assumed that any confirmed positive urinalysis results are an indication of soluble uranium to which the kidney has been exposed.

5.1 Urinalysis for Workers from High-Fired-Yellowcake Areas

The corrective actions to be taken depend on the amount of uranium detected and are given in Table 1. Figure 1 and other information in NUREG-0874 (Ref. 1) may be used to determine acceptable action levels for a single intake as a function of time for workers from high-fired-yellowcake areas.

5.2 Urinalysis for Workers from Low-Fired-Yellowcake Areas

The corrective actions to be taken depend on the amount of uranium detected and are given in Table 1. Figure 2 and other information in NUREG-0874 (Ref. 1) may be used to obtain acceptable action levels for a single intake as a function of time for workers from low-fired-yellowcake areas.

5.3 Urinalysis for Workers from Ore-Dust Areas Exclusively

The corrective actions to be taken depend on the amount of uranium detected and are given in Table 1. Figure 3 and information in NUREG-0874 (Ref. 1) may be used to obtain acceptable action levels for a single intake as a function of time for workers from ore-dust areas.

5.4 In Vivo

It should be assumed that positive in vivo results indicate the quantity of uranium in relatively insoluble form that has accumulated in the lung. Corrective action should be taken in accordance with Table 2 of this guide.

6. TIME OF SPECIMEN COLLECTION AND AVAILABILITY OF RESULTS

Routine and special urine specimens for analysis of uranium compounds pertinent to mill operations should usually be collected at least 36 hours after the most recent occupancy in the mill. The 36-hour delay is necessary to avoid uranium that is eliminated without uptake in kidney tissues. (However, if compounds are encountered that mainly produce a very short-lived component, Morrow (Ref. 3, p. 6) recommends the use of two action levels: a 1 μg/L Monday morning urinary excretion rate and an exposure-associated urinary output of 100 μg/L during the first 24 hours after the exposure. Tables 1 and 2 would not necessarily be applicable to these results.) Sufficient volume should be collected for four analyses, each of which should be capable of achieving an LLD of 5 μg/L (see Appendix A).

Urinalysis results should be available to the person responsible for conducting the bioassay program within 20 days after specimen collection. If the urinalyses are performed by an outside laboratory, results exceeding 35 μg/L should be reported by telephone.

In vivo results should be available to the person conducting the bioassay program within 20 days after measurement. Results exceeding 16 nCi (590 Bq) should be reported by telephone.

7. PREVENTION OF SPECIMEN CONTAMINATION[3]

7.1 Collection

The specimens should be collected before the worker enters the work area and in an area free of uranium contamination. The collection may occur at an area outside the mill specifically designated to be maintained contamination free. The hands should be carefully washed prior to voiding. Disposable collection containers should be used.

Under unusual circumstances where specimens cannot be collected in this manner, the worker should shower immediately prior to voiding. When a shower is not possible, disposable plastic or rubber gloves should be worn during voiding.

7.2 Laboratory Analysis

All laboratory analyses should be performed in a laboratory essentially free of uranium contamination using containers and equipment essentially free of such contamination. Both on-site and off-site laboratories should maintain the quality control procedures specified in Section 8 of this guide. Use of the laboratory, containers, and equipment for process or environmental samples should be restricted to low-level samples. (Note: The laboratory may be located within the restricted area provided these conditions are met.)

7.3 In Vivo Counting Precautions

For in vivo measurements, employee and clothing contamination are major sources of measurement bias. Care must be taken to minimize these factors. Only new clothing or clothing washed in a facility separate from those used for

[3]The appropriate actions specified in Table 1 should be taken for any result that is confirmed by a second analysis even though specimen contamination is believed to be the cause of the elevated result.

potentially contaminated clothing should be worn during the in vivo measurement. If the in vivo measurement results indicate contamination, the subject should reshower, use clean clothing, and be recounted.

8. QUALITY CONTROL

A quality control program for bioassay measurements should be incorporated in each uranium mill bioassay program. A quality control program consistent with that recommended in the draft standard ANSI/HPS-N13.30 (Ref. 4) will be acceptable. Alternatively, the following specific quality control program for bioassay at uranium mills will be acceptable.

8.1 Urinalysis

Each batch of specimens sent to the laboratory for analysis should be accompanied by at least two control urine specimens. When possible, these control specimens should be taken from individuals who are not and have not been occupationally exposed to uranium; otherwise simulated controls known to contain a uranium concentration less than 1 μg/L may be used. Aliquots of each of these control urine specimens should be taken; one should be a "blank," one should be spiked with uranium to obtain a concentration of 10 to 20 μg/L, and one should be spiked to 40 to 60 μg/L, the actual spiked concentrations being recorded confidentially and not available to the analytical laboratory. When results are received, the licensee should ensure that each reading is corrected for the reading of the corresponding blank, that the net reading of each spiked sample is recorded, and that an average of the percent deviation of the spiked sample net reported values from the "true" amount of spiked uranium sample is calculated. The percent deviation for the spiked samples accompanying each batch of urine specimens should be within 30% of the spiked values. Otherwise, the most recent batch of affected samples should be rerun, and steps should be taken to correct the procedures for spiking or the procedures for laboratory analyses, or both.

In order to provide adequate quality control within the analytical laboratory as well as to provide a check on the quality control program of the mill, the analytical laboratory should duplicate the analysis of 10% to 20% of the samples received, including the blanks and spikes received from the mill. In addition, the laboratory should measure its own reagent and urine blanks and spiked standards as appropriate to check its own procedures, provide its own calibration factors, check its LLDs, and evaluate its results for each batch. The laboratory should report the results of its own blank and standard samples along with the other results reported to the mill.

8.2 In Vivo

For in vivo measurements, a quality control program using persons known to have no lung or systemic uranium burdens and phantoms spiked with known amounts of uranium should be used to test the counting system before measurements on each group of employees.

9. USE OF RESPIRATORY PROTECTION DEVICES

Licensees using respiratory protection devices in accordance with paragraph 20.103(c) of 10 CFR Part 20 are to conduct bioassay programs in accordance with paragraph 20.103(c)(2) and NUREG-0041, "Manual of Respiratory Protection Against Airborne Radioactive Materials" (Ref. 5).

Under certain conditions, bioassay measurements should be performed to ensure the proper evaluation of personnel exposure and to evaluate the actual effectiveness provided by respiratory protection devices. If a worker wearing such a device is subjected for a period of 1 week to an average concentration greater than 10^{-10} μCi/mL (3.7×10^{-6} Bq/mL), as given in Table 1, Column 1, of Appendix B to 10 CFR Part 20 for soluble natural uranium, urinalysis should be performed to test the actual effectiveness of the device. This special bioassay measurement should also be performed if for any reason the magnitude of the exposure that would have occurred if no respiratory protection device had been worn is unknown. The time that the sample for this special measurement was collected should be recorded; it should be consistent with the need to relate bioassay results to kidney exposure (see Section 6).

The appropriate urinalysis or in vivo measurement given in Section 3 of this guide should not be reduced because of the use of respiratory protection devices.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plans for using this regulatory guide.

Except in those cases in which an applicant or licensee proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described in this guide will be used in the evaluation of existing bioassay programs of uranium mill licensees or proposed programs of applicants for such licenses.

Table 1

CORRECTIVE ACTIONS BASED ON MONTHLY URINARY URANIUM RESULTS[a]

Urinary Uranium Concentration	Interpretation	Actions
Less than 15 μg/L	Uranium confinement and air sampling programs are indicated to be adequate.[b]	None. Continue to review further bioassay results.
15 to 35 μg/L	Uranium confinement and air sampling may not provide an adequate margin of safety.[b]	1. Confirm results (repeat urinalysis). 2. Identify the cause of elevated urinary uranium and initiate additional control measures if the result is confirmed. 3. Examine air sampling data to determine the source and concentration of intake. If air sampling results are anomalous, investigate sampling procedures. Make corrections if necessary. 4. Determine whether other workers could have been exposed and perform bioassay measurements for them. 5. Consider work assignment limitations until the worker's urinary uranium concentration falls below 15 μg/L. 6. Improve uranium confinement controls or respiratory protection program as investigation indicates.
Greater than 35 μg/L	Uranium confinement and perhaps air sampling programs are not acceptable.[c]	1. Take the actions given above. 2. Continue operations only if it is virtually certain than no other worker will exceed a urinary uranium concentration of 35 μg/L. 3. Establish work restrictions for affected employees or increase uranium confinement controls if ore dust or high-temperature-dried yellowcake are involved. 4. Analyze bioassay samples weekly.
Confirmed to be greater than 35 μg/L for two consecutive specimens, confirmed to be greater than 130 μg/L for any single specimen, or air sampling indication of more than a quarterly limit of intake	Worker may have exceeded regulatory limit on intake.	1. Take the actions given above. 2. Have urine specimen tested for albuminuria. 3. Obtain an in vivo count if worker may have been exposed to Class Y material or ore dust. 4. Evaluate exposures. 5. Establish further uranium confinement controls or respiratory protection requirements as indicated. 6. Consider continued work restrictions on affected employees until urinary concentrations are below 15 μg/L and laboratory tests for albuminuria are negative.

[a] Use Figures 1-3 to adjust action levels for other frequencies of bioassay sampling. The model used in NUREG-0874 (Ref. 1) employs fractional composition values (F_1, F_2, F_3) for Class D, Class W, and Class Y components of yellowcake compounds. The assigned values in NUREG-0874 are based on data from available literature. The use of alternative values of F_1, F_2, and F_3 specific for a particular operation are acceptable provided (1) details regarding their determination are described and mentioned in employee exposure records (see paragraph 20.401(c)(1) of 10 CFR Part 20) and (2) the model as published in NUREG-0874 is then used in the determination of alternative urinalysis frequencies and action levels.

[b] However, if a person is exposed to uranium ore dust or other material of Class W or Y alone, refer to Section 6 of NUREG-0874 about the possibility of the need for conducting in vivo lung counts on selected personnel or about using alternative urine sampling times and associated action levels computed using NUREG-0874.

[c] Unless the result was anticipated and caused by conditions already corrected.

Table 2

CORRECTIVE ACTIONS BASED ON IN VIVO RESULTS[a]

Amount of Uranium Detected	Interpretation	Actions
Below 9 nCi (330 Bq)	May be below detection limit. This result does not necessarily indicate that uranium confinement and air sampling programs are validated.	Rely on urinalysis results to determine corrective actions (unless air sampling indicates quarterly intake limits are exceeded for ore dust).
9 to 16 nCi (330 to 590 Bq)	Confinement and air sampling programs should be examined.[b] Uranium activity in lungs could be too high.	1. Confirm result (repeat measurement within 6 months). Ensure that results are not caused by body surface activity. 2. Examine air sampling data to determine source and concentrations of intake. If air sampling results are anomalous, investigate air sampling procedures. Make corrections, if necessary. 3. Identify the cause of elevated activity and initiate additional uranium confinement control measures. 4. Determine whether other workers could have been exposed and perform special bioassay measurements for them. 5. Consider work assignment limitations that will permit the lung burden to be reduced through natural elimination; ensure that the lung burden does not exceed 16 nCi (590 Bq).
More than 16 nCi (590 Bq)	Uranium confinement and air sampling probably are not acceptable.[b] Uranium activity in the lungs should be reduced by increased protection measures for the workers involved.	1. Within 90 days, take the actions listed above for 9 to 16 nCi (330 to 590 Bq). 2. Establish work restrictions for affected workers or increased uranium confinement control measures. (Normally workers with a lung burden greater than 16 nCi (590 Bq) are not allowed by their employer to resume work in airborne activity areas until the burden is reduced to less than 9 nCi or 330 Bq.) 3. Perform individual case studies (bioassays) for affected workers. 4. Continue operations only when it is virtually certain no additional workers will exceed 16 nCi (590 Bq).

[a]The model used in NUREG-0874 (Ref. 1) employs fractional composition values (F_1, F_2, F_3) for Class D, Class W, and Class Y components of yellowcake compounds. The assigned values in NUREG-0874 are based on data from available literature. The use of alternative values of F_1, F_2, and F_3 specific for a particular operation are acceptable provided (1) details regarding their determination are described and mentioned in employee exposure records (see paragraph 20.401(c)(1) of 10 CFR Part 20) and (2) the model as published in NUREG-0874 is then used in the determination of alternative urinalysis frequencies and action levels.

[b]Unless the result was anticipated and caused by conditions already corrected.

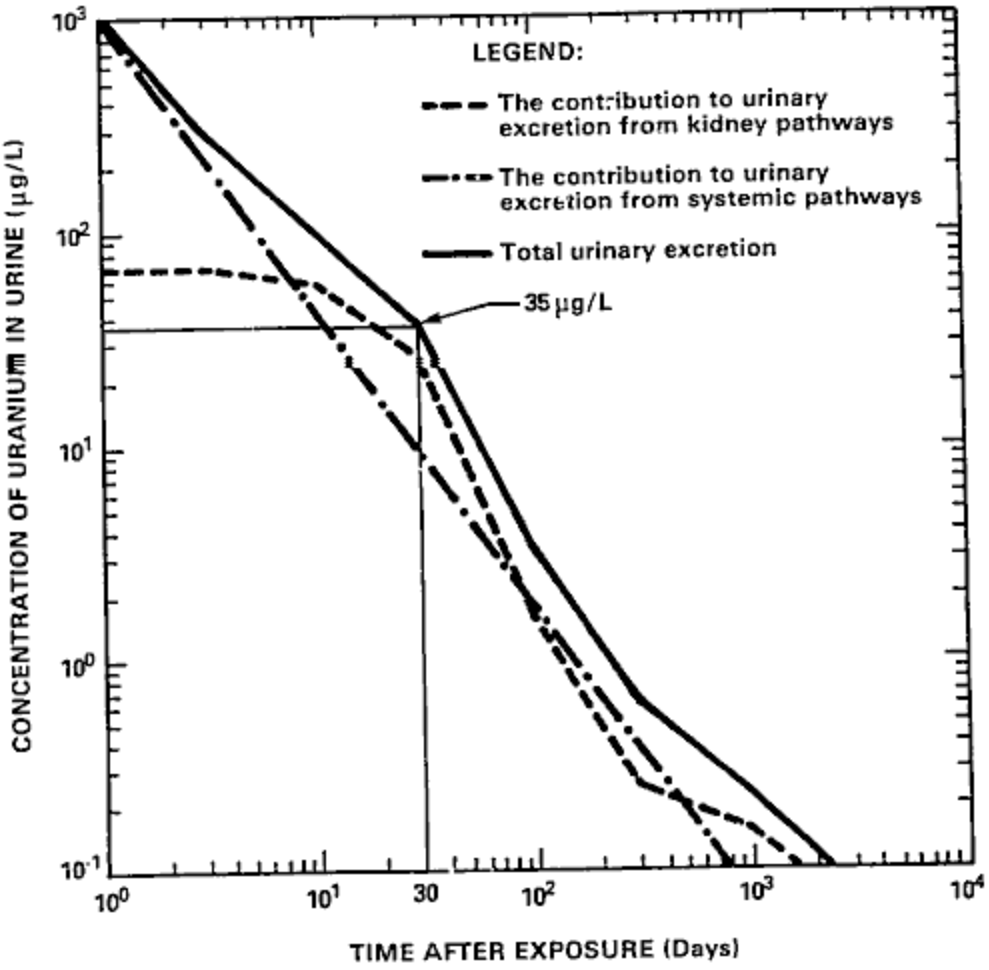

Figure 1 Uranium Concentration in Urine Following Single Exposure to High-Fired Yellowcake (Intake = 160,000 µg U = 1 ALI) (from NUREG-0874, Ref. 1)

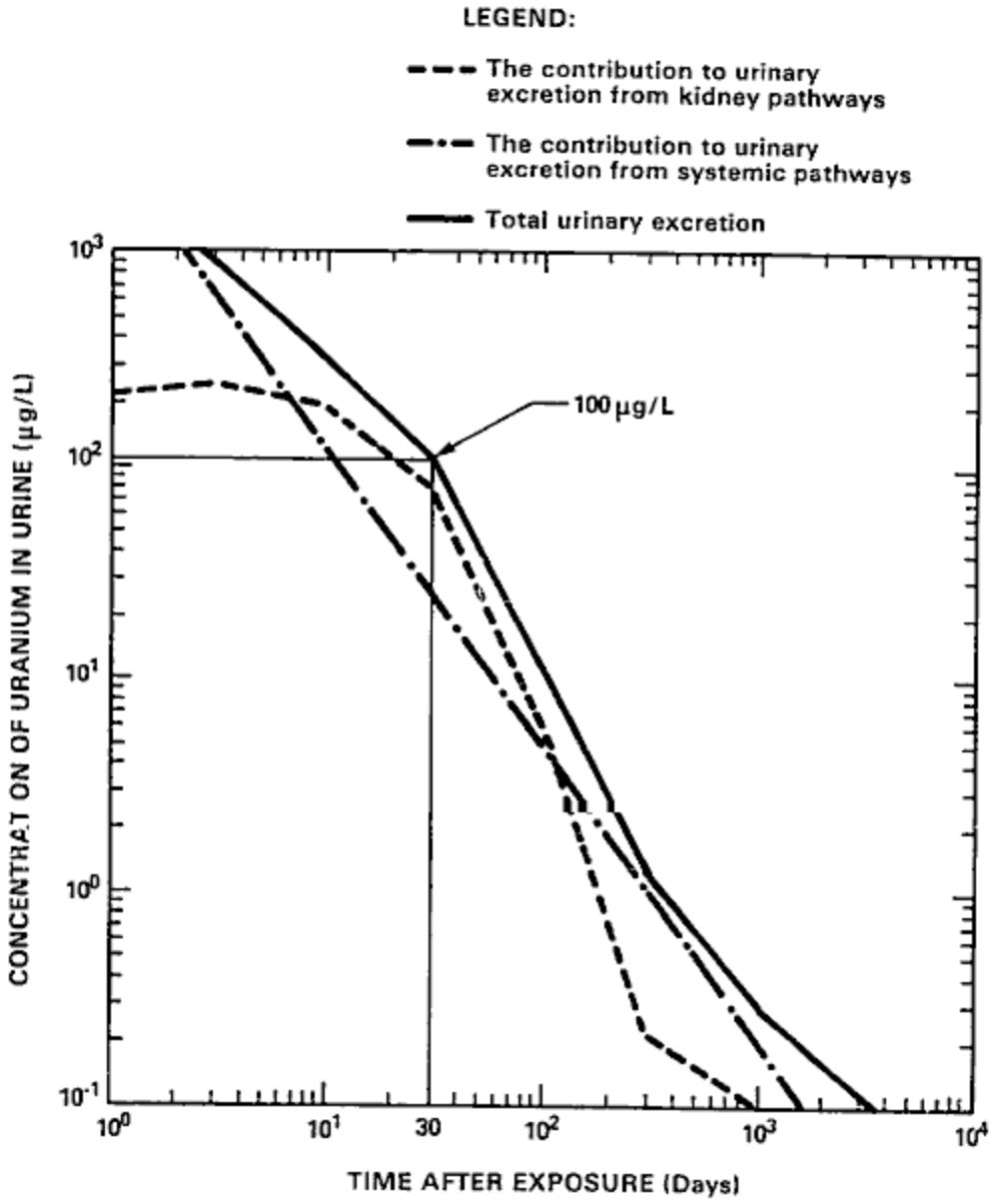

Figure 2 Uranium Concentration in Urine Following Single Exposure to Low-Fired Yellowcake (Intake = 260,000 µg U = 1 ALI) (from NUREG-0874, Ref. 1)

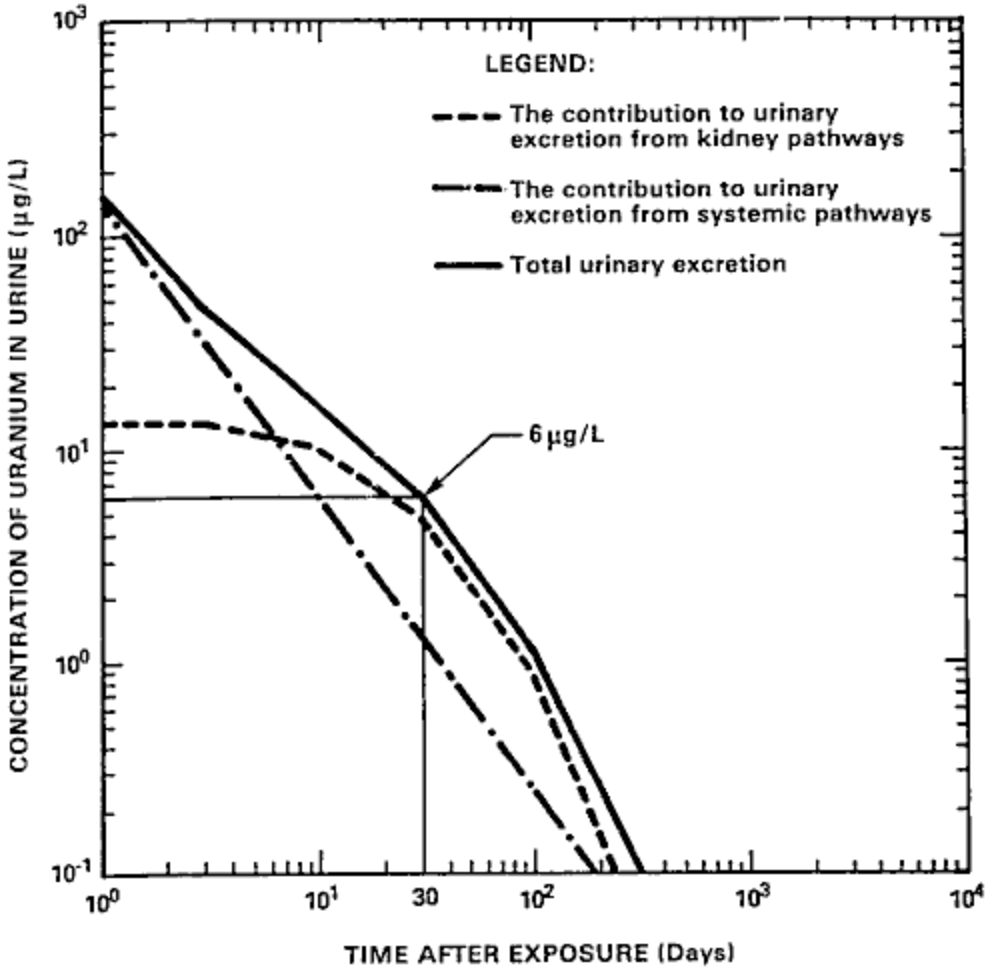

Figure 3 Uranium Concentration in Urine Following Exposure to Ore Dust (from NUREG-0874, Ref. 1)

REFERENCES

1. R. E. Alexander, R. B. Neel, J. S. Puskin, and A. Brodsky, "Internal Dosimetry Model for Applications to Bioassay at Uranium Mills," NUREG-0874,* U.S. Nuclear Regulatory Commission, Washington, DC, 1986.

2. International Commission on Radiological Protection, "Report of ICRP Committee II on Permissible Dose for Internal Radiation (1959), with Bibliography for Biological Mathematical and Physical Data," ICRP Publication 2,** Pergamon Press, Elmsford, NY, 1960.

3. P. E. Morrow et al., "Metabolic Fate and Evaluation of Injury in Rats and Dogs Following Exposure to the Hydrolysis Products of Uranium Hexafluoride," NUREG/CR-2268,* U.S. Nuclear Regulatory Commission, Washington, DC, 1982.

4. American National Standards Institute (ANSI)/Health Physics Society (HPS), "Performance Criteria for Radiobioassay," Draft ANSI/HPS-N13.30, 1987.***

5. J. L. Caplin, "Manual of Respiratory Protection Against Airborne Radioactive Materials," NUREG-0041,* U.S. Nuclear Regulatory Commission, Washington, DC, 1976.

BIBLIOGRAPHY

Alexander, R. E., "Applications of Bioassay for Uranium," WASH-1251,* U.S. Atomic Energy Commission, Washington, DC, 1974.

Atomic Energy Control Board, "Guide to Bioassay of Uranium at Uranium Mine-Mill Facilities," Regulatory Document R-5, 1981. Available from the Atomic Energy Control Board, P.O. Box 1046, Ottawa, Ontario, Canada K1P 5S9.

Fisher, D. R., et al. (Pacific Northwest Laboratory, Battelle Memorial Institute), "Measurements of ^{234}U, ^{238}U, and ^{230}Th in Excreta of Uranium Mill Crushermen," NUREG/CR-2503,* U.S. Nuclear Regulatory Commission, Washington, DC, 1982.

McGuire, S. A., "The NRC's Limit on Intake of Uranium Ore Dust," NUREG-0941,* U.S. Nuclear Regulatory Commission, Washington, DC, 1983.

Spitz, H. B., J. C. Simpson, and T. L. Aldridge (Pacific Northwest Laboratory, Battelle Memorial Institute), "Analysis of Uranium Urinalysis and *In Vivo* Measurement Results from Eleven Participating Uranium Mills," NUREG/CR-2955,* U.S. Nuclear Regulatory Commission, Washington, DC, 1984.

Swaja, R. E., and C. S. Sims (Oak Ridge National Laboratory), "Occupational Radiological Monitoring at Uranium Mills," NUREG/CR-3598,* U.S. Nuclear Regulatory Commission, Washington, DC, 1984.

U.S. Nuclear Regulatory Commission, "Health Physics Surveys at Uranium Mills," Regulatory Guide 8.30,* Washington, DC, June 1983.

*Copies may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Post Office Box 37082, Washington, DC 20013-7082; or the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

**ICRP publications are available from Pergamon Press, Fairview Park, Elmsford, NY 10523.

***Available from the Health Physics Society, 1340 Old Chain Bridge Road, Suite 300, McLean, VA 22101.

APPENDIX A

LOWER LIMIT OF DETECTION OF URANIUM

For the purposes of this guide, the lower limit of detection (LLD) is defined as the smallest concentration of radioactive material in urine that has a 95% probability (chance) of being detected when measurement procedures are set so that the concentration level at which detection is considered significant produces only a 5% chance of calling a background reading a positive sample.* Radioactive material is then called "detected" when the value obtained from an instrument reading is above the LLD and is thus high enough to permit a conclusion that activity above the system background is determined to be present. Thus, for a fluorometric measurement that may include a radiochemical separation in which the "blank" urines fluctuate with a standard deviation S_b, the LLD corresponds to an activity that is defined as

$$LLD = \frac{4.65S_b}{KEvYe^{-\lambda t}}$$

Where

LLD = the lower limit of detection (μg/L or μCi/L),

S_b = the standard deviation of fluctuations in fluorometer blank measurements or count rate (counts per second) for a specific time of measurement and specific aliquot volume,

K = conversion or calibration factor to convert units of S_b from instrument scale reading units to mass or activity units; units of K may be μA/μg or d/sec-μCi if activity is counted to obtain the final result (this term is omitted if S_b is given in microcuries directly by use of a calibration standard),

E = the counting efficiency (counts per disintegration); it is 1 when a fluorometric standard is measured in the same geometry as the sample,

v = volume (in liters) of aliquot taken from the urine sample and added to the flux in the fusion dish. Note: As long as the concentration of uranium in the aliquot is the same as the concentration in the original urine sample, the volume of the original urine sample does not affect this calculation.

Y = the fractional radiochemical yield or recovery (if applicable),

λ = the decay constant for the particular radionuclide, and

t = the elapsed time between sample collection and counting for correcting for radioactive decay when decay during time t is significant, but decay is negligible during the fluorometric measurement.

*This definition of LLD was chosen to be consistent with the NRC position previously stated in Tables 1 and 3 of Regulatory Guide 4.8, "Environmental Technical Specifications for Nuclear Power Plants." The definition is also used in other regulatory guides, among them 4.14, "Radiological Effluent and Environmental Monitoring at Uranium Mills", 8.14, "Personnel Neutron Dosimeters"; and 8.30, "Health Physics Surveys in Uranium Mills."

EXAMPLE: LLD FOR URANIUM WHEN FLUOROMETRIC ANALYSIS IS USED

This example is worked in terms of micrograms of natural uranium per liter of urine. The LLD could just as well be calculated in terms of microcuries or becquerels of uranium per liter. A conversion factor of 6.77×10^{-7} μCi/μg (0.025 Bq/μg) for natural uranium can be used if the uranium quantity is known in micrograms. The quantity of uranium added to the fusion dish will be determined, and then it will be divided by the volume of urine in the aliquot taken from the total collected sample.

First, determine the standard deviation of the background measurement (blank urine) (which will approximate an estimate of the standard error of the average of a triplicate measurement if calculated as shown below). In this example, urine samples were taken from 12 individuals who worked in areas of the plant where no uranium exposure could have occurred. For each of these "blank" urines, three (triplicate) measurements were made, each measurement consisted of taking 0.2 mL from an individual urine sample and pipetting it into a platinum dish containing a NaF pellet, which was then fused and placed into a fluorometer for measurement. The readings (in microamperes in this case) of the three 0.2 mL aliquots of each individual "blank" urine were then averaged.

The 12 triplicate averages for the blank urines were:

Sample Number, i	Average Fluorometer Readings (X_i) (microamperes)
1	0
2	0.07
3	0.07
4	0.07
5	0
6	0
7	0.13
8	0.13
9	0.17
10	0.10
11	0.13
12	0

The standard deviation S_b (same as an estimate of the standard error of the triplicate average) may be calculated by the following equation (or a computer or calculator programmed for this equation).

$$S_b = \left(\frac{1}{n-1} \sum_{i}^{n} (X_i - \bar{X})^2 \right)^{1/2}$$

n = the number of samples

X_i = the average reading for triplicate i from sample i

$\bar{X}$ = the average of all triplicate averages

For the data above, the standard deviation is:

$S_b = \pm 0.0612$ µA and $\bar{X} = 0.0725$ µA

Convert S_b to micrograms of uranium. On this fluorometer, samples of pure U_3O_8 averaging 0.012 µg added to the fusion dish gave readings in the fluorometer averaging 3.44 µA. The fluorometer will thus have a calibration factor of 287 µA/µg U_3O_8. The U_3O_8 compound is 85% uranium by weight (238 x 3 = 714, 16 x 8 = 128, 714/842 = 0.85). Therefore, the fluorometer will read 338 µA/µg of elemental uranium (287/0.85 = 338)

Now, the standard deviation in micrograms of uranium is calculated:

$$S_b = \frac{0.0612 \text{ µA}}{338 \text{ µA/µg}} = 0.000181 \text{ µg of uranium.}$$

If this is converted to microcuries using the conversion factor given before, then

$$S_b = 0.000181 \text{ µg} \times 6.77 \times 10^{-7} \text{ µCi/µg}$$

$$= 1.23 \times 10^{-10} \text{ µCi } (4.55 \times 10^{-6} \text{ Bq})$$

In the equation for LLD, the counting efficiency will be 1. (The term E is not applicable to a fluorometric analysis.) The aliquot volume of 0.2 mL is used in the LLD equation since the numerical value for each fluorescence reading is related to this volume of urine. Also, for a fluorometric reading compared against a calibration factor, the radiochemical yield is not applicable, and Y should be set equal to 1. The exponential term for radioactive decay, $\exp(-\lambda t)$, will also be equal to 1 since the half-life of uranium is so long that the amount of decay between collection and analysis will be negligible. Therefore, the LLDs in mass and activity concentration units become:

$$LLD_m = \frac{4.65 \times 0.000181}{0.0002} = 4.21 \text{ µg/L}$$

$$LLD_a = \frac{4.65 \times 1.23 \times 10^{-10}}{0.0002}$$

$$= 2.86 \times 10^{-6} \text{ µCi/L} \quad (0.106 \text{ Bq})$$

VALUE/IMPACT STATEMENT

A draft value/impact statement was published with Proposed Revision 1 to Regulatory Guide 8.22 (Task OP 013-4) when the draft revised guide was published for public comment in January 1987. No significant changes were necessary, so a separate value/impact statement for the final guide has not been prepared. A copy of the draft value/impact statement is available for inspection and copying for a fee at the Commission's Public Document Room at 1717 H Street NW., Washington, DC, under Task OP 013-4.

U.S. NUCLEAR REGULATORY COMMISSION

Revision 1
June 1992

REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 8.25

(Draft was issued as DG-8003)

AIR SAMPLING IN THE WORKPLACE

A. INTRODUCTION

Air sampling in the workplace is an acceptable method for meeting certain of the survey and dose assessment requirements of 10 CFR Part 20, "Standards for Protection Against Radiation." For example, 10 CFR 20.1204 allows estimates of worker intakes of radioactive materials based on air sampling and allows adjustments of derived air concentrations (DACs) and annual limits on intake (ALIs) based on the particle size distribution; 10 CFR 20.1501 requires radiation surveys necessary to comply with the regulations and to evaluate potential radiological hazards; 10 CFR 20.1703 requires assessment of airborne radioactive material concentrations when respirators are used; 10 CFR 20.1902 requires posting of airborne radioactivity areas; 10 CFR 20.2103 requires records of radiation surveys; and 10 CFR 20.2202 and 10 CFR 20.2203 require reporting of excessive concentrations of or exposure to airborne radioactive materials.

This guide provides guidance on air sampling in restricted areas (as defined in 10 CFR Part 20) of the workplace. In this guide, the term "air sampling" includes the collection of samples for later analysis as well as real-time monitoring in which samples are analyzed as they are collected. The guide does not cover environmental or effluent sampling or the analysis of samples.

In addition, this guide does not apply to activities conducted under 10 CFR Part 50 at reactor facilities. Although the provisions of 10 CFR Part 20 apply equally to nuclear reactors and to other facilities, the air sampling programs of reactor licensees are well established, and the NRC is satisfied that the quality of air sampling at nuclear reactors is adequate. Therefore, no further guidance on air sampling is needed at this time for reactor licensees.

Any information collection activities mentioned in this regulatory guide are contained as requirements in 10 CFR Part 20, which provides the regulatory basis for this guide. The information collection requirements in 10 CFR Part 20 have been cleared under OMB Clearance No. 3150-0014.

B. DISCUSSION

Air sampling can be used to determine whether the confinement of radioactive materials is effective, to measure airborne radioactive material concentrations in the workplace, to estimate worker intakes, to determine posting requirements, to determine what protective equipment and measures are appropriate, and to warn of significantly elevated levels of airborne radioactive materials. If bioassay measurements are used to determine worker doses of record, air sampling may be used to determine time of intake and to

determine which workers should have bioassay measurements.

General guidance on air sampling for specific types of facilities is also discussed in several other regulatory guides, including:

- Regulatory Guide 8.21, "Health Physics Surveys for Byproduct Material at NRC-Licensed Processing and Manufacturing Plants"
- Regulatory Guide 8.23, "Radiation Safety Surveys at Medical Institutions"
- Regulatory Guide 8.24, "Health Physics Surveys During Enriched Uranium-235 Processing and Fuel Fabrication"
- Regulatory Guide 8.30, "Health Physics Surveys in Uranium Mills"

These facility-specific guides cover air sampling in general terms, while this guide discusses air sampling in more depth. Thus, the guides are complementary.

This guide provides recommendations on air sampling to meet the requirements of 10 CFR Part 20. Draft NUREG-1400, "Air Sampling in the Workplace,"[1] provides examples, methods, and techniques that the licensee may find useful for implementing the recommendations in this guide. However, NUREG-1400 does not establish regulatory positions or recommendations and should not be used as a compliance document to establish the adequacy of licensee programs.

C. REGULATORY POSITION

1. EVALUATING THE NEED FOR AIR SAMPLING

The implementation of some sections in 10 CFR Part 20 may require air sampling. This section of this guide provides recommendations on when and what type of air sampling is acceptable to meet the Part 20 requirements.

1.1 When To Evaluate the Need for Air Sampling

As a general rule, any licensee who handles or processes unsealed or loose radioactive materials in quantities that during a year will total more than 10,000 times the ALI for inhalation should evaluate the need for air sampling. (If the same material is used repeatedly, multiply the quantity used by the number of times used.) If more than one radioactive material is used, the need for air sampling should be determined by whether the sum of the quantities of each divided by each respective ALI exceeds 10,000. When quantities handled in a year are less than 10,000 times the ALI, air sampling generally is not needed. (The basis for this value is that experience has shown that worker intakes are unlikely to exceed one one-millionth of the material being handled or processed, as discussed in NUREG-1400.)

1.2 Air Sampling Based on Potential Intakes and Concentrations

The extent of air sampling may be based on estimates of worker intakes and on estimated airborne concentrations of radioactive materials as shown in Table 1. Estimates of potential intakes and concentrations should be based on historical air sampling or bioassay data if these data are available. If the data are not available, potential intakes and concentrations should be estimated. Estimates of intakes and concentrations should be based on a consideration of (1) the quantity of radioactive material being handled, (2) the ALI of the material, (3) the release fraction for the radioactive material based on its physical form and use, (4) the type of confinement for the material, and (5) other factors appropriate for the specific facility. The estimated prospective intake provides only a guide to the appropriate types of air sampling. The radiation safety officer should use professional judgment and experience to perform air sampling appropriate for the specific situation.

1.3 Grab vs. Continuous Air Sampling

Air sampling may be continuous during work hours or intermittent (grab samples taken during part of the work). When continuous sampling during the work day is performed for continuous processes, a weekly sample exchange period is generally acceptable (except for very short-lived radionuclides). Longer sample exchange periods may be appropriate if airborne radioactive material concentrations and nuisance dust concentrations are both relatively low. When grab sampling is performed for continuous processes, a weekly sampling frequency is generally acceptable; however, monthly or quarterly sampling may be acceptable for areas in which concentrations of airborne radioactive material are expected to average below a few percent of the DAC. Grab sampling would also be appropriate when operations are conducted on an intermittent basis.

1.4 Air Sampling When Respiratory Protective Equipment Is Used

Air sampling is required by 10 CFR 20.1703(a)(3)(i) to evaluate airborne hazards whenever respiratory protective equipment is used to limit intakes pursuant to 10 CFR 20.1702. Air samplers that are located to determine worker intake are

[1] Single copies of draft NUREG-1400 are available free, to the extent of the supply. Submit a written request to the Office of Administration, Distribution and Mail Services Section, U.S. Nuclear Regulatory Commission, Washington, DC 20555. A final version of NUREG-1400 is being developed and should be published in 1993.

Table 1
Air Sampling Recommendations Based on Estimated Intakes and Airborne Concentrations

Worker's estimated annual intake as a fraction of ALI	Estimated airborne concentrations as a fraction of DAC	Air sampling recommendations
< 0.1	< 0.01	Air sampling is generally not necessary. However, monthly or quarterly grab samples or some other measurement may be appropriate to confirm that airborne levels are indeed low.
	> 0.01	Some air sampling is appropriate. Intermittent or grab samples are appropriate near the lower end of the range. Continuous sampling is appropriate if concentrations are likely to exceed 0.1 DAC averaged over 40 hours or longer.
> 0.1	< 0.3	Monitoring of intake by air sampling or bioassay is required by 10 CFR 20.1502(b).
	> 0.3	A demonstration that the air samples are representative of the breathing zone air is appropriate if (1) intakes of record will be based on air sampling and (2) concentrations are likely to exceed 0.3 DAC averaged over 40 hours (i.e., intake more than 12 DAC-hours in a week).
Any annual intake	> 1	Air samples should be analyzed before work resumes the next day when potential intakes may exceed 40 DAC-hours in 1 week. When work is done in shifts, results should be available before the next shift ends. (Credit may be taken for protection factors if a respiratory protection program is in place.)
	> 5	Continuous air monitoring should be provided if there is a potential for intakes to exceed 40 DAC-hours in 1 day. (Credit may be taken for protection factors if a respiratory protection program is in place.)

acceptable for this purpose. If the worker's job activity will be the main source of airborne radioactive material, the sampling should be done during the activity, not prior to the activity.

1.5 Prompt Analysis of Certain Samples

In situations in which there is a potential for intakes to exceed 40 DAC-hours in a week, air samples should be analyzed promptly on a daily basis. (In evaluating the need for prompt analysis, credit may be taken for respirator protection factors if a respiratory protection program is in place.) Sample results should be available before work resumes the following day. When work is done in shifts, results should be available before the next shift ends, preferably during the first half of the next shift. For special or nonroutine operations, an attempt should be made to have analysis results available within one hour.

1.6 Continuous Air Monitoring

In situations in which there is a potential for accidents to cause intakes exceeding 40 DAC-hours in a day, continuous air monitoring should be done. When continuous air monitors with automatic alarms are used, the alarm set points should be set as low as practical for the work being conducted without causing excessive false alarms (e.g., more than once per quarter).If continuous air monitors with automatic alarms are used, check sources should be used weekly to check that the monitor responds and causes an alarm. Continuous check sources may also be used, provided there is no interference with the radionuclide of interest. If the response is not within

± 20 percent of the normal response, the monitor should be repaired or recalibrated.

1.7 Establishing Airborne Radioactivity Areas

Air sampling with samplers located to determine worker intake may be used to determine whether an area is an airborne radioactivity area. Any room, enclosure, or area must be posted as an airborne radioactivity area if (1) concentrations of airborne radioactive materials are in excess of the DAC or (2) a worker in the area would be exposed to more than 12 DAC-hours in a week (10 CFR 20.1902 and 20.1003). To determine whether the concentration exceeds the DAC over the short term, the sample collection time should not exceed 1 hour. Shorter sample collection times may be used if desired, but they are not required.

Areas should not be posted as airborne radioactivity areas on the basis of unlikely accidents that might cause the DAC to be exceeded. An airborne radioactivity area should be established based on the radioactivity levels normally encountered or on levels that can reasonably be expected to occur when work is being performed.

1.8 Air Sampling vs. Bioassay for Determining Intakes

If sufficient data to determine a worker's intake are available from both air sampling and bioassay measurements and the results are significantly different, the licensee should base the worker's intake estimate on the data considered by the radiation protection staff to be the most accurate.

1.9 Substitutes for Air Sampling

If experience indicates that worker intakes are generally low, it may be acceptable to substitute other techniques in place of air sampling. For example, when working with tritium, iodine, or other materials that are easily and effectively detected by bioassay, it could be appropriate to eliminate all air sampling and rely completely on bioassays to measure intakes and verify confinement.

2. LOCATION OF AIR SAMPLERS

Concentrations of airborne radioactive materials in a room are generally not uniform. Concentrations usually vary greatly from one location to another, sometimes by orders of magnitude even for locations that are relatively close. Therefore, the location of air samplers is important because inappropriately placed samplers can give misleading results.

This section applies only to fixed-location and portable samplers. It does not apply to personal (lapel) samplers.

2.1 Purpose of the Measurement

Before selecting a sampling location, the licensee should decide on the purpose of the measurement. Examples of purposes are (1) estimating worker intakes, (2) verifying that the confinement of radioactive materials is effective, (3) providing warning of abnormally high concentrations, (4) determining whether there is any leakage of radioactive materials from a sealed confinement system, and (5) determining whether an airborne radioactivity area exists.

2.2 Determination of Airflow Patterns

Airflow patterns should be determined in order to locate air samplers appropriately. The locations of ventilation air inlets and exhausts and of sources of airborne radioactive materials should be noted in order to determine the predominant airflow patterns and likely radioactive material transport routes. When sampling air in rooms with complex airflow patterns, it may be useful to use smoke tubes or neutrally buoyant markers to determine airflow patterns.

When sampling air in an airborne radioactivity area to determine the intakes of workers whose intake must be monitored under 10 CFR 20.1502(b), smoke tubes or neutrally buoyant markers should be used to determine airflow patterns from the source to the worker's breathing zone. In some instances, the use of larger smoke sources or neutrally buoyant marker sources to observe airflow patterns is desirable. However, observations of airflow patterns should be omitted in areas of high external radiation exposure if making the observations would result in total worker doses (internal plus external) that are not as low as is reasonably achievable.

The airflow pattern determinations should be repeated if there are changes at the facility, including changes in locations of the individual work locations and seasonal variations that might change airflow patterns, or if there is a reason to suspect problems. The radiation protection staff should be aware of facility characteristics, operations, and changes that might change airflow patterns. In addition, the location of at least 10 percent of the fixed-location samplers should be evaluated annually to confirm that their locations are still appropriate.

2.3 Selecting Sampler Locations

Air samples should be collected in airflow pathways downstream of sources of airborne radioactive material.

When the purpose of the sample is to verify the effectiveness of confinement or to provide warning of elevated concentrations, the sampling point should be located in the airflow pathway near the release point. These samplers do not have to be placed near the worker's breathing zone, and thus concentrations

might be considerably different from the concentrations in the breathing zone. If the room has several widely spaced sources of airborne radioactive material, more than one sampling point may be needed.

When the purpose of sampling is to determine worker intakes, each frequently occupied work location should have its own sampler. The air samplers should be placed as close to the breathing zone of the worker as practical without interfering with the work or the worker. In addition, air flow patterns in the area should be considered in placing samplers so that the sampler is likely to be in the airflow downstream of the source and prior to or coincident with the location of the worker. An estimate should be made of the time the worker spends at the work location (unless personal air samplers are being used).

For hoods, glove boxes, and other similar enclosures used to contain radioactive material, air samplers may be installed slightly above head height and in front of the worker or they may be installed on the front face of the enclosure.

Normally, air samplers intended to measure workplace concentrations should not be located in or near exhaust ducts, because concentrations there will usually be diluted compared to concentrations in work areas. However, samplers may be located in ducts if their purpose is to detect leakage from systems that do not leak during normal operation and if quantitative measurements of workplace airborne concentrations are not needed.

3. DEMONSTRATION THAT AIR SAMPLING IS REPRESENTATIVE OF INHALED AIR

Section 20.1502(b) of 10 CFR Part 20 requires monitoring of the intake of any worker whose intake is likely to exceed 0.1 ALI. Section 20.1204 allows the use of air sampling, bioassay, or a combination of both to determine a worker's intake.

3.1 Need To Demonstrate that Air Sampling Is Representative of Breathing Zone Air

It should be demonstrated that the air sampled is representative of breathing zone air if all four of the following conditions are met: (1) monitoring of intake is required by 10 CFR 20.1502(b) because annual intake is likely to exceed 0.1 ALI, (2) the intake of record will be based on air sampling rather than bioassay, and (3) the exposure will occur in an airborne radioactivity area where airborne concentrations are likely to exceed 12 DAC-hours in a week, and (4) lapel samplers or samplers located within about 1 foot of the worker's head are not used. (The results from lapel samplers or samplers that are located within about 1 foot of the worker's head may be accepted as representative without further demonstration that the results are representative.)

3.2 Demonstration that Air Sampling Is Representative

Four methods may be used to demonstrate representativeness of the results from samplers that are not located within about 1 foot of the worker's head: (1) comparison with lapel sampler results (for this comparison, lapel samplers may be equipped with cyclones with an efficiency of at least 50 percent for particles with an aerodynamic equivalent diameter of 4 micrometers if the particles sampled are solubility class W or Y),[2] (2) comparison with bioassay results, (3) comparison using multiple measurements near the breathing zone, and (4) comparison with quantitative airflow tests.

Table 2 describes the application of each of the methods and includes acceptance criteria for determining whether sampling results may be considered representative.

3.3 Corrective Actions if Sampling Results Are Not Representative

If the method used to demonstrate representativeness does not show that the sampling results are representative, the licensee should analyze the situation, determine the likely cause of the problem, and fix the problem. The licensee should also correct intake estimates made within the last year and subsequent to the previous demonstration of representativeness. To fix the problem, it may be appropriate to relocate samplers to be more representative, apply correction factors to correct sampling results, switch to lapel sampling, or use bioassay measurements to determine intakes.

4. ADJUSTMENTS TO DERIVED AIR CONCENTRATIONS

NRC regulations in 10 CFR 20.1204(c) permit, upon prior approval of the NRC, the adjustment of DACs to reflect the actual physical and chemical characteristics of airborne radioactive materials.

4.1 Adjusting DACs Based on Measurements of Particle Size

If the licensee elects to request approval to adjust DACs based on measured activity median aerodynamic diameters of airborne particles, the following information should be submitted:

1. The need for the adjustment.
2. The radioactive materials involved and either their chemical form (if the chemical

[2]American Conference of Governmental Industrial Hygienists, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, Notice of Intended Changes: Appendix D—Particle Size Selective Sampling Criteria for Airborne Particulate Matter, 1991. The 4-micrometer criterion is also in the process of being adopted by the International Standards Organization (ISO) and the European Standardization Committee (CEN).

Table 2
Methods To Demonstrate the Representativeness of Air Sampling

Method	Description
1. Comparison with lapel samplers	*Include:* Workers whose annual intakes must be monitored under 10 CFR 20.1502(b) because intakes are likely to exceed 10% of an ALI and whose dose of record will be based primarily on air sampling. *Comparison:* Compare intakes measured by air sampling with intakes measured by lapel samplers for at least 1 week for continuous operations or for several operations for repeated short-duration operations. *Acceptance criteria:* The ratio of the intakes calculated from air sampling divided by the intakes calculated from lapel samplers should exceed 0.7 when averaged for all workers included in the comparison. The ratio for each individual worker should exceed 0.5. (The values of 0.7 and 0.5 were selected so that the accuracy of intakes based on air sampling would be compatible with the accuracy expected of external radiation dosimeters.)
2. Comparison with bioassay results	*Include:* Workers whose annual intakes must be monitored under 10 CFR 20.1502(b) because intakes are likely to exceed 10% of an ALI and whose dose of record will be based primarily on air sampling. *Comparison:* Compare the sum of the intakes determined from air sampling with the sum of the intakes calculated from those bioassay measurements. *Acceptance criteria:* The ratio of the sum of the intakes calculated from air sampling divided by the sum of the intakes calculated from bioassay measurements should exceed 0.7 when averaged for all workers included in the comparison. The ratio for each individual worker should exceed 0.5 for each individual worker.
3. Comparison with multiple samplers	*Include:* Work locations at which airborne concentrations are likely to exceed 0.3 DAC and that are generally occupied by workers whose intakes must be monitored and whose dose of record will be based on air sampling. *Comparison:* Use multiple samplers to take measurements at four or more locations around the worker's head. *Acceptance criteria:* The concentration determined by the fixed-location sampler divided by the concentration averaged for all the multiple samplers should exceed 0.7 for the work location.
4. Comparison with quantitative airflow measurements	*Include:* Work locations at which airborne concentrations are likely to exceed 0.3 DAC that are generally occupied by workers whose intakes must be monitored and whose dose of record will be based on air sampling. *Comparison:* Release a tracer material near the source release point. Measure its concentration with the fixed-location sampler and with another sampler placed closed to the worker's head. *Acceptance criteria:* The concentration measured by fixed-location sampler divided by the concentration of the sampler placed close to the worker's head should exceed 0.7.

compounds are listed in Appendix B of Part 20) or their solubility classes (D, W, or Y). Describe how the chemical forms or solubility classes were determined.

3. A graph of the adjusted DAC vs. activity median aerodynamic diameter.

4. The method by which the activity median aerodynamic diameter will be measured.

5. The locations at which the measurements will be made.

6. The frequency of measurements.

7. Methods or techniques that will be used to average results by location or time.

The following locations and frequency of measurements are acceptable to the NRC. For an initial determination of the adjustment, the licensee should take the average of three measurements of the activity median aerodynamic diameter at or near each work location or process. The licensee should then determine whether the entire area or room can be represented by a single activity median aerodynamic diameter or whether the area or room should be divided into areas with different particle sizes. After the initial determination of median diameter in each area of the workplace has been made, the licensee should reassess the median diameters by making another measurement at approximately one-quarter of the work locations at 6-month intervals, selecting different locations each time. However, if two consecutive reassessments do not show a substantial change in the median diameter, reassessments may be annual. Reassessments should also be done after there have been process changes likely to affect the size distribution of particles. If the activity median aerodynamic diameter has changed, the median diameter for the area should either be reassessed or replaced with a default value of 1 micrometer.

If the licensee elects to adjust the DAC based on the size distribution for short-duration operations, such as special maintenance jobs, at least one measurement should be made each time the job is done. In the event of abnormal or accident conditions, the median diameter for normal operating conditions may be assumed for intake assessments.

4.2 Using Cyclones To Adjust Measured Airborne Concentrations

If the licensee elects to request approval to use cyclones or other particle size discrimination samplers to adjust the measured airborne concentrations, the following information should be submitted:

1. The need for the adjustment.

2. The radioactive materials involved and their chemical form (relative to the chemical forms listed in Appendix B to Part 20) or solubility class (D, W, or Y).

3. A description of how the chemical form or solubility class was determined.

4. The type of cyclone, the type of sampler, the air flow rate, and the collection efficiency of 4 micrometer particles at the flow rate that will be used.

5. A list of locations or worker areas that will be sampled using cyclones.

In general, this method is suitable for solubility class W and Y compounds but not solubility class D compounds. Cyclones should have an efficiency of at least 50 percent for particles with an aerodynamic diameter of 4 micrometers.[2]

4.3 Adjusting DACs for Solubility

NRC regulations in 10 CFR 20.1204(c) permit, upon prior approval of the NRC, the adjustment of the DAC based on chemical characteristics. If the licensee elects to request approval to adjust DACs based on particle solubility in the human body, the following information should be submitted:

1. The need for adjustment.

2. A description of how the solubility of the material was determined.

3. A description of how the adjusted DAC was determined.

4. The number and frequency of measurements. (A frequency of at least annually is recommended.)

5. MEASURING THE VOLUME OF AIR SAMPLED

The accuracy of air sampling measurements and the calibration of air sampling instruments is not explicitly dealt with in Part 20. However, it is implied that measurements required by Part 20 must be suitably accurate. This section of the guide describes acceptable methods to determine the volume of air to be sampled to ensure suitable accuracy.

5.1 Means To Determine Volume of Air Sampled

All air samplers to be used for quantitative measurements should have a means to determine the volume of air sampled. This recommendation applies to fixed-location samplers, portable samplers, and lapel samplers.

5.2 Calibration Frequency and Methods

The licensee should calibrate airflow meters at least annually. Additional calibrations should be

performed after repairs or modifications to the meter or if the meter is believed to have been damaged. The methods described in Section F of "Air Sampling Instruments"[3] to calibrate airflow meters are acceptable to the NRC staff.

5.3 Uncertainty

The uncertainty in the volume of air sampled should be less than 20 percent. The uncertainty, U_v, in percent may be calculated from the equation:

$$U_v = [U_s^2 + U_c^2 + U_t^2]^{1/2}$$

where:

U_s = the percent uncertainty in reading the meter scale

U_c = the percent uncertainty in determining the calibration factor

U_t = the percent uncertainty in the measurement of the sampling time.

5.4 Inleakage

Air samplers and associated sampling lines should be checked for leakage of air into the sampling line upstream of the flow measurement device when they are calibrated for volume of air sampled.

5.5 Change in Flow Rate

If the flow rate changes by more than ± 10 percent during collection of a sample, a correction should be made by averaging the initial and the final flow rates.

6. EVALUATION OF SAMPLING RESULTS

6.1 Detecting Changes in Air Concentrations Over Time

For fixed-location sampling whose purpose is to confirm confinement of radioactive materials for routine or repeated operations, the results should either (1) be analyzed for trends (for example, by control charts) to determine whether airborne concentrations are within the normal range and administrative and engineering controls are thus operating properly to maintain occupational doses as low as is reasonably achievable or (2) be compared with administrative action levels that serve as a basis for determining when confinement is satisfactory.

6.2 Efficiency of Collection Media

If the efficiency of the collection media (such as filters) for an air sample is less than 95 percent for the material being collected, the sample result should be corrected to account for radioactive material not collected by the collection media. If penetration of radioactive material into the collection media or self-absorption of radiation by the material collected would reduce the count rate by more than 5 percent, a correction factor should be used.

6.3 Detection Sensitivity

The 10 CFR Part 20 monitoring criteria (i.e., 10 percent of the limit) do not establish required levels of detection sensitivity (lower level of detection, minimum detectable activity, minimum detectable concentration, etc.). For example, lapel samplers may not be able to detect uranium concentrations of 10 percent of the DAC, but lapel samplers are still acceptable for measuring the uranium intake of workers. The monitoring criteria should not be considered requirements on the sensitivity of a particular measurement because when the results of multiple measurements are summed, the sum will have a greater statistical power than the individual measurements. However, to achieve the greater statistical power, the licensee should record all numerical values measured, even values below "minimum detectable amounts" and values that are negative because the measured count rate is below the background. Results should not be recorded as "below MDA" or similar statements.

If the licensee desires to calculate the minimum detectable activity of a single sample (MDA), it may be calculated by use of the following equation:

$$MDA = \frac{2.71 + 3.29[R_b T_s(1 + T_s/T_b)]^{1/2}}{EKT_s}$$

where:

R_b = the background count rate

T_s = the sample counting time

T_b = the background (or blank) counting time

E = the filter efficiency

K = a calibration factor to convert counts per minute into activity (e.g., counts per minute per microcurie)

(The derivation of this equation is described in NUREG-1400.)

If the proportion of the total activity of a sample that is due to a specific radionuclide in a mixture is known, the MDA for that radionuclide should be reduced proportionally:

$$MDA_i = A_i/A \times MDA$$

where:

A_i/A = the proportion of the total sample activity from radionuclide i.

[3] 7th Edition, American Conference of Governmental Industrial Hygienists, 1989. Copies are available for purchase from the ACGIH, 6500 Glenway Avenue, Building D-7, Cincinnati, Ohio 45211.

6.4 Deposition of Particulates in Sampling Lines

If sampling lines are used for collecting airborne particulates, the lines should be as short as possible and should be made of a material not subject to significant static charge effects (e.g., grounded metal). However, up to several feet of flexible plastic tubing, such as tygon, may be used to connect the sampling line to the sample collector. The penetration of particles with an aerodynamic equivalent diameter of 10 micrometers should be at least 50 percent. DEPOSITION[4] software is an acceptable means of calculating penetration.

6.5 Annual Review of Air Sampling Measurements

Section 20.1101(c) of Part 20 requires that the licensee periodically (at least annually) review the radiation protection program content and implementation. The review of the air sampling component of the program should determine (1) whether the measurements are accurate and reliable and (2) whether changes should be made to improve the measurements. The review should be done annually and should cover the prior year's activities. The annual review of air sampling measurements may be combined with reviews of other aspects of the radiation protection program.

The annual review should include but not necessarily be limited to:

1. *Purposes and amount of air sampling:* Was the air sampling appropriate for the intended purposes? Was there too much or too little air sampling done?

2. *Location of Sampling:* Were fixed-location air samplers located properly? Were grab samples taken with proper regard to airflow patterns?

3. *Trends:* Do trends in air sampling results and worker intakes indicate that confinement of radioactive materials remains adequate? Were prospective estimates of intake reasonably accurate?

4. *Posting:* Is the posting of airborne radioactivity areas appropriate?

5. *Procedures:* Are written procedures still suitable and up to date?

6. *Adjustment of DACs:* Were DACs adjusted for particle size or solubility? If so, are the original adjustment factors still valid?

7. *Correction factors:* Were correction factors applied to air samples to determine worker intakes? If so, are the correction factors still valid?

8. *False alarms:* Was continuous air monitoring done? If so, did excessive false alarms occur?

9. *Representativeness:* For air sampling done to determine significant intakes, was the representativeness demonstrated to be adequate?

10. *Changes:* Have changes in air sampling procedures or equipment occurred that could affect the quality of the measurements? Have changes in the facility operation or equipment occurred that could affect the quality of air sampling measurements?

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plans for using this regulatory guide.

Except in those cases in which an applicant proposes acceptable alternative methods for complying with specified portions of the Commission's regulations, the methods described in this guide will be used in the evaluation of applications for new licenses, license renewals, and license amendments and for evaluating compliance with 10 CFR 20.1001–20.2401.

[4]N.K. Anand and A. R. McFarland, "DEPOSITION: Software for Characterizing Aerosol Particle Deposition in Sampling Lines," Draft NUREG/GR-0006, October 1991. Single copies are available free, to the extent of supply, upon written request to the Office of Information Resources Management, Distribution Section, U.S. Nuclear Regulatory Commission, Washington, DC 20555. A final version of NUREG/GR-0006 is being developed. For information on DEPOSITION software contact. Aerosol Technology Laboratory, Department of Mechanical Engineering, Texas A&M University, College Station, TX 77843, Attention: Dr. Andrew R. McFarland. Telephone (409) 845-2204.

REGULATORY ANALYSIS

A separate regulatory analysis was not prepared for this regulatory guide. The regulatory analysis prepared for 10 CFR Part 20, "Standards for Protection Against Radiation" (56 FR 23360), provides the regulatory basis for this guide and examines the costs and benefits of the rule as implemented by the guide. A copy of the "Regulatory Analysis for the Revision of 10 CFR Part 20" (PNL–6712, November 1988), is available for inspection and copying for a fee at the NRC Public Document Room, 2120 L Street, NW. (Lower Level), Washington, DC, as an enclosure to Part 20.

U.S. NUCLEAR REGULATORY COMMISSION

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REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 8.30
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HEALTH PHYSICS SURVEYS IN URANIUM MILLS

A. INTRODUCTION

Section 40.32, "General Requirements for Issuance of Specific Licenses," of 10 CFR Part 40, "Domestic Licensing of Source Material," states that the Commission will approve an application to operate a uranium mill if the applicant is qualified by reason of training and experience to be able to protect health and minimize danger to life and property and if the applicant's proposed equipment, facilities, and procedures are also adequate.

The following sections of 10 CFR Part 20, "Standards for Protection Against Radiation," of the Commission's regulations deal with the protection of mill workers: §20.201 requires adequate surveys, §20.101 limits worker exposure to external radiation, §20.103 limits exposure to airborne radioactive material in restricted areas, §20.202 requires personnel radiation dosimeters in certain instances, §20.203 requires posting of warning signs and controlling access to areas with high radiation levels, §20.401 requires records of radiation surveys and personnel monitoring reports, and §20.405 requires reports of overexposures.

This guide describes health physics surveys acceptable to the NRC staff for protecting uranium mill workers from radiation and the chemical toxicity of uranium while on the job. The guidance can also be applied, in part, to other types of uranium recovery facilities and portions of conversion facilities since some of the processes used in these facilities are similar to those in uranium mills.

The guide does not cover surveys to prevent the release of radioactive material to unrestricted areas or surveys to measure the exposure of the public to radioactive materials in effluents, except for surveys of the skin and clothing of workers leaving the mill and surveys of equipment and packages leaving the mill.

Any guidance in this document related to information collection activities has been cleared under OMB Clearance No. 3150-0019 and No. 3150-0013.

B. DISCUSSION

Regulatory Guide 3.5, "Standard Format and Content of License Applications for Uranium Mills," outlines the type of information that applicants for a uranium mill license should include in their applications and suggests a uniform format for presenting that information. This regulatory guide describes occupational health physics (radiation protection) surveys acceptable to the NRC licensing staff that an applicant may use for describing surveys in Section 5.5, "Radiation Safety," in Regulatory Guide 3.5.

The contents of this guide are based to a significant extent on NRC's current licensing practice. The contents of this guide are also based to a large extent on the International Atomic Energy Agency (IAEA) "Manual of Radiological Safety in Uranium and Thorium Mines and Mills" (Ref. 1). The NRC is also developing a report on occupational radiological monitoring at uranium mills that will describe how many of the surveys in this guide can be performed properly. That report will be available in late 1983.

The subjects of respiratory protection, uranium bioassay, and programs for maintaining occupational exposures to radiation as low as reasonably achievable are not included in this guide. Those subjects are covered in Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection," Regulatory Guide 8.22, "Bioassay at Uranium Mills," and Regulatory Guide 8.31, "Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills Are As Low As Is Reasonably Achievable."

C. REGULATORY POSITION

1. SURVEYS

1.1 Surveys for Airborne Uranium Ore Dust

Surveys for airborne uranium ore dust are necessary (1) to demonstrate compliance with the quarterly intake

limits for workers specified in §20.103(a) of 10 CFR Part 20, (2) to meet the posting requirements for airborne radioactivity areas in §20.203(d), (3) to determine whether precautionary procedures such as process or other engineering controls, increased surveillance, limitation on working times, provision of respiratory protective equipment, or other precautions should be considered to meet §§20.103(b)(1) and (b)(2), and (4) to determine whether exposures to radioactive materials are being maintained as low as is reasonably achievable as stated in §§20.1(c) and 20.103(b)(2).

The concentration applicable to limiting exposure to airborne uranium ore dust in restricted areas is given in paragraph 4 of the Note to Appendix B, "Concentrations in Air and Water Above Natural Background," of Part 20. If gross alpha counting of the air sample is performed, concentration is 1×10^{-10} microcuries (μCi) of alpha activity per milliliter (ml) of air. This concentration applies to the alpha emissions of uranium-238, uranium-235 (negligible), uranium-234, thorium-230, and radium-226. If chemical separation of uranium followed by alpha counting, alpha spectrometry, or fluorometric procedures are used to determine the uranium concentration alone, the concentration is 5×10^{-11} μCi of uranium per ml of air. In mass units the concentration is 75 micrograms (μg) of natural uranium per cubic meter of air.* The uranium ore dust concentration is applicable to areas where ore is handled prior to chemical separation of the uranium from the ore. Where the ore crushing and grinding circuits, chemical leaching areas, and yellowcake areas are physically isolated from each other, the ore dust concentration obviously applies to the ore handling areas.

Where ore handling and yellowcake processing are not physically isolated from each other, the concentration value of 1×10^{-10} μCi/ml may be used provided that gross alpha counting is performed. For other methods of analysis that include only measurements of uranium it is necessary to determine the fraction of the alpha activity that is due to ore dust. For example, in a mill that produces little ore dust because it has a wet ore grinding process but has significant emissions from yellowcake processing equipment, the natural uranium concentration of 1×10^{-10} μCi of natural uranium per ml of air (or 200 μg of soluble natural uranium/m^3**) may be applicable throughout the plant. To know when uranium ore dust concentrations are sufficiently low to allow use of this limit for natural uranium, paragraph 5 of the Note to Appendix B to Part 20 should be consulted. If uranium ore dust concentrations are below 10% of the applicable concentration value in Appendix B of Part 20 (i.e., below 5×10^{-12} μCi/ml), uranium ore dust may be considered to be not present, and the appropriate value for natural uranium (1×10^{-10} μCi/ml) may be used instead. If ore dust concentrations exceed 10% of the Appendix B value, the airborne mixture may either be considered entirely ore dust (for which the concentration value of 5×10^{-11} μCi/ml applies) or a new concentration value for the mixture, MPC_m, may be calculated using the following equation:

$$MPC_m = \left[\frac{f_{nu}}{MPC_{nu}} + \frac{f_{od}}{MPC_{od}} \right]^{-1}$$

where:

MPC_{nu} = regulatory concentration value for natural uranium

MPC_{od} = regulatory concentration value (in radiometric units) for natural uranium in ore dust

f_{nu} = fraction of alpha activity from natural uranium as yellowcake, i.e., $C_{nu}/(C_{nu} + C_{od})$

f_{od} = fraction of alpha activity from natural uranium in ore dust, i.e., $C_{od}/(C_{nu} + C_{nu})$

Since this equation would only be used with the 5×10^{-11} μCi/ml value of C_{od}, f_{od} is calculated as the fraction of the uranium alpha activity only. This equation was derived from, and is thus equivalent to, the inequality shown in paragraph 1 of the Note to Appendix B, 10 CFR Part 20 (see Appendix A of this guide).

In areas that are not "airborne radioactivity areas," an acceptable sampling program for airborne uranium ore dust includes monthly grab samples of 30-minutes duration in worker-occupied areas while ore is being actively handled. As an alternative, weekly grab samples of 5-minutes duration each using a high-volume sampler (roughly 30 cfm) are acceptable as long as the licensee can demonstrate that the volume sampled is accurately known. The quantity of air sampled and the method of analysis should allow a lower limit of detection (LLD) of 5×10^{-12} μCi of natural uranium per ml of air (or 7.5 μg of uranium per m^3 of air). Appendix B to this guide shows how to calculate the LLD when a fluorometric analysis for uranium is used. If any area is an "airborne radioactivity area," as defined in §20.203(d), 30-minute samples should be taken weekly if workers occupy the area. Outdoor areas such as the ore pad should be sampled quarterly.

Only ore dust samples representative of the air inhaled by the workers present are acceptable. Samples taken at a height of about 3 to 6 feet between the source and the worker are normally considered representative. Samples should be taken while normal ore handling is taking place. The state of operation of major equipment during sampling should be recorded. In large rooms, several locations should be sampled. Special breathing zone sampling (lapel sampling or other sampling of the immediate breathing zone of a particular worker) is not necessary for ore dust.

*Micrograms of uranium can be converted to microcuries by using the specific activity of natural uranium: 6.77×10^{-7} μCi/μg.

**The primary standard for airborne soluble natural uranium is 200 $\mu g/m^3$. Multiplying that value by 6.77×10^{-7} μCi/μg gives 1.35×10^{-10} μCi/ml. This is rounded down to give the Appendix B concentration of 1×10^{-10} μCi/ml.

During the first year of operation, new mills will need a more extensive air sampling program than operating mills to determine what locations provide measurements of the concentration representative of the concentration to which workers are exposed.

Sample analysis should usually be completed within two working days after sample collection. Unusual results should be reported promptly to the Radiation Safety Officer (RSO).*

Regulatory limits on the intake of ore dust are discussed in Section C.3 of this guide.

1.2 Surveys for Airborne Yellowcake

It is generally accepted that uranium dissolved in the lung or absorbed by the gastrointestinal tract enters the bloodstream and is excreted or distributed to various body organs. The rate of dissolution for yellowcake appears to depend on its temperature history. Yellowcake dried at low temperature, which is predominantly composed of ammonium diuranate, dissolves more quickly than yellowcake dried at higher temperature; and a relatively large fraction is rapidly transferred to kidney tissues (Refs. 2-4). If the intake of such yellowcake is controlled to protect the kidney from the chemical toxicity of uranium, radiological protection criteria for natural uranium will also be satisfied. For purposes of compliance with 10 CFR Part 20, yellowcake undried or dried at low temperature should be classified as soluble.

Yellowcake dried at high temperature is a mixture of compounds, which contains a major portion of more insoluble uranium oxides. Radiation dose to the lung and other organs is the limiting consideration rather than chemical toxicity primarily due to the large insoluble component. For compliance purposes, yellowcake dried at 400°C and above should be classified as insoluble (Refs. 5 and 6).

Solubility classification is important with respect to compliance with the Commission's weekly intake regulations for soluble uranium. Paragraph 20.103(a)(2), in connection with footnote 4 of Appendix B to Part 20, imposes a weekly intake limit of 0.0065 μCi (9.6 mg) for soluble uranium. If this limit is exceeded during a calendar week, an overexposure has occurred.** A weekly overexposure limit is imposed because hazardous conditions must be corrected quickly where chemical toxicity to the kidney may be involved.

Solubility classification is not an important consideration from the viewpoint of complying with the Commission's quarterly intake limits for natural uranium. Paragraph 20.103(a)(1), footnote 3, requires that every quarterly intake limit be calculated as the product of the Appendix B, Column 1 concentration and the constant 6.3×10^8 ml (which is the assumed number of milliliters of air inhaled by a worker, while on the job, during one calendar quarter). The concentration value for either soluble or insoluble natural uranium is 1×10^{-10} μCi/ml of air. Thus, the quarterly intake limit for any type of yellowcake is 0.063 μCi (approximately 93 mg) of uranium.* If this value is exceeded, an overexposure has occurred.

The regulations for insoluble uranium do not contain overexposure limits based on the weekly intake. However, a weekly control measure is specified in §20.103(b)(2), which is applicable to insoluble natural uranium, such as yellowcake dried at high temperature. It is not a violation of the NRC's regulations if a worker's intake of insoluble uranium exceeds the equivalent of 40 hours at a concentration of 1×10^{-10} μCi/ml in any period of seven consecutive days, for a single time. However, failure to make an evaluation of an occurrence, take appropriate actions to ensure against recurrence, and maintain the required records is a violation of §20.103(b)(2).

Thus, surveys for airborne yellowcake are necessary to demonstrate compliance with the weekly and quarterly intake limits in §§20.103(a)(1) and (a)(2). Surveys are also necessary to establish the boundaries of airborne radioactivity areas and to determine whether surveillance, limitation on working times, provisions of respiratory equipment, or other precautions should be considered in compliance with §20.103(b).

The recommended survey program for yellowcake uses a combination of general air sampling and breathing zone sampling during operations that may involve considerable intake such as those that require a special work permit.

Grab samples for yellowcake with a duration of 30 minutes should be performed weekly in airborne radioactivity areas and monthly in areas not designated as airborne radioactivity areas. As an alternative, weekly grab samples of 5-minutes duration using a high-volume sampler (roughly 30 cfm) are acceptable in areas that are not airborne radioactivity areas instead of monthly 30-minute samples as long as the licensee can demonstrate that the volume of air sampled is accurately known. The increased duration of surveys in airborne radioactivity areas should be performed to meet the requirement in §20.103(b)(2) for increased surveillance in such areas.

Breathing zone sampling for specific jobs should be used to monitor intakes of individual workers doing special high-exposure jobs if the special jobs are likely to involve more than 10 MPC-hours** in any one week. An example of a job during which such breathing zone sampling may be used is maintenance of yellowcake drying and packaging equipment.

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* The title "Radiation Safety Officer" is used by many licensees and, in this guide, means the person responsible for conducting health physics survey programs; other titles are equally acceptable.

** In connection with the 0.0065 μCi weekly limit and the 0.063-μCi quarterly limit, note that 0.0065 multiplied by 13 does not yield 0.063, as would normally be expected. The reason is as follows. The 0.0065 μCi weekly limit is derived from the 200-$\mu g/m^3$ value specified in footnote 4 of Appendix B. The 0.063-μCi quarterly limit is derived from the 1×10^{-10} μCi/ml value from Column 1, Appendix B. The 1×10^{-10} value contains a roundoff error that essentially accounts for the anomaly.

* 1×10^{-10} μCi/ml $\times$ 6.3×10^8 ml/quarter = 0.063 μCi/quarter. 0.063 μCi $\div$ 6.77×10^{-7} μCi/μg = 9.3×10^4 μg = 93 mg.

** MPC is the acronym for maximum permissible concentration.

Samples should be representative of the air inhaled by the workers. The state of operation of major equipment during sampling should be recorded.

The quantity of air sampled and the method of analysis should allow a lower limit of detection of at least 1×10^{-11} μCi/ml (10% of the Part 20, Appendix B concentration). Appendix B to this guide shows a calculation of the LLD.

Sample analysis should usually be completed within 2 working days after sample collection to permit prompt corrective action if needed. Unusual results should be reported promptly to the RSO.

1.3 Surveys for Radon-222 and Its Daughters

In uranium mills, significant concentrations in air of radon-222 and its daughters may occur near ore storage bins and crushing and grinding circuits or anywhere large quantities of ore are found, particularly dry ore. In addition, any poorly ventilated room can have high radon* daughter concentrations even if large quantities of ore are not present.

NRC regulations permit measurements of concentrations of either radon itself or the radon daughters. Thus either type of measurement is acceptable. However, at uranium mills, measurements of daughters are considered by the staff to be more appropriate. Measurements of radon daughter concentrations are more appropriate because radon daughter concentrations are both easy to measure and because radon daughter concentrations are the best indicator of worker dose. The dose from radon will be negligible in comparison with the dose from radon daughters (Ref. 7, p. 78, and Ref. 8).

Monthly measurements of radon daughter concentrations should be made where radon daughters routinely exceed 10% of the limit or 0.03 working level (i.e., the radon daughter concentrations are considered to be present according to paragraph 5 of the Note to Appendix B to Part 20). If radon daughter concentrations are normally greater than 0.08 working level (25% of limit) or radon concentrations are above 8×10^{-9} μCi/ml (8 pCi/l), the sampling frequency should be increased to weekly. Sampling should continue to be performed weekly until four consecutive weekly samples indicate concentrations of radon daughters below 0.08 working level or radon below 8×10^{-9} μCi/ml (8 pCi/l). After that radon daughter surveys may be resumed on a monthly basis.

Quarterly sampling for radon daughters should be made where previous measurements have shown the daughters are not generally present in concentrations exceeding 0.03 working level (10% of the limit) but where proximity to sources of radon daughters might allow them to be present. For example, quarterly measurements might be appropriate for a shop area attached to the crushing and grinding circuit building.

Radon daughter samples should be representative of worker exposures. Samples should be taken near locations where workers are most often present. The state of operation of major equipment during sampling and the time of day the sample was taken should be recorded.

The lower limit of detection for radon daughter measurements should be 0.03 working level so that concentrations defined as being present in paragraph 5 of the Note to Appendix B to Part 20 can be detected. Appendix B of this guide shows how to calculate the LLD for a radon daughter measurement. Measured values less than the lower limit of detection, including negative values, should still be recorded on data sheets. The lower limit of detection is set high enough to provide a high degree of confidence that 95% of the measured values above the LLD truly represent radon daughters and are not "false positive" values. However, the most accurate average for a sampling location is obtained by averaging all representative values, including values obtained that are below the lower limit of detection.

The modified Kusnetz method for measuring radon daughter working levels is a suitable method for uranium mills. The procedure consists of sampling radon daughters on a high efficiency filter paper for 5 minutes and, after a delay of 40 to 90 minutes, measuring the alpha counts on the filter during a 1-minute interval. The original Kusnetz method measured the alpha count rate. In the modified Kusnetz method, the rate meter is replaced by a scaler. This improves the sensitivity to a practical lower limit of 0.03 working level for a 1-minute count on a 10-liter (0.01 cubic meter) sample. This is about a factor of 10 lower than that originally obtained using the original Kusnetz method. A 4-minute count gives a lower limit of about 0.003 working level (Ref. 1). High efficiency membrane or glass fiber filters should be used to minimize loss of alpha counts by absorption in the filter. However, a correction factor to account for alpha absorption in the filter paper should still be used. Care should be taken to avoid contamination of the alpha counter.

The modified Kusnetz method is discussed in more detail in References 1 and 9. Other acceptable methods discussed in Reference 1 are the original Kusnetz method with greater than 10 liters of air sampled, the modified Tsivoglou method, and the Rolle method. The modified Tsivoglou method is slightly more accurate but is also more complicated than the modified Kusnetz method. The Rolle method is quicker than the Kusnetz method, but is less sensitive. Alpha spectroscopy yields acceptable results, but the instruments are expensive and fragile and lack portability. Recently, "instant working level" meters have been developed, which have the advantage of speed. These are also acceptable if an LLD of 0.03 working level can be achieved.

1.4 Surveys for External Radiation

Most, but not all, mill workers receive external gamma radiation doses of less than 1 rem per year (Ref. 1). Gamma

*The term "radon" used in this guide means "radon-222."

radiation exposure rates are generally below 1 milliroentgen per hour (mR/hr) in contact with incoming ore and are about 1.2 mR/hr in contact with fresh yellowcake (Ref. 1). During the buildup of the uranium daughters thorium-234 and protactinium-234 in fresh yellowcake, the radiation levels increase somewhat for several months following yellowcake production.

Gamma radiation surveys should be performed semiannually throughout the mill at locations representative of where workers are exposed in order to allow determination of "radiation area" boundaries in accordance with §20.203(b) and to determine external radiation dosimetry requirements, in accordance with §20.202. At new mills, a gamma radiation survey should be performed shortly after plant operation starts.

If the semiannual survey reveals any areas accessible to personnel where the gamma exposure rates are high enough that a major portion of the body of an individual could receive a dose in excess of 5 mrem in any hour or a dose in excess of 100 mrem in any 5 consecutive days, the area must be designated a "radiation area," as defined in §20.202(b)(2). For example, if the maximum time any individual worker spends in a room in a 5-day period is 40 hours, the room will be a "radiation area" if the exposure rate exceeds 2.5 mR/hr. Few mills will have radiation dose rates this high, but such dose rates have been found where radium-226 builds up in part of the circuit.

The survey frequency in radiation areas should be quarterly. Survey measurements should be representative of where workers might stand so that their whole-body radiation exposures can be estimated. Thus, measurements should generally be made at about 12 inches from the surfaces.* Use of surface "contact" exposure rate measurements are not required for establishing radiation area boundaries or estimating personnel whole-body exposures because these exposures would not be representative of the exposures workers would receive.

A list of the radiation levels in each area of the plant should be prepared after each survey. The number of areas on the list should be held to a manageable number. In general, a minimum of 20 survey locations is necessary to characterize the radiation levels in the mill.

To determine the need for personnel monitoring, quarterly radiation exposures expected for each category of plant worker should be calculated from the measured radiation levels and predicted occupancy times. If the calculated quarterly gamma ray dose for any individual worker exceeds 0.31 rem, §20.202 of 10 CFR Part 20 requires that the worker wear a personnel radiation dosimeter (e.g., film badge or TLD). In addition, personnel monitoring should be used for at least a 1-year period to verify the survey results even if predicted levels are below 0.31 rem. When feasible, the personnel monitoring results should be correlated with the gamma survey results as a cross-check on each.

In addition to gamma surveys, beta surveys of specific operations that involve direct handling of large quantities of aged yellowcake are advised to ensure that extremity and skin exposures for workers who will perform those operations are not unduly high. Beta surveys should be used to determine the need for protective clothing for these operations (e.g., thick rubber gloves). Beta surveys should also be used to determine if procedures could be changed to reduce beta dose while still allowing the worker to do the operation efficiently. Because of these needs, beta dose rates, unlike gamma dose rates, are usually measured on the surface and at short distances rather than at 12 inches. Beta surveys need be done only once for an operation but should be repeated for an operation any time the equipment or operating procedure is modified in a way that may have changed the beta dose that would be received by the worker.

The beta dose rate on the surface of yellowcake just after separation from ore is negligible, as shown in Figure 1; but this dose rate rises steadily thereafter. The beta dose rate from yellowcake aged for a few months after chemical separation from the ore so that equilibrium with protactinium-234 and thorium-234 has been reached is about 150 mrem/hr (Ref. 10). Figure 2 shows the beta dose rate from aged yellowcake as a function of distance from the surface (Ref. 10). The diameter of the yellowcake source used to measure the dose rates shown in Figure 2 was 9.5 cm. Rubber work gloves (thickness: 0.04 cm or 50 mg/cm^2) will reduce the beta dose to the hands from aged yellowcake by about 15%. Extremity monitoring is required by §20.202(a) for any worker whose hand dose would exceed 4.68 rems in a quarter.

In the case of beta surveys, it is usually acceptable to substitute evaluations of beta doses based on Figures 1 and 2 in place of surveys using radiation survey instruments.

It should be noted that commercially available film badge and TLD services often have not been able to measure beta radiation in the mixed beta-gamma field of a uranium mill (see, for example, Tables A-11 and A-12 of Reference 11 and Tables 6 and 9 of Reference 12). Workers' beta doses should be estimated from the beta surveys described above rather than from personnel monitoring reports.

1.5 Surveys for Surface Contamination

NRC regulations provide no specific limit on surface contamination levels in restricted areas. However, yellowcake or ore dust lying on surfaces can become resuspended and contribute to the intake of radionuclides, which is limited by §20.103(a).

In ore handling areas, surface contamination is not a problem because of the very low specific activity of the ore. In fact, cleanup attempts by methods such as sweeping are

*See § 20.204(a) and Item 6(a) of Regulatory Guide 10.6, "Guide for the Preparation of Applications for Use of Sealed Sources and Devices for Performing Industrial Radiography."

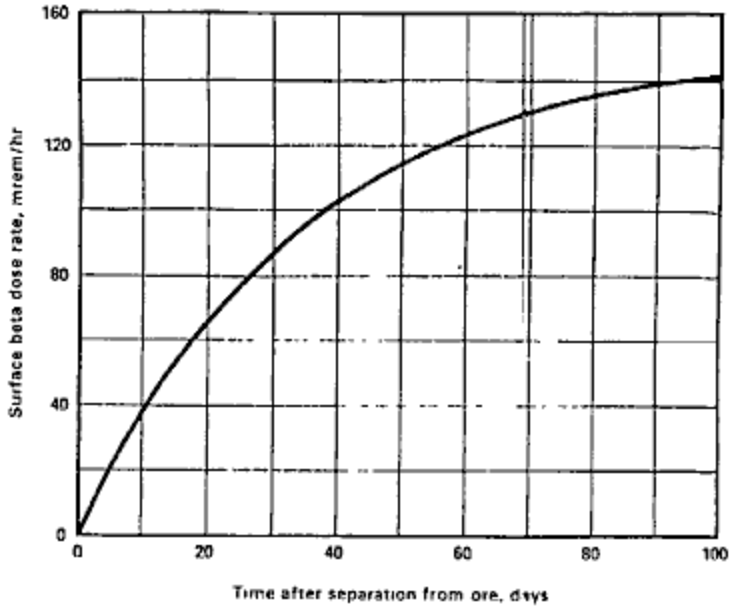

FIGURE 1. BETA DOSE RATE ON THE SURFACE OF YELLOWCAKE

This curve was prepared by S. McGuire, NRC staff, by calculating the buildup of thorium-234 and protactinium-234 from the parent uranium-238, and the buildup of thorium-231 from the parent uranium-235. The surface beta dose rate was normalized to 150 mrem/hr (Figure 2 shows the measured value on the surface). Since measurements show that less than 1% of the thorium, radium, and lead initially present in the ore remains after the chemical separation process, betas from thorium-234, lead-210, and lead-214 in the ore before separation are negligible in the yellowcake after separation (Ref. 13).

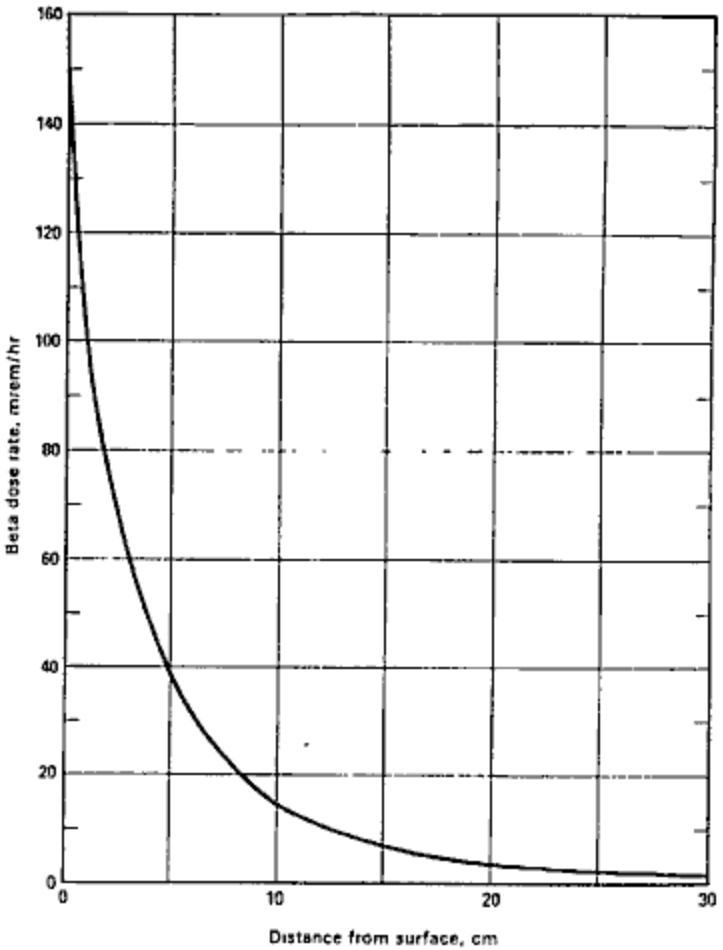

FIGURE 2. BETA DOSE RATE FROM YELLOWCAKE SEPARATED FROM ORE FOR MORE THAN 100 DAYS (from Reference 12)

likely to produce a more serious hazard through resuspension in the air than if the ore dust were allowed to remain where it lies. When necessary, cleanup may be performed by hosing down the ore dust into floor sumps or by using vacuum suction systems with filtered exhausts.

In leaching and chemical separation areas there is usually little dust and little difficulty with surface contamination.

In the precipitation circuit and the yellowcake drying and barrelling areas, surface contamination can be a problem because of the concentrated nature of the yellowcake. The International Atomic Energy Agency (IAEA) recommends (Ref. 1) a limit for alpha contamination on such areas as walls, floors, benches, and clothing of 10^{-3} μCi/cm^2 (220,000 dpm/100 cm^2), which is equivalent to about 2 mg/cm^2 of natural uranium. Based on experience, the IAEA concluded that if surface contamination levels are kept below this value, the contribution to airborne radioactivity from surface contamination will be well below applicable limits. The British National Radiological Protection Board also recommends a limit of 10^{-3} μCi/cm^2 for uranium alpha contamination in active areas of plants (Ref. 14), based on calculations using resuspension factors rather than experience.

The NRC staff considers surface contamination levels of 10^{-3} μCi/cm^2 acceptable to meet the ALARA concept in uranium mills. The levels are low enough to ensure little contribution to airborne radioactivity, yet are practical to meet. Such an amount of yellowcake surface contamination is readily visible because of the low specific activity of uranium and does not require a survey instrument for detection. It is recommended that surfaces where yellowcake may accumulate be painted in contrasting colors because surveys for surface contamination in work areas are visual rather than by instrument. Surfaces painted prior to the implementation date of this guide need not be repainted merely to meet this recommendation. However, when such surfaces are repainted they should be painted in contrasting colors.

In yellowcake areas daily visual inspections should be made for locating yellowcake contamination on surfaces. Visible yellowcake should be cleaned up promptly, especially where contamination will be disturbed and resuspended on walkways, railings, tools, vibrating machinery, and similar surfaces. Spills should be cleaned up before the yellowcake dries so that resuspension during cleanup will be lessened.

In rooms where work with uranium is not performed, such as eating rooms, change rooms, control rooms, and offices, a lower level of surface contamination should be maintained. These areas should be spot-checked weekly for removable surface contamination using smear tests. The areas should be promptly cleaned if surface contamination levels exceed the values shown in Table 1.

TABLE 1

Surface Contamination Levels for Uranium and Daughters on Equipment To Be Released for Unrestricted Use, Clothing, and Nonoperating Areas of Mills*

Average	5,000 dpm alpha per 100 cm^2	Averaged over no more than 1 m^2
Maximum	15,000 dpm alpha per 100 cm^2	Applies to an area of not more than 100 cm^2
Removable	1,000 dpm alpha per 100 cm^2	Determined by smearing with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the smear

Note: The contamination levels are given in units of dpm/100 cm^2 because this is the minimum area typically surveyed. When performing a smear or wipe test, the area should very roughly approximate 100 cm^2. However, there is no need to be very precise about the area to be smeared.

* These values are taken from: Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors," and "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct Source, or Special Nuclear Material," Division of Fuel Cycle and Material Safety, USNRC, Washington, D.C. 20555, November 1976. Available in NRC Public Document Room for inspection and copying for a fee.

1.6 Surveys for Contamination of Skin and Personal Clothing

Contamination of skin and personal clothing should be controlled to prevent the spread of contamination to unrestricted areas (e.g., the workers' cars and homes). Alpha radiation from uranium on the skin or clothing is not a direct radiation hazard because the alpha particles do not penetrate the dead layer of the skin. Rather, uranium is primarily a hazard if it is inhaled or swallowed.

Visual examination for yellowcake is not sufficient evidence that the worker's skin or clothing is sufficiently free of contamination to permit the workers to leave the work environment. Normally such contamination can be adequately controlled if yellowcake workers wash their hands before eating, shower before going home, and do not wear street clothes while working with yellowcake in the mill. Prior to leaving the restricted area, everyone who has worked with yellowcake during the day should either shower or monitor their skin after changing clothes. If the worker does not change clothes, the clothes should also be monitored. The soles of the shoes of anyone entering the yellowcake area of the mill should either be brushed or monitored before leaving the mill. An alpha survey instrument should be available at the exit of the employee change room. In addition, the licensee should at least quarterly use a calibrated alpha survey instrument to perform an unannounced spot survey for alpha contamination on selected yellowcake workers leaving the mill.

Limits on acceptable levels of alpha contamination of skin and clothing are those in Table 1, but used in the following manner. All alpha contamination on skin and clothing should be considered to be removable so that the limit of 1,000 dpm alpha per 100 cm^2 applies.* Additional showering or washing should be done if the limit is exceeded. The value of 5,000 dpm alpha contamination per 100 cm^2 should be used for the soles of shoes using a portable alpha survey instrument to measure total alpha activity. If alpha levels exceed the value in Table 1, the clothing should be laundered before leaving the site. If the soles of shoes exceed the value in Table 1, the shoes should be brushed or scrubbed until they are below the limit.

1.7 Surveys of Equipment Prior to Release to Unrestricted Areas

Surface contamination surveys should be conducted before potentially contaminated equipment is released to unrestricted areas. The surface contamination limits listed in Table 1 are recommended.** If contamination above these limits is detected, the equipment should be decontaminated until additional efforts do not significantly reduce contamination levels.

The licensee should develop methods to prevent potentially contaminated equipment from leaving the restricted area without being monitored. In some cases this is facilitated if parking for workers and visitors is outside the restricted area.

1.8 Surveys of Packages Prepared for Shipment

After being filled, yellowcake packages should be washed down to remove surface contamination. Surveys of external surfaces of yellowcake packages prepared for shipment should be carried out before shipment. The surveys conducted should be adequate to ensure that the wash-downs are reducing surface contamination levels to less than Department of Transportation (DOT) limits, but do not necessarily include a survey of each package. The bottoms of some, but not all barrels, should be surveyed to determine the effectiveness of the wash downs.

Contamination on packages should not exceed Department of Transportation limits in 49 CFR §173.397. The average measured removable alpha contamination determined by wiping the external surface of the package with an absorbent material should be below 2200 dpm/100 cm^2 if a non-exclusive-use vehicle is to be used (49 CFR §§173.397(a) and (a)(1)) or 22,000 dpm/100 cm^2 if an exclusive-use vehicle is to be used (49 CFR §§173.397(b) and (a)(1)). Packages having higher contamination levels should be cleaned and resurveyed prior to shipment. Visible yellowcake should be cleaned off.

1.9 Ventilation Surveys

A properly operating ventilation system is the most effective means of worker protection from inhalation hazards at a uranium mill. The operation of the ventilation system should be checked each day by the radiation safety staff during the daily walk-through of the mill.

Whenever equipment or procedures in the mill are changed in a manner that affect ventilation, a survey should be made of the ventilation rates in the area to ensure that the ventilation system is operating effectively.

1.10 Surveys for Contamination on Respirators

Before being reused, respirator face pieces and hoods should be surveyed for alpha contamination by a standard wipe or smear technique. Removable alpha contamination levels should be less than 100 dpm/100 cm^2 (Ref. 16, Section 9.6).

1.11 Summary of Survey Frequencies

Table 2 summarizes the survey frequencies given in this guide.

2. INTAKE AND EXPOSURE CALCULATIONS

2.1 Uranium Ore Dust and Yellowcake

In 10 CFR Part 20, §20.103(a)(1) establishes a quarterly intake limit on airborne uranium in yellowcake and in ore dust, §20.103(a)(2) establishes a weekly intake limit on airborne soluble uranium (low-temperature dried yellowcake), and §20.103(b)(2) establishes a weekly control measure for ore dust and airborne insoluble uranium (high-temperature dried yellowcake).

This guide presents two equivalent methods for calculating worker intake. The first method expresses intake in terms of microcuries or micrograms. The second method expresses intake in terms of MPC-hours of exposure. The methods are equivalent and either may be used.

Method 1: The Intake Method (Microcuries or Micrograms)

The intake of uranium ore dust or yellowcake during the weekly or quarterly period being evaluated may be estimated using the following equation:

$$I_u = b \sum_{i=1}^{n} \frac{X_i t_i}{PF}$$

where:

I_u = uranium intake, μg or μCi

*This value is comparable to the limit of 10^{-5} μCi/cm^2 or 2,200 dpm per 100 cm^2, recommended by the International Atomic Energy Agency on page 15 of Reference 1 and the United Kingdom Atomic Energy Authority in Reference 15.

**See Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors," and "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct Source, or Special Nuclear Material," Division of Fuel Cycle and Material Safety USNRC, Washington, D.C. 20555, November 1976. Available in NRC Public Document Room for inspection and copying for a fee.

TABLE 2

SUMMARY OF SURVEY FREQUENCIES

Type of Survey	Type of Area	Survey Frequency	Lower Limit of Detection
1. Uranium ore dust	Airborne radioactivity areas Other indoor process areas Outdoor areas	Weekly grab samples Monthly grab samples Quarterly grab samples	5×10^{-12} µCi/ml (uranium)
2. Yellowcake	Airborne radioactivity areas Other indoor process areas Special maintenance involving high airborne concentrations of yellowcake	Weekly grab samples Monthly grab samples Extra breathing zone grab samples	1×10^{-11} µCi/ml
3. Radon daughters	Areas that exceed 0.08 working level Areas that exceed 0.03 working level Areas below 0.03 working level	Weekly radon daughter grab samples Monthly radon daughter grab samples Quarterly radon daughter grab samples	0.03 WL
4. External radiation: Gamma	Throughout mill Radiation areas	Semiannually Quarterly	0.1 mR/hr
Beta	Where workers are in close contact with yellowcake	Survey by operation done once plus whenever procedures change	1 mrad/hr
5. Surface contamination	Yellowcake areas Eating rooms, change rooms, control rooms, offices	Daily Weekly	Visual 500 dpm alpha per 100 cm^2
6. Skin and personal clothing	Yellowcake workers who shower	Quarterly	500 dpm alpha per 100 cm^2
	Yellowcake workers who do not shower	Each day before leaving	
7. Equipment to be released	Equipment to be released that may be contaminated	Once before release	500 dpm alpha per 100 cm^2
8. Packages containing yellowcake	Packages	Spot check before release	500 dpm alpha per 100 cm^2
9. Ventilation	All areas with airborne radioactivity	Daily	Not applicable
10. Respirators	Respirator face pieces and hoods	Before reuse	100 dpm alpha per 100 cm^2

t_i = time of exposure to average concentration X_i (hr)

X_i = average concentration of uranium in breathing zone air during the time t_i, $\mu g/m^3$ or $\mu Ci/m^3$

b = breathing rate, 1.2 m^3/hr

PF = the respirator protection factor, if applicable*

n = the number of exposure periods during the week or quarter

Method 2: The MPC-hour Method

The intake of uranium ore dust or yellowcake during the weekly or quarterly period being evaluated may be estimated using the following equation:

$$I_u = \sum_{i=1}^{n} \frac{X_i t_i}{MPC \times PF}$$

where:

I_u = uranium intake, MPC-hours

t_i = time that the worker is exposed to concentrations X_i (hr)

X_i = average concentration of uranium in the air near the worker's breathing zone, $\mu Ci/ml$

MPC = the concentration value for the radioactive material from Appendix B of Part 20, $\mu Ci/ml$

X_i/MPC = the number of MPCs

PF = the respirator protection factor, if applicable*

n = the number of exposure periods during the week or quarter

2.2 Radon Daughters

In 10 CFR Part 20, §20.103(a)(1) establishes an annual limit on the intake of radon daughters. Radon daughter intake may be estimated using either of the two following equations:

Method 1: The Intake Method (Working-Level Months)

$$I_r = \frac{1}{170} \sum_{i=1}^{n} \frac{W_i t_i}{PF}$$

where:

I_r = radon daughter intake, working-level months

t_i = time of exposure to W_i (hr)

170 = number of hours in a working month

W_i = average number of working levels in breathing zone air during the time (t_i)

PF = the respirator protection factor, if applicable *

n = the number of exposure periods during the year

Method 2: The MPC-hour Method

$$I_r = \sum_{i=1}^{n} \frac{W_i t_i}{MPC \times PF}$$

where:

I_r = radon daughter intake, MPC-hours

t_i = time of exposure to W_i (hr)

W_i = average number of working levels in breathing zone air during the time (t_i)

MPC = the Appendix B (Part 20) concentration value for radon daughters (0.33 working levels)

W_i/MPC = the number of MPCs of radon daughters

PF = respirator protection factor, if applicable*

n = the number of exposure periods during the year

The values of t_i may be determined by actual timing and recording for each exposure, or t_i values may be derived from a time study of worker occupancy in the various mill areas. Such studies should be updated annually and after any significant change in mill equipment, procedures, or job functions. When nonroutine maintenance or cleanup operations are performed, accurate time records should be kept, and the results of special area or breathing zone samples taken over this period should be added to the calculations of employee exposures.

3. REPORTS OF OVEREXPOSURES TO AIRBORNE MATERIALS

Any overexposure of a person to airborne radioactivity must be reported to the NRC. Section 20.405 requires

*If the licensee's respiratory protection program is being conducted in conformance with Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection," and the appropriate NRC Regional Office has been notified that the licensee plans to use respirators, the prescribed protection factor (PF) may be used in the calculation of I_u and I_r.

overexposure reports to the appropriate NRC regional office if the intake of uranium ore dust or yellowcake exceeds the quantities specified in §20.103 or if the exposure to radon daughters exceeds the working-level values specified in footnote 3 to Appendix B to 10 CFR Part 20. Many uranium mill workers are exposed to a combination of these materials. In such cases, Appendix B to 10 CFR Part 20 specifies the method for determining whether NRC exposure limits have been exceeded. Overexposure reports are also required for combined exposures that exceed NRC limits.

A listing of exposure limits follows:

1. Soluble uranium, weekly determination.

If during a period of 1 calendar week a worker has an intake of soluble uranium (yellowcake dried at a temperature below 400°C) exceeding 9.6 mg, an overexposure has occurred.*

2. Airborne radioactivity, quarterly determination.

For a worker exposed to uranium ore dust, yellowcake, or both, it is necessary to determine whether an overexposure has occurred during the quarter. Either one of the two following methods may be used for this purpose.

Method 1: The Intake Method (Microcuries or Milligrams). The ore dust uranium intake in microcuries (or milligrams) is divided by 0.03 μCi** (or 47 mg) to calculate the fraction of the limit that has been taken in. The yellowcake intake for the quarter in microcuries (or milligrams) is divided by 0.063 μCi (or 93 mg). Add the two fractions. If the sum exceeds unity, an overexposure has occurred.

Method 2: MPC-hour Method. Add the exposures, in MPC-hours, of uranium ore dust and yellowcake. If the total for any worker exceeds 520 MPC-hours*** an overexposure has occurred.

3. Radon daughters, annual determination.

Exposure to radon daughters is limited on an annual basis. If the intake method is used, an intake exceeding 4 working-level months in a calendar year is an overexposure. If the MPC-hour method is used, an exposure exceeding 2080 MPC-hours in a calendar year is an overexposure.

4. ACTION LEVELS

4.1 The 40-Hour Control Measure

The 40-hour control measure, specified in §20.103(b)(2), is an action level of concern to the uranium mill operator. If during a week a worker is subjected to an intake exceeding 40 MPC-hours, §20.103(b)(2) requires that the cause must be determined, corrective action to prevent another such occurrence must be taken, and a record of the corrective action must be maintained.

Use either of the two methods in Section C.2 of this guide to calculate a worker's weekly intake. If the microcurie (or milligram) method is used, a weekly intake of uranium ore dust plus yellowcake exceeding 1/13 of the quarterly limit given in Section C.3 of this guide exceeds the 40-hour control measure. Do not include radon daughters because these are considered only on an annual basis. If the sum of the two fractions for the weekly intake exceeds 1/13, the 40-hour control measure has been exceeded.

If the MPC-hour method is used, the MPC-hours from ore dust and yellowcake are added. If the sum exceeds 40 MPC-hours, the 40-hour control measure has been exceeded.

4.2 Administrative Action Levels

In addition, the licensee should establish administrative action levels to protect workers. Action levels should be established as shown below. A record of each investigation made and the actions taken, if any, should be kept.

1. *Uranium ore dust.* The RSO should establish an action level for each ore dust sampling location. The action level for the location should be set somewhat above the normal fluctuations that occur when the mill is operating properly. If any sample is above the action level for that location, the RSO should find out why and should take corrective action if appropriate.

2. *Yellowcake.* Similarly, for yellowcake the RSO should establish an action level for each sampling location. In addition, action levels should be established for maintenance activities where breathing zone sampling is used. The action level for maintenance activities can be expressed either in airborne concentration or in MPC-hours. If any action level is exceeded, the RSO should find out why and should take corrective action if appropriate.

3. *Radon daughters.* The RSO should establish an action level for radon daughters for each sampling location. If the action level for any location is exceeded, the RSO should find out why and should take corrective action, if appropriate.

4. *Time-weighted exposure to airborne radioactivity.* If any worker's time-weighted exposure, calculated by either of the two methods in Section C.2 of this guide, exceeds 25% of the exposure limits, as listed in Section C.3 of this guide, the RSO should determine the causes of the exposure, should investigate why the exposure was higher than previous exposures in performing the work, and should take corrective action if appropriate. This action level will be on a weekly basis for soluble uranium (yellowcake dried at less than 400°C), a quarterly basis for uranium ore dust and yellowcake combined, and an annual basis for radon daughters.

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* 40 hours at a concentration of 0.2 mg/m^3 and a breathing rate of 1.2 m^3/hr.

** If total alpha activity is measured instead of uranium activity, divide by 0.06 μCi.

*** 40 hours/week x 13 weeks = 520 hours.

5. *Gamma dose rates.* The RSO should establish an action level for each location where the gamma dose rate is periodically measured. If the action level for any location is exceeded, the RSO should find out the cause of the elevation and should take corrective action, if appropriate.

6. *Dosimeter results.* The RSO should establish action levels for the monthly dosimeter results. If the action level for any person is exceeded, the RSO should find out the cause and take corrective action, if appropriate.

7. *Contamination on skin and clothing.* If alpha contamination of the skin or clothing of workers leaving the mill is found to exceed 1000 dpm/100 cm^2, an investigation of the cause of the contamination should be made and corrective action taken, if appropriate.

8. *Low airborne radioactivity readings.* Abnormally low readings of airborne radioactivity (uranium ore dust, yellowcake, and radon daughters) should also be investigated since very low readings may indicate an equipment malfunction or procedural error. The RSO should establish action levels for low readings of airborne radioactivity. If readings are below these action levels, the RSO should find out why and should take corrective action, if appropriate.

5. ESTABLISHMENT OF "AIRBORNE RADIOACTIVITY AREAS"

In general, yellowcake drying and packaging rooms and enclosures should always be considered to be airborne radioactivity areas because of the high concentrations that can result if any equipment malfunctions. On the other hand, ore crushing and grinding areas and areas outside yellowcake drying and packaging areas will not normally need to be classified as airborne radioactivity areas when normal engineering controls are used.

Any area, room, or enclosure is an "airborne radioactivity area," as defined in §20.203(d), if (1) at any time the uranium concentration exceeds 0.5×10^{-10} μCi/ml in the case of ore dust or 1×10^{-10} μCi/ml in the case of yellowcake (i.e., the values in Appendix B to 10 CFR Part 20) or (2) the concentration exceeds 25% of the values in Appendix B to 10 CFR Part 20 averaged over the number of hours in any one week in which individuals are present in such area, room, or enclosure. For example, an area that is occupied 20 hours per week (out of the 40 hours used as a basis for the limits) is an airborne radioactivity area if the concentration of uranium in yellowcake exceeds 0.5×10^{-10} μCi/ml of air. The licensee should maintain records to show that occupancy is in fact thus limited.

If combinations of radon daughters, ore dust, and yellowcake are present (see Section C.1.3 of this guide), their concentrations divided by the appropriate Table I Appendix B value should be added. If the sum of these fractions exceeds unity or if the sum exceeds 0.25 after adjustment for the occupancy factor, the area is an airborne radioactivity area.

6. POSTING OF CAUTION SIGNS, LABELS, AND NOTICES TO EMPLOYEES

The radiation protection staff should periodically survey to ensure that signs, labels, required notices to employees, copies of licenses, and other items are properly posted as required by 10 CFR §19.11 and §20.203.

The mill and tailings area should be fenced to restrict access, and the fence should be posted with "Caution, Radioactive Material" signs as required in §20.203(e)(2). If the fence and all entrances are posted and in addition contain the words "Any area within this mill may contain radioactive material," the entire area is posted adequately to meet the requirement in §20.203(e)(2). Additional posting of each room with "Radioactive Material" signs is not necessary.

"Radiation Areas" and "Airborne Radioactivity Areas" must be posted in accordance with §§20.203(b) and (d). The licensee should avoid posting radiation area signs and airborne radioactivity area signs in areas that do not require them. The purpose of the signs is to warn workers where additional precautions to avoid radiation exposure are appropriate. Posting all areas in the mill with such signs defeats this purpose.

7. CALIBRATION OF SURVEY INSTRUMENTS

Portable survey instruments should be placed on a routine maintenance and calibration program to ensure that properly calibrated and operable survey instruments are available at all times for use by the health physics staff.

Survey instruments should be checked for constancy of operation with a radiation check source prior to each usage. If the instrument response to the radiation check source differs from the reference reading by more than 20%, the instrument should be repaired if necessary and recalibrated (Ref. 17, paragraph 4.6).

This constancy check should be supplemented by calibrations at 12-month intervals or at the manufacturer's suggested interval, whichever is shorter (Ref. 17, paragraph 4.7.1). An adequate calibration of survey instruments cannot be performed solely with built-in check sources. Electronic calibrations that do not involve a source of radiation will not determine the proper functioning and response of all components of an instrument. However, an initial calibration with a gamma source and periodic tests using electronic input signals may be considered adequate for the high dose ranges on survey instruments if those ranges are not used routinely. Each instrument should be calibrated at two points at about one-third and two-thirds of each linear scale routinely used or with a calibration at one point near the midpoint of each decade on logarithmic scales that are routinely used. Digital readout instruments with either manual or automatic scale switching should be calibrated in the same manner as are meter-dial instruments. Digital readout instruments without scale switching should

be calibrated in the same manner as are logarithmic readout instruments. Survey instruments should be calibrated following repair. A survey instrument may be considered properly calibrated when the instrument readings are within ±20% of the calculated or known values for each point checked (see Regulatory Guide 10.6, Appendix A).

Calibration for beta dose rate measurements may be performed in the following manner. A usual technique for making a beta survey is to note the difference between the open-window and closed-window reading on a GM or ionization chamber survey meter. The difference is considered to be the beta dose rate. This approach is incorrect if the survey meter has been calibrated with a gamma source alone. A correction factor must be applied to determine the beta dose rate.

To determine the calibration factor, use Figure 2 in this guide. Place the detector of the survey meter at the surface of an extended yellowcake source that has been separated from ore for at least 100 days. Use a piece of paper or thin plastic between the detector and yellowcake to avoid contaminating the detector. Note the difference between the open-window and closed-window readings. Compute a calibration factor that applies to the surface dose rate that will make the difference between the open-window and closed-window readings equal to the surface beta dose rate of 150 mrem/hr, as shown in Figure 2. To determine the calibration factor that applies at a distance from the surface, place the axis of the detector at 2 cm from the surface. Note the difference between the open-window and closed-window readings. Compute a calibration factor that will make the difference between the open-window and closed-window readings equal to 75 mrem/hr, as shown in Figure 2. A sample calculation is shown in Appendix C.

Errors in estimates of the volume of air that has passed through filters should be avoided by accurate calibration of the flow rate and by preventing or correcting for the loss of flow caused by accumulation of material on the filter. As material accumulates on filter paper the air flow rate will drop. Thus less air volume will be sampled. Air flow rates through filters should be determined by calibrating pumps with the filter paper in place once every 6 months to ±20% accuracy. These calibrations should be done in accordance with manufacturer's recommendations. Further information on these calibrations is contained in Regulatory Guide 8.25, "Calibration and Error Limits of Air Sampling Instruments for Total Volume of Air Sampled."

The fluorometric analysis system should be calibrated by processing a known standard uranium solution and a blank sample with each batch. Every quarter, the fluorometer response should be checked by a complete serial dilution.

Alpha counting systems used for radon daughter measurements should be calibrated at least monthly by using a known standard alpha source.

Alpha survey meters used to detect contamination on skin and equipment should receive a constancy check each week and a calibration annually.

8. PROTECTIVE CLOTHING

Workers working with yellowcake should be provided with protective clothing such as coveralls and shoes or shoe covers. Rubber work gloves should be used when aged yellowcake will be handled to reduce the beta dose rate and to avoid contamination of the skin with uranium.

Protective clothing should be changed and discarded or laundered weekly or whenever yellowcake is visible on the clothing. Potentially contaminated clothing should not be sent to a laundry that is not specifically authorized by the NRC or an Agreement State to process clothing contaminated with uranium unless the clothing has been surveyed and found to have less uranium contamination than the values in Table 1 of this guide.

9. QUALITY ASSURANCE PROGRAM

The licensee should ensure the accuracy of survey measurements by having a quality assurance program. Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations)–Effluent Streams and the Environment," should be consulted for guidance on quality assurance.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plans for using this regulatory guide.

Except in those cases in which an applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, applications for new uranium mills and renewal applications submitted after July 1, 1983, should follow the recommendations in this guide.

APPENDIX A

DERIVATION OF EQUATION FOR MPC_m

The equation for MPC_m is derived here. The equation for mixtures in paragraph 1 of the Note to Appendix B of Part 20 is:

$$\frac{C_a}{MPC_a} + \frac{C_b}{MPC_b} + \frac{C_c}{MPC_c} \leq 1$$

Consider a mixture of natural uranium as yellowcake with a concentration of C_{nu} and ore dust with a concentration C_{od}. If the sum of the concentrations equals the MPC for the mixture

$$C_{nu} + C_{od} = MPC_m$$

$$\frac{C_{nu} + C_{od}}{MPC_m} = 1$$

the equality in the first equation will apply.

Therefore:

$$\frac{C_{nu}}{MPC_{nu}} + \frac{C_{od}}{MPC_{od}} = \frac{C_{nu} + C_{od}}{MPC_m}$$

Solve for MPC_m

$$MPC_m = \frac{C_{nu} + C_{od}}{\frac{C_{nu}}{MPC_{nu}} + \frac{C_{od}}{MPC_{od}}}$$

Divide the numerator and denominator of the right-hand side by $C_{nu} + C_{od}$

$$MPC_m = \frac{1}{\frac{C_{nu}}{(C_{nu} + C_{od})(MPC_{nu})} + \frac{C_{od}}{(C_{nu} + C_{od})(MPC_{od})}}$$

The term

$$\frac{C_{nu}}{C_{nu} + C_{od}}$$

can be recognized as f_{nu}, the fraction of activity from natural uranium as yellowcake.

Therefore:

$$MPC_m = \left[\frac{f_{nu}}{MPC_{nu}} + \frac{f_{od}}{MPC_{od}}\right]^{-1}$$

APPENDIX B

LOWER LIMIT OF DETECTION

For the purposes of this guide the lower limit of detection (LLD) is defined as the smallest concentration of radioactive material that has a 95% probability of being detected.* Radioactive material is "detected" if the value measured on an instrument is high enough to conclude that activity above the system background is probably present.

For a particular measurement where radioactive disintegrations are detected (which may include a radiochemical separation):

$$LLD = \frac{4.66 S_b}{3.7 \times 10^4 E V Y e^{-\lambda t}}$$

where:

LLD = the lower limit of detection (μCi/ml)

S_b = the standard deviation of background count rate (counts per second)

3.7×10^4 = the number of disintegrations/sec/μCi (this term is omitted if S_b is given in terms of microcuries)

E = the counting efficiency (counts per disintegration)

V = the sample volume (ml)

Y = the fractional radiochemical yield (if applicable)

λ = the decay constant for the particular radionuclide

t = the elapsed time between sample collection and counting.

Example: LLD for uranium when fluorometric analysis is used.

Work this example in terms of microcuries of natural uranium. The LLD could just as well be calculated in terms of micrograms of uranium. A conversion factor of 6.77×10^{-7} μCi/μg for natural uranium can be used if the uranium quantity is known in micrograms.

First, determine the standard deviation of the background count rate S_b. To do this perform a fluorometric analysis for several clean filter papers that have not been used to collect air samples. At least 5 filter papers would have to be analyzed over many months. The value of S_b will be in terms of microamperes because fluorometers usually give readings in microamperes.

The value of S_b can then be converted either to microcuries or to counts per second by using a calibration factor.

A sample calculation is shown here. The fluorometric readings for 10 clean filter papers are as follows:

Sample number	Fluorometric reading (X_i) (microamperes)
1	0.062
2	0.072
3	0.050
4	0.050
5	0.050
6	0.040
7	0.086
8	0.088
9	0.088
10	0.018

Calculate the standard deviation S_b by the equation (or by pocket calculator):

$$S_b^2 = \frac{1}{n-1} \sum_{i=1}^{n} (X_i - \bar{X})^2$$

where:

n = the number of samples

X_i = the reading for sample i

$\bar{X}$ = the average of the readings

For the data above, the standard deviation is:

$S_b = 0.023$ μA

Convert S_b to micrograms of uranium. On this fluorometer 0.1 μg of U_3O_8 gives a reading of 0.67 μA. The fluorometer will read 6.7 μA/μg of U_3O_8. This compound is 85% uranium by weight (238 x 3 = 714, 16 x 8 = 128, 714/842 = 0.85). Therefore, the fluorometer will read 7.9 μA/μg of uranium (6.7/0.85 = 7.9).

Now calculate the standard deviation in micrograms of uranium:

$$S_b = \frac{0.023 \ \mu A}{7.9 \ \mu A/\mu g}$$

*This definition of LLD was chosen to be consistent with the NRC position previously stated in Tables 1 and 3 of Regulatory Guide 4.8, "Environmental Technical Specifications for Nuclear Power Plants." The basis for the definition is given in References 18 and 19 of this guide. The definition is also used in other regulatory guides, among them 4.14, "Radiological Effluent and Environmental Monitoring at Uranium Mills," and 8.14, "Personnel Neutron Dosimeters."

= 0.0029 μg of uranium

To convert to microcuries, use a conversion factor of 6.77×10^{-7} μCi/μg of uranium.

Therefore:

$S_b = 0.0029\ \mu g \times 6.77 \times 10^{-7}\ \mu Ci/\mu g$

$= 1.97 \times 10^{-9}\ \mu Ci$

In the equation for LLD, the counting efficiency E will be 1. (The term E is not applicable to a fluorometric analysis.)

The sample volume V will be equal to the collection rate of the air sampler times the sample collection time. Assume a low-volume air sampler with an air flow rate of 10 liters per minute and a 30-minute sample collection time.

V = 10 liters/min x 30 minutes

= 300 liters

= 300,000 ml

For a fluorometric analysis, the radiochemical yield is not applicable, and Y may be set equal to 1.

The exponential term for radioactive decay $e^{-\lambda t}$ will also be equal to 1 because the half-life of uranium is so long that the amount of decay between collection and analysis will be negligible.

Therefore

$$LLD = \frac{4.66 \times 1.97 \times 10^{-9}\ \mu Ci}{300{,}000\ ml}$$

$= 3 \times 10^{-14}$ μCi of uranium/ml of air

This LLD is about 150 times more sensitive than recommended in the guide as an acceptable lower limit of detection.

Example: LLD for radon daughters when the modified Kusnetz method is used

The background standard deviation is established by using blank filters. Assume the alpha counts on 10 blank filters counted for 1 minute each are as shown below:

Sample Number	Alpha Counts
1	2
2	3
3	1
4	3
5	2
6	2
7	2
8	3
9	2
10	4

For these filters S_b can be calculated to be 0.84 counts for a 1-minute count.

Assume the counting efficiency E is 0.27. Consider a low-volume sampler with a flow rate of 5 liters per minute and a 5-minute collection time. Therefore, the sample volume will be 25,000 ml. The radiochemical yield Y is not applicable, and is set equal to 1.

To calculate radioactive decay the value of λ can be taken to be roughly 0.026 per minute (for lead-214, the radon daughter with the longest half-life). The value of t is taken to be 60 minutes. It will be accurate enough to use 60 minutes for this value even though it could be as short as 40 minutes or as long as 90 minutes. Therefore $e^{-\lambda t}$ equals 0.21. The lower limit of detection can now be calculated:

$$LLD = \frac{4.66 \times 0.84\ counts/min}{0.27\ counts/dis \times 25\ liters \times 1 \times 0.21}$$

= 2.8 dpm/liter

To convert this LLD to working levels (WL), divide by the factor from Figure 1 in ANSI N13.8-1973 (Ref. 9). The factor is 110 dpm/liter/WL for a sample counted 60 minutes after collection. Therefore:

LLD = 0.025 WL

This is below the LLD for radon daughters recommended in this guide.

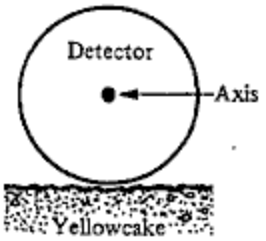
APPENDIX C

BETA CALIBRATION OF SURVEY INSTRUMENT

Here is an example for calibrating the survey instrument.

At the surface:

The closed-window reading is 3 mR/hr. The open-window reading is 28 mR/hr. The difference is 25 mR/hr. Since the beta dose rate at the surface is 150 mrem/hr, the calibration factor CF_{sur} can be calculated from the equation below:



Observed dose rate x CF = actual dose rate

$25\ mR/hr \times CF_{sur} = 150\ mrem/hr$

$$CF_{sur} = \frac{150\ mrem/hr}{25\ mR/hr}$$

$CF_{sur} = 6$ mrem/mR (at the surface)

At 2 cm: Place the axis of the detector at 2 cm from the surface of the yellowcake. The closed-window reading is 3 mR/hr. The open-window reading is 23 mR/hr. The difference is 20 mR/hr. Since the beta dose rate at 2 cm is 75 mrem/hr, the calibration factor CF_{2cm} can be calculated:

$$CF_{2cm} = \frac{75\ mrem/hr}{20\ mR/hr}$$

$CF_{2cm} = 3.75$ mrem/mR (at 2 cm)

The value obtained at 2 cm will generally be accurate enough to use at all distances greater than 2 cm.

REFERENCES

1. International Atomic Energy Agency, *Manual on Radiological Safety in Uranium and Thorium Mines and Mills*, IAEA Safety Series No. 43, Vienna, 1976.[1]

2. D. R. Kalkwarf, "Solubility Classification of Airborne Products from Uranium Ores and Tailings Piles," NRC Report NUREG/CR-0530, January 1979.[2]

3. A. F. Eidson and J. A. Mewhinney, "In Vitro Dissolution of Uranium Product Samples from Four Uranium Mills," NRC Report NUREG/CR-0414, October 1978.[2]

4. N. A. Dennis, H. M. Blauer, and J. E. Kent, "Dissolution Fractions and Half-times of Single Source Yellowcake in Simulated Lung Fluids," *Health Physics*, Vol. 42, p. 469, April 1982.

5. R. C. Merritt, *The Extractive Metallurgy of Uranium*, Colorado School of Mines Research Institute, pp. 252-254, 1971.

6. L. M. Steckel and C. M. West, "Characterization of Y-12 Uranium Process Materials Correlated with In Vitro Experience," AEC Report Y-1544-A, 1966.[2]

7. National Council on Radiation Protection and Measurements, "Natural Background Radiation in the United States," NCRP Report No. 45, Washington, D.C., 1975.

8. International Commission on Radiological Protection, "Occupational Limits for Inhalation of Radon-222, Radon-220 and their Short-Lived Daughters," ICRP Publication 32, Pergamon Press, Oxford, 1981.

9. American National Standards Institute, "Radiation Protection in Uranium Mines," ANSI N13.8-1973.[3]

10. D. Haggard, Battelle-Pacific Northwest Laboratory, letter to Dr. Stephen A. McGuire, U.S. Nuclear Regulatory Commission, June 29, 1982.[4]

11. L. L. Nichols, "A Test of the Performance of Personnel Dosimeters," Battelle-Pacific Northwest Laboratories Report BNWL-2159, April 1977.

12. P. Plato and G. Hudson, "Performance Testing of Personnel Dosimetry Services," NRC Report NUREG/CR-1064, 1980.[2]

13. M. H. Momeni et al., "Radioisotopic Composition of Yellowcake," NRC Report NUREG/CR-1216, 1979.[2]

14. A. D. Wrixon, G. S. Linsley, K. C. Binns, and D. F. White, "Derived Limits for Surface Contamination," British National Radiological Protection Board Report NRPB-DL2, November 1979.

15. United Kingdom Atomic Energy Authority, Health and Safety Code, "Maximum Permissible Doses from Inhaled and Ingested Radioactive Materials," Authority Code No. E.1.2, Issue No. 1, London, June 1961.

16. J. L. Caplin et al., "Manual of Respiratory Protection Against Airborne Radioactive Material," NRC Report NUREG-0041, October 1976.[2]

17. American National Standards Institute, "Radiation Protection Instrumentation Test and Calibration," ANSI N323-1978.[3]

18. J. H. Harley, Editor, "EML Procedures Manual," DOE Report HASL-300, p. D-08-01, revised annually.[2]

19. L. A. Currie, "Limits for Qualitative Detection and Quantitative Determination - Application to Radioactivity," *Analytical Chemistry*, Vol. 40, pp. 586-593, 1968.

[1] Available from UNIPUB, P.O. Box 433, Murray Hill Station, New York, New York 10016.

[2] Available from National Technical Information Service (NTIS), Springfield, Virginia 22161.

[3] Available from American National Standards Institute, 1430 Broadway, New York, New York 10018.

[4] Available in NRC Public Document Room for inspection and copying for a fee.

VALUE/IMPACT STATEMENT

1. PROPOSED ACTION

1.1 Description

Applicants for a uranium milling license must submit a license application containing the information specified in Regulatory Guide 3.5, "Standard Format and Content of License Applications for Uranium Mills." The purpose of this proposed action is to describe health physics surveys that are acceptable to the NRC staff to protect workers. Information about health physics surveys is covered under Section C.5, "Operations," in Regulatory Guide 3.5.

1.2 Need

Licensees are now uncertain what the NRC staff will accept in the way of a health physics survey program to protect workers. As a consequence, a wide variety of programs are submitted. In order to meet minimum acceptable standards, much correspondence between the applicant and NRC is required. A guide will reduce the amount of correspondence needed, save manpower for both NRC and the applicant, show clearly how NRC regulations apply to uranium mills, and establish a uniform standard for an acceptable survey program for worker protection.

1.3 Value/Impact

1.3.1 NRC

The impact of the proposed guidance will be primarily to reduce licensing staff effort expended in reviewing applications and corresponding with applicants in areas where the application does not meet acceptable NRC licensing standards. One staff-year was required to develop the guide.

1.3.2 Other Government Agencies

The proposed guidance will impact on the Mine Safety and Health Administration (MSHA) because they also regulate occupational health protection at uranium mills and on Agreement State regulatory agencies that regulate mills, primarily agencies in New Mexico, Colorado, Texas, Washington, and Florida. A Memorandum of Understanding (MOU) signed by NRC and MSHA states that each agency will coordinate the development of standards with the other agency. The MOU was published in the *Federal Register* (45 FR 1315) on January 4, 1980.

1.3.3 Industry

Industry will benefit from having clear guidance on what constitutes NRC licensing policy. The total cost of the occupational health physics program (surveys plus other parts of the program) is estimated to be roughly 4 staff-years per year or about $300,000 per year per mill when the costs of overhead, supplies, equipment, and contracted services are included. This does not include the cost of the environmental and effluent monitoring program nor does it include amortization costs on equipment in the mill installed to limit occupational exposure. Equipment design is not covered in this guide, therefore, costs are not estimated here. However, the annual amortization and operating costs of equipment installed to protect workers is not negligible.

1.3.4 Workers

Workers' protection should improve from having clearly stated and consistent standards for health physics survey programs. Workers and workers' representatives will now have access to a clearly defined standard health physics survey program. This will help them understand whether their employer has an adequate program and why some things are done as they are.

1.3.5 Public

The guidance pertains to worker protection programs. It will not directly affect the public.

1.4 Decision

The NRC should develop guidance on standard health physics survey programs for worker protection that are acceptable to the NRC licensing staff.

2. TECHNICAL APPROACH

The technical approach in the guidance is based on (1) NRC licensing policy as expressed in Safety Evaluation Reports (SER) written by the NRC licensing staff, especially the recent SER for Minerals Exploration Company Sweetwater Uranium Project; (2) the IAEA Manual on Radiological Safety in Uranium and Thorium Mines and Mills, IAEA Safety Series No. 43, 1976; (3) public comments received on Draft Guide OH 710-4; and (4) other references cited in the guide.

The most important technical question raised by the public comments concerned the duration of grab samples for uranium ore dust and yellowcake. The draft guide recommended 60-minute samples.

Mr. William Shelley of Kerr-McGee, speaking for the American Mining Congress (AMC), wrote that sampling for uranium ore dust in non-airborne radioactivity areas should be weekly with 5-minute high-volume samples rather than monthly with 60-minute samples as in the guide. The AMC, in a subsequent letter intended to supplement Mr. Shelley's comments, stated that 60-minute samples at 20 to 25 operator-occupied sites would require 3 to 4 days for sample collection, which is excessive. The AMC recommended monthly 30-minute samples with a stipulation requiring additional sampling in the area if an action level were exceeded. The AMC said weekly 5-minute high-volume samples "are not

deemed preferable in this context." The AMC recommended weekly 15-minute high-volume samples with a flow rate of 30 cfm when more frequent sampling was needed and said such sampling would satisfy the LLD values in the guide. The AMC stated that filters could clog during long sampling times, thereby reducing the accuracy of the measurement.

Mr. Gerald Sinke of Kerr McGee, in a subsequent letter to clarify the AMC objection to 60-minute samples, stated that the Kerr-McGee mill sampled weekly at 36 locations in ore handling areas. Mr. Sinke said that 5-minute samples would be more accurate than 60-minute samples because the technician would be present during sample collection, whereas he would not be present during a 60-minute sample. Mr. Sinke showed by calculation that an LLD of 2.7×10^{-12} μCi/ml was obtained using a 5-minute sample with a flow rate of 760 liters/min. This meets the recommended LLD of 5×10^{-12} μCi/ml. Sinke's method is based on alpha counting after radon decay. Alpha counting will not work well for ore dust with long sampling times because the dust loading on the filter paper will cause self-absorption of the alpha particles. The State of New Mexico Environmental Improvement Agency said that 30-minute samples seemed excessively long.

The above comments claim that 60-minute samples are too long and state that the recommended LLD can be obtained with shorter samples. Based on NRC's calculations such as those shown in the new appendix to the guide, it is correct that an acceptable LLD can be met with samples of far less than 60-minute duration as long as the air flow is sufficient and the analysis background is low enough.

The NRC agrees that excessive dust loading is likely to be deposited on filters of high-volume samplers during a 60-minute sample. On the other hand, monthly 5-minute samples seem too short to account for short-term variations in air concentrations. A time longer than 5 minutes is believed to be necessary because the grab samples are taken at a fairly low frequency – weekly or monthly depending on the levels of airborne radioactivity present. The NRC accepts the fairly low weekly or monthly frequency because concentrations of ore dust are generally low in ore dust areas (typically 10% of the Appendix B values) and because the concentrations have been observed to fall within fairly narrow ranges, except for seasonal variations due to increased ventilation during warmer months. Concentrations of yellowcake when equipment is not operating are also low and fall within limited ranges. More extensive sampling is required for maintenance operations and in certain operations when yellowcake is actively handled.

In view of this, the recommended sample duration is lowered to 30 minutes at an adequate air flow rate to meet the recommended LLD of 5×10^{-12} μCi/ml. However, in areas that are not airborne radioactivity areas, weekly 5-minute samples are acceptable instead of monthly 30-minute samples.

The second most important technical question raised by the public comments concerned the recommended limits on surface contamination in work areas, namely the value for alpha activity of 0.001 μCi/cm^2. Mr. L. M. Cook of Chevron Resources Company said that the limit on contamination levels of 0.001 μCi/cm^2 may not keep ingestion low enough and that bioassays would routinely be high.

The NRC response is that surface alpha contamination levels of 0.001 μCi/cm^2 are generally recognized as being adequate to maintain the inhalation of resuspended particles to very low levels. Experimental work in a uranium facility showed that surface contamination of this magnitude contributed less than 1% of the exposures received by employees.[1] Experience in plants led the International Atomic Energy Agency to recommend this value for uranium mills.[2] Theoretical calculations based on resuspension factors led the British National Radiological Protection Board to recommend the same limit.[3] In the words of the International Commission on Radiological Protection (ICRP), "Experience has shown that there is not necessarily a correlation between surface contamination in the workplace and the exposure of workers."[4]

There are several physical factors that reduce the resuspension of small respirable particles. Fine dusts (<50 microns) are extremely resistant to resuspension by wind because these particles lie in the laminar layer next to the ground and do not protrude much into the turbulent air layers.[5] In addition, respirable particles (<10 microns) tend to agglomerate in a process called weathering and their resuspension depends on a mechanical impact to break the agglomerate.[6]

A more complete "Response to Public Comments on Health Physics Surveys in Uranium Mills" is available from the author of the guide: Dr. Stephen A. McGuire, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

3. PROCEDURAL APPROACH

In its preliminary value/impact assessment, the staff considered several procedural approaches for carrying out the proposed action and selected the publication of a regulatory guide.

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[1] A. J. Breslin, A. C. George, P. C. LeClare, and H. Glauberman, "The Contribution of Uranium Surface Contamination to Inhalation Exposures," AEC Report HASL-175, 1966.

[2] International Atomic Energy Agency, *Manual on Radiological Safety in Uranium and Thorium Mines and Mills*, IAEA Safety Series No. 43, Vienna, 1976.

[3] A. D. Wrixon et al., "Derived Limits for Surface Contamination," British National Radiological Protection Board Report NRPB-DL2, November 1979.

[4] International Commission on Radiological Protection, "General Principles of Monitoring for Radiation Protection of Workers," ICRP Publication 12, Pergamon Press, Oxford, Paragraph 54, 1969.

[5] See for example, J. E. Newman et al., "Wind as Related to Critical Flushing Speed Versus Reflotation Speed by High-Volume Sampler Particulate Loading," *Atmosphere–Surface Exchange of Particulate and Gaseous Pollutants*, ERDA Symposium Series 38, 1974.

[6] See for example, G. A. Sehmel, "Particle Resuspension from an Asphalt Road Caused by Car and Truck Traffic," in footnote 5.

3.1 Decision on Procedural Approach

Developing a regulatory guide is the favored procedural approach.

4. STATUTORY CONSIDERATIONS

4.1 NRC Authority

NRC authority for issuance of this guide derives from the Atomic Energy Act of 1954, as amended, through those portions of the Commission's regulations in Title 10 of the Code of Federal Regulations cited in the introduction to the guide.

4.2 Need for NEPA Assessment

The proposed action is not a major action significantly affecting the quality of the human environment as defined by paragraph 51.5(a)(10) of 10 CFR Part 51 and does not require an environmental impact statement.

5. CONCLUSION

The regulatory guide on health physics survey programs for worker protection in uranium mills should be issued.

U.S. NUCLEAR REGULATORY COMMISSION

May 1983

REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 8.8
(Task OH 941-4)

INFORMATION RELEVANT TO ENSURING THAT OCCUPATIONAL RADIATION EXPOSURES AT URANIUM MILLS WILL BE AS LOW AS IS REASONABLY ACHIEVABLE

A. INTRODUCTION

Paragraph 20.1(c) of 10 CFR Part 20, "Standards for Protection Against Radiation," states that licensees should make every reasonable effort to keep radiation exposures, as well as releases of radioactive material to unrestricted areas, as far below the limits specified in Part 20 as is reasonably achievable. Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable," sets forth the philosophy and general management policies and programs that licensees should follow to achieve this objective.

This guide recommends design criteria and administrative practices acceptable to the NRC staff for maintaining occupational exposures as low as is reasonably achievable (ALARA) in uranium mills. However, some of the basic processes at other types of uranium recovery facilities have a similar potential for exposing workers to uranium and its daughters. Therefore, the guidance provided in this guide can be applied, as appropriate, to those facilities as well.

An existing NRC report, NUREG-0706, "Final Generic Environmental Impact Statement on Uranium Milling" (Ref. 1), also provides detailed information for controlling the radiation hazard and chemical toxicity of airborne uranium and its daughter products in uranium mills.

This guide is directed toward occupational health protection from radiologic and toxic hazards from airborne particulates of uranium and its daughters. However, it is also recognized that uranium mill workers will be exposed to external radiation in addition to inhaled particulates. Therefore, ensuring protection of mill workers from external radiation hazards is also addressed.

Specific guidance regarding protection of the public from radiologic and toxic hazards caused by materials in effluents to unrestricted areas is beyond the scope of this guide. This topic is mentioned only in connection with actions that influence both occupational exposure and effluent control. Some of the same controls that have been shown to keep occupational exposures to airborne uranium and its daughters ALARA also tend to keep releases of these materials from the mill ALARA (see Regulatory Guide 4.14, "Radiological Effluent and Environmental Monitoring At Uranium Mills").

Any guidance in this document related to information collection activities has been cleared under OMB Clearance No. 3150-0014.

B. DISCUSSION

The principle of maintaining occupational radiation exposures as low as is reasonably achievable is an extension of an original recommendation of the National Committee on Radiation Protection (NCRP) (now the National Council on Radiation Protection and Measurements) in its Report No. 17 (Ref. 2). In this early report, the NCRP introduced the philosophy of assuming that any radiation exposure may carry some risk and recommended that radiation exposure be kept at a level "as low as practicable" below the recommended maximum permissible dose equivalent. This philosophy is currently referred to as "as low as is reasonably achievable" (ALARA). Similar recommendations to keep exposures ALARA have been included in NCRP reports up to the present time (Ref. 3), as well as in recommendations of the National Academy of Sciences–National Research Council (Ref. 4), the Federal Radiation Council (Ref. 5), and other independent scientific and professional organizations (Ref. 6). Therefore, NRC has incorporated this basic radiation protection philosophy from these recommendations into its regulations and guides.

This guide provides a detailed supplement for uranium mill licensees of the basic philosophy of Regulatory Guide 8.10, which lists for all specific licensees the types of

management commitments and radiation protection programs that would help to achieve the objective of maintaining occupational exposures ALARA.

Regulatory Guide 3.5, "Standard Format and Content of License Applications for Uranium Mills," outlines the information that applicants should include in an application for a uranium mill license. This regulatory guide describes the details of an acceptable radiation protection and ALARA program that an applicant should describe as recommended in Section C.5, "Operations," of Regulatory Guide 3.5.

C. REGULATORY POSITION

The principles and practices presented in this guide should be used as guidance in developing the radiation protection and ALARA program for a uranium mill for appropriate sections of an application* for a new or renewal license. The recommendations of this guide are intended to assist applicants in preparing license applications that are acceptable to the NRC licensing staff and are consistent with the philosophy of ALARA. Unique features not addressed here will be specifically reviewed by the NRC licensing staff.

A licensee's program for occupational protection against uranium and its daughters will be considered consistent with the ALARA philosophy if the uranium mill's operating policies and programs satisfy the following major principles and practices.

1. ALARA PHILOSOPHY

A major purpose of the occupational radiation protection program at a uranium mill is to maintain radiation exposure ALARA for all employees, contractors, and visitors.

The implementation and effectiveness of a successful ALARA program is the responsibility of everyone involved in the processing of uranium ores. Responsibilities for conducting a radiation protection and ALARA program are shared by licensee management,** the radiation safety officer (RSO),*** and all mill workers.

1.1 Licensee Management

Licensee management is responsible for developing, implementing, and enforcing the rules, policies, and procedures necessary for an effective radiation protection and ALARA program to ensure the health and safety of workers.

Licensee management should provide the following:

1. A strong commitment to and continuing support for the development and implementation of the radiation protection and ALARA program;

2. Information and policy statements to employees, [illegible]

3. A periodic management audit program that reviews procedural and operational efforts to maintain exposures ALARA;

4. Continuing management evaluation of the health physics program, its staff, and its allocation of adequate space and money;

5. Appropriate briefings and training in radiation safety, including ALARA concepts for all uranium mill employees and, when appropriate, for contractors and visitors.

1.2 Radiation Safety Officer

The radiation safety officer (RSO) has primary responsibility for the technical adequacy and correctness of the radiation protection and ALARA program and has continuing responsibility for surveillance and supervisory action in the enforcement of the program.

The radiation safety officer should be assigned the following:

1. Major responsibility for the development and administration of the radiation protection and ALARA program;

2. Sufficient authority to enforce regulations and administrative policies that affect any aspect of the radiological safety program;

3. Responsibility to review and approve plans for new equipment, process changes, or changes in operating procedures to ensure that the plans do not adversely affect the protection program against uranium and its daughters;

4. Adequate equipment and laboratory facilities to monitor relative attainment of the ALARA objective.

1.3 Mill Workers

Because a radiation protection and ALARA program is only as effective as the workers' adherence to the program, all workers at the mill should be responsible for the following:

1. Adhering to all rules, notices, and operating procedures for radiation safety established by licensee management and the RSO;

*An application and a suggested format for its completion may be obtained from the licensing staff of the Division of Waste Management, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

**"Management" is defined here as those persons authorized by the licensee of record to make policies and to direct activities of the recovery facility.

***The title "radiation safety officer" is used synonymously with "radiation protection manager" by many licensees and will be used in this guide to designate the qualified individual who is responsible for developing and supervising the radiation safety program; other titles are equally acceptable.

2. Reporting promptly to the RSO and licensee management equipment malfunctions or violations of standard practices or procedures that could result in increased radiological hazard to any individual;

3. Suggesting improvements for the radiation protection and ALARA program.

2. HEALTH PHYSICS ORGANIZATION AND ADMINISTRATIVE PROCEDURES

2.1 Health Physics Authorities and Responsibilities

The radiation safety officer at the mill site should be responsible for conducting the health physics program and for assisting the resident manager in ensuring compliance with NRC's regulations and the license conditions applicable to worker health protection.

Generally, the RSO should report directly to the resident manager on matters of radiation safety. The RSO should be directly responsible for supervising the health physics technicians, for overseeing the day-to-day operation of the health physics program, and for ensuring that records required by the NRC are maintained. The RSO should have both the responsibility and the authority, through appropriate line management, to suspend, postpone, or modify any work activity that is unsafe or potentially a violation of the Commission's regulations or license conditions, including the ALARA program. It is recommended that management delegate this responsibility and authority directly to the RSO. The RSO may have other safety-related duties, such as responsibility for programs of industrial hygiene and fire safety, but should have no direct production-related responsibility.

2.2 Operating Procedures

Written standard operating procedures should be established for all activities that involve handling, processing, or storing radioactive materials. All such procedures should include consideration of pertinent radiation safety practices. Written procedures should also be established for such activities as health physics monitoring, sampling, analysis, and instrument calibration. An up-to-date copy of each written procedure, including accident response and radiological fire protection plans, should be kept accessible to all employees. All written procedures involving radioactive material control should be compiled in a manual that allows documentation of each revision and its date.

To ensure that proper radiation protection principles are being applied, written procedures for all activities should be reviewed and approved in writing by the RSO before being implemented and whenever a change in a procedure is proposed. In addition, the RSO should review all existing operating procedures at least annually to ensure the procedures do not violate any newly established radiation protection practices.

For work on nonroutine maintenance jobs where the potential for exposure to radioactive material exists and for which no standard written operating procedure already exists, a radiation work permit (RWP)* should be used. Such permits should describe the following:

1. The details of the job to be performed,

2. Any precautions necessary to reduce exposure to uranium and its daughters,

3. The radiological monitoring and sampling necessary before, during, and following completion of the job.

The RSO should indicate by signature the review of each RWP prior to the initiation of work, and the work should be carried out in strict adherence to the conditions of the RWP. The RSO should designate a member of the radiation safety office staff or a supervisory member of the production staff who has received specialized radiation protection training to review and sign RWPs when the RSO is not available, e.g., during off shifts.

2.3 Surveillance: Audits and Inspections

It has been observed repeatedly that, if sufficient management interest exists, exposure to hazardous materials is reduced. Frequent management audit and inspection of worker health protection practices at a uranium mill can serve to provide management with the information necessary to conduct an appropriate ALARA program.

2.3.1 Daily and Weekly Inspections

The RSO and the mill foreman should conduct a weekly inspection of all mill areas to observe general radiation control practices and review required changes in procedures and equipment. The RSO or designated health physics technician should conduct a daily walk-through (visual) inspection of all work and storage areas of the mill to ensure proper implementation of good radiation safety procedures, including good housekeeping and cleanup practices that would minimize unnecessary contamination. Problems observed during all inspections should be noted in writing in an inspection logbook. The entries should be dated, signed, and maintained on file for at least 1 year. The RSO should review all violations of radiation safety procedures or other potentially hazardous problems with the resident manager or other mill employees who have authority to correct the problem. Also, the RSO should review the daily work-order and shift logs on a regular basis to determine that all jobs and operations having a potential for exposing personnel to uranium, especially those RWP jobs that would require a radiation survey and monitoring, were approved in writing by the RSO, his staff, or designee prior to initiation of work.

*The term "radiation work permit" is used by many licensees and will be used throughout this guide; other terms such as "special work permit" are equally acceptable.

2.3.2 Monthly Reviews

At least monthly, the RSO should review the results of daily and weekly inspections, including a review of all monitoring and exposure data for the month. The RSO should provide to the resident manager and all department heads for their review a written summary of the month's significant worker protection activities containing (1) a summary of the most recent personnel exposure data, including bioassays and time-weighted calculations, and (2) a summary of all pertinent radiation survey records.

In addition, the monthly summary report should specifically address any trends or deviations from the radiation protection and ALARA program, including an evaluation of the adequacy of the implementation of license conditions regarding radiation protection and ALARA. The summary should provide a description of unresolved problems and the proposed corrective measures. Monthly summary reports should be maintained on file and readily accessible for at least 5 years.

2.3.3 Radiation Protection and ALARA Program Audit

Licensee management should have annual audits of the radiation protection and ALARA program performed and written reports on the audits submitted to corporate management. All members of the audit team should be knowledgeable concerning the radiation protection program at the mill. In addition, one member of the team should be experienced in the operational aspects of specialized uranium mill radiation protection practices. The RSO should accompany the audit team but should not be a member.

The audit report should summarize the following data:

1. Employee exposure records (external and time-weighted calculations),

2. Bioassay results,

3. Inspection log entries and summary reports of daily, weekly, and monthly inspections,

4. Documented training program activities,

5. Radiation safety meeting reports,

6. Radiological survey and sampling data,

7. Reports on overexposure of workers submitted to NRC, Mine Safety and Health Administration (MSHA), or States,

8. Operating procedures that were reviewed during this time period.

The report on the annual radiation protection and ALARA audit should specifically discuss the following:

1. Trends in personnel exposures for identifiable categories of workers and types of operational activities,

2. Whether equipment for exposure control is being properly used, maintained, and inspected,

3. Recommendations on ways to further reduce personnel exposures from uranium and its daughters.

2.4 Technical Qualifications of Health Physics Staff

2.4.1 Radiation Safety Officer

The RSO should have the following education, training, and experience:

1. Education: A bachelor's degree in the physical sciences, industrial hygiene, or engineering from an accredited college or university or an equivalent combination of training and relevant experience in uranium mill radiation protection. Two years of relevant experience are generally considered equivalent to 1 year of academic study.

2. Health physics experience: At least 1 year of work experience relevant to uranium mill operation in applied health physics, radiation protection, industrial hygiene, or similar work. This experience should involve actually working with radiation detection and measurement equipment, not strictly administrative or "desk" work.

3. Specialized training: At least 4 weeks of specialized classroom training in health physics specifically applicable to uranium milling. In addition, the RSO should attend refresher training on uranium mill health physics every 2 years.

4. Specialized knowledge: A thorough knowledge of the proper application and use of all health physics equipment used in the mill, the chemical and analytical procedures used for radiological sampling and monitoring, methodologies used to calculate personnel exposure to uranium and its daughters and a thorough understanding of the uranium milling process and equipment used in the mill and how the hazards are generated and controlled during the milling process.

2.4.2 Health Physics Technicians

In addition to the RSO, there should be a minimum of one full-time health physics technician at any full-scale operating uranium mill. The health physics technician should have one of the following combinations of education, training, and experience:

1. Education: An associate degree or 2 or more years of study in the physical sciences, engineering, or a health-related field,

Training: At least a total of 4 weeks of generalized training (up to 2 weeks may be on-the-job training) in radiation health protection applicable to uranium mills,

Experience: One year of work experience using sampling and analytical laboratory procedures that involve health physics, industrial hygiene, or industrial safety measures to be applied in a uranium mill; or

2. Education: A high school diploma,

Training: A total of at least 3 months of specialized training (up to 1 month may be on-the-job training) in radiation health protection relevant to uranium mills,

Experience: Two years of relevant work experience in applied radiation protection.

The health physics technician should demonstrate a working knowledge of the proper operation of health physics instruments used in the mill, surveying and sampling techniques, and personnel dosimetry requirements.

2.5 Radiation Safety Training

All new employees should be instructed by means of an established course in the inherent risks of exposure to radiation and the fundamentals of protection against exposure to uranium and its daughters before beginning their jobs. Other guidance pertinent to this course is found in Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure," and Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure." This course of instruction should include the following topics:

1. Fundamentals of Health Protection
   a. The radiologic and toxic hazards of exposure to uranium and its daughters,
   b. How uranium and its daughters enter the body (inhalation, ingestion, and skin penetration),
   c. Why exposures to uranium and its daughters should be kept as low as is reasonably achievable (ALARA).
2. Personal Hygiene at Uranium Mills
   a. Wearing protective clothing,
   b. Using respirators correctly,
   c. Eating, drinking, and smoking only in designated areas,
   d. Using proper methods for decontamination (i.e., showers).
3. Facility-Provided Protection
   a. Ventilation systems and effluent controls,
   b. Cleanliness of the work place,
   c. Features designed for radiation safety for process equipment,
   d. Standard operating procedures,
   e. Security and access control to designated areas.
4. Health Protection Measurements
   a. Measurement of airborne radioactive materials,
   b. Bioassays to detect uranium (urinalysis and in vivo counting),
   c. Surveys to detect contamination of personnel and equipment,
   d. Personnel dosimetry.
5. Radiation Protection Regulations
   a. Regulatory authority of NRC, MSHA, and State,
   b. Employee rights in 10 CFR Part 19,
   c. Radiation protection requirements in 10 CFR Part 20.
6. Mill Emergency Procedures.

A written or oral test with questions directly relevant to the principles of radiation safety and health protection in uranium milling covered in the training course should be given to each worker. The instructor should review the test results with each worker. The instructor should discuss any wrong answers to test questions with the worker until the worker understands the correct answer. Workers who fail the test should be retested after receiving additional training. These tests and results should be maintained on file.

Each permanent worker should be provided an abbreviated retraining course annually. Documented successful completion of the retraining course should also be maintained on file. Retraining should include relevant information that has become available during the past year, a review of safety problems that have arisen during the year, changes in regulations and license conditions, exposure trends, and other current topics.

In addition, all new workers, including supervisors, should be given specialized instruction on the health and radiation safety aspects of the specific jobs they will perform. This instruction should be in the form of individualized on-the-job training. Supervisors should be provided additional specialized training on their supervisory responsibilities in the area of worker radiation protection. Retraining should be conducted annually and documented. All employees should sign a statement that they received job-specific radiation safety training. The statement should indicate the dates the training was received and it should be cosigned by the instructor. Radiation safety matters of concern that arise during plant operation should be discussed

with all workers during regular monthly or bimonthly safety meetings.

All visitors who have not received training should be escorted by someone properly trained and knowledgeable about the hazards of the mill. At a minimum, visitors should be instructed specifically on what they should do to avoid possible hazards in the areas of the mill they will be visiting.

Contractors having work assignments in the mill should also be given appropriate training and safety instruction. Contract workers who will perform work on heavily contaminated equipment should receive the same training and radiation safety instruction normally required of all permanent workers. Only job-specific radiation safety instruction is necessary for contract workers who have previously received full training on prior work assignments at the mill or have evidence of recent and relevant radiation safety training elsewhere.

2.6 Surveys

The RSO and radiation safety office staff are responsible for performing all routine and special radiation surveys as required by license conditions and by 10 CFR Part 20. Acceptable survey methods are specified in Section C.1 of Regulatory Guide 8.30, "Health Physics Surveys in Uranium Mills."

2.7 Respiratory Protection

The RSO and the radiation safety office staff are responsible for the implementation of a respiratory protection program, if one is needed. There should be adequate supplies of respiratory devices to enable issuing a device to each individual who enters an airborne radioactivity area. Additional respiratory protection devices should be located near access points of airborne radioactivity areas. All airborne radioactivity areas should have controlled access. Routine physical (medical) evaluation should be required of those individuals who will use respirators. If the licensee elects to take credit for protection factors the respiratory protection program must meet, at a minimum, the requirements of § 20.103 of 10 CFR and should follow the recommendations in Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection," which are supported in NUREG-0041, "Manual of Respiratory Protection Against Airborne Radioactive Materials" (Ref. 7).

2.8 Bioassay Procedures

The RSO is responsible for implementing a bioassay program. The frequency adopted and the type of analysis should meet the recommendations in Regulatory Guide 8.22, "Bioassay at Uranium Mills."

3. FACILITY AND EQUIPMENT DESIGN

General considerations for the design of uranium mills and uranium ore processing equipment should not be based solely on chemical process efficiency, but should also be based on the relative potential for radiologic and toxic hazards resulting from exposure of personnel to uranium and its daughters. Major aspects of planning and design that should be considered are discussed below.

3.1 Space Layout

Facility layout should be designed to maintain employee exposures ALARA while at the same time ensuring that exposure to other persons is not thereby increased. The mill layout should provide for:

1. Safe access to process equipment and for routine maintenance;

2. Adequate ventilation in all mill areas in which radioactive materials might be spilled, suspended, or volatilized;

3. Isolation of yellowcake drying, packaging, and shipping areas from other accessible mill areas;

4. Controlling access to the uranium mill proper and the ability to secure or restrict entry to any airborne radioactivity area;

5. Change rooms and shower facilities so that all workers can remove any possible radioactive contamination before leaving the site;

6. Dispersion control on radioactive materials moving from contamination areas (e.g., crushers) to relatively contamination-free areas (e.g., crusher control room);

7. Isolation of mill areas where there is a high potential for the dispersal of uranium as the result of a fire.

3.2 Access Control

Access to airborne radioactivity areas should be controlled or restricted by the use of caution signs and operational procedures, or security locks when permitted by fire protection regulations.

3.3 Ventilation Systems

To the extent practicable, the facility ventilation systems should accomplish the following:

1. As a minimum design objective, provide local exhaust ventilation (such as chemical hoods) or general area ventilation where concentrations of natural uranium and its daughters may be present in excess of 25% of the values given in Table 1 of Appendix B to 10 CFR Part 20.* The design ventilation rate (air exchange rate) should be sufficient to maintain airborne concentrations of natural uranium and its daughters to less than 25% of the maximum permissible concentration (MPC) given in Table 1 of Appendix B to 10 CFR Part 20.

*The figure 25% is used here to encourage the use of ventilation systems and other process controls in an effort to prevent the existence of airborne radioactivity areas as defined in § 20.203(d), and according to § 20.103(b)(1), "The licensee shall, as a precautionary procedure, use process or other engineering controls, to the extent practicable, to limit concentrations of radioactive materials in air to below those which delimit an airborne radioactivity area...."

2. In addition, establish a facility-specific, operational ALARA goal for concentrations of natural uranium and its daughters at less than 25% of the values given in Table 1 of Appendix B to 10 CFR Part 20.

3. Design exhaust stacks so that exhausted air will not enter air intakes that service any other mill areas.

4. Locate exhaust vents in a way that ensures compliance with the requirements of § 20.106, "Radioactivity in effluents to unrestricted areas," of 10 CFR Part 20, and 40 CFR, "Protection of Environment," Part 190, "Environmental Radiation Standards for Nuclear Power Operations," for effluents to unrestricted areas, as well as ALARA exposure considerations for the worker.

3.4 Fire Control

Because of the potential for loss of control of radioactive material in the event of a fire, a facility should have adequate firefighting equipment and workers should be trained in its proper use.

Provisions should be made for fire alarms, fire extinguishers, sprinkler systems, fire hydrants, water tanks, and other general firefighting equipment. Emergency procedures and training should include immediate fire control as a priority item. Design features should include automatic fire detection and suppression equipment in high fire-potential areas (e.g., solvent extraction area). In the event of fire, there should be provision for drainage of solvent to sumps or to outside lined ponds. Appropriate caution signs should be posted in areas of fire hazard. Fire detection systems should be checked weekly. Fire drills should be performed at least semiannually.

3.5 Laboratory Design Features

Consideration should be given to providing different laboratory facilities for metallurgical and bioassay analyses, if they are both performed at the mill site. Owing to the sensitivity required in performing bioassay analyses, provisions should be made to ensure against cross-contamination of uranium from mill ore samples. Laboratory equipment and surfaces should be constructed of materials that are easily decontaminated. Laboratory surfaces used for the preparation of bioassay samples should be decontaminated daily to less than 200 dpm α/100 cm^2 of total surface contamination. All mill laboratories should provide adequate general ventilation and exhaust fume hoods. Special attention should be directed to the design of air exhaust systems that service ore sample pulverizing and grinding equipment. The design of the laboratory should provide for the safe handling, storage, and disposal of radioactive wastes resulting from sample analyses.

3.6 Ore and Product Storage

Uranium mill plans should include the following:

1. Provisions for raw ore storage, fine ore bins, and yellowcake storage in areas so that the material does not cause unnecessary exposure to mill personnel and so that material is not dispersed by wind and rain;

2. Adequate space in the yellowcake storage and packaging areas to conduct initial surveys and spot smear tests of yellowcake packages and to enable decontamination of drums to avoid transporting a contaminated package through other mill areas;

3. Locations for yellowcake storage and shipping areas that minimize the handling time required prior to shipment.

3.7 General Equipment Considerations

General features applicable to equipment that will be used for handling, containing, or contacting uranium and its daughters are as follows:

1. Equipment that contains large volumes of uranium bearing liquids should be designed with sumps or dikes to contain the liquids in the event of leaks or spills;

2. Equipment should be designed for optimum ease of carrying out procedures, especially routine maintenance, to minimize working time where personnel are exposed to radiation or radioactive material, and to maximize distances of personnel from the source of radiation with which they are working;

3. Appropriate caution signs and symbols should be provided to meet the requirements of § 20.203 of 10 CFR Part 20, as discussed in more detail in Regulatory Guide 8.30, "Health Physics Surveys in Uranium Mills";

4. The use of semiautogenous methods for grinding ore is recommended because of the significantly reduced generation of airborne dusts.

4. CONTROL OF AIRBORNE URANIUM AND ITS DAUGHTERS

One of the major inhalation hazards associated with uranium milling facilities results from the resuspension in air of uranium and its daughters. Therefore, properly designed ventilation and dust control systems are needed to ensure that exposure of workers is maintained ALARA. There are, in general, four areas that present radiologic and toxic hazards caused by airborne materials at a typical uranium mill. These areas encompass (1) ore storage, handling, and crushing; (2) ore grinding, leaching, and concentrating processes; (3) yellowcake precipitation, drying, and packaging; and (4) miscellaneous mill locations as specified in Section 4.4. Appropriate design objectives for ventilation and dust control systems recommended for each of these generalized mill areas are given below.

4.1 Ore Storage, Handling, and Crushing Areas

Where ore is handled in the open, the objective should be to minimize blowing of dust. Water sprinkling systems

are recommended for use on ore piles when the ore moisture content is less than 10%. If ore is crushed and transported in the dry state (i.e., moisture content less than 25%), the use of ventilation systems and dust collectors is recommended. As ore travels along convevor belts to the grinder, all drop points should have either hooded dust collectors or dust suppressant systems, such as sprinklers or foam ejectors. When crushers are used prior to grinding, it is recommended that a hooded ventilation system be installed over all external openings to the crusher. The use of wet scrubbers or dust collectors is recommended for ventilation systems that service ore storage, handling, and crushing areas of the mill to prevent recirculation of contaminated air.

4.2 Grinding, Leaching, and Concentrating Process Areas

General ventilation systems are recommended to service mill areas where any grinding method is performed to ensure against the buildup of radon-222 and its daughters and ore dust normally released in the grinding process. The ventilation rate should be adequate to maintain the concentrations of radon-222 or its daughters and natural uranium from ore dust to less than 25% of the value specified in Table 1 of Appendix B to 10 CFR Part 20 as modified by the note to Appendix B. It is recommended that all leaching and thickening tanks located in enclosed structures be covered and vented directly to the outside atmosphere. General ventilation systems for mill areas where leaching and thickening tanks are located should be designed to maintain natural uranium ore dust concentrations in air at less than 19.0 $\mu g/m^3$ of uranium. If the mill is so designed that the solvent extraction (SX) concentration process equipment is in enclosed structures, a general ventilation system is recommended and should be designed to maintain the airborne natural uranium concentration in air to less than 50 $\mu g/m^3$ of uranium or 2.5×10^{-11} $\mu Ci/cm^3$ (i.e., 25% of the MPC for natural uranium). The use of wet scrubbers on general ventilation systems that service areas of the mill where grinding and leaching equipment are located is recommended. Scrubbers are not necessary on ventilation systems that service areas of the mill where the clarification or solvent extraction equipment is located.

4.3 Precipitation, Drying, and Packaging Areas

General ventilation systems are required and should be designed to maintain the concentration in air of yellowcake near precipitation tanks, yellowcake thickeners, yellowcake filters, and yellowcake repulp equipment to less than 50 $\mu g/m^3$ of uranium in air or 2.5×10^{-11} $\mu Ci/cm^3$ (i.e., 25% of the maximum permissible concentration). The next step of the recovery process involves the drying and packaging of yellowcake. Since the potential for the release of airborne yellowcake is much greater in dry form, it is recommended that drying and packaging of yellowcake should be performed in an enclosure that is separated from other areas of the mill. Also, the drying and packaging enclosure should be maintained under negative pressure. A separate air suction ring system should also be used at each yellowcake drumming station. Individual suction ring systems need only be operated during periods when the drum at that location is being filled. The exhausts for the drying and packaging enclosure and the suction ring should be vented through a wet scrubber. To ensure proper operation, the scrubber system on the concentrate drying and packaging area should be checked every shift and documented, or automatic malfunction alarm or interlock systems installed. Manometer readings or operational and instrument checks should be recorded once per shift and subsequently documented.

4.4 Miscellaneous Locations

Other important areas of the mill that have the potential for containing hazardous levels of uranium and its daughters in air include maintenance shops, rubber shops, metallurgical and bioassay laboratories, and general laundries, if they exist. Each of the above mill areas should be serviced by ventilation systems designed to maintain air concentration of natural uranium and its daughters to less than 50 $\mu g/m^3$ or 2.5×10^{-11} $\mu Ci/cm^3$ of uranium. Wet scrubbers are not necessary on these systems, however, bag filters are recommended.

D. IMPLEMENTATION

Except in those cases in which an applicant or licensee proposes an acceptable alternative method, this guide and Regulatory Guide 3.5, "Standard Format and Content of License Applications for Uranium Mills"; Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection"; Regulatory Guide 8.22, "Bioassay at Uranium Mills"; and Regulatory Guide 8.30, "Health Physics Surveys in Uranium Mills," will be used as the basis for evaluating license applications and radiation safety and ALARA programs of NRC-licensed uranium mills.

REFERENCES

1. U.S. Nuclear Regulatory Commission, "Final Generic Environmental Impact Statement on Uranium Milling," USNRC Report NUREG-0706, September 1980.*

2. National Bureau of Standards, "Permissible Dose from External Sources of Ionizing Radiation," *Handbook 59, Recommendations of the National Council on Radiation Protection* (NCRP Report No. 17), Washington, D.C., September 24, 1954.

3. National Council on Radiation Protection and Measurements, "Review of the Current State of Radiation Protection Philosophy," Report No. 43, Washington, D.C., January 15, 1975.

4. National Academy of Sciences – National Research Council, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," Washington, D.C., 1972.

5. Federal Radiation Council, "Background Material for the Development of Radiation Protection Standards," Report No. 1, Washington, D.C., 1960.

6. International Commission on Radiological Protection, "Implications of Commission Recommendations That Doses Be Kept As Low As Readily Achievable," Report No. 22, Pergamon Press, Elmsford, New York, 1974.

7. U.S. Nuclear Regulatory Commission, "Manual of Respiratory Protection Against Airborne Radioactive Materials," USNRC Report NUREG-0041, October 1976.*

*Copies are available from the NRC/GPO Sales Program, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

VALUE/IMPACT STATEMENT

1. PROPOSED ACTION

1.1 Description

Applicants for a uranium milling license must submit a license application containing the information specified in Regulatory Guide 3.5, "Standard Format and Content of License Applications for Uranium Mills." The purpose of this action is to describe both administrative health physics programs and methods to achieve ALARA occupational exposure to workers that are acceptable to the NRC staff. Health physics programs are covered in Section C.5, "Operations," in Regulatory Guide 3.5.

1.2 Need for the Proposed Action

Currently, licensees are uncertain what the NRC staff will accept in the way of a health physics and ALARA program or procedures and design features needed to achieve ALARA exposures in a uranium mill. As a consequence, a wide variety of programs are submitted. To meet minimum standards, much correspondence between the applicant and NRC is required. A guide will reduce the amount of correspondence needed, save personnel resources for both NRC and the applicant, show clearly how NRC regulations apply to uranium mills, and establish a uniform standard for an acceptable health physics and ALARA program for worker protection.

1.3 Value/Impact of the Action

1.3.1 NRC

The impact of the guidance will be primarily to reduce licensing staff effort in reviewing applications and in corresponding with applicants about areas where the application does not meet current NRC licensing requirements. An estimated 0.75 staff-year is required to develop the guide.

1.3.2 Other Government Agencies

The guidance will impact on the Mine Safety and Health Administration (MSHA) because they also regulate occupational health protection at uranium mills and on Agreement State regulatory agencies that regulate mills, primarily New Mexico, Colorado, Texas, Washington, and Florida. A Memorandum of Understanding (MOU) signed by NRC and MSHA states that each agency will coordinate the development of standards with the other agency. The MOU was published in the *Federal Register* (45 FR 1315) on January 4, 1980.

1.3.3 Industry

Industry will benefit from having clear guidance on what constitutes NRC licensing policy. Some minor expense may be involved, however, in upgrading current health physics programs and in establishing an effective ALARA program where one does not currently exist to meet the recommendations in the guidance.

1.3.4 Workers

Workers' protection should improve from having clearly stated and consistent standards for health physics and ALARA programs. Workers and their representatives will now have access to a clearly defined standard ALARA program for uranium mills. This will help them understand whether their employer has an adequate program and why some things are done as they are.

1.3.5 Public

The guidance pertains to worker protection programs. It will not directly affect the public.

1.4 Decision

The NRC should publish guidance on a standard administrative health physics and ALARA program for worker protection that is acceptable to the NRC licensing staff.

2. TECHNICAL APPROACH

The technical approach in the guidance is based on (1) NRC licensing policy as expressed in Safety Evaluation Reports (SER) written by the NRC licensing staff, especially the recent SER for Minerals Exploration Company Sweetwater Uranium Project, and (2) other references to be cited in the guidance.

3. PROCEDURAL APPROACH

3.1 Procedural Alternatives

The three reasonable procedural alternatives are as follows:

a. Regulation,

b. Regulatory guide,

c. Continue to handle each licensing application on a case-by-case basis

3.2 Value/Impact of Procedural Alternatives

A regulation is not suitable for the type of guidance envisioned because some of the program must be tailored to the design and needs of the individual mill.

A regulatory guide is recommended since it provides the best mix of flexibility and clear statement of a uniform and consistent licensing policy.

3.3 Decision on Procedural Approach

The staff concludes that a regulatory guide should be published.

4. STATUTORY CONSIDERATIONS

Authority for this guide is derived from the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, as amended, through the Commission's regulations.

5. CONCLUSION

In summary, it is proposed that a regulatory guide should be published concerning radiation protection and ALARA programs in uranium mills for worker protection.

Appendix F

Utah Division of Ra[illegible]ion Control
Equipment I[illegible]tory
August 29, 2001

Instruments

Quanity	Type	Make	Model
1	Pressurized Ion Chamber	Reuter-Stokes	RSS-111-100
2	Alarm Rate meter	Ludlum	177
7	Pressurized Ion Chamber	Victoreen	450P
1	Microrem	Bicron	Microrem
2	Neutron	Ludlum	15
2	Rate Meter GM	Ludlum	14C
2	Rate meter	Ludlum	2
12	Rate Meter	Ludlum	2241-2
8	Scaler	Ludlum	1000
1	Scaler/Rate Meter	Ludlum	2200
6	Scaler/Rate Meter	Ludlum	2220
4	Scaler/Rate Meter	Eberline	ESP-1
3	ur meter	Ludlum	12S
2	ur meter	Ludlum	19
1	Portable NaI MCA	Berkeley Nucleonics	SAM 935
6	High Vol Air Samplers	Hi-Q	
12	Pocket Dosimeters	Arrowtech	200 mr
2	Alarming Dosimeters	Dositec	L36

Detectors

QTY	RAD	Shape	Type	Maker	Model	area (cm^2)	wi[illegible]dow
4	α	2" X 6"	ZnS	Eberline	AC-3-8	59	my[illegible]ar
1	α	1" end window counter	ZnS	Eberline	SPA-1	5	my[illegible]ar
2	α	4" round flashlight	ZnS	Ludlum	43-1	75	my[illegible]ar
1	α	1.5" end window	ZnS	Ludlum	43-2	11.6	my[illegible]ar
6	α	2" X 7"	ZnS	Ludlum	43-5	50	my[illegible]ar
1	α	3" X 3"	ZnS	Ludlum	43-65	50	my[illegible]ar
1	α	1" end window counter	ZnS	Ludlum	43-9	5	my[illegible]ar
6	αβγ	Pancake shielded	GM	Bicron	LPGM	12	mi[illegible]a
2	αβγ	Pancake shielded	GM	Eberline	HP-210T	12	mi[illegible]a
1	αβγ	Pancake	GM	Eberline	HP-260	12	mi[illegible]a
12	αβγ	Pancake	GM	Ludlum	44-9	12	mi[illegible]a
2	αβ	Gas Proportional	PRO	Ludlum	43-68	100	my[illegible]ar
1	βγ	side window	GM	Ludlum	44-6		St[illegible]inless
2	βγ	side window	GM	Eberline	HP-270		St[illegible]inless
2	βγ	side window	GM	Victoreen	489-4		alu[illegible]minum
1	αβγ	.01" X 1" end window	ORG	Bicron	B1	5	my[illegible]ar
3	γ	2 X 2	NaI	Ludlum	44-10		N/[illegible]
1	γ	.08 X 2	NaI	Ludlum	44-17	20	my[illegible]ar
3	γ	1 X 1	NaI	Ludlum	44-2		N/[illegible]
3	γ	.04 X 1	NaI	Ludlum	44-3	5	my[illegible]ar

Calibration Source Dose Rate Calculations

Source Manufacturer:	Source Model:	Source S/N:
J.L. Shepard	28-6A	10181
Calibration Date:	**Half Life (years)**	**Current Date:**
8/14/86	30.17	10/8/98
Dose Rate @ 1 Meter	**Source Age:**	**Current Dose Rate @ 1 Meter**
353 mr/hr	12.16 years	267 mr/hr

Dose Rate Desired (mr/hr)	Distance (inches)	FEET	INCHES	"16ths"
10,000	6.43	0	6	7
9,000	6.78	0	6	12
8,000	7.19	0	7	3
7,000	7.69	0	7	11
6,000	8.30	0	8	5
5,000	9.10	0	9	2
4,000	10.17	0	10	3
3,000	11.74	0	11	12
2,000	14.38	1	2	6
1,000	20.34	1	8	5
900	21.44	1	9	7
800	22.74	1	10	12
750	23.49	1	11	8
700	24.31	2	0	5
600	26.26	2	2	4
500	28.77	2	4	12
400	32.16	2	8	3
300	37.14	3	1	2
250	40.68	3	4	11
200	45.49	3	9	8
190	46.67	3	10	11
180	47.95	3	11	15
170	49.34	4	1	5
160	50.86	4	2	14
150	52.52	4	4	8
140	54.37	4	6	6
130	56.42	4	8	7
120	58.72	4	10	12
110	61.33	5	1	5
100	64.33	5	4	5
90	67.81	5	7	13
80	71.92	5	11	15
75	74.28	6	2	4
70	76.89	6	4	14
60	83.05	6	11	1
50	90.97	7	6	16
40	101.71	8	5	11
30	117.44	9	9	7
25	128.65	10	8	10
20	143.84	11	11	13

INSTRUMENT CALIBRATION PROCEDURE

1. Purpose

This procedure is designed to ensure that portable radiation instruments are calibrated accurately and safely.

2. Applicability

This procedure applies to all portable radiation instruments that are being used by staff members for verifying regulatory compliance or for protecting Division staff.

3. References

a. Calibration of Survey Instruments Used in Radiation Protection for the Assessment of Ionizing Radiation Fields and Radioactive Surface Contamination, NCRP 112
b. American National Standards Institute, Radiation Protection Instrumentation Test and Calibration, ANSI N323-1978
c. U.S. Nuclear Regulatory Commission, Regulatory Guide 10.*, Revision 2, 1985.

4. Procedures

a. Exposure Rate Instruments
    i. Physical checks
        (1) Physical Condition
        (2) Check Batteries
        (3) Digital element
        (4) Meter Light
        (5) Zero adjust
        (6) High Voltage
        (7) Setup Parameters
        (8) audible function works
    ii. Calibration
        (1) Set up calibration area
            (a) Wear dosimetry
            (b) Mark area as Radiation Area
            (c) Position source beam toward an uninhabited area ie. outside wall on second floor
            (d) Set up calibration stand at the predetermined distance from the source
            (e) Position the detector's long axis perpendicular to the beam axis.
        (2) As Found readings
            (a) Calculate current source strength (See appendix a)
            (b) Check each range at mid scale. Do not attempt to calibrate any

meters at dose rate < 2 mr/hr because of background interference. Also it is not necessary to calibrate instruments above 1000 mr/hr.

(c) Check one range at approximately ¼ and ¾ scale

(d) Check integrating modes by exposing the detector for 36 seconds to a rate 100 times the desired dose. (36 seconds is 1/100th of an hour)

(e) Check dose and dose rate alarms by exposing them to sufficient radiation to trip the alarms and verifying that they function. Regardless of the reading, document the results in the as found section of the form.

(f) If all readings are within ± 10%, the instrument passes calibration

(3) After adjustment

(a) If any reading is not within ± 10% then make adjustments and recalibrate and record the results in the after adjustment section of the calibration form.

(b) Recent surveys, made with meters that are adjusted, may need to be reviewed.

(4) Fill out a calibration sticker (appendix d) and attach it to the meter. Include any special instructions or notes on the sticker such as:

(a) Maximum radiation calibrated to.

(b) Specific Probe Serial numbers

(c) Any limitations

(d) Any special settings

b. Contamination Survey Instruments

i. Physical checks

(1) Physical Condition

(2) Check Batteries

(3) Digital element

(4) Meter Light

(5) Zero adjust

(6) High Voltage

(7) Setup Parameters

(8) audible function works

ii. Calibration

(1) Select source

(a) Similar energy

(b) Similar activity

(2) Measure background

(3) Determine Plateau if appropriate

(4) Count Soure(s) and record reading.

(5) If detector area is greater than source size then take measurements at several different locations and average the results.

(6) If needed, calculate instrument dead time and set instrument accordingly.

(7) Calculate correction factors (CF) for direct surface readings per 100 cm^2. CF=100/A*E where A=detector window area in cm^2 and E = detector

efficiency in cpm/dpm.

(8) Fill out a calibration sticker (appendix d) and attach it to the meter.

(9) Attach sticker showing efficiencies or correction factors, if appropriate.

5. Notes

a. Source to detector distance should be at least 5 times the maximum detector dimension.

b. Instruments can not be calibrated below 1 mr/hr because of background interference. Instrument responses can be evaluated below this level.

6. Appendices

a. Calibration Source Dose Rate Calculations

b. Exposure Rate Instrument Calibration Form

c. Contamination Instrument Calibration Form

d. Calibration Stickers

CALIBRATION CERTIFICATE

STATE OF UTAH
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL

EQUIPMENT

	MAKE	TYPE	MODEL	SERIAL
METER				
PROBE				
CALIBRATOR	J.L. Shepard	Cs-137	26-6A	10181

PHYSICAL CHECKS

BATTERY CHECK	AUDIO CHECK	METER LIGHT	DIGITAL ELEMENT	HI-VOLT CHECK	SETTINGS	

AS FOUND READINGS

SCALE/ DECADE	UNITS	SOURCE DISTANCE	EXPOSURE		% ERROR	± 10%
			ACTUAL	READING		

CORRECTED READINGS

SCALE/ DECADE	UNITS	SOURCE DISTANCE	EXPOSURE		% ERROR	± 10%
			ACTUAL	READING		

COMMENTS

Signature: _____ DATE: _____

State of Utah
Department of Environmental Quality

Division of Radiation Control

	MAKE	TYPE	MODEL	SERIAL
METER				
DETECTOR				

CALIBRATION SETTING	THRESHHOLD SETTING

DIGITS	VOLT	BATT	AUDIO	LIGHT

Nuclide	Initial Activity	Calibration Date	Source Age	Half Life	Activity	DPM	First	Second	Thiird	Sample Counts	Net Counts	Efficiency
Bkgd		2/5/01										
C-14	1.8e-01	1/1/80	21.1	5.73e+03	0.17455	3.84e+05						
Pm-147	1.4e-01	11/17/79	21.2	2.62e+00	0.00051	1.13e+03						
Tc-99	4.0e-02	3/19/80	20.9	2.13e+05	0.04000	8.80e+04						
Sr-90	2.1e-02	10/11/79	21.3	3.02e+01	0.01286	5.66e+04						
Cl-36	2.3e-02	10/12/79	21.3	3.01e+05	0.02260	4.97e+04						
Bi-210	1.9e-02	10/16/79	21.3	2.23e+01	0.00983	2.16e+04						
Th-230	1.6e-04	1/9/96	5.1	7.70e+04	0.00016	3.52e+02						

Signature: _____ DATE: _____

Utah Division of Radiation Control
168 North 1950 West
Salt Lake City, Utah 84114-4850
(801)536-4250 Office

MODEL: _____ SERIAL: _____

DATE: _____ BY: _____

NOTES: _____

_____

Nuclide	Efficiency	Max Energy	Avg Energy
C-14		0.156	0.049
Pm-147		0.002	0.062
Tc-99		0.003	0.084
Sr-90		0.005	0.157
Cl-36		0.007	0.251
Bi-210		1.161	0.389
U-238			N/A

PROCEDURES FOR SAMPLE ANALYSIS USING THE IBM MODEL 30 COMPUTER WITH EG&G GAMMA VISION SPECTRUM ANALYSIS FOR MICROSOFT WINDOWS 3.x

PLEASE READ PROCEDURES CAREFULLY BEFORE PERFORMING OPERATIONS

CAUTION: DO NOT TOUCH SETTINGS ON THE NIMBIN MODULE!

Background Information: EG&G ORTEC's GammaVision, is an integrated MCA emulator and gamma spectrum analysis program for the Microsoft windows operating environment. A spectrum may exist in three places: in the multichannel buffer (called Detector), in computer memory (Buffer), or in a file on disk. The detector is where the data are generated from the HPGe detector. Data may be displayed and manipulated directly in the detector memory or the buffer. Copying data into either will overwrite the current contents (you are warned before any data is lost). Actions on the buffer have no effect on data acquisition taking place in the detector.

Type "win" at the prompt

If the computer is turned off, you will need to turn on the computer first. Then you start by double-clicking (using the mouse) on the GammaVision icon. The gamma vision main display will now be on the screen. If the computer is already on, you can press any Key and the main display will appear on the screen.

fig. 1

1) If a spectrum appears on the screen the operator will need to save this spectrum by clicking on File along the menu line (See figure 1). This will cause a submenu to appear.

2) Now click on the Save function. These functions write the spectrum from the displayed memory to disk. If the Save function is selected with a memory that has no previous filename associated with it, the dialog box shown in Fig. 2 appears, prompting the user for a filename. The user should now enter a filename followed by extension: .spc Once the filename and extension has been entered, you are provided with a series of dialog boxes regarding sample description, quantity, collection date and time. If no changes are neccesary, click on OK for each one.

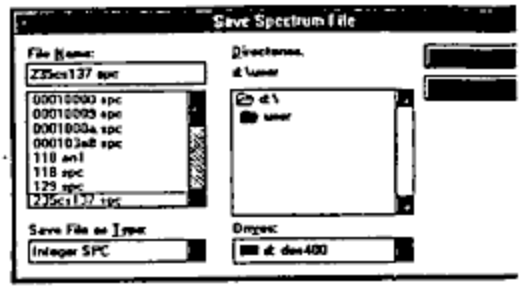

fig. 2

3) Once the spectrum has been saved, the user can click on Acquire, and click on Clear (fig. 3). This clears the spectrum from the screen. Next the user must click on Acquire and click on Start. The detector has a unique set

of entries; ie *real time and live time, sample description,sample quantity, and collection date and time.* These fields should be entered prior to acquisition.

fig. 3

3) The live time should remain at 10,000 seconds (unless a shorter acquisition time is warranted by the user). If 10,000 seconds is ok, then click on OK. Next the sample description is entered. Enter the sample description then click on OK. Next the sample quantity should be entered if the output activity is to be normalized to a volume or weight.
Enter the weight of the sample and reporting units, (ie uCi). After the weight has been entered click on OK. Next the collection date and time should be entered.

<u>Prior to clicking on OK, place the sample on the detector and close the lid!</u>

4) Then click on OK. Once the user clicks on OK, the acquisition starts. Note: if the sample is not in the counting well prior to the last step, the above steps will have to be repeated.

5) Once the acquisition is completed, perform a peak search, click on Analysis, and click on Peak Search. The peaks in the spectrum will be highlighted in blue. The user can press the home key and this will move the cursor to the left of the screen. The user then can press the Ctrl and Arrow key and move the cursor from left to right stopping at each peak or use the mouse and click on peak arrow key, lower right hand corner of screen. Note: overlapping or close peaks may have contiguous ROIs. If ROIs overlap the user may want to delete the region of interest and insert a region around the peak of interest. At the bottom of the screen will be information regarding the peak: ie energy and best library match and activity in uCi's.

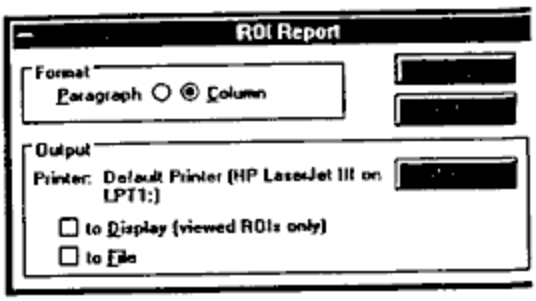

fig. 4

6) If the user wants a report (printout) of the Regions of Interest, then the user should click on Analysis and click on ROI Report (See fig. 4). The report function can be

used to produce a semi-quantitative nuclide list from the spectrum. The dialog shown in fig. 4 allows the report to be sent to a disk or the printer. The format "paragraph" should be highlighted and the output should be to the printer. (Note; these settings are already set up). After checking these parameters, click on OK. The screen will flash the report and send it to the printer which should start printing the information.

7) After sending the report to the printer, the user should click on the File setting and click on Save. This will allow the user to save the spectrum as described earlier on page 1. The user should give the sample a filename followed by the .spc extension prior to continuing with the next sample.

8) If another sample is to be counted, the user should take out the previously counted sample and write on the can the file name in which it was saved as. Now the user can go back to step 1 (ie; click on Acquire, click on Clear, then click on Start).

More specific software applications, information and function description can be found in the EG&G ORTEC brown user manual labeled #[illegible] right of the computer.

If the user has questions concerning the above procedures please contact John Hultquist.

F:\mon_was\jhultqui\wp\gamma pro

Rev. 10/97

Utah!
Where ideas connect
Department of Environmental Quality
Division of Radiation Control

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FILE

OCT 2 2 2002

October 23, 2002

Paul Lohaus, Director
Office of State and Tribal Programs
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Via Federal Express

Dear Mr. Lohaus:

The Utah Division of Radiation Control (UDRC) is preparing to submit a final application to amend the present Agreement with the Nuclear Regulatory Commission (NRC) to allow UDRC to regulate uranium mills and tailings in the State of Utah. Prior to submission of the final application, UDRC is providing NRC with documents pertaining to how UDRC would regulate the groundwater aspect of the amended Agreement. As you are aware, UDRC intends to substitute the Utah Administrative Rules for Ground Water Quality Protection, R317-6 for groundwater standards provided in Appendix A, 10 CFR Part 40 (EPA Rules 40 CFR Part 192). In support of this substitution, UDRC has prepared the following document for NRC review and comment:

(1) Enclosure 1 - Summary of the process used to determine of how to best regulate groundwater at Utah uranium mill facilities;
(2) Enclosure 2 - Executive Summary - Comparison of NRC Groundwater Protection Criteria in 10 CFR Part 40, Appendix A with Utah Ground Water Quality Protection Rules (UAC R317-6)
(3) Enclosure 3 - Detailed Comparison of NRC Groundwater Protection Criteria in 10 CFR Part 40, Appendix A with Utah Ground Water Quality Protection Rules (UAC R317-6)

We are providing you with the above information to ensure NRC that the proposed Utah program is equivalent to the comparable NRC groundwater program under Appendix A, 10 CFR Part 40 (EPA Rules 40 CFR Part 192). We believe that although we may use different terminology on occasion or may have a different regulatory process approach on an issue, the end result, protection of the groundwater resource, is achieved under both programs.

We are also aware of a provision of the Uranium Mill Tailings Radiation Control Act which specifies that an "alternate standard" may need to be approved by the NRC if a state chooses a different path regarding groundwater regulation. As such, we are requesting a determination of a regulatory and process path forward to facilitate Utah's request. We appreciate your help and consideration of this important matter. If you have questions or I can be of further assistance, please do not hesitate to contact me.

Sincerely,

William J. Sinclair, Director

Enclosure 1 - Description of the Proposed Utah Groundwater Program for Uranium Mills and Tailings

Description of the proposed Utah Groundwater Program for uranium mills and tailings
Utah Division of Radiation Control
October 2002

Prior to submitting a draft application to the Nuclear Regulatory Commission (NRC), the Department of Environmental Quality (DEQ), Divisions of Radiation Control and Water Quality convened stakeholders to examine the issue of Agreement State status and specifically, how to best address the "groundwater authority" issue. The stakeholders reached consensus that the groundwater program was best addressed by use of the current Utah program. A major issue for stakeholders was to assure consistency of groundwater regulation throughout the state of Utah and among the variety of permit holders. The Stakeholders' group consisted of representatives of the four impacted facilities (Envirocare, International Uranium, Plateau Resources, and Rio Algom), county elected officials (Tooele and San Juan County), DEQ Boards representatives from Radiation Control and Water Quality Board, and representatives of the Division of Radiation Control and the Division of Water Quality. The entire Stakeholder work effort is found at: http://www.deq.state.ut.us/EQRAD/MILLS/ATLAS/Deq_task.htm

The Division of Radiation Control (DRC) intends to administer both the groundwater permitting and radioactive material licensing for disposal facilities and uranium mills. Facilities will have both a groundwater discharge permit and radioactive materials license issued by DRC staff. Two facilities already have state groundwater discharge permits, Envirocare and Plateau Resources. International Uranium is in the process of obtaining a state groundwater discharge permit. International Uranium is also complying with a state Corrective Action Order to investigate a non-radiologic release at the White Mesa Mill.

The permit and enforcement process has been made efficient by utilizing existing provisions of the Utah Water Quality Act which allows the Water Quality Board and Executive Director to designate the Director of the Division of Radiation Control as a Co-Executive Secretary to administer provisions of the Water Quality Act for the identified facilities [see Utah Code Annotated (UCA) 19-5-106 and 19-5-104 (1),(k)]. The DRC Director has been designated as a Co-Executive Secretary of the Water Quality Board and given legal authority to issue, administer, and enforce specific groundwater permits under the Utah Water Quality Rule UCA R317-6 as applied to the following facilities: Envirocare, Rio Algom, International Uranium Corporation, and Plateau Resources Limited, and as allowed under the provisions of UCA 19-5-104(1)(k).

No separate involvement of the DEQ Division of Water Quality staff is required although they are available to consult with the DRC Director regarding interpretation of rules and other technical or procedural matters relating to groundwater protection. Appeals of enforcement proceedings and permit issues relating to groundwater would be through the Utah Water Quality Board. The Division has substituted the Administrative Rules for Ground Water Quality

Protection, R317-6 for groundwater standards provided in Appendix A, 10 CFR Part 40 (EPA Rules 40 CFR Part 192).

Umills encl

Enclosure 2 - Executive Summary - Comparison of NRC Groundwater Protection Criteria in 10 CFR Part 40, Appendix A With Utah Ground Water Quality Protection Regulations (UAC R317-6)

Executive Summary - Comparison of NRC Groundwater Protection Criteria in 10 CFR Part 40, Appendix A
With Utah Ground Water Quality Protection Regulations (UAC R317-6)

NRC Criterion	Rule Comparability
Definitions	Aquifer - The State definition is essentially equivalent. Compliance period - Although the mechanics vary, the State provides an equivalent approach. Ground water - The State definition is equivalent. Leachate - The term is not directly defined in the State rule. However, State practice is to ensure control of the discharge of leachates through issuance of Construction and discharge permits (see discussion for "liners" below) Liners - This term is not directly defined in the State Groundwater Discharge Permit (GWDP) rule. However, in practice, liners are carefully examined during the course of issuance of both State construction and discharge permits Point of compliance - The State definition is equivalent. Uppermost aquifer - Equivalent definitions are found in two other State terms (see discussion of "aquifer" in full comparison document)
Criterion 5B(1)	Although the mechanics differ, the State rule provides an equivalent measure of protection for the groundwater resource
Criterion 5B(2)(a)(b)(c)	The State rule is equivalent in its requirements for source term characterization under Criterion 5B(2)(a). No predetermined list of contaminants is specified in the Utah Groundwater Quality Protection (GWQP) Rules. However, the approach provides that: (1) Groundwater Quality Standards (GWQS) can be determined by the Executive Secretary a priori before a

Criterion 5B(2)(a)(b)(c) [continued]	contaminant pollutes the water table aquifer, and (2) Executive Secretary can use the Criterion 13 list as a guide in combination with specific source characterization information provided by the Permit applicant to determine the type and number of GWQS and Groundwater Protection levels (GWPLs) necessary for a permit or corrective action plan. The State approach allows flexibility beyond the Criterion 13 list to determine site-specific GWQS on other pollutants know to be toxic or cause health or environmental harm, or established by other accepted regulatory, research, or governmental agencies.
Criterion 5B(3)	Minor differences exist in the State wording. However, the objectives of the Permit application needs and the Contaminant Investigation Report (CIR) and Corrective Action Plan (CAP) requirements for groundwater cleanup; plus the capability of the Executive Secretary to require the additional actions and data gathering all combine to provide an equivalent degree of protection of groundwater resources.
Criterion 5B(4)	The State rules provide steps to identify underground sources of drinking water through the groundwater classification process. This process is a major underpinning to the State permit issuance and groundwater corrective action programs. The State groundwater classification system provides protection for some limited groundwater resources that could be considered "exempted" from protection under EPA rules.
Criterion 5B(5)	Although the State/NRC mechanics differ somewhat, the overall objective in the State rules is equivalent.
Criterion 5B(6)	Equivalent requirements are found in the State rules, in that the owner/operator is required to demonstrate that practicable corrective actions have been applied and the ACL poses no risk to human health or the environment. The

Criterion 5B(6) [continued]	detailed technical factors that must be considered under the NRC requirements are also adequately addressed by the State rules.
Criterion 5C	The differences seen in the concentration limits adopted for groundwater protection under the State rules (GWQS) are due to the fact that the State has stayed abreast of the EPA changes to drinking water MCL values.
Criterion 5D	The State rules are equivalent in purpose and objective to the NRC Criterion 5D requirements. While the State process does not include an 18-month deadline for the owner/operator to implement a groundwater corrective action plan, a similar time period transpires during submittal of a contaminant investigation report followed by a corrective action plan. If necessary, an enforcement order ensures any obligations that need to be met are accomplished.
Criterion 5E	The State rules and practice in determining if a discharge facility has incorporated best available control technology (BAT) are consistent and equivalent to all the groundwater protection program considerations in NRC Criterion 5E
Criterion 5F	The State rules and agency practice are equivalent to the NRC requirement
Criterion 5G	The State rules and agency practice are equivalent to NRC requirements for Criterion 5G.
Criterion 5H	The State rules are equivalent to the NRC requirement
Criterion 7A	Detection monitoring: The State rules and practice allow the establishment of a groundwater detection monitoring program that is equivalent to the NRC requirement. License issuance: The State rule is equivalent to this NRC requirement. Compliance monitoring: The State rule is more protective of

Criterion 7A (continued)	the groundwater resource, the GWPL concept provides early warning of a release before exceedance of the applicable GWQS. Corrective action: The State rules in question are equivalent to the NRC requirement.
Criterion 13	The flexibility of the State rules allow the Executive Secretary to tailor the groundwater monitoring parameters, determine appropriate GWQS and GWPLs, and set groundwater cleanup compliance concentration levels based on the individual waste source term characteristics of each disposal site. NRC Criterion 13 contaminants may be used as a guide in this process

Umills enc2

Enclosure 3 - Comparison of Several NRC Groundwater Protection Criteria in 10 CFR Part 40, Appendix A with Utah Ground Water Quality Protection Regulations (UAC R317-6)

Comparison of Several NRC Groundwater Protection Criteria in 10 CFR 40, Appendix A with Utah Ground Water Quality Protection Regulations (UAC R317-6)

NRC Citation	NRC Regulatory Language	Discussion of Equivalent Utah Statutory Authority and/or Rules
Definitions	*"Aquifer" means a geologic formation, group of formations, or part of a formation capable of yielding a significant amount of ground water to wells or springs. Any saturated zone created by uranium or thorium recovery operations would not be considered an aquifer unless the zone is or potentially is (1) hydraulically interconnected to a natural aquifer, (2) capable of discharge to surface water, or (3) reasonably accessible because of migration beyond the vertical projection of the boundary of the land transferred for long-term government ownership and care in accordance with Criterion 11 of this appendix*	A similar definition is found in the State Ground Water Quality Protection (GWQP) Rules, Utah Administrative Code (UAC) R317-6-1.1: *"Aquifer" means a geologic formation, group of geologic formations or part of a geologic formation that contains sufficiently saturated permeable material to yield usable quantities of water to wells and springs.* Editorial Note: the State definition intentionally avoids specifying a minimum aquifer yield value in order to protect all useable groundwater resources, including both current and future sources. As the second-most arid State in the nation, Utah has a unique need to protect many small public water supply systems that draw on low-yielding seeps and springs for public drinking water. In some cases these small water companies capture and combine groundwater flow from several low yielding seeps and springs to provide sufficient drinking water for a local community. With regards to artificial mounds of groundwater created by spills, releases, or other wastewater discharges, found in subsurface intervals that previously were unsaturated, the Utah Water Quality Act (WQA) provides that such wastewaters are privately owned industrial process waters, and not "Waters of the State", should they meet the following statutory requirements [see Utah Code Annotated [UCA] 19-5-102(18)(a and b)]: 1. Retained on Private Property – meaning "*...confined to or retained within the limits of private property,...*" This means the use of active hydraulic control to prevent the wastewater from leaving the physical boundaries of the property owned by the Permittee, and 2. Lack of Adverse Impact – the wastewater discharged to the subsurface does not "*...develop into or constitute a nuisance, a public health hazard, or a menace to fish or wildlife.*" Under these circumstances, the State GWQP rules would not apply to the artificial zone of saturation created by the facility. However, should the artificial mound leave the property boundaries, or contain contaminants in excess of the State Ground Water Quality Standards (GWQS), said groundwater is subject to regulation by the State. **Rule Comparability:** the State definition is essentially equivalent.
	"Compliance period" begins when the Commission sets secondary ground-water protection standards and ends when the owner or operator's license is terminated and the site is transferred to the State or Federal agency for long-term care.	This specific term is currently undefined in the State GWQP Rules. However, two (2) sections of the State rule apply to this concept. Under R317-6-6.1(A) and (B), a facility that "*...discharges or would probably result in a discharge of pollutants that may move directly or indirectly into ground water...*" is required to obtain a Ground Water Quality Discharge Permit (hereafter Permit) from the Executive Secretary. Upon issuance of the Permit, the owner/operator is required to comply with the State GWQP Rules, as implemented by the Permit. Thereafter, the Permit continues in force until the Executive Secretary determines that circumstances at the facility have changed such that the operation poses "*...a de minimus actual or potential effect on ground water quality.*" [R317-6-6.2(A) and (A)(25)]. If at facility closure, the Executive Secretary finds groundwater quality at the site to be at concentrations that are less than or equal to the State GWQS, then the facility would be determined to meet the "de-minimus" criterion referenced above, and the Permit terminated. At that point, the radioactive material license would also be terminated, and the facility transferred to the DOE general license. **Rule Comparability:** although the mechanics vary, the State approach is equivalent.

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	"Ground water" means water below the land surface in a zone of saturation. For purposes of this appendix, ground water is the water contained within an aquifer as defined above.	A similar definition is found in the State GWQP Rules, as follows (R317-6-1.19): *"Ground Water" means subsurface water in the zone of saturation including perched ground water.* **Rule Comparability:** the State definition is equivalent.
	"Leachate" means any liquid, including any suspended or dissolved components in the liquid, that has percolated through or drained from the byproduct material.	This term is used extensively in the State GWQP rules without a formal regulatory definition. Many times it is used interchangeably with the term "effluent" (R317-6-1.28, R317-6-6.2(A)(1), and R317-6-6.3(F)). However, this term may also be encompassed by the State definition for "pollution", which is "*…contamination, or other alteration of the physical, chemical, or biological properties of any waters of the State, or such discharge of any liquid, gaseous, or solid substance into any waters of the state as will create a nuisance or render such waters harmful or detrimental or injurious to public health, safety, or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life.*" (R317-6-1.30). **Rule Comparability:** this term is not directly defined in the State rule. However, State practice is to ensure control of the discharge of leachates thru issuance of Construction and discharge permits (see discussion for "liner", below).
	"Liner" means a continuous layer of natural or man-made materials, beneath or on the sides of a surface impoundment which restricts the downward or lateral escape of byproduct material, hazardous constituents, or leachate.	This specific term is not used in the State GWQP Rules in order that the rules so apply to many different types of waste or wastewater discharge sources, including waste impoundments, pipe discharges of wastewater, among others. Instead, generic reference is made in the State rules to a "discharge" which is defined as"*…the release of a pollutant directly or indirectly into subsurface waters of the state*" (R317-6-1.13). Another State term is also applicable, "point of discharge", which "*…means the area within outermost location at which effluent or leachate has been stored, applied, disposed of, or discharged; for a diked facility, the outermost edge of the dikes*" (R317-6-1.28). Accordingly, the discharge to the subsurface and to Waters of the State could be through a liner under a waste or wastewater impoundment facility. Said liner could be made of earthen or man-made materials. Under the State WQA, an owner / operator is required to first secure a Permit before operating a Treatment Works [UCA 19-5-107(3)]. In turn, the Executive Secretary reviews engineering plans and specifications for Treatment Works and issues Construction Permits [UCA 19-5-104(1)(h)]. During the course of this review the design and construction of proposed liner systems is carefully examined. The purpose of the liner system is to prevent and/or abate the seepage discharge that must be controlled to be in compliance with the State GWQP rules. In addition, the GWQP Rules also require the Permittee to provide information to demonstrate how the discharge will be controlled and not migrate into or adversely effect the quality of Waters of the State, including both ground water and surface water [R317-6-6.3(G)]. The design and construction of liner systems is central to this goal **Rule Comparability:** this term is not directly defined in the State GWQP rule. However, in practice liners are carefully examined during the course of issuance of both State Construction and discharge Permits.
	"Point of compliance" is the site specific location in the uppermost aquifer where the ground-water protection standard must be met.	A similar definition is found in the State GWQP Rules for Compliance Monitoring Point (CMP), which is defined as "…a well, seep, spring, or other sampling point used to determine compliance with applicable permit limits" (R317-6-1.10). Another citation in the State GWQP Rules requires that the CMP be located as close as practicable to the point of discharge … and within the property boundaries owned by the facility [R317-6-6.9(A)]. This same section of the rules allows the Executive Secretary to require that the State GWQS be met at the CMP. **Rule Comparability:** the State definition is equivalent.

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	"Uppermost aquifer" means the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary.	This specific term is not used in the State GWQP Rules. However, two other related terms are defined, including: *"Water Table" means the top of the saturated zone of a body of unconfined ground water at which the pressure is equal to that of the atmosphere.* (R317-6-1.39), and "Water Table Aquifer" means an aquifer extending downward from the water table to the first confining bed (R317-6-1.40). For additional information see discussion on the definition of "aquifer", above. **Rule Comparability:** equivalent definitions are found in two other State terms.
Criterion 5B(1)	*Uranium and thorium byproduct materials must be managed to conform to the following secondary ground-water protection standard: Hazardous constituents entering the ground water from a licensed site must not exceed the specified concentration limits in the uppermost aquifer beyond the point of compliance during the compliance period.*	The Utah Ground Water Quality Protection (GWQP) Rules also mandate that groundwater quality at the compliance monitoring point must not exceed the State Ground Water Quality Standards (GWQS) while a discharge Permit is required. This mandate is the product of both statutory requirements provided in the Utah Water Quality Act (WQA), and the Utah GWQP Rules promulgated therefrom, as outlined below: WQA Citations (UCA 19-5): 19-5-107(1)(a): provides that it is unlawful to discharge pollutants into Waters of the State, or to directly or indirectly place wastes where they may cause ground or surface water pollution. 19-5-102(18): defines all groundwater, including the uppermost aquifer, and surface water as Waters of the State. 19-5-102(3): defines discharge as the addition of any pollutant to any Waters of the State. 19-5-102(10): defines pollution as man-made alteration of the quality of Waters of the State, including among others, radiological changes. 19-5-102(17): defines waste or pollutant as the discharge of various types of waste into water. 19-5-107(3)(b): requires an owner / operator to first secure a Permit from the Executive Secretary before operating a "treatment works"*. 19-5-102(14): defines Treatment Works, as facilities used to treat, stabilize, or hold wastes* 19-5-104(1)(e): empowers the Utah Water Quality Board (hereafter Board) to adopt Standards of quality for Waters of the State, and classify said waters, for the prevention, control, and abatement of pollution. 19-5-104(1)(h): empowers the Board to review engineering plans and specifications and issue construction permits for Treatment Works. 19-5-104(1)(i): empowers the Board to issue, revoke, modify, or deny discharge Permits to prevent or control discharge of pollutants and wastes into Waters of the State (after public notice and opportunity for public hearing). * = Similar requirements are found in the GWQP Rules for waste disposal sites, including mining and milling operations [R317-6-6.1(A) and(B)]. Editorial Note: in practice the Executive Secretary issues both the Construction Permit and the Groundwater Quality Discharge Permit concurrently as a single document. Both regulatory instruments work together in tandem to govern the construction, operation, maintenance, monitoring, and closure of a facilsty in order to protect local groundwater resources. GWQP Rule Citations (Utah Administrative Code R317-6): R317-6-1.1: defines aquifer as geologic formation(s), or parts thereof that are sufficiently saturated to yield useable quantities of water to wells and springs. R317-6-1.20: defines State Ground Water Quality Standards (GWQS) as concentration levels adopted for the protection of groundwater quality.

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		R317-6-1.10. defines Compliance Monitoring Point (CMP) as a well, or other sampling point used to determine compliance with Permit limits. R317-6-4: defines Ground Water Protection Limits (GWPLs) that are groundwater monitoring concentration limits used at Permitted facilities, and are assigned as a fraction of the GWQS. The determination of these limits vary according to background groundwater class, and are used as an early warning mechanism to protect groundwater quality. R317-6-6.16(B): mandates that out-of-compliance status exists for a facility when 2 consecutive groundwater quality samples from a CMP exceed the Permit limit (GWQS or GWPL) and the background groundwater concentration by a statistically significant measure (e.g. 2 standard deviations). **Rule Comparability:** although the mechanics differ, the State rule provides an equivalent measure of protection for the groundwater resource.
	Hazardous constituents are those constituents identified by the Commission pursuant to paragraph 5B(2) of this criterion. Specified concentration limits are those limits established by the Commission as indicated in paragraph 5B(5) of this criterion.	Equivalent to this requirement, the Ground Water Quality Standards (GWQS) were adopted by the Utah Water Quality Board (hereafter Board) for the protection of groundwater quality in Utah (R317-6-1.20). Said GWQS include specific groundwater quality contaminants and concentration limits (R317-6-2.1). In a like manner, the Executive Secretary can determine ad hoc GWQS for a facility on a case-by-case basis during issuance of a Permit (R317-6-2.2). **Rule Comparability:** equivalent capability exists to set ad hoc protections standards for groundwater quality.
	The Commission will also establish the point of compliance and compliance period on a site specific basis through license conditions and orders. The objective in selecting the point of compliance is to provide the earliest practicable warning that the impoundment is releasing hazardous constituents to the ground water. The point of compliance must be selected to provide prompt indication of ground-water contamination on the hydraulically downgradient edge of the disposal area.	In a similar fashion the State rules specify compliance monitoring points which are: 1. Wells or other sampling points, determined on a facility specific basis, used to determine compliance with the Permit (R317-6-1.10). 2. Used to determine compliance with GWQS and/or Groundwater Protection Levels (GWPL) [R317-6-6.9A]. GWPLs are defined as a fraction of GWQS concentration, depending on local groundwater class, and are used to provide early warning of an impending release to groundwater (R317-6-4). Groundwater class is based on the background concentrations of total dissolved solids (TDS) in the aquifer, and is used to afford more protection to high quality, low TDS groundwater (R317-6-3). 3. Located after consideration of local hydrology, type of pollutants, and other factors (ibid.), 4. Located as close as practicable to the point of discharge in order to provide early warning of a release to groundwater (ibid.). Point of discharge is defined as the outermost perimeter of the discharge source, or for impoundments the outermost edge of the dikes (R317-6-1.28), and 5. Located on property owned by the facility (unless permission granted from affected nearby property owners [R317-6-6.9A]). **Rule Comparability:** equivalent provisions are provided in the State regulations.
	The Commission shall identify hazardous constituents, establish concentration limits, set the compliance period, and may adjust the point of compliance if needed to accord with developed data and site information as to the flow of ground water or contaminants, when the detection monitoring established under	The Executive Secretary also identifies contaminants needed for monitoring during review of the initial Permit application, primarily through evaluation of the possible source term contaminants present on site (R317-6-6.3F). This information is integral to GWQP Rule mandate that requires the Permittee to submit a groundwater monitoring plan as a part of the Permit application. This plan must include a description and justification of the types and numbers of ground water quality parameters to be monitored [R317-6-6.3(1)(7)]. Concentration limits for the Permit are based on Ground Water Protection Levels (GWPL), which by definition are determined by groundwater class, and are fractions of the State GWQS. During issuance of a Permit, the Executive

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	Criterion 7A indicates leakage of hazardous constituents from the disposal area.	Secretary can determine permit specific pollutants, on a case-by case basis, as Ad-hoc GWQS (R317-6-2.2). As mentioned above, the compliance period begins when the Permit is issued, and continues until it is terminated by the Executive Secretary just prior to site transfer to the DOE general license, see discussion on "compliance period" definition, above. The ability to adjust the number and location of groundwater monitoring wells or to adjust the number of groundwater quality monitoring parameters, to ensure adequate detection of groundwater contamination from the waste disposal site is made possible by the groundwater monitoring requirements in R317-6-6.9A. A re-evaluation and change in Permit requirements, if necessary, is usually accomplished every 5-years as a part of Permit renewal, as outlined in R317-6-6.6 and 6.7. Editorial Note: With the intent of preventing groundwater pollution, the evaluation and adjustment of requirements upon Permit renewal does not require that pollution first adversely impact local groundwater quality before Permit monitoring changes are made. As for a detection monitoring program, historically some Permittees have successfully argued use of an initial short list of groundwater monitoring parameters that is expanded to a longer list of contaminants upon detection of any contaminant of concern. In common practice the Executive Secretary includes re-opening provisions in Permits to allow modification of the CMP locations, numbers of wells, and water quality parameters on an as-needed basis. **Rule Comparability:** The State rule provides the same capability with regards to identifying the types and numbers of contaminants needed for groundwater monitoring, establishing necessary concentration limits (GWQS and GWPLs), and determining the location and number of CMPs. The State rules also offer an additional degree of protection in that these determinations are made a priori at the time of Permit issuance, and need not wait for groundwater pollution to be made manifest.
Criterion 5B(2)	*A constituent becomes a hazardous constituent subject to paragraph 5B(5) only when the constituent meets all three of the following tests:* *(a) The constituent is reasonably expected to be in or derived from the byproduct material in the disposal area;* *(b) The constituent has been detected in the ground water in the uppermost aquifer; and* *(c) The constituent is listed in Criterion 13 of this appendix.*	The Permittee is required to submit an application that provides a detailed characterization of the potential contaminant source term [R317-6-6.3(F)]. Thereafter, the groundwater monitoring contaminants are identified by the Executive Secretary after careful examination of the characteristics of the effluents or wastes that may be discharged or potentially discharged from the facility (ibid.). The Executive Secretary then determines the groundwater monitoring parameters and sets appropriate concentration limits (GWQS and/or GWPLs) to protect public health and the environment [R317-6-6.9(A)]. These contaminants can include ad-hoc GWQS, mentioned above (R317-6-2.2). Editorial Note: with an eye to preventing groundwater pollution the State rule does not have any pre-requisite that the contaminant must first pollute the water table aquifer before it is regulated by Permit. While Criterion 13 is extensive and can be used as a guide to determine groundwater monitoring parameters, no pre-determined list of contaminants is dictated by the GWQP Rules. The purpose of this approach is to allow the Executive Secretary flexibility in tailoring the Permit requirements, on a case-by-case basis, to the individual characteristics of each discharging or potentially discharging facility. **Rule Comparability:** the State rule is equivalent in its requirements for source term characterization under Criterion 5B(2)(a). No predetermined list of contaminants is specified in the Utah GWQP Rules. However, the State approach provides that: 1) GWQS can be determined by the Executive Secretary a priori before a contaminant pollutes the water table

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		aquifer, and 2) Executive Secretary can use the Criterion 13 list as a guide in combination with site specific source characterization information provided by the Permit applicant to determine the type and number of GWQS and GWPLs necessary for a Permit or Corrective Action Plan. This State approach allows flexibility beyond the Criterion 13 list to determine site-specific GWQS on other pollutants known to be toxic or cause health or environmental harm, as established by other accepted regulatory, research, or governmental agencies.
Criterion 5B(3)	*Even when constituents meet all three tests in paragraph 5B(2) of this criterion, the Commission may exclude a detected constituent from the set of hazardous constituents on a site specific basis if it finds that the constituent is not capable of posing a substantial present or potential hazard to human health or the environment. In deciding whether to exclude constituents, the Commission will consider the following:* *(a) Potential adverse effects on ground-water quality, considering --* *(i) The physical and chemical characteristics of the waste in the licensed site, including its potential for migration;* *(ii) The hydrogeological characteristics of the facility and surrounding land;* *(iii) The quantity of ground water and the direction of ground-water flow;* *(iv) The proximity and withdrawal rates of ground-water users;* *(v) The current and future uses of ground water in the area;* *(vi) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality;* *(vii) The potential for health risks caused by human exposure to waste constituents;* *(viii) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;* *(ix) The persistence and permanence of the potential adverse effects.*	This type of evaluation is handled either during Permit issuance or thru the course of Executive Secretary approval of a groundwater Corrective Action Plan. As a part of a Permit application, the owner / operator is required to provide a complete description of these same data elements, including [R317-6-6.3(D) thru (J)]: 1. Water Source Description – including wells, well uses, topography, springs, water bodies, drainages, and man-made structures within 1-mile of the facility. 2. Hydrogeologic Description – including a description of soil types, aquifers, groundwater flow direction, groundwater quality, aquifer material, and well logs within a 1-mile radius of the facility. 3. Source Term Characterization – including the type, source, and physical / chemical radiological / and toxic characteristics of the effluent or potential effluent that may be discharged from the facility. This also includes average and maximum daily volumes wastewater / leachate to be discharged, and the anticipated contaminant concentrations in said discharges. 4. Source Control Justification – including a detailed description and justification that the source(s) or potential source(s) will be controlled and managed to protect receiving ground and surface water quality resources (including surface water standards, GWQS, groundwater class limits, and GWPLs). During the Permit issuance process, the Executive Secretary may determine that certain groundwater contaminants at a facility are necessary for groundwater monitoring and may set concentration limits (GWQS and GWPLs) for those pollutants (R317-6-6.9(A) and R317-6-2.2). On the other hand, the Executive Secretary may determine that monitoring needs at a waste disposal site are best served by requiring that certain contaminants be sampled only for a groundwater monitoring purpose without establishment of a respective GWPL or GWQS for that contaminant(s). As in all cases of Permit issuance, the Executive Secretary is required to issue a public notice the draft Permit has been prepared for the facility, provide a 30-day minimum public comment period, and receive public comment on the action in question (R317-6-6.5). A similar process is found in the State GWQP Rules after a contaminant reaches the water table aquifer at a facility. After determination that a groundwater contaminant has exceeded its GWQS (un-permitted facility), or a Permit limit (e.g., GWPL), the Executive Secretary may require the owner / operator to prepare and conduct both a Contaminant Investigation and a Corrective Action Plan [R317-6-6.15 (A) and (C)]. The purpose of the Contaminant Investigation Report (CIR) is to fully characterize the apparent pollution and its source, and local groundwater hydrogeologic conditions. The State GWQP Rules require a significant amount of detail must be included in the CIR, including [R317-6-6.15(D)(1)(a) thru (e)]: 1. Characterization of Pollution – including: amount, form, concentration, toxicity, environmental fate and transport, other significant characteristics of the groundwater pollution (including any contributing surface contamination),

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	(b) Potential adverse effects on hydraulically-connected surface water quality, considering – *(i) The volume and physical and chemical characteristics of the waste in the licensed site;* *(ii) The hydrogeological characteristics of the facility and surrounding land;* *(iii) The quantity and quality of ground water, and the direction of ground-water flow;* *(iv) The patterns of rainfall in the region;* *(v) The proximity of the licensed site to surface waters;* *(vi) The current and future uses of surface waters in the area and any water quality standards established for those surface waters;* *(vii) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality;* *(viii) The potential for health risks caused by human exposure to waste constituents;* *(ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and* *(x) The persistence and permanence of the potential adverse effects.*	vertical and horizontal extent of the contamination, and concentrations and distribution and chemical makeup of the contamination within the plume. 2. Characterization of the Facility – including: contaminant substances / mixtures present and media of occurrence, hydrogeologic conditions present at facility (including upgradient and downgradient conditions), surface waters present at the site, climate and meteorological conditions at the site, type / location / description of the possible sources of the pollution, and groundwater withdrawals and types of uses within a 2-mile radius. 3. Evaluation of CIR Data Gaps – including quality assurance / quality control measures used to collect the data, description of data used in the CIR, and description of data gaps encountered and plans to fill said data gaps. 4. Risk Assessment – including all studies necessary to justify the proposed groundwater contaminant cleanup concentration(s). 5. Any Other Information Required – by the Executive Secretary must also be included in the CIR. Among other uses, this provision allows the Executive Secretary to protect hydraulically connected surface water. After submittal and approval of the CIR, the owner / operator is required to submit a Corrective Action Plan (CAP). The CAP must provide several different types of information, as follows [R317-6-6.15(D)(2) and 6.15(E)]: 1. Construction and Operation Description – for the proposed Corrective Action (CA) system. 2. Completion Schedule – for construction of the proposed CA system and cleanup of the effected groundwater. 3. Demonstration of Protection – that the proposed CA system will protect public health and the environment. 4. Demonstration that Approved Groundwater Concentration Limits Will Be Met – this includes approved GWQS [R317-6-6.15(F)(1)], ad-hoc GWQS established by the Executive Secretary for the cleanup [R317-6-6.15(F)(2)], or other alternate cleanup concentrations approved by the Executive Secretary [as per R317-6-6.15(G)]. 5. Evaluation of Off-site Impacts – including, but not limited to contaminants released from the site by contaminated groundwater or the transport and disposition of the contaminated material at a secondary disposal site. 6. Demonstration of Permanent Effect – that the CA will produce a permanent effect in cleaning up the contaminated groundwater at the site. 7. Description of All Measures to be Used – used by the CA system, including, but not limited to: capping or other source control methods, long-term groundwater monitoring and reporting, long-term operation and maintenance of the CA system, environmental hazard notices and other security, periodic review to determine if the CA system continues to protect public health and the environment. 8. Any Other Information Required – by the Executive Secretary during review of the CAP. This provision allows the Executive Secretary to protect hydraulically connected surface waters, among other things. Editorial Note: during review of the CIR and CAP, the Executive Secretary may omit a groundwater contaminant from any required groundwater monitoring or cleanup action, provided that said contaminant does not pose a risk to public health and the environment and meets all other State requirements, as listed above. Before approval of any CAP, the Executive Secretary must publish a public notice in a local newspaper and provide at least a 30-day public comment

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		period [R317-6-6.15(E)]. **Rule Comparability:** minor differences exist in the State wording. However, the objectives of the Permit application needs and the CIR and CAP requirements for groundwater cleanup; plus the capability of the Executive Secretary to require the additional actions and data gathering all combine to provide an equivalent degree of protection of groundwater resources.
Criterion 5B(4)	*In making any determinations under paragraphs 5B(3) and 5B(6) of this criterion about the use of ground water in the area around the facility, the Commission will consider any identification of underground sources of drinking water and exempted aquifers made by the Environmental Protection Agency.*	A similar process of identifying groundwater suitable for human consumption, and therefore enhanced protection, is made by the Executive Secretary thru the State groundwater classification process. Under this process, groundwater is classified by its Total Dissolved Solids (TDS) content, among other parameters, as follows (see R317-6-3 and R317-6-4): Class IA = Pristine Groundwater, where TDS < 500 mg/l (GWPLs here are determined on a 10% basis of GWQS). Class 1B = Irreplaceable Groundwater for a public drinking water system (GWPLs here are also determined on 10% basis of the GWQS). Class 1C = Ecologically Important Groundwater, necessary for the existence of wildlife (GWPLs here are based on pre-requisite surface water quality standards needed to support the wildlife). Class II = Drinking Water quality groundwater where 500 mg/l < TDS < 3,000 mg/l, and no groundwater contaminant exceeds its GWQS (GWPLs here are determined on a 25% basis of the GWQS) Class III = Limited Use Groundwater, where 3,000 mg/l < TDS < 10,000 mg/l or one or more contaminants exceed their respective GWQS (GWPLs here are determined on a 50% basis of the GWQS.) This groundwater class is roughly equivalent to an "exempted aquifer" under the EPA Safe Drinking Water Act / Underground Injection Control Regulations found in 40 CFR 146.4) Class IV = Saline Groundwater, where TDS > 10,000 mg/l (GWPLs here are determined on a case-by-case basis by the Executive Secretary. In practice, the Executive Secretary has assigned GWPLs at facilities overlying Class IV groundwater in order to ensure that sufficient engineering controls are provided to adequately contain and sequester 11e.(2) waste contaminants). Under State rule, the Board may initiate the groundwater classification process during the Permit issuance process. Either a community or an individual person may petition the Board to classify nearby aquifers or parts of aquifers with the intent of protecting local groundwater quality (R317-6-5). **Rule Comparability:** the State rules provide steps to identify underground sources of drinking water thru the groundwater classification process. This process is a major underpinning to the State Permit issuance and groundwater corrective action programs. The State groundwater classification system provides protection for some limited groundwater resources that could be considered "exempted" from protection under EPA rules.
Criterion 5B(5)	*At the point of compliance, the concentration of a hazardous constituent must not exceed --*	The State process for determining compliance at the compliance monitoring point has several points in common. Compliance exists when groundwater quality meets one of the following Permit limits [R317-6-6.16(A) and (B)]:

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	(a) The Commission approved background concentration of that constituent in the ground water; *(b) The respective value given in the table in paragraph 5C if the constituent is listed in the table and if the background level of the constituent is below the value listed; or* *(c) An alternate concentration limit established by the Commission.*	1. GWPLs – where groundwater monitoring results are equal to or below the GWPL concentrations assigned in the Permit. As described above, the GWPLs are fractions of the GWQS, are determined largely by groundwater class, and are used to provide early warning of a discharge to groundwater. When a GWPL is exceeded, the Permittee is required to implement more frequent groundwater sampling to confirm the apparent exceedance. 2. Alternate Concentration Limits (ACL) – where the Board has approved ACLs in issuance of a Permit, pursuant to R317-6-6.4(B) or (D),the Permittee is required to maintain local groundwater quality below the corresponding ACL limits [R317-6-6.4(E)]. Further, background groundwater quality concentrations for contaminants of concern are taken in to account in these compliance determinations at one or more of the following decision points: 1. Initial Determination of Groundwater Class – if natural background at a waste disposal site contains contaminants at a concentration in excess of the GWQS, then that groundwater is categorized Class III. In this case, less protection of the aquifer is afforded and higher GWPL values assigned in the Permit (R317-6-4.6). Details on how background groundwater quality data are to be collected and the background determined are found in R317-6-6.10. 2. Class IV Groundwater – in those cases where background groundwater TDS is greater than 10,000 mg/l, the Executive Secretary classifies the groundwater Class IV and determine GWPLs, on a Permit specific basis, to protect human health and the environment (R317-6-4.7). Historically in these cases, the GWPL concentrations were assigned equal to the corresponding GWQS. 3. Out of Compliance Status – a facility is not deemed to be out-of-compliance with its Permit limits (GWPLs or ACLs) until after 2 consecutive groundwater samples exceed [R317-6-6.16(B)]: a) The assigned Permit limit (GWPL or ACL), and b) The background contaminant concentration, as determined by the mean plus 2-standard deviation concentration, or c) The groundwater concentration found is statistically significantly higher than the applicable Permit limit, as determined by EPA RCRA statistical methods. **Rule Comparability:** Although the State / NRC mechanics differ somewhat, the overall objective in the State rules is equivalent.
Criterion 5B(6)	*Conceptually, background concentrations pose no incremental hazards and the drinking water limits in paragraph 5C state acceptable hazards but these two options may not be practically achievable at a specific site. Alternate concentration limits that present no significant hazard may be proposed by licensees for Commission consideration. Licensees must provide the basis for any proposed limits including consideration of practicable corrective actions, that limits are as low as reasonably achievable, and*	In a similar vein, the State also assumes that Class I and II groundwater poses no risk to human consumption, in that these groundwaters are deemed drinking water quality (R317-6-3.1 thru 3.5). For new facilities that overlie Class III groundwater (EPA "exempted' aquifers), the Board may approve an ACL request if the Permittee is able to show the extent which the release will exceed the TDS class limit, the appropriate GWQS, and the applicable GWPLs for all contaminants of concern and demonstrates that [R317-6-6.4(B)]: 1. The facility incorporates Best Available Technology (BAT) in its control of the discharge, 2. The pollution poses no risk to human health and the environment, and 3. The ACL is justified based on other considerations such as substantial over-riding social and economic benefits. For existing facilities, i.e., those that pre-dated the State GWQP Rules (adopted in 1989) and notified the Executive

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	information on the factors the Commission must consider. The Commission will establish a site specific alternate concentration limit for a hazardous constituent as provided in paragraph 5B(5) of this criterion if it finds that the proposed limit is as low as reasonably achievable, after considering practicable corrective actions, and that the constituent will not pose a substantial present or potential hazard to human health or the environment as long as the alternate concentration limit is not exceeded. In making the present and potential hazard finding, the Commission will consider the following factors: *(a) Potential adverse effects on ground-water quality, considering --* *(i) The physical and chemical characteristics of the waste in the licensed site including its potential for migration;* *(ii) The hydrogeological characteristics of the facility and surrounding land;* *(iii) The quantity of ground water and the direction of ground-water flow;* *(iv) The proximity and withdrawal rates of ground-water users;* *(v) The current and future uses of ground water in the area;* *(vi) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality;* *(vii) The potential for health risks caused by human exposure to waste constituents;* *(viii) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;* *(ix) The persistence and permanence of the potential adverse effects.*	Secretary of their existence before February 10, 1990, ACLs may be approved by the Board if the Permittee shows the extent the discharge exceeds applicable TDS class limits, GWQS and applicable GWPLs for the contaminants of concern, and demonstrates that [R317-6-6.4(D)]: 1. Steps are being taken to control the source of the pollution, including a defined program of action and schedule, 2. The pollution poses no risk to human health and the environment, and 3. The ACL is justified based on other considerations such as substantial over-riding social and economic benefits. With regards to the detailed factors that the Commission must consider when making a decision on a proposed ACL, particularly those dealing with potential adverse effects on groundwater quality [Criterion 5B(6)(a)] and surface water quality [Criterion 5B(6)(b)], the NRC regulatory language in Criterion 5B(6) is identical to that found in Criterion 5B(3), above. For an evaluation of the comparability of these detailed factors with the applicable State rules, the reader is referenced to the Criterion 5B(3) section above. Editorial Note: all technical information provided by the Permittee in support of an ACL application is normally revisited and re-evaluated by the Executive Secretary at the time of Permit renewal; which is based on a 5-year life cycle [R317-6-6.7]. **Rule Comparability**: equivalent requirements are found in the State rules, in that the owner / operator is required to demonstrate that practicable corrective actions have been applied and the ACL poses no risk to human health or the environment. The detailed technical factors that must be considered under the NRC requirements are also adequately addressed by the State rules.

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	(b) Potential adverse effects on hydraulically-connected surface water quality, considering -- *(i) The volume and physical and chemical characteristics of the waste in the licensed site;* *(ii) The hydrogeological characteristics of the facility and surrounding land;* *(iii) The quantity and quality of ground water, and the direction of ground-water flow;* *(iv) The patterns of rainfall in the region;* *(v) The proximity of the licensed site to surface waters;* *(vi) The current and future uses of surface waters in the area and any water quality standards established for those surface waters;* *(vii) The existing quality of surface water including other sources of contamination and the cumulative impact on surface water quality;* *(viii) The potential for health risks caused by human exposure to waste constituents;* *(ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and* *(x) The persistence and permanence of the potential adverse effects.*	
Criterion 5C	Table 5C contains the NRC maximum concentration values for groundwater protection (GWP Values), see Attachment 1, below	Comparison of NRC GWP concentration values and the State GWQS is found in Attachment 1, below. Editorial Note: In 1987 the NRC adopted EPA drinking water maximum concentration limits (MCLs) as Ground Water Protection Standards (GWPS) in 10 CFR 40 Appendix A, Table 5C. Likewise, in 1989 when the Utah GWQP Rules were promulgated, the State's GWQS were equal to these same EPA MCLs (R317-6-2, Table 1), see Attachment 1, below. However, since 1989 the U.S. EPA has revised its drinking water MCLs with new concentrations that took effect largely in 1992. In order to ensure protection of groundwater quality and public health in Utah, the State followed suit and adopted the revised EPA MCL values as GWQS. Unfortunately, these changes in drinking water MCLs have not been revised by EPA in its groundwater protection standards for uranium mills found in 40 CFR 192. This is the principal reason why differences exist between the NRC GWPS and the Utah GWQS. **Rule Comparability**: the differences seen in the concentration limits adopted for groundwater protection under the State rules (GWQS) are due to the fact the State has stayed abreast of the EPA changes to drinking water MCL values.

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Criterion 5D	*If the ground-water protection standards established under paragraph 5B(1) of this criterion are exceeded at a licensed site, a corrective action program must be put into operation as soon as is practicable, and in no event later than eighteen (18) months after the Commission finds that the standards have been exceeded. The licensee shall submit the proposed corrective action program and supporting rationale for Commission approval prior to putting the program into operation, unless otherwise agreed to by the Commission. The objective of the program is to return hazardous constituent concentration levels in ground water to the concentration levels set as standards. The licensee's proposed program must address removing hazardous constituents that have entered the ground water at the point of compliance or treating them in place. The program must also address removing or treating any hazardous constituents that exceed concentration limits in ground water between the point of compliance and the downgradient facility property boundary. The licensee shall continue corrective action measures to the extent necessary to achieve and maintain compliance with the groundwater standard. The Commission will determine when the licensee may terminate corrective action measures based on data from the ground-water monitoring program and other information that provide reasonable assurance that the ground-water protection standard will not be exceeded.*	Similar objectives are found in the State regulations. Upon an exceedance of a GWPL established by Permit, the Permittee is required to implement an accelerated groundwater sampling program in order to confirm the exceedance [R317-6-6.16(A)]. Out-of-compliance status does not exist until after at least 2 or more consecutive groundwater samples exceed either [R317-6-6.16(B)]: 1. The assigned Permit limit (GWPL or ACL), and 2. The background contaminant concentration, as determined by the mean plus 2-standard deviation concentration, or 3. The groundwater concentration found is statistically significantly higher than the applicable Permit limit, as determined by EPA RCRA statistical methods. Generally this determination takes between 2 to 6-months, depending on the sampling frequency established in the Permit for this purpose. Upon confirmation that the out-of-compliance status exists, the Permittee is required to notify the Executive Secretary of the release within 24-hours (verbal) and 5-days (written) [R317-6-6.15(B)]. At this point, a 2-step process begins, as outlined below: 1. Contaminant Investigation Report - the Executive Secretary requires the Permittee to submit a Contaminant Investigation (CI) Report for review and approval [R317-6-6.15(C)]. Within 30-days of receipt of this notice, the Permittee is required to submit a schedule for completion of the contaminant investigation and submittal of the required report (ibid.). This proposed schedule may be accepted, rejected, and or modified by the Executive Secretary (ibid.). The technical content required of the CI Report is comprehensive and outlined in R317-6-6.15(D)(1). Studies are required to characterize both the groundwater pollution and the apparent pollution source(s). During review of the CI Report the Executive Secretary may request additional information on an as needed basis. 2. Groundwater Corrective Action Plan – in the next step the Permittee is required to submit a Groundwater Corrective Action (CA) Plan, for Executive Secretary approval, that includes both a schedule for completion of the action and description of the construction and operation of the corrective action program [R317-6-6.15(D)(2)]. Several technical requirements must be met by the proposed corrective action, including [R317-6-6.15(E)]: a. Completeness and Accuracy – both the CA Plan and the CI Report must be complete and accurate. b. Protective – the corrective action must be protective of public health and the environment. To be protective, the Executive Secretary must consider potential impacts to groundwater quality at locations outside and beyond the Permitted facility boundaries. c. Approved Concentration Limits – the corrective action must meet the groundwater concentration limits approved by the Executive Secretary, or Alternate Corrective Action Concentration Limits approved by the Board. d. Permanent Effect – the corrective action must produce a permanent effect. Source controls imposed must not cause pollution to other unaffected areas within the facility boundaries. 3. Groundwater Corrective Action Concentration Limits – significant effort is put into determination of the contaminants that must be controlled and mitigated by the corrective action and the appropriate concentration limit for each. In general, the corrective action must either return the groundwater quality to the State GWQS or to an approved alternative concentration limit [R317-6-6.15(F)]. For contaminants where no GWQS is established in the State rule, the Executive Secretary is allowed to establish site specific, ad-hoc GWQS that are protective of human health and the environment [ibid., and R317-6-6.15(F)(2)]. 4. Alternative Groundwater Corrective Action Concentration Limits – a CA Plan may propose an Alternate

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		Corrective Action Concentration Limit (ACACL) [R317-6-6.15(G)]. However, only the Board may approve a proposed ACACL. Proposed concentrations for an ACACL may be either higher or lower than the corresponding GWQS, as outlined below: a. Higher ACACLs – the Board may approve a higher ACACL concentration provided that the Permittee is able to demonstrate the proposed concentration and corrective action program is: i. Protective of human health and the environment ii. Incorporates Best Available Technology (BAT), as defined in R317-6-1.3, and iii. Both conservative and technologically achievable. b. Lower ACACLs – a third party may request the Board apply a lower ACACL to a CA Plan. However, such a request requires submittal and Board consideration of: i. Relevant cleanup or health standards, criteria or guidance, ii. Relevant scientific information, iii. Information relevant to protectiveness, iv. Impact of additional proposed measures. c. Additional Considerations – irrespective if the proposed ACACL is higher or lower, the Board must also consider: i. Good Cause – which includes capital, operation, and maintenance costs, costs of periodic reviews, potential future remedial action costs, and loss of resource value, and ii. Background and Existing Groundwater Concentrations – in its deliberations the Board may consider background concentrations at the facility. However, under no circumstances can an ACACL be greater than the existing concentrations at the facility, or the concentrations projected to result from the existing pollution conditions. In the process of reviewing the CI Report and CA Plan, the Executive Secretary is required to consider many issues including: 1. The need for long-term operation of the corrective action program and long-term groundwater monitoring in order to demonstrate that the GWQS or ACACL concentrations have been met [R317-6-6.15(E)(5)(a) and (d)], and 2. The need for periodic review of the groundwater quality data at the facility to determine if the correction action protects human health and the environment [R317-6-6.15(E)(5)(e)]. Upon acceptance of the CI Report and CA Plan, the Executive Secretary is required to provide a public notice, and a 30-day public comment period. Thereafter, the Executive Secretary is required to issue an order to Permittee approving, disapproving, or modifying the CA Plan [R317-6-6.15(E)]. **Rule Comparability:** the State rules are equivalent in purpose and objective to the NRC Criterion 5D requirements. While the State process does not include an 18-month deadline for the owner /operator to implement a groundwater corrective action program; a similar time period normally transpires during submittal of the contaminant investigation report and groundwater corrective action plan. If necessary, an enforcement order ensures any obligations that need to be met are accomplished.
Criterion 5E	*In developing and conducting ground-water protection programs, applicants and licensees shall also consider the following:*	The State requirements in this regard are very similar. During issuance of a Permit, the Executive Secretary must make a finding that the Permittee has applied BAT to the new waste disposal facility [R317-6-6.4(A)(3)]. Currently, it is the Executive Secretary's practice for Class I, II, and III groundwater to require BAT to include an engineering design that incorporates a double Flexible Membrane Liner (FML) and a leak detection system (LDS). This LDS in turn becomes

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	(1) Installation of bottom liners (Where synthetic liners are used, a leakage detection system must be installed immediately below the liner to ensure major failures are detected if they occur. This is in addition to the ground-water monitoring program conducted as provided in Criterion 7. Where clay liners are proposed or relatively thin, in-situ clay soils are to be relied upon for seepage control, tests must be conducted with representative tailings solutions and clay materials to confirm that no significant deterioration of permeability or stability properties will occur with continuous exposure of clay to tailings solutions. Tests must be run for a sufficient period of time to reveal any effects if they are going to occur (in some cases deterioration has been observed to occur rather rapidly after about nine months of exposure)) *(2) Mill process designs which provide the maximum practicable recycle of solutions and conservation of water to reduce the net input of liquid to the tailings impoundment.* *(3) Dewatering of tailings by process devices and/or in-situ drainage systems (At new sites, tailings must be dewatered by a drainage system installed at the bottom of the impoundment to lower the phreatic surface and reduce the driving head of seepage, unless tests show tailings are not amenable to such a system. Where in-situ dewatering is to be conducted, the impoundment bottom must be graded to assure that the drains are at a low point. The drains must be protected by suitable filter materials to assure that drains remain free running. The drainage system must also be adequately sized to assure good drainage).*	the primary compliance monitoring point for the facility, and the Permit issued with appropriate performance monitoring requirements for operation and maintenance of the LDS [R317-6-6.9(B)]. In these situations, groundwater monitoring wells then become secondary compliance monitoring points in a Permit [R317-6-6.9(A)]. With regard to clay liners that might be used at a disposal site, State rules found in R317-6-6.3(F) require, among other things, that the applicant thoroughly characterize the physical properties of the waste and leachate to be controlled. State requirements set out in R317-6-6.3(G) mandate that the Permittee provide "*...Information which shows that the discharge can be controlled and will not migrate into or adversely effect the quality of any other waters of the state, ...*" This includes geochemical and engineering stability of the earthen materials with the anticipated waste and / or leachates. As for three (3) remaining NRC considerations, mill process designs that maximize wastewater recycling, tailings de-watering, and neutralization of tailings; all are consistent with the State definition of BAT which includes "*...the application of design, equipment, work practice, operation standard or combination thereof at a facility to effect the maximum reduction of a pollutant achievable by available processes and methods ...*" (R317-6-1.3) Editorial Note: for facilities where disposal cell or other related construction occurs over a multi-year timeframe, or where construction is delayed for an extended period, it is possible that new or emerging environmental and engineering technology could be available. Under these circumstances, the State definition of BAT could change during the non-construction period. In such situations, the Executive Secretary would: 1. Inform the Permittee that the Construction Permit has expired. Pursuant to State rules, a Construction Permit expires within 1-year of the issuance date should the approved facility not be under "substantial construction" [see R317-3-1.1(E)(3)(b)]. This action terminates any former approval for the Permittee to construct, operate, or modify the disposal cell or other "treatment works". 2. Amend the Groundwater Quality Discharge Permit to incorporate the new BAT definition and related requirements for facilities that have yet to be constructed. This change would normally be made at the time of Permit renewal, which is based on a 5-year life cycle [R317-6-6.6]. However, at the Permittee's request this Permit change could be made at an earlier date as a major modification of the Permit, following public notice and comment. At issuance of the modified or renewed Permit, the Executive Secretary is required to make a finding before the public that adequate BAT has been applied to the facility not yet constructed [R317-6-6.4(A)(3)]. In this manner, the Executive Secretary ensures that current BAT engineering design, construction, operation, and maintenance have been applied to the permitted facility for the protection of local groundwater resources **Rule Comparability**: the State rules and practice in determining if a discharge facility has incorporated BAT at its facility are consistent with and equivalent to all the groundwater protection program considerations in NRC Criterion 5E.

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	(4) Neutralization to promote immobilization of hazardous constituents.	
Criterion 5F	*Where ground-water impacts are occurring at an existing site due to seepage, action must be taken to alleviate conditions that lead to excessive seepage impacts and restore ground-water quality. The specific seepage control and ground-water protection method, or combination of methods, to be used must be worked out on a site-specific basis. Technical specifications must be prepared to control installation of seepage control systems. A quality assurance, testing, and inspection program, which includes supervision by a qualified engineer or scientist, must be established to assure the specifications are met.*	Similar requirements are found in the State rules. In the process of issuing a Permit for an existing facility, one that pre-dated the GWQP rules, the Executive Secretary must determine that the GWQS and GWPLs will be met at some time in the future [R317-6-6.4(C)]. Among other mitigation measures, this demonstration would include adequate engineering design, construction, operation and maintenance of seepage control systems at a tailings impoundment or other treatment works. The Executive Secretary can require such technical information be provided as a part of a Permit application pursuant to R317-6-6.3(Q). Agency practice has been to also require submittal of construction quality assurance / quality control (CQA/QC) plans as a part of a Permit application. Once approved by the Executive Secretary, these plans become enforceable attachments to the Permit. Again, State rules allow such plans to be required and implemented during construction of a waste / wastewater disposal system (ibid.). For existing facilities that have already caused groundwater pollution, the State rules require the Permit application include a corrective action plan or other measures to remedy the groundwater quality problem [R317-6-6.3(P)]. Again, agency practice has been to require development and implementation of CQA/QC Plans in order to ensure the efficacy of the corrective action, which is authorized under R317-6-6.3(Q). **Rule Comparability:** the State rules and agency practice are equivalent to this NRC requirement.
Criterion 5G	*In support of a tailings disposal system proposal, the applicant/operator shall supply information concerning the following:* *(1) The chemical and radioactive characteristics of the waste solutions.* *(2) The characteristics of the underlying soil and geologic formations particularly as they will control transport of contaminants and solutions. This includes detailed information concerning extent, thickness, uniformity, shape, and orientation of underlying strata. Hydraulic gradients and conductivities of the various formations must be determined. This information must be gathered from borings and field survey methods taken within the proposed impoundment area and in surrounding areas where contaminants might migrate to ground water. The information gathered on boreholes must include both geologic and geophysical logs in sufficient number and degree of*	State rules also require detailed characterization of the tailings waste and wastewater as a part of the Permit application process [R317-6-6.3(F)]. As for subsurface characterization, the State rules mandate that a Permit application include a detailed characterization of: 1. Local geology and groundwater hydrology within a 1-mile radius of the tailings facility [R317-6-6.3(D and E)], and 2. Detailed site-specific characterization of hydrogeologic conditions, including, but not limited to: depth to groundwater, background groundwater quality, saturated thickness, groundwater flow direction(s), porosity, aquifer permeability, and flow system characteristics [R317-6-6.3(K)]. Further, the Executive Secretary has the ability to require additional information from the Permittee as needed in the application process [R317-6-6.3(Q)]. Historically, State Permits for 11e.(2) facilities in Utah have been required to provide the following information, including: 1. On-Site Geologic and Hydrogeologic Data – from borings, boreholes, and wells installed in the immediate vicinity of the proposed disposal areas. Such information includes, but is not limited to: depth to groundwater; hydraulic gradients; groundwater flow directions; aquifer permeability and spatial distribution thereof; geologic formation thickness, orientation, and extent; and aquifer mineral content; etc. 2. Field Aquifer Permeability - laboratory test results have been excluded in favor of field permeability test methods, e.g. slug and pump tests.

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	sophistication to allow determining significant discontinuities, fractures, and channeled deposits of high hydraulic conductivity. If field survey methods are used, they should be in addition to and calibrated with borehole logging. Hydrologic parameters such as permeability may not be determined on the basis of laboratory analysis of samples alone; a sufficient amount of field testing (e.g., pump tests) must be conducted to assure actual field properties are adequately understood. Testing must be conducted to allow estimating chemi-sorption attenuation properties of underlying soil and rock. (3) Location, extent, quality, capacity and current uses of any ground water at and near the site.	3. Soil-Water Partitioning Coefficients – geochemical testing of site specific soil materials has already been required to justify 11e.(2) tailings cell design. Regarding the extent, quality, capacity and current uses of groundwater, these same information needs are required by the State rules for a Permit application, pursuant to R317-6-6.3(D), (E), and (K). **Rule Comparability**: the State rules and agency practice are equivalent to the NRC requirements for Criterion 5G.
Criterion 5H	*Steps must be taken during stockpiling of ore to minimize penetration of radionuclides into underlying soils; suitable methods include lining and/or compaction of ore storage areas.*	Ore stockpiles are an essential component of milling operations, and are regulated as potential sources of groundwater contamination under the State rules [R317-6-6.1(A) and (B)]. For a new disposal facility, the Permittee must demonstrate that BAT has been applied to the project [R317-6-6.4(A)(3)]. In turn, the State definition of BAT includes the application of engineering design and operation standards to maximize the reduction of pollutants discharged (R317-6-1.3). The design and construction of liners beneath an ore storage pad could meet this requirement. For existing facilities other means may be necessary to minimize the discharge of pollutants from an ore storage pad. **Rule Comparability**: The State rules are equivalent to this NRC requirement.
Criterion 7A	*The licensee shall establish a detection monitoring program needed for the Commission to set the site specific ground-water protection standards in paragraph 5B(1) of this appendix. For all monitoring under this paragraph the licensee or applicant will propose for Commission approval as license conditions which constituents are to be monitored on a site specific basis. A detection monitoring program has two purposes. The initial purpose of the program is to detect leakage of hazardous constituents from the disposal area so that the need to set ground-water protection standards is monitored. If*	The existing State Permit process establishes GWQS for all related contaminants at time of Permit issuance [R317-6-2 and 2.2, and R317-6-6.4(A)(1) and (C)(1)]. In the event that new GWQS are adopted by the Board, the Permit may be reopened and new monitoring requirements, GWQS, and GWPLs required of the Permittee [R317-6-6.6(B)]. Similar to the NRC requirements and as explained above, some State Permits have been issued with a 2-tiered approach to groundwater monitoring, including a limited list of initial parameters used for detection monitoring. Later, upon detection this short list can be expanded, at the discretion of the Executive Secretary, to include more contaminants, should the initial parameters be detected [R317-6-6.9(A)]. Although the Permit applicant may propose groundwater monitoring parameters [R317-6-6.3(J)], the final determination of the number and type of contaminants that will be sampled by the Permittee is made by the Executive Secretary at the time of Permit issuance [R317-6-6.9(A)]. Any adjustment needed in the number and location of groundwater monitoring wells or in the number of groundwater quality monitoring parameters required by the Permit in order to maximize early detection of groundwater contamination from a waste disposal site is possible pursuant to R317-6-6.9A. A re-evaluation of the groundwater

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	leakage is detected, the second purpose of the program is to generate data and information needed for the Commission to establish the standards under Criterion 5B. The data and information must provide a sufficient basis to identify those hazardous constituents which require concentration limit standards and to enable the Commission to set the limits for those constituents and the compliance period. They may also need to provide the basis for adjustments to the point of compliance.	monitoring system and any change needed in Permit requirements is usually accomplished every 5-years as a part of Permit renewal (R317-6-6.6 and 6.7). **Rule Comparability**: the State rules and practice allow the establishment of a groundwater detection monitoring program that is equivalent to the NRC requirement.
	For licenses in effect September 30, 1983, the detection monitoring programs must have been in place by October 1, 1984. For licenses issued after September 30, 1983, the detection monitoring programs must be in place when specified by the Commission in orders or license conditions.	All State Permits have an approved groundwater monitoring program in place at the time of Permit issuance [R317-6-6.4(A)(2), R317-6-6.4(C)(2), and R317-6-6.9]. **Rule Comparability**: the State rule is equivalent to this NRC requirement.
	Once ground-water protection standards have been established pursuant to paragraph 5B(1), the licensee shall establish and implement a compliance monitoring program. The purpose of the compliance monitoring program is to determine that the hazardous constituent concentrations in ground water continue to comply with the standards set by the Commission.	Under the State process, GWQS and GWPLs are determined for the facility at the time of Permit issuance [R317-6-2 and 2.2, and R317-6-6.4(A)(1) and (C)(1)]. Compliance with the GWPL ensures compliance with the GWQS, in that the GWPLs are set at lower concentrations, as determined by local groundwater class. This approach provides extra protection for high quality groundwater or sensitive wildlife habitats dependent on groundwater. The State GWPL approach also provides early warning of a release and additional time to identify the cause and full extent of the problem and craft a corrective action program to solve it before it travels off-site. **Rule Comparability**: the State rule is more protective of the groundwater resource, in that the GWPL concept provides early warning of a release before exceedance of the applicable GWQS.
	In conjunction with a corrective action program, the licensee shall establish and implement a corrective action monitoring program. The purpose of the corrective action monitoring program is to demonstrate the effectiveness of the corrective actions. Any monitoring program required by this paragraph may be based on existing monitoring programs to the extent the existing programs can meet the stated objective for the program.	The State rules require that long-term groundwater and other monitoring is an essential element of the CA Plan approved by the Executive Secretary [R317-6-6.15(E) and (E)(5)(a)]. These long-term monitoring requirements can be added to a facility's Permit, pursuant to R317-6-6.4(G). Thereafter, determination that a facility continues to comply with the requirements of the CA Plan is made thru groundwater monitoring requirements in the Permit [R317-6-6.4(A)(2) and (C)(2)]. **Rule Comparability**: the State rules in question are equivalent to this NRC requirement.

NRC Citation	NRC Regulatory Language	Discussion of Equivalent Utah Statutory Authority and/or Rules
Criterion 13	*Secondary ground-water protection standards required by Criterion 5 of this appendix are concentration limits for individual hazardous constituents. The following list of constituents identifies the constituents for which standards must be set and complied with if the specific constituent is reasonably expected to be in or derived from the byproduct material and has been detected in ground water. For purposes of this appendix, the property of gross alpha activity will be treated as if it is a hazardous constituent. Thus, when setting standards under paragraph 5B(5) of Criterion 5, the Commission will also set a limit for gross alpha activity. The Commission does not consider the following list imposed by 40 CFR Part 192 to be exhaustive and may determine other constituents to be hazardous on a case-by-case basis, independent of those specified by the U.S. Environmental Protection Agency in Part 192.*	All of the NRC Criterion 13 hazardous constituents, and more, can be incorporated into the monitoring and compliance requirements in a State Permit, at the discretion of the Executive Secretary [R317-6-6.9(A), and R317-6-6.4(A)(2) and (C)(2)]. The flexibility provided by the State rule has allowed the Executive Secretary to regulate several contaminants at 11e.(2) waste disposal sites that have significant human health and / or environmental impacts, and are not currently listed in Criterion 13. Examples of several contaminants that exist leachates or groundwater at one or more 11e.(2) waste sites in Utah include, but are not limited to: ammonia, fluoride, manganese, nitrate, and nitrite. Although not classified as hazardous constituents under the EPA RCRA program, these groundwater contaminants have potential adverse health and environmental effects that deserve attention and control. Close review of the NRC Criterion 13 parameters with the current EPA RCRA list of Hazardous Constituents (40 CFR 261, Appendix VIII), has also shown that the current Criterion 13 list of contaminants is less than complete, as summarized in the findings below. Details of this review are also found in Attachment 2, below.
	Hazardous Constituents <<< See Attachment 2 below for listing of the 380 NRC Criterion 13 contaminants >>>	Findings: the State rules allow the Executive Secretary flexibility in determination of the type and number of groundwater monitoring parameters needed in a Permit for an 11e.(2) facility, see discussion on NRC Criterion 5(B)(2), above. In this process, the Executive Secretary may use the NRC Criterion 13 list of contaminants as a guide, in conjunction with site specific source term characterization efforts, to determine appropriate groundwater monitoring parameters, GWQS and GWPLs in a Permit. However, it important to note that at the time of promulgation of the NRC uranium mill rules in 1987 the 380 Criterion 13 contaminants were adopted verbatim from the EPA RCRA list of Hazardous Constituents found in 40 CFR 261, Appendix VIII. Since 1987, the EPA has amended Appendix VIII list 13 times, as outlined below: 53 FR 13388, Apr. 22, 1988 — 53 FR 43881, Oct. 31, 1988 — 54 FR 50978, Dec. 11, 1989 55 FR 50483, Dec. 6, 1990 — 56 FR 7568, Feb. 25, 1991 — 59 FR 468, Jan. 4, 1994 59 FR 31551, June 20, 1994 — 60 FR 7853, Feb. 9, 1995 — 60 FR 19165, Apr. 17, 1995 62 FR 32977, June 17, 1997 — 63 FR 24625, May 4, 1998 — 65 FR 14475, Mar. 17, 2000, and 65 FR 67127, Nov. 8, 2000 DRC comparison of the NRC Criterion 13 contaminants with the current EPA RCRA Appendix VIII list, promulgated on November 8, 2000, shows many differences exist in the number of contaminants listed, as follows: 1. 8 NRC Contaminants Eliminated – eight (8) NRC Criterion 13 contaminants have been dropped from the current EPA RCRA Hazardous Constituent list, including:

NRC Citation	NRC Regulatory Language	Discussion of Equivalent Utah Statutory Authority and/or Rules

2-sec-Butyl-4,6-dinitrophenol (DNBP) — Iron dextran
Molybdenum* and compounds, N.O.S. — 4-Nitroquinoline-1-oxide
Radium -226 and -228 — Strontium sulfide
Thorium and compounds, N.O.S.,3 (when producing thorium byproduct material) — Uranium* and compounds, N.O.S.3.

* Uranium and molybdenum have been effectively added back to the Criterion 13 list pursuant to existing EPA rules in 40 CFR 192.32(a)(2)(i).

2. 84 New Contaminants Added – EPA has added 84 new contaminants to its Appendix VIII RCRA Hazardous Constituent list that are not currently found in NRC Criterion 13, including:

A2213 — Aldicarb sulfone
Allyl Chloride — Barban
Bendiocarb — Bendocarb phenol
Benomyl — Benzo(k)fluoranthene
Beryllium powder — Bis(pentamethylene)-thiuram tetrasulfide
Butylate — Carbaryl
Carbendazim — Carbofuran
Carbofuran phenol — Carbosulfan
Chloroprene — Copper dimethyldithiocarbamate
m-Cumenyl methylcarbamate — Cycloate
Dazomet — Diethylene glycol, dicarbamate
Dimetilan — Dinoseb
Disulfiram — EPTC
Ethyl Zeram — Ethylene glycol monoethyl ether
Ferbam — Formetanate hydrochloride
Formparanate — Heptachlorodibenzofurans
Heptachlorodibenzo-p-dioxins — Hexachlorodibenzo-p-dioxins
Hexachlorodibenzofurans — 3-Iodo-2-propynyl n-butylcarbamate
Isolan — Manganese dimethyldithiocarbamate
Metam Sodium — Methiocarb
Metolcarb — Mexacarbate
Molinate — 2-Nitropropane
Octachlordibenzo-p-dioxin (OCDD) — Octachlordibenzofuran (OCDF)
Oxamyl — Pebulate
Pentachlorodibenzo-p-dioxins — Pentachlordibenzofurans
Physostigmine — Physostigmine salicylate
Potassium dimethyldithiocarbamate — Potassium n-hydroxymethyl-n-methyldithiocarbamate
Potassium n-methyldithiocarbamate — Potassium pentachlorophenate
Promecarb — Propham
Propoxur — Prosulfocarb
Selenium, tetrakis(dimethyl-dithiocarbamate) — Sodium dibutyldithiocarbamate
Sodium diethyldithiocarbamate — Sodium dimethyldithiocarbamate

NRC Citation	NRC Regulatory Language	Discussion of Equivalent Utah Statutory Authority and/or Rules
		Sodium pentachlorophenate Tetrabutylthiuram disulfide Tetrachloroethylene 2,3,4,6-tetrachlorophenol, sodium salt Thiodicarb Tirpate Toluene-2,6-diamine o-Toluidine Triallate Vernolate Sulfallate Tetrachlorodibenzofurans 2,3,4,6-tetrachlorophenol, potassium salt Tetramethylthiuram monosulfide Thiophanate-methyl Toluene-2,4-diamine Toluene-3,4-diamine p-Toluidine Triethylamine Ziram **Rule Comparability:** the flexibility of the State rules allows the Executive Secretary to tailor the groundwater monitoring parameters, determine appropriate GWQS and GWPLs, and set groundwater cleanup compliance concentration limits based on the individual waste source term characteristics of each disposal site. NRC Criterion 13 contaminants may be used as a guide in this process.

ATTACHMENT 1

Comparison of NRC GWPS (10 CFR 40, Appendix A, Table 5C)
With
Utah Ground Water Quality Standards (UAC R317-6-2)

DRC Spreadsheet NRCgwps.xls
Tabsheet Compare

Comparison of NRC GWPS vs. Utah DEQ GWQS										
10 CFR 40, Appendix A, Table 5c vs. Utah Administrative Code (UAC) R317-6-2, Table 1										
		Current			EPA Drinking Water Criteria					
		NRC GWPS	Utah GWQS						Lifetime Health	
		10 CFR 40,	(UAC R317-6-2,		DW MCL		DW Action Level		Advisory	
	CAS	Appendix A	Table 1)			Effective		Effective		Effective
Parameter	No.	Table 5C	Aug-99	1/22/02	Conc.	Date	Conc	Date	Conc.	Date
Metals (mg/l)					*40 CFR 141.62*					
Arsenic		0.05	0.05	0.05	0.01	1/23/06				
Barium		1.0	1.0	2.0	2.0	1992				
Cadmium		0.01	0.01	0.005	0.005	7/30/92				
Chromium		0.05	0.05	0.1	0.1	7/30/92				
Lead		0.05	0.05	0.015			0.015	Jan-92		
Mercury		0.002	0.002	0.002	0.002	7/30/92				
Selenium		0.01	0.01	0.05	0.05	7/30/92				
Silver		0.05	0.05	0.1					0.1	1992
Organics (mg/l)					*40 CFR 141.61*					
Endrin	72-20-8	0.0002	0.0002	0.002	0.002	8/17/92				
Lindane	58-89-9	0.004	0.004	0.0002	0.0002	7/30/92				
Methoxychlor	72-43-5	0.1	0.1	0.04	0.04	7/30/92				
Toxaphene	8001-35-2	0.005	0.005	0.003	0.003	7/30/92				
2,4-D	94-75-7	0.1	0.1	0.07	0.07	7/30/92				
2,4,5-TP Silvex	93-72-1	0.01	0.01	0.05	0.05	7/30/92				
Radiologics (pCi/l)					*40 CFR 141.66*					
Ra-226+Ra-228		5.0	5.0	5.0	5.0					
Gross Alpha		15.0	15.0	15.0	15.0					
	Key to Notes:									
	no shade	= Utah GWQS = NRC GWPS								

ATTACHMENT 2

Utah Division of Radiation Control
Comparison of NRC Criterion 13 Contaminants (10 CFR 40, Appendix A)
With
Current EPA List of Hazardous Constituents (40 CFR 261, Appendix VIII)

DRC Spreadsheet NRCriterion13.xls
Tabsheet CompareNRCvsEPA

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	*Promulgated by NRC circa 1987*			EPA	EPA	*Last Date of EPA Promulgation: 11/8/00*			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
	Bold Red Text	= parameters found on both lists = parameters dropped by EPA since 1987			**Bold Underline Text** = New Parameters in Current EPA Rules (not found in NRC Criterion 13)				
1	Acetonitrile (Ethanenitrile)	Acetonitrile	Ethanenitrile	2	1	A2213	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester	30558-43-1	U394
2	Acetophenone (Ethanone, 1-phenyl)	Acetophenone	Ethanone, 1-phenyl	3	2	Acetonitrile	Same	75-05-8	U003
3	3-(alpha-Acetonylbenzyl)-4-hydroxycoumarin and salts (Warfarin)	Warfarin	3-(alpha-Acetonylbenzyl)-4-hydroxycoumarin and salts	475 thru 478	3	Acetophenone	Ethanone, 1-phenyl-	98-86-2	U004
4	2-Acetylaminofluorene (Acetamide, N-(9H-fluoren-2-yl)-)	2-Acetylaminofluorene	Acetamide, N-(9H-fluoren-2-yl)-	4	4	2-Acetylaminofluorene	Acetamide, N-9H-fluoren-2-yl-	53-96-3	U005
5	Acetyl chloride (Ethanoyl chloride)	Acetyl chloride	Ethanoyl chloride	5	5	Acetyl chloride	Same	75-36-5	U006
6	1-Acetyl-2-thiourea (Acetamide, N-(aminothioxomethyl)-)	1-Acetyl-2-thiourea	Acetamide, N-(aminothioxomethyl)-	6	6	1-Acetyl-2-thiourea	Acetamide, N-(aminothioxomethyl)-	591-08-2	P002
7	Acrolein (2-Propenal)	Acrolein	2-Propenal	7	7	Acrolein	2-Propenal	107-02-8	P003
8	Acrylamide (2-Propenamide)	Acrylamide	2-Propenamide	8	8	Acrylamide	2-Propenamide	79-06-1	U007
9	Acrylonitrile (2-Propenenitrile)	Acrylonitrile	2-Propenenitrile	9	9	Acrylonitrile	2-Propenenitrile	107-13-1	U009
10	Aflatoxins	Aflatoxins	Same	10	10	Aflatoxins	Same	1402-68-2	
11	Aldrin (1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a,8b-hexahydro-endo, exo-1,4:5,8-Dimethanonaphthalene)	Aldrin	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a,8b-hexahydro-endo, exo-1,4:5,8-Dimethanonaphthalene	13	11	Aldicarb	Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	116-06-3	P070
12	Allyl alcohol (2-Propen-1-ol)	Allyl alcohol	2-Propen-1-ol	14	12	Aldicarb sulfone	Propanal, 2-methyl-2-(methylsulfonyl) -, O-[(methylamino) carbonyl] oxime.	1646-88-4	P203
13	Aluminum phosphide	Aluminum phosphide	Same	16	13	Aldrin	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-,(1alpha,4alpha,4abeta,5alpha,8alpha,8abeta)-.	309-00-2	P004
14	4-Aminobiphenyl ([1,1'-Biphenyl]-4-amine)	4-Aminobiphenyl	[1,1'-Biphenyl]-4-amine	17	14	Allyl alcohol	2-Propen-1-ol	107-18-6	P005

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.
NRC Order No.	Promulgated by NRC circa 1987			EPA Order No.
	Hazardous Constituent (verbatim listing)	Compound Names Parsed by DRC		
		Chemical Name	Synonym	
15	6-Amino-1,1a,2,8,8a,8b-hexahydro-8-(hydroxymethyl)-8a-methoxy-5-methyl-carbamate azirino[2',3'3,4]pyrrolo(1,2-a)indole-4,7-dione, (ester) (Mitomycin C) (Azirino[2'3'3,4]pyrrolo(1,2-a)indole-4,7-dione, 6-amino-8-[((amino-carbonyl)oxy)methyl)-1,1a,2,8,8a,8b-hexa-hydro-8a methoxy-5-methy-)	Mitomycin C	6-Amino-1,1a,2,8,8a,8b-hexahydro-8-[hydroxymethyl)-8a-methoxy-5-methyl-carbamate azirino[2',3'3,4]pyrrolo(1,2-a]indole-4,7-dione, (ester) or Azirino[2'3'3,4]pyrrolo(1,2-a]indole-4,7-dione, 6-amino-8-[[(amino-carbonyl)oxy)methyl]-1,1a,2,8,8a,8b-hexa-hydro-8a methoxy-5-methy-	296
16	5-(Aminomethyl)-3-Isoxazolol (3(2H)-Isoxazolone, 5-(aminomethyl)-)	5-(Aminomethyl)-3-Isoxazolol	3(2H)-Isoxazolone, 5-(aminomethyl)-	18
18	4-Aminopyridine (4-Pyridinamine)	4-Aminopyridine	4-Pyridinamine	19
17	Amitrole (1H-1,2,4-Triazol-3-amine)	Amitrole	1H-1,2,4-Triazol-3-amine	20
18	Aniline (Benzenamine)	Aniline	Benzenamine	22
19	Antimony and compounds, N.O.S.(3)	Antimony and compounds, N.O.S (3)	Same	23 & 24
20	Aramite (Sulfurous acid, 2-chloroethyl-, 2-[4-(1,1-dimethylethyl) phenoxy]-1-methylethyl ester)	Aramite	Sulfurous acid, 2-chloroethyl-, 2-[4-(1,1-dimethylethyl) phenoxy)-1-methylethyl ester	25
21	Arsenic and compounds, N.O.S.3	Arsenic and compounds, N.O.S.3	Same	26 & 27
22	Arsenic acid (Orthoarsenic acid)	Arsenic acid	Orthoarsenic acid	28
23	[illegible]	Arsenic pentoxide	Arsenic (V) oxide	29
24	Arsenic trioxide (Arsenic (III) oxide)	Arsenic trioxide	Arsenic (III) oxide	30
25	Auramine (Benzenamine, 4,4'-carbonimidoylbis[N,N-Dimethyl-, monohydrochloride)	Auramine	Benzenamine, 4,4'-carbonimidoylbis[N,N-Dimethyl-, monohydrochloride	31
26	Azaserine (L-Serine, diazoacetate (ester))	Azaserine	L-Serine, diazoacetate (ester)	32
27	Barium and compounds, N.O.S.3	Barium and compounds, N.O.S.3	Same	34 &

EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
EPA Order No.	Last Date of EPA Promulgation: 11/8/00 (verbatim listing)			
	Common name	Chemical abstracts name	CAS No	HW No.
15	Allyl chloride	1-Propene, 3-chloro	107-18-6	
16	Aluminum phosphide	Same	20859-73-8	P006
17	4-Aminobiphenyl	[1,1'-Biphenyl]-4-amine	92-67-1	
18	5-(Aminomethyl)-3-Isoxazolol	3(2H)-Isoxazolone, 5-(aminomethyl)-	2763-96-4	P007
19	4-Aminopyridine	4-Pyridinamine	504-24-5	P008
20	Amitrole	1H-1,2,4-Triazol-3-amine	61-82-5	U011
21	Ammonium vanadate	Vanadic acid, ammonium salt	7803-55-6	P119
22	Aniline	Benzenamine	62-53-3	U012
23	Antimony	Same	7440-36-0	
24	Antimony compounds, N.O.S.1			
25	Aramite	Sulfurous acid, 2-chloroethyl 2-[4-(1,1-dimethylethyl)phenoxy)-1-methylethyl ester	140-57-8	
26	Arsenic	Same	7440-38-2	
27	Arsenic compounds, N.O.S.1			
28	Arsenic acid	Arsenic acid H3 AsO4	77[illegible]4	P010

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.
NRC	Promulgated by NRC circa 1987			EPA
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order
No.	(verbatim listing)	Chemical Name	Synonym	No
28	Banum cyanide	Banum cyanide	Same	38
29	Benz[c]acridine (3,4-Benzacridine)	Benz[c]acridine	3,4-Benzacridine	40
30	Benz[a]anthracene (1,2-Benzanthracene)	Benz[a]anthracene	1,2-Benzanthracene	41
31	Benzene (Cyclohexatriene)	Benzene	Cyclohexatriene	43
32	Benzenearsonic acid (Arsonic acid, phenyl-)	Benzenearsonic acid	Arsonic acid, phenyl-	44
33	Benzene, dichloromethyl- (Benzal chloride)	Benzene, dichloromethyl	Benzal chloride	42
34	Benzenethiol (Thiophenol)	Benzenethiol	Thiophenol	439
35	Benzidine ([1,1'-Biphenyl]-4,4'diamine)	Benzidine	[1,1'-Biphenyl]-4,4'diamine	45
36	Benzo[b]fluoranthene (2,3-Benzofluoranthene)	Benzo[b]fluoranthene	2,3-Benzofluoranthene	46
37	Benzo[j]fluoranthene (7,8-Benzofluoranthene)	Benzo[j]fluoranthene	7,8-Benzofluoranthene	47
38	Benzo[a]pyrene (3,4-Benzopyrene)	Benzo[a]pyrene	3,4-Benzopyrene	49
39	p-Benzoquinone (1,4-Cyclohexadienedione)	p-Benzoquinone	1,4-Cyclohexadienedione	50
40	Benzotrichloride (Benzene, trichloromethyl)	Benzotrichloride	Benzene, trichloromethyl	51
41	Benzyl chloride (Benzene, (chloromethyl)-)	Benzyl chloride	Benzene, (chloromethyl)-	52
42	Beryllium and compounds, N.O.S.3	Beryllium and compounds, N.O.S.3	Same	54
43	Bis(2-chloroethoxy)methane (Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro-])	Bis(2-chloroethoxy)methane	Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro-]	147
44	Bis(2-chloroethyl) ether (Ethane, 1,1'-oxybis[2-chloro-])	Bis(2-chloroethyl) ether	Ethane, 1,1'-oxybis[2-chloro-]	148
45	N,N-Bis(2-chloroethyl)-2-naphthylamine (Chlornaphazine)	Chlornaphazine	N,N-Bis(2-chloroethyl)-2-naphthylamine	84
46	Bis(2-chloroisopropyl) ether (Propane, 2,2'-oxybis[2-chloro-])	Bis(2-chloroisopropyl) ether	Propane, 2,2'-oxybis[2-chloro-]	149

EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
EPA	Last Date of EPA Promulgation: 11/8/00			
Order	(verbatim listing)			
No.	Common name	Chemical abstracts name	CAS No.	HW No.
29	Arsenic pentoxide	Arsenic oxide As2 O5	1303-28-2	P011
30	Arsenic trioxide	Arsenic oxide As2 O3	1327-53-3	P012
31	Auramine	Benzenamine, 4,4'-carbonimidoylbis[N,N-dimethyl	492-80-8	U014
32	Azaserine	L-Serine, diazoacetate (ester)	115-02-6	U015
33	**Barban**	Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester	101-27-9	U280
34	Barium	Same	7440-39-3	
35	Barium compounds, N.O.S.1			
36	Barium cyanide	Same	542-62-1	P013
37	**Bendiocarb**	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate	22781-23-3	U278
38	**Bendiocarb phenol**	1,3-Benzodioxol-4-ol, 2,2-dimethyl-	22961-82-6	U364
39	**Benomyl**	Carbamic acid, [1- [(butylamino) carbonyl]-1H-benzimidazol-2-yl] -, methyl ester.	17804-35-2	U271
40	Benz[c]acridine	Same	225-51-4	U016
41	Benz[a]anthracene	Same	56-55-3	U018
42	Benzal chloride	Benzene, (dichloromethyl)-	98-87-3	U017
43	Benzene	Same	71-43-2	U019
44	Benzenearsonic acid	Arsonic acid, phenyl-	98-05-5	
45	Benzidine	[1,1'-Biphenyl]-4,4 1-diamine	92-87-5	U021
46	Benzo[b]fluoranthene	Benz[e]acephenanthrylene	205-99-2	
47	Benzo[j]fluoranthene	Same	20[illegible]3	

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
47	Bis(chloromethyl) ether (Methane, oxybis[chloro-])	Bis(chloromethyl) ether	Methane, oxybis[chloro-]	148	48	Benzo(k)fluoranthene	Same	207-08-9	
48	Bis(2-ethylhexyl) phthalate (1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester)	Bis(2-ethylhexyl) phthalate	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	161	49	Benzo(a)pyrene	Same	50-32-8	U022
49	Bromoacetone (2-Propanone, 1-bromo-)	Bromoacetone	2-Propanone, 1-bromo-	56	50	p-Benzoquinone	2,5-Cyclohexadiene-1,4-dione	106-51-4	U197
50	Bromomethane (Methyl bromide)	Bromomethane	Methyl bromide	276	51	Benzotrichloride	Benzene, (trichloromethyl)-	98-07-7	U023
51	4-Bromophenyl phenyl ether (Benzene, 1-bromo-4-phenoxy-)	4-Bromophenyl phenyl ether	Benzene, 1-bromo-4-phenoxy-	58	52	Benzyl chloride	Benzene, (chloromethyl)-	100-44-7	P028
52	Brucine (Strychnidin-10-one, 2,3-dimethoxy-)	Brucine	Strychnidin-10-one, 2,3-dimethoxy-	59	53	Beryllium powder	Same	7440-41-7	P015
53	2-Butanone peroxide (Methyl ethyl ketone, peroxide)	2-Butanone peroxide	Methyl ethyl ketone, peroxide	280	54	Beryllium compounds, N.O.S.1			
54	Butyl benzyl phthalate (1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester)	Butyl benzyl phthalate	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester	60	55	Bis(pentamethylene)-thiuram tetrasulfide	Piperidine, 1,1'-(tetrathiodicarbonothioyl)-bis-	120-54-7	
55	*2-sec-Butyl-4,6-dinitrophenol (DNBP) (Phenol, 2,4-dinitro-6-(1-methylpropyl)-)*	*2-sec-Butyl-4,6-dinitrophenol (DNBP)*	*Phenol, 2,4-dinitro-6-(1-methylpropyl)-*	N.C.	56	Bromoacetone	2-Propanone, 1-bromo-	598-31-2	P017
56	Cadmium and compounds, N.O.S.3	Cadmium and compounds, N.O.S.3	Same	63 & 64	57	Bromoform	Methane, tribromo-	75-25-2	U225
57	Calcium chromate (Chromic acid, calcium salt)	Calcium chromate	Chromic acid, calcium salt	65	58	4-Bromophenyl phenyl ether	Benzene, 1-bromo-4-phenoxy-	101-55-3	U030
58	Calcium cyanide	Calcium cyanide	Same	66	59	Brucine	Strychnidin-10-one, 2,3-dimethoxy-	357-57-3	P018
59	Carbon disulfide (Carbon bisulfide)	Carbon disulfide	Carbon bisulfide	71	60	Butyl benzyl phthalate	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester	85-68-7	
60	Carbon oxyfluoride (Carbonyl fluoride)	Carbon oxyfluoride	Carbonyl fluoride	72	61	Butylate	Carbamothioic acid, bis(2-methylpropyl)-, S-ethyl ester	2008-41-5	
61	Chloral (Acetaldehyde, trichloro-)	Chloral	Acetaldehyde, trichloro-	75	62	Cacodylic acid	Arsinic acid, dimethyl-	75-60-5	U136
62	Chlorambucil (Butanoic acid, 4-[bis(2-chloroethyl)amino]benzene-)	Chlorambucil	Butanoic acid, 4-[bis(2-chloroethyl)amino]benzene-	76	63	Cadmium	Same	7440-43-9	
63	Chlordane (alpha and gamma isomers) (4,7-Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3,4,7,7a-tetrahydro-)(alpha and gamma isomers)	Chlordane (alpha and gamma isomers)	4,7-Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3,4,7,7a-tetrahydro-)(alpha and gamma isomers	77 & 78	64	Cadmium compounds, N.O.S.1			

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
64	Chlorinated benzenes, N.O.S.3	Chlorinated benzenes, N.O.S.3	Same	79	65	Calcium chromate	Chromic acid H2 CrO4, calcium salt	13765-19-0	U032
65	Chlorinated ethane, N.O.S.3	Chlorinated ethane, N.O.S.3	Same	80	66	Calcium cyanide	Calcium cyanide Ca(CN)2	592-01-8	P021
66	Chlorinated fluorocarbons, N.O.S.3	Chlorinated fluorocarbons, N.O.S.3	Same	81	67	Carbaryl	1-Naphthalenol, methylcarbamate	63-25-2	U279
67	Chlorinated naphthalene, N.O.S.3	Chlorinated naphthalene, N.O.S.3	Same	82	68	Carbendazim	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester	10605-21-7	U372
68	Chlorinated phenol, N.O.S.3	Chlorinated phenol, N.O.S.3	Same	83	69	Carbofuran	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate	1563-66-2	P127
69	Chloroacetaldehyde (Acetaldehyde, chloro-)	Chloroacetaldehyde	Acetaldehyde, chloro-	85	70	Carbofuran phenol	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-	1563-38-8	U367
70	Chloroalkyl ethers, N.O.S.3	Chloroalkyl ethers, N.O.S.3	Same	86	71	Carbon disulfide	Same	75-15-0	P022
71	p-Chloroaniline (Benzenamine, 4-chloro-)	p-Chloroaniline	Benzenamine, 4-chloro-	87	72	Carbon oxyfluoride	Carbonic difluoride	353-50-4	U033
72	Chlorobenzene (Benzene, chloro-)	Chlorobenzene	Benzene, chloro-	88	73	Carbon tetrachloride	Methane, tetrachloro-	56-23-5	U211
73	Chlorobenzilate (Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-,ethyl ester)	Chlorobenzilate	Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-,ethyl ester	89	74	Carbosulfan	Carbamic acid, [(dibutylamino) thio] methyl-, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester	55285-14-8	P189
74	chloro-3-methyl)	p-Chloro-m-cresol	Phenol, 4-chloro-3-methyl	90	75	Chloral	Acetaldehyde, trichloro-	75-87-6	U034
75	1-Chloro-2,3-epoxypropane (Oxirane, 2-(chloromethyl)-)	1-Chloro-2,3-epoxypropane	Oxirane, 2-(chloromethyl)-	201	76	Chlorambucil	Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-	305-03-3	U035
76	2-Chloroethyl vinyl ether (Ethene, (2-chloroethoxy)-)	2-Chloroethyl vinyl ether	Ethene, (2-chloroethoxy)-	91	77	Chlordane	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-	57-74-9	U036
77	Chloroform (Methane, trichloro-)	Chloroform	Methane, trichloro-	92	78	Chlordane (alpha and gamma isomers)		U036	
78	Chloromethane (Methyl chloride)	Chloromethane	Methyl chloride	277	79	Chlorinated benzenes, N.O.S.1			
79	Chloromethyl methyl ether (Methane, chloromethoxy-)	Chloromethyl methyl ether	Methane, chloromethoxy-	93	80	Chlorinated ethane, N.O.S.1			
80	2-Chloronaphthalene (Naphthalene, betachloro-)	2-Chloronaphthalene	Naphthalene, betachloro-	94	81	Chlorinated fluorocarbons, N.O.S.1			
81	2-Chlorophenol (Phenol, o-chloro-)	2-Chlorophenol	Phenol, o-chloro-	95	82	Chlorinated naphthalene, N.O.S.1			
82	1-(o-Chlorophenyl)thiourea (Thiourea, (2-chlorophenyl)-)	1-(o-Chlorophenyl)thiourea	Thiourea, (2-chlorophenyl)-	96	83	Chlorinated phenol, N.O.S.1			

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	*Promulgated by NRC circa 1987*			EPA	EPA	*Last Date of EPA Promulgation: 11/8/00*			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No	Common name	Chemical abstracts name	CAS No.	RW No.
83	3-Chloropropionitrile (Propanenitrile, 3-chloro-)	3-Chloropropionitrile	Propanenitrile, 3-chloro-	99	84	Chlomaphazin	Naphthalenamine, N,N'-bis(2-chloroethyl)-	494-03-1	U026
84	Chromium and compounds, N.O.S.3	Chromium and compounds, N.O.S.3	Same	99 & 100	85	Chloroacetaldehyde	Acetaldehyde, chloro-	107-20-0	P023
85	Chrysene (1,2-Benzphenanthrene)	Chrysene	1,2-Benzphenanthrene	101	86	Chloroalkyl ethers, N.O.S.1			
86	Citrus red No. 2 (2-Naphthol, 1-[(2,5-dimethoxyphenyl)azo]-)	Citrus red No. 2	2-Naphthol, 1-[(2,5-dimethoxyphenyl)azo]-	102	87	p-Chloroaniline	Benzenamine, 4-chloro-	106-47-8	P024
87	Coal tars	Coal tars	Same	103	88	Chlorobenzene	Benzene, chloro-	108-90-7	U037
88	Copper cyanide	Copper cyanide	Same	104	89	Chlorobenzilate	Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-, ethyl ester	510-15-6	U038
89	Creosote (Creosote, wood)	Creosote		105	90	p-Chloro-m-cresol	Phenol, 4-chloro-3-methyl-	59-50-7	U039
90	Cresols (Cresylic acid) (Phenol, methyl-)	Cresols (Cresylic acid)	Phenol, methyl-	107	91	2-Chloroethyl vinyl ether	Ethene, (2-chloroethoxy)-	110-75-8	U042
91	Crotonaldehyde (2-Butenal)	Crotonaldehyde	2-Butenal	108	92	Chloroform	Methane, trichloro-	67-66-3	U044
92	Cyanides (soluble salts and complexes), N.O.S.3	Cyanides (soluble salts and complexes), N.O.S.3	Same	110	93	Chloromethyl methyl ether	Methane, chloromethoxy-	107-30-2	U046
93	Cyanogen (Ethanedinitrile)	Cyanogen	Ethanedinitrile	111	94	beta-Chloronaphthalene	Naphthalene, 2-chloro-	91-58-7	U047
94	Cyanogen bromide (Bromine cyanide)	Cyanogen bromide	Bromine cyanide	112	95	o-Chlorophenol	Phenol, 2-chloro-	95-57-8	U048
95	Cyanogen chloride (Chlorine cyanide)	Cyanogen chloride	Chlorine cyanide	113	96	1-(o-Chlorophenyl)thiourea	Thiourea, (2-chlorophenyl)-	5344-82-1	P026
96	Cycasin (beta-D-Glucopyranoside, (methyl-ONN-azoxy)methyl-)	Cycasin	beta-D-Glucopyranoside, (methyl-ONN-azoxy)methyl-	114	97	Chloroprene	1,3-Butadiene, 2-chloro-	126-99-8	
97	2-Cyclohexyl-4,6-dinitrophenol (Phenol, 2-cyclohexyl-4,6-dinitro-)	2-Cyclohexyl-4,6-dinitrophenol	Phenol, 2-cyclohexyl-4,6-dinitro-	116	98	3-Chloropropionitrile	Propanenitrile, 3-chloro-	542-76-7	P027
98	Cyclophosphamide (2H-1,3,2,-Oxazaphosphorine, [bis(2-chloroethyl) amino]-tetrahydro-,2-oxide)	Cyclophosphamide	2H-1,3,2,-Oxazaphosphorine, [bis(2-chloroethyl)amino-tetrahydro-,2-oxide	117	99	Chromium	Same	7440-47-3	
99	Daunomycin (5,12-Naphthacenedione, (8S-cis)-8-acetyl-10-[(3-amino-2,3,6-trideoxy)-alpha-L-lyxohexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-)	Daunomycin	5,12-Naphthacenedione, (8S-cis)-8-acetyl-10-[(3-amino-2,3,6-trideoxy)-alpha-L-lyxohexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-	120	100	Chromium compounds, N.O.S.1			

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1997			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No	HW No.
100	DDD (Dichlorodiphenyldichloroethane) (Ethane, 1,1-dichloro-2,2-bis(p-chlorophenyl)-)	DDD (Dichlorodiphenyldichloroethane)	Ethane, 1,1-dichloro-2,2-bis(p-chlorophenyl)-	122	101	Chrysene	Same	218-01-9	U050
101	DDE (Ethylene, 1,1-dichloro-2,2-bis(4-chlorophenyl)-)	DDE	Ethylene, 1,1-dichloro-2,2-bis(4-chlorophenyl)-	123	102	Citrus red No. 2	2-Naphthalenol, 1-[(2,5-dimethoxyphenyl)azo]-	6358-53-8	
102	DDT (Dichlorodiphenyltrichloroethane) (Ethane, 1,1,1-trichloro-2,2-bis (p-chlorophenyl)-)	DDT (Dichlorodiphenyltrichloroethane)	Ethane, 1,1,1-trichloro-2,2-bis (p-chlorophenyl)-	124	103	Coal tar creosote	Same	8007-45-2	
103	Diallate (S-(2,3-dichloroallyl) diisopropylthiocarbamate)	Diallate	S-(2,3-dichloroallyl) diisopropylthiocarbamate	125	104	Copper cyanide	Copper cyanide CuCN	544-92-3	P029
104	Dibenz[a,h]acridine (1,2,5,6-Dibenzacridine)	Dibenz[a,h]acridine	1,2,5,6-Dibenzacridine	126	105	Copper dimethyldithiocarbamate	Copper, bis(dimethylcarbamodithioato-S,S')-	137-29-1	
105	Dibenz[a,j]acridine (1,2,7,8-Dibenzacridine)	Dibenz[a,j]acridine	1,2,7,8-Dibenzacridine	127	106	Creosote	Same		U051
106	Dibenz[a,h]anthracene (1,2,5,6-Dibenzanthracene)	Dibenz[a,h]anthracene	1,2,5,6-Dibenzanthracene	128	107	Cresol (Cresylic acid)	Phenol, methyl-	1319-77-3	U052
107	7H-Dibenzo(c,g)carbazole (3,4,5,6-Dibenzcarbazole)	7H-Dibenzo(c,g)carbazole	3,4,5,6-Dibenzocarbazole	129	108	Crotonaldehyde	2-Butenal	4170-30-3	U053
108	Dibenzo[a,e]pyrene (1,2,4,5-Dibenzpyrene)	Dibenzo[a,e]pyrene	1,2,4,5-Dibenzpyrene	130	109	m-Cumenyl methylcarbamate	Phenol, 3-(methylethyl)-, methyl carbamate	64-00-6	P202
109	Dibenzo[a,h]pyrene (1,2,5,6-Dibenzpyrene)	Dibenzo[a,h]pyrene	1,2,5,6-Dibenzpyrene	131	110	Cyanides (soluble salts and complexes) N.O.S.1			P030
110	Dibenzo[a,i]pyrene (1,2,7,8-Dibenzpyrene)	Dibenzo[a,i]pyrene	1,2,7,8-Dibenzpyrene	132	111	Cyanogen	Ethanedinitrile	460-19-5	P031
111	1,2-Dibromo-3-chloropropane (Propane, 1,2-dibromo-3-chloro-)	1,2-Dibromo-3-chloropropane	Propane, 1,2-dibromo-3-chloro-	133	112	Cyanogen bromide	Cyanogen bromide (CN)Br	506-68-3	U246
112	1,2-Dibromoethane (Ethylene dibromide)	1,2-Dibromoethane	Ethylene dibromide	209	113	Cyanogen chloride	Cyanogen chloride (CN)Cl	506-77-4	P033
113	Dibromomethane (Methylene bromide)	Dibromomethane	Methylene bromide	262	114	Cycasin	beta-D-Glucopyranoside, (methyl-ONNazoxy) methyl	14901-08-7	
114	Di-n-butyl phthalate (1,2-Benzenedicarboxylic acid, dibutyl ester)	Di-n-butyl phthalate	1,2-Benzenedicarboxylic acid, dibutyl ester	134	115	Cycloate	Carbamothioic acid, cyclohexylethyl-, S-ethyl ester	1134-23-2	
115	o-Dichlorobenzene (Benzene, 1,2-dichloro-)	o-Dichlorobenzene	Benzene, 1,2-dichloro-	135	116	2-Cyclohexyl-4,6-dinitrophenol	Phenol, 2-cyclohexyl-4,6-dinitro-	131-89-5	P034
116	m-Dichlorobenzene (Benzene, 1,3-dichloro-)	m-Dichlorobenzene	Benzene, 1,3-dichloro-	136	117	Cyclophosphamide	2H-1,3,2-Oxazaphosphorin-2-amine, N,N-bis(2-chloroethyl)tetrahydro-, 2-oxide	50-18-0	U058
117	p-Dichlorobenzene (Benzene, 1,4-dichloro-)	p-Dichlorobenzene	Benzene, 1,4-dichloro-		118	2,4-D	Acetic acid, (2,4-dichlorophenoxy)-	0	U240

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	Last Date of EPA Promulgation: 11/8/00				
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
118	Dichlorobenzene, N.O.S.3 (Benzene, dichloro-, N.O.S.3)	Dichlorobenzene, N.O.S. 3	Benzene, dichloro-, N.O.S.3	136	119	2,4-D, salts, esters			U240
119	3,3'-Dichlorobenzidine ([1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-)	3,3'-Dichlorobenzidine	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-	139	120	Daunomycin	5,12-Naphthacenedione, 8-acetyl-10-[(3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-	20830-81-3	U059
120	1,4-Dichloro-2-butene (2-Butene, 1,4-dichloro-)	1,4-Dichloro-2-butene	2-Butene, 1,4-dichloro-	140	121	Dazomet	2H-1,3,5-thiadiazine-2-thione, tetrahydro-3,5-dimethyl	533-74-4	
121	Dichlorodifluoromethane (Methane, dichlorodifluoro-)	Dichlorodifluoromethane	Methane, dichlorodifluoro-	141	122	DDD	Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro-	72-54-8	U060
122	1,1-Dichloroethene (Ethylidene dichloride)	1,1-Dichloroethene	Ethylidene dichloride	215	123	DDE	Benzene, 1,1'-(dichloroethenylidene)bis[4-chloro-	72-55-9	...
123	1,2-Dichloroethane (Ethylene dichloride)	1,2-Dichloroethane	Ethylene dichloride	210	124	DDT	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-chloro-	50-29-3	U061
124	trans-1,2-Dichloroethene (1,2-Dichloroethylene)	trans-1,2-Dichloroethene	1,2-Dichloroethylene	144	125	Dialate	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester	2303-16-4	U062
125	Dichloroethylene, N.O.S.3 (Ethene, dichloro-, N.O.S.3)	Dichloroethylene, N.O.S. 3	Ethene, dichloro-, N.O.S.3	142	126	Dibenz[a,h]acridine	Same	226-36-8	
126	1,1-Dichloroethylene (Ethene, 1,1-dichloro-)	1,1-Dichloroethylene	Ethene, 1,1-dichloro-	143	127	Dibenz[a,j]acridine	Same	224-42-0	
127	Dichloromethane (Methylene chloride)	Dichloromethane	Methylene chloride	283	128	Dibenz[a,h]anthracene	Same	53-70-3	U063
128	2,4-Dichlorophenol (Phenol, 2,4-dichloro-)	2,4-Dichlorophenol	Phenol, 2,4-dichloro-	149	129	7H-Dibenzo[c,g]carbazole	Same	194-59-2	
129	2,6-Dichlorophenol (Phenol, 2,6-dichloro-)	2,6-Dichlorophenol	Phenol, 2,6-dichloro-	150	130	Dibenzo[a,e]pyrene	Naphtho[1,2,3,4-def]chrysene	192-65-4	
130	2,4-Dichlorophenoxyacetic acid (2,4-D), salts and esters (Acetic acid, 2,4-dichlorophenoxy-, salts and esters)	2,4-Dichlorophenoxyacetic acid (2,4-D) salts and esters	Acetic acid, 2,4-dichlorophenoxy-, salts and esters	118 & 119	131	Dibenzo[a,h]pyrene	Dibenzo[b,def]chrysene	189-64-0	
131	Dichlorophenylarsine (Phenyl dichlorarsine)	Dichlorophenylarsine	Phenyl dichlorarsine	151	132	Dibenzo[a,i]pyrene	Benzo[rst]pentaphene	189-55-9	U064
132	Dichloropropane, N.O.S.3 (Propane, dichloro-, N.O.S.3)	Dichloropropane, N.O.S. 3	Propane, dichloro-, N.O.S.3	152	133	1,2-Dibromo-3-chloropropane	Propane, 1,2-dibromo-3-chloro-	96-12-8	U066
133	1,2-Dichloropropane (Propylene dichloride)	1,2-Dichloropropane	Propylene dichloride	379	134	Dibutyl phthalate	1,2-Benzenedicarboxylic acid, dibutyl ester	84-74-2	U069

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by ORC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
134	Dichloropropanol, N.O.S.3 (Propanol, dichloro-, N.O.S.3)	Dichloropropanol, N.O.S. 3	Propanol, dichloro-, N.O.S 3	153	135	o-Dichlorobenzene	Benzene, 1,2-dichloro-	95-50-1	U070
135	Dichloropropene, N.O.S.3 (Propene, dichloro-, N.O.S.3)	Dichloropropene, N.O.S. 3	Propene, dichloro-, N.O.S.3	154	136	m-Dichlorobenzene	Benzene, 1,3-dichloro-	541-73-1	U071
136	1,3-Dichloropropene (1-Propene, 1,3-dichloro-)	1,3-Dichloropropene	1-Propene, 1,3-dichloro-	155	137	p-Dichlorobenzene	Benzene, 1,4-dichloro-	106-46-7	U072
137	Dieldin (1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octa-hydro-endo, exo- 1,4:5,8-Dimethanonaphthalene)	Dieldin	1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octa-hydro-endo, exo- 1,4:5,8-Dimethanonaphthalene	156	138	Dichlorobenzene, N.O.S.1	Benzene, dichloro-	25321-22-6	
138	1,2:3,4-Diepoxybutane (2,2'-Bioxirane)	1,2:3,4-Diepoxybutane	2,2'-Bioxirane	157	139	3,3'-Dichlorobenzidine	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-	91-94-1	U073
139	Diethylarsine (Arsine, diethyl-)	Diethylarsine	Arsine, diethyl-	158	140	1,4-Dichloro-2-butene	2-Butene, 1,4-dichloro-	764-41-0	U074
140	N,N-Diethylhydrazine (Hydrazine, 1,2-diethyl)	N,N-Diethylhydrazine	Hydrazine, 1,2-diethyl	162	141	Dichlorodifluoromethane	Methane, dichlorodifluoro-	75-71-8	U075
141	O,O-Diethyl S-methyl ester of phosphorodithioic acid (Phosphorodithioic acid, O,O-diethyl S-methyl ester)	O,O-Diethyl S-methyl ester of phosphorodithioic acid	Phosphorodithioic acid, O,O-diethyl S-methyl ester	163	142	Dichloroethylene, N.O.S.1	Dichloroethylene	25323-30-2	
142	O,O-Diethylphosphoric acid, O-p-nitrophenyl ester (Phosphoric acid, diethyl p-nitrophenyl ester)	O,O-Diethylphosphoric acid, O-p-nitrophenyl ester	Phosphoric acid, diethyl p-nitrophenyl ester	164	143	1,1-Dichloroethylene	Ethene, 1,1-dichloro-	75-35-4	U078
143	Diethyl phthalate (1,2-Benzenedicarboxylic acid, diethyl ester)	Diethyl phthalate	1,2-Benzenedicarboxylic acid, diethyl ester	165	144	1,2-Dichloroethylene	Ethene, 1,2-dichloro-, (E)-	156-60-5	U079
144	O,O-Diethyl O-2-pyrazinyl phosphorothioate (Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester)	O,O-Diethyl O-2-pyrazinyl phosphorothioate	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	166	145	Dichloroethyl ether	Ethane, 1,1'-oxybis[2-chloro-	111-44-4	U025
145	Diethylstilbesterol (4,4'-Stilbenediol,alpha,alpha-diethyl, bis(dihydrogen phosphate, (E)-)	Diethylstilbesterol	4,4'-Stilbenediol,alpha,alpha-diethyl, bis(dihydrogen phosphate, (E)-	167	146	Dichloroisopropyl ether	Propane, 2,2'-oxybis[2-chloro-]	108-60-1	U027
146	Dihydrosafrole (Benzene, 1,2-methylenedioxy-4-propyl-)	Dihydrosafrole	Benzene, 1,2-methylenedioxy-4-propyl-	168	147	Dichloromethoxy ethane	Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro-]	111-91-1	U024
147	3,4-Dihydroxy-alpha-(methylamino)methyl benzyl alcohol (1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]-)	3,4-Dihydroxy-alpha-(methylamino)methyl benzyl alcohol	1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]-	202	148	Dichloromethyl ether	Methane, oxybis[chloro-	542-88-1	P016

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1997			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
148	Diisopropylfluorophosphate (DFP) (Phosphorofluoridic acid, bis(1-methylethyl) ester)	Diisopropylfluorophosphate (DFP)	Phosphorofluoridic acid, bis(1-methylethyl) ester	169	149	2,4-Dichlorophenol	Phenol, 2,4-dichloro-	120-83-2	U081
149	Dimethoate (Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester)	Dimethoate	Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester	170	150	2,6-Dichlorophenol	Phenol, 2,6-dichloro-	87-65-0	U082
150	3,3'-Dimethoxybenzidine ([1,1'-Biphenyl]- 4,4'-diamine, 3-3'-dimethoxy-)	3,3'-Dimethoxybenzidine	[1,1'-Biphenyl]- 4,4'-diamine, 3-3'-dimethoxy-	171	151	Dichlorophenylarsine	Arsenous dichloride, phenyl-	696-28-6	P036
151	p-Dimethylaminoazobenzene (Benzenamine, N,N-dimethyl-4-(phenylazo)-)	p-Dimethylaminoazobenzene	Benzenamine, N,N-dimethyl-4-(phenylazo)-	172	152	Dichloropropane, N.O.S.1	Propane, dichloro-	26638-19-7	
152	7,12-Dimethylbenz[a]anthracene (1,2-Benzanthracene, 7,12-dimethyl-)	7,12-Dimethylbenz[a]anthracene	1,2-Benzanthracene, 7,12-dimethyl-	173	153	Dichloropropanol, N.O.S.1	Propanol, dichloro-	26545-73-3	
153	3,3'-Dimethylbenzidine ([1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-)	3,3'-Dimethylbenzidine	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-	174	154	Dichloropropene, N.O.S.1	1-Propene, dichloro-	26952-23-8	
154	Dimethylcarbamoyl chloride (Carbamoyl chloride, dimethyl-)	Dimethylcarbamoyl chloride	Carbamoyl chloride, dimethyl-	175	155	1,3-Dichloropropene	1-Propene, 1,3-dichloro-	542-75-6	U084
155	1,1-Dimethylhydrazine (Hydrazine, 1,1-dimethyl-)	1,1-Dimethylhydrazine	Hydrazine, 1,1-dimethyl-	176	156	Dieldrin	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-,(1aalpha,2beta,2aalpha,3beta,6beta,6aalpha,7beta,7aalpha)-	60-57-1	P037
156	1,2-Dimethylhydrazine (Hydrazine, 1,2-dimethyl-)	1,2-Dimethylhydrazine	Hydrazine, 1,2-dimethyl-	177	157	1,2:3,4-Diepoxybutane	2,2'-Bioxirane	1464-53-5	U085
157	3,3-Dimethyl-1-(methylthio)-2-butanone, O-[(methylamino) carbonyl] oxime (Thiofanox)	Thiofanox	3,3-Dimethyl-1-(methylthio)-2-butanone, O-[(methylamino) carbonyl] oxime	430	158	Diethylarsine	Arsine, diethyl-	692-42-2	P038
158	alpha,alpha-Dimethylphenethylamine (Ethanamine, 1,1-dimethyl-2-phenyl-)	alpha,alpha-Dimethylphenethylamine	Ethanamine, 1,1-dimethyl-2-phenyl-	178	159	Diethylene glycol, dicarbamate	Ethanol, 2,2'-oxybis-, dicarbamate	5952-26-1	U395
159	2,4-Dimethylphenol (Phenol, 2,4-dimethyl-)	2,4-Dimethylphenol	Phenol, 2,4-dimethyl-	179	160	1,4-Diethyleneoxide	1,4-Dioxane	123-91-1	U108

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
160	Dimethyl phthalate (1,2-Benzenedicarboxylic acid, dimethyl ester)	Dimethyl phthalate	1,2-Benzenedicarboxylic acid, dimethyl ester	180	151	Diethylhexyl phthalate	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	117-81-7	U028
161	Dimethyl sulfate (Sulfuric acid, dimethyl ester)	Dimethyl sulfate	Sulfuric acid, dimethyl ester	181	152	N,N'-Diethylhydrazine	Hydrazine, 1,2-diethyl-	1615-80-1	U086
162	Dinitrobenzene, N.O.S 3 (Benzene, dinitro-, N.O.S 3)	Dinitrobenzene, N.O.S. 3	Benzene, dinitro-, N.O.S.3	183	153	O,O-Diethyl S-methyl dithiophosphate	Phosphorodithioic acid, O,O-diethyl S-methyl ester	3288-58-2	U087
163	4,6-Dinitro-o-cresol and salts (Phenol, 2,4-dinitro-6-methyl-, and salts)	4,6-Dinitro-o-cresol and salts	Phenol, 2,4-dinitro-6-methyl-, and salts	184 & 185	154	Diethyl-p-nitrophenyl phosphate	Phosphoric acid, diethyl 4-nitrophenyl ester	311-45-5	P041
164	2,4-Dinitrophenol (Phenol, 2,4-dinitro-)	2,4-Dinitrophenol	Phenol, 2,4-dinitro-	186	155	Diethyl phthalate	1,2-Benzenedicarboxylic acid, diethyl ester	84-66-2	U088
165	2,4-Dinitrotoluene (Benzene, 1-methyl-2,4-dinitro-)	2,4-Dinitrotoluene	Benzene, 1-methyl-2,4-dinitro-	187	156	O,O-Diethyl O-pyrazinyl phosphoro-thioate	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	297-97-2	P040
166	2,6-Dinitrotoluene (Benzene, 1-methyl-2,6-dinitro-)	2,6-Dinitrotoluene	Benzene, 1-methyl-2,6-dinitro-	188	157	Diethylstilbesterol	Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)-	56-53-1	U089
167	Di-n-octyl phthalate (1,2-Benzenedicarboxylic acid, dioctyl ester)	Di-n-octyl phthalate	1,2-Benzenedicarboxylic acid, dioctyl ester	190	158	Dihydrosafrole	1,3-Benzodioxole, 5-propyl-	94-58-6	U090
168	1,4-Dioxane (1,4-Diethylene oxide)	1,4-Dioxane	1,4-Diethylene oxide	180	159	Diisopropylfluorophosphate (DFP)	Phosphorofluoridic acid, bis(1-methylethyl) ester	55-91-4	P043
169	Diphenylamine (Benzenamine, N-phenyl-)	Diphenylamine	Benzenamine, N-phenyl-	191	170	Dimethoate	Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester	60-51-5	P044
170	1,2-Diphenylhydrazine (Hydrazine, 1,2-diphenyl-)	1,2-Diphenylhydrazine	Hydrazine, 1,2-diphenyl-	192	171	3,3'-Dimethoxybenzidine	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethoxy-	119-90-4	U091
171	Di-n-propylnitrosamine (N-Nitroso-di-n-propylamine)	Di-n-propylnitrosamine	N-Nitroso-di-n-propylamine	193	172	p-Dimethylaminoazobenzene	Benzenamine, N,N-dimethyl-4-(phenylazo)-	60-11-7	U093
172	Disulfoton (O,O-diethyl S-[2-(ethylthio)ethyl] phosphorodithioate)	Disulfoton	O,O-diethyl S-[2-(ethylthio)ethyl] phosphorodithioate	195	173	7,12-Dimethylbenz[a]anthracene	Benz[a]anthracene, 7,12-dimethyl-	57-97-6	U094
173	2,4-Dithiobiuret (Thioimidodicarbonic diamide)	2,4-Dithiobiuret	Thioimidodicarbonic diamide	196	174	3,3'-Dimethylbenzidine	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-	119-93-7	U095
174	Endosulfan (5-Norbornene, 2,3-dimethanol, 1,4,5,6,7,7-hexachloro-, cyclic sulfite)	Endosulfan	5-Norbornene, 2,3-dimethanol, 1,4,5,6,7,7-hexachloro-, cyclic sulfite	197	175	Dimethylcarbamoyl chloride	Carbamic chloride, dimethyl-	79-44-7	U097
175	Endrin and metabolites (1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,endo-1,4:5,8-dimethanonaphthalene, and metabolites)	Endrin and metabolites	1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,endo-1,4:5,8-dimethanonaphthalene, and metabolites	199 & 200	176	1,1-Dimethylhydrazine	Hydrazine, 1,1-dimethyl-	57-14-7	U098
176	Ethyl carbamate (Urethan) (Carbamic acid, ethyl ester)	Ethyl carbamate (Urethan)	Carbamic acid, ethyl ester	204	177	1,2-Dimethylhydrazine	Hydrazine, 1,2-dimethyl-	540-73-8	U099

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.
NRC	*Promulgated by NRC circa 1987*			EPA
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order
No.	(verbatim listing)	Chemical Name	Synonym	No.
177	Ethyl cyanide (propanenitrile)	Ethyl cyanide	propanenitrile	205
178	Ethylenebisdithiocarbamic acid, salts and esters (1,2-Ethanediyl-biscarbamodithioic acid, salts and esters)	Ethylenebisdithiocarbamic acid, salts and esters	1,2-Ethanediyl-biscarbamodithioic acid, salts and esters	207 & 208
179	Ethyleneimine (Aziridine)	Ethyleneimine	Aziridine	212
180	Ethylene oxide (Oxirane)	Ethylene oxide	Oxirane	213
181	Ethylenethiourea (2-Imidazolidinethione)	Ethylenethiourea	2-Imidazolidinethione	214
182	Ethyl methacrylate (2-Propenoic acid, 2-methyl-, ethyl ester)	Ethyl methacrylate	2-Propenoic acid, 2-methyl-, ethyl ester	216
183	Ethyl methanesulfonate (Methanesulfonic acid, ethyl ester)	Ethyl methanesulfonate	Methanesulfonic acid, ethyl ester	217
184	Fluoranthene (Benzo[j,k]fluorene)	Fluoranthene	Benzo[j,k]fluorene	220
185	Fluorine	Fluorine	Same	221
186	2-Fluoroacetamide (Acetamide, 2-fluoro-)	2-Fluoroacetamide	Acetamide, 2-fluoro-	222
187	Fluoroacetic acid, sodium salt (Acetic acid, fluoro-, sodium salt)	Fluoroacetic acid	Acetic acid, fluoro-, sodium salt	223
188	Formaldehyde (Methylene oxide)	Formaldehyde	Methylene oxide	224
189	Formic acid (Methanoic acid)	Formic acid	Methanoic acid	226
190	Glycidylaldehyde (1-Propanol-2,3-epoxy)	Glycidylaldehyde	1-Propanol-2,3-epoxy	228
191	Halomethane, N.O.S.3	Halomethane, N.O.S.3	Same	229
192	Heptachlor (4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-)	Heptachlor	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	230
193	Heptachlor epoxide (alpha, beta, and gamma isomers) (4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-2,3-epoxy-3a,4,7,7-tetrahydro-, alpha, beta, and gamma isomers)	Heptachlor epoxide (alpha, beta, and gamma isomers)	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-2,3-epoxy-3a,4,7,7-tetrahydro-, alpha, beta, and gamma isomers	231 & 232

EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
EPA	*Last Date of EPA Promulgation: 11/8/00*			
Order	(verbatim listing)			
No.	Common name	Chemical abstracts name	CAS No.	HW No.
178	alpha,alpha-Dimethylphenethylamine	Benzeneethanamine, alpha,alpha-dimethyl-	122-09-8	P046
179	2,4-Dimethylphenol	Phenol, 2,4-dimethyl-	105-67-9	U101
180	Dimethyl phthalate	1,2-Benzenedicarboxylic acid, dimethyl ester	131-11-3	U102
181	Dimethyl sulfate	Sulfuric acid, dimethyl ester	77-78-1	U103
182	Dimetilan	Carbamic acid, dimethyl-, 1-[(dimethylamino) carbonyl]-5-methyl-1H-pyrazol-3-yl ester	644-64-4	P191
183	Dinitrobenzene, N.O.S.1	Benzene, dinitro-	25154-54-5	
184	4,6-Dinitro-o-cresol	Phenol, 2-methyl-4,6-dinitro-	534-52-1	P047
185	4,6-Dinitro-o-cresol salts			P047
186	2,4-Dinitrophenol	Phenol, 2,4-dinitro-	51-28-5	P048
187	2,4-Dinitrotoluene	Benzene, 1-methyl-2,4-dinitro-	121-14-2	U105
188	2,6-Dinitrotoluene	Benzene, 2-methyl-1,3-dinitro-	606-20-2	U106
189	Dinoseb	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	88-85-7	P020
190	Di-n-octyl phthalate	1,2-Benzenedicarboxylic acid, dioctyl ester	117-84-0	U017
191	Diphenylamine	Benzenamine, N-phenyl-	122-39-4	
192	1,2-Diphenylhydrazine	Hydrazine, 1,2-diphenyl-	122-66-7	U109
193	Di-n-propylnitrosamine	1-Propanamine, N-nitroso-N-propyl-	621-64-7	U111
194	Disulfiram	Thioperoxydicarbonic diamide, tetraethyl	97-77-8	

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
194	Hexachlorobenzene (Benzene, hexachloro-)	Hexachlorobenzene	Benzene, hexachloro-	235	185	Disulfoton	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester	298-04-4	P039
195	Hexachlorobutadiene (1,3-Butadiene, 1,1,2,3,4,4-hexachloro-)	Hexachlorobutadiene	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	236	186	Dithiobiuret	Thioimidodicarbonic diamide [(H2 N)C(S)]2NH	541-53-7	P049
196	Hexachlorocyclohexane (all isomers) (Lindane and isomers)	Lindane and isomers	Hexachlorocyclohexane (all isomers)	261	187	Endosulfan	6,9-Methano-2,4,3-benzodioxathiepin,6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9ahexahydro-,3-oxide	115-29-7	P050
197	Hexachlorocyclopentadiene (1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-)	Hexachlorocyclopentadiene	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	237	188	Endothall	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	145-73-3	P088
198	Hexachloroethane (Ethane, 1,1,1,2,2,2-hexachloro-)	Hexachloroethane	Ethane, 1,1,1,2,2,2-hexachloro-	240	189	Endrin	2,7:3,6-Dimethanonaphth[2,3-b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octa-hydro-,(1aalpha,2beta,2abeta,3alpha,6alpha,6abeta,7beta,7aalpha)-	72-20-8	P051
199	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4:5,8-endo,endo-dimethanonaphthalene (Hexachlorohexa-hydro-endo,endo-dimethanonaphthalene)	Isodrin	Hexachlorohexa-hydro-endo,endo-dimethanonaphthalene	251	190	Endrin metabolites			P051
200	Hexachlorophene (2,2'-Methylenebis(3,4,6-trichlorophenol)	Hexachlorophene	2,2'-Methylenebis(3,4,6-trichlorophenol	241	191	Epichlorohydrin	Oxirane, (chloromethyl)-	106-89-8	U041
201	Hexachloropropene (1-Propene, 1,1,2,3,3,3-hexachloro-)	Hexachloropropene	1-Propene, 1,1,2,3,3,3-hexachloro-	242	192	Epinephrine	1,2-Benzenediol, 4-(1-hydroxy-2-(methylamino)ethyl)-, (R)-	51-43-4	P042
202	Hexaethyl tetraphosphate (Tetraphosphoric acid, hexaethyl ester)	Hexaethyl tetraphosphate	Tetraphosphoric acid, hexaethyl ester	243	193	EPTC	Carbamothioic acid, dipropyl-, S-ethyl ester	759-94-4	
203	Hydrazine (Diamine)	Hydrazine	Diamine	244	194	Ethyl carbamate (urethane)	Carbamic acid, ethyl ester	51-79-6	U238
204	Hydrocyanic acid (Hydrogen cyanide)	Hydrocyanic acid	Hydrogen cyanide	245	195	Ethyl cyanide	Propanenitrile	107-12-0	P101
205	Hydrofluoric acid (Hydrogen fluoride)	Hydrofluoric acid	Hydrogen fluoride	246	196	Ethyl Ziram	Zinc, bis(diethylcarbamodithioato-S,S')-	14324-55-1	

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
206	Hydrogen sulfide (Sulfur hydride)	Hydrogen sulfide	Sulfur hydride	247	207	Ethylenebisdithiocarbamic acid	Carbamodithioic acid, 1,2-ethanediylbis-	111-54-6	U114
207	Hydroxydimethylarsine oxide (Cacodylic acid)	Hydroxydimethylarsine oxide	Cacodylic acid	62	208	Ethylenebisdithiocarbamic acid, salts and esters			U114
208	Indeno (1,2,3-cd)pyrene (1,10-(1,2-phenylene)pyrene)	Indeno (1,2,3-cd)pyrene	1,10-(1,2-phenylene)pyrene	248	209	Ethylene dibromide	Ethane, 1,2-dibromo-	106-93-4	U067
209	Iodomethane (Methyl iodide)	Iodomethane	Methyl iodide	287	210	Ethylene dichloride	Ethane, 1,2-dichloro-	107-06-2	U077
210	*Iron dextran (Ferric dextran)*	*Iron dextran*	*Ferric dextran*	N.C.	211	Ethylene glycol monoethyl ether	Ethanol, 2-ethoxy-	110-80-5	U359
211	Isocyanic acid, methyl ester (Methyl isocyanate)	Isocyanic acid	Methyl isocyanate	288	212	Ethyleneimine	Aziridine	151-56-4	P054
212	Isobutyl alcohol (1-Propanol, 2-methyl-)	Isobutyl alcohol	1-Propanol, 2-methyl-	250	213	Ethylene oxide	Oxirane	75-21-8	U115
213	Isosafrole (Benzene, 1,2-methylenedioxy-4-allyl-)	Isosafrole	Benzene, 1,2-methylenedioxy-4-allyl-	253	214	Ethylenethiourea	2-Imidazolidinethione	96-45-7	U116
214	Kepone (Decachlorooctahydro-1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one)	Kepone	Decachlorooctahydro-1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one	254	215	Ethylidene dichloride	Ethane, 1,1-dichloro-	75-34-3	U076
215	Lasiocarpine (2-Butenoic acid, 2-methyl-, 7-[[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester)	Lasiocarpine	2-Butenoic acid, 2-methyl-, 7-[[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester	255	216	Ethyl methacrylate	2-Propenoic acid, 2-methyl-, ethyl ester	97-63-2	U118
216	Lead and compounds, N.O.S.③	Lead and compounds, N.O.S.③	Same	256 & 257	217	Ethyl methanesulfonate	Methanesulfonic acid, ethyl ester	62-50-0	U119
217	Lead acetate (Acetic acid, lead salt)	Lead acetate	Acetic acid, lead salt	258	218	Famphur	Phosphorothioic acid, O-[4-[(dimethylamino)sulfonyl]phenyl] O,O-dimethyl ester	52-85-7	P097
218	Lead phosphate (Phosphoric acid, lead salt)	Lead phosphate	Phosphoric acid, lead salt	259	219	Ferbam	Iron, tris(dimethylcarbamodithioato-S,S')-	14484-64-1	
219	Lead subacetate (Lead, bis(acetato-O)tetrahydroxytri-)	Lead subacetate	Lead, bis(acetato-O)tetrahydroxytri-	260	220	Fluoranthene	Same	206-44-0	U120
220	Maleic anhydride (2,5-Furandione)	Maleic anhydride	2,5-Furandione	262	221	Fluorine	Same	7782-41-4	P056
221	Maleic hydrazide (1,2-Dihydro-3,6-pyridazinedione)	Maleic hydrazide	1,2-Dihydro-3,6-pyridazinedione	263	222	Fluoroacetamide	Acetamide, 2-fluoro-	640-19-7	P057
222	Malononitrile (Propanedinitrile)	Malononitrile	Propanedinitrile	264	223	Fluoroacetic acid, sodium salt	Acetic acid, fluoro-, sodium salt	62-74-8	P058

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	Last Date of EPA Promulgation: 11/8/00				
Order	Hazardous Constituent	Compound Names Parsed by ORC		Order	EPA Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
223	Melphalan (Alanine, 3-[p-bis(2-chloroethyl)amino]phenyl-,L-)	Melphalan	Alanine, 3-[p-bis(2-chloroethyl)amino]phenyl-,L-	266	224	Formaldehyde	Same	50-00-0	U122
224	Mercury fulminate (Fulminic acid, mercury salt)	Mercury fulminate	Fulminic acid, mercury salt	269	225	Formetanate hydrochloride	Methanimidamide, N,N-dimethyl-N'-(3-[(methylamino) carbonyl)oxy]phenyl]- ,monohydrochloride	23422-53-9	P198
225	Mercury and compounds, N.O.S.3	Mercury and compounds, N.O.S.3	Same	267 & 268	226	Formic acid	Same	64-18-6	U123
226	Methacrylonitrile (2-Propenenitrile, 2-methyl-)	Methacrylonitrile	2-Propenenitrile, 2-methyl-	271	227	Formparanate	Methanimidamide, N,N-dimethyl-N'-[2-methyl-4-[[(methylamino) carbonyl]oxy]phenyl]-	17702-57-7	P197
227	Methanethiol (Thiomethanol)	Methanethiol	Thiomethanol	437	228	Glycidylaldehyde	Oxiranecarboxyaldehyde	765-34-4	U126
228	Methapyrilene (Pyridine, 2-[(2-dimethylamino)ethyl]-2-thenylamino-)	Methapyrilene	Pyridine, 2-[(2-dimethylamino-	272	229	Halomethanes, N.O.S.1			
229	Methomyl (Acetimidic acid, N-[(methylcarbamoyl)oxy]thio-, methyl ester)	Methomyl	Acetimidic acid, N-[(methylcarbamoyl)oxy]thio-, methyl ester	274	230	Heptachlor	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	76-44-8	P059
230	Methoxychlor (Ethane, 1,1,1-trichloro-2,2-bis(p-methoxyphenyl)-)	Methoxychlor	Ethane, 1,1,1-trichloro-2,2-bis(p-methoxyphenyl)-	275	231	Heptachlor epoxide	2,5-Methano-2H-indeno[1,2-b]oxirene,2,3,4,5,6,7,7-heptachloro-1a,1b,5,5a,6,6ahexa-hydro-,(1aalpha,1bbeta,2alpha,5alpha, 5abeta,6beta,6aalpha)-	1024-57-3	
231	2-Methylaziridine (1,2-Propylenimine)	2-Methylaziridine	1,2-Propylenimine	380	232	Heptachlor epoxide (alpha, beta, and gamma isomers)			
232	3-Methylcholanthrene (Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-)	3-Methylcholanthrene	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	280	233	Heptachlorodibenzofurans			
233	Methyl chlorocarbonate (Carbonochloridic acid, methyl ester)	Methyl chlorocarbonate	Carbonochloridic acid, methyl ester	276	234	Heptachlorodibenzo-p-dioxins			
234	4,4-Methylenebis(2-chloroaniline) (Benzenamine, 4,4 methylenebis- (2-chloro-)	4,4-Methylenebis(2-chloroaniline)	Benzenamine, 4,4-methylenebis-(2-chloro-	281	235	Hexachlorobenzene	Benzene, hexachloro-	118-74-1	U127
235	Methyl ethyl ketone (MEK) (2-Butanone)	Methyl ethyl ketone (MEK)	2-Butanone	284	236	Hexachlorobutadiene	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	87-68-3	U128
236	Methyl hydrazine (Hydrazine, methyl-)	Methyl hydrazine	Hydrazine, methyl-	285	237	Hexachlorocyclopentadiene	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77-47-4	U130
237	2-Methyllactonitrile (Propanenitrile, 2-hydroxy-2-methyl-)	2-Methyllactonitrile	Propanenitrile, 2-hydroxy-2-methyl-	289	238	Hexachlorodibenzo-p-dioxins			

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.
NRC Order No.	Promulgated by NRC circa 1987	Compound Names Parsed by DRC		EPA Order No.
	Hazardous Constituent (verbatim listing)	Chemical Name	Synonym	
238	Methyl methacrylate (2-Propenoic acid, 2-methyl-, methyl ester)	Methyl methacrylate	2-Propenoic acid, 2-methyl-, methyl ester	290
239	Methyl methanesulfonate (Methanesulfonic acid, methyl ester)	Methyl methanesulfonate	Methanesulfonic acid, methyl ester	291
240	2-Methyl-2-(methylthio)propionaldehyde-o-(methylcarbonyl) oxime [Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime]	2-Methyl-2-(methylthio)propionaldehyde-o-(methylcarbonyl) oxime	Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	11
241	N-Methyl-N-nitro-N-nitrosoguanidine (Guanidine, N-nitroso-N-methyl-N- nitro-)	N-Methyl-N-nitro-N-nitrosoguanidine	Guanidine, N-nitroso-N-methyl-N-nitro-	297
242	Methyl parathion (0,0-dimethyl 0-(4-nitrophenyl) phosphorothioate)	Methyl parathion	0,0-dimethyl 0-(4-nitrophenyl) phosphorothioate	292
243	Methylthiouracil (4-IH-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-)	Methylthiouracil	4-IH-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	293
244	***Molybdenum and compounds, N.O.S.3***	***Molybdenum and compounds, N.O.S.3***	***Same***	N.C.
245	Mustard gas (Sulfide, bis(2-chloroethyl)-)	Mustard gas	Sulfide, bis(2-chloroethyl	299
246	Naphthalene	Naphthalene	Same	300
247	1,4-Naphthoquinone (1,4-Naphthalenedione)	1,4-Naphthoquinone	1,4-Naphthalenedione	301
248	1-Naphthylamine (alpha-Naphthylamine)	1-Naphthylamine	alpha-Naphthylamine	302
249	2-Naphthylamine (beta-Naphthylamine)	2-Naphthylamine	beta-Naphthylamine	303
250	1-Naphthyl-2-thiourea (Thiourea, 1-naphthalenyl-)	1-Naphthyl-2-thiourea	Thiourea, 1-naphthalenyl-	304
251	Nickel and compounds, N.O.S.3	Nickel and compounds, N.O.S.3	Same	305 & 306
252	Nickel carbonyl (Nickel tetracarbonyl)	Nickel carbonyl	Nickel tetracarbonyl	307

EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)					
EPA Order No.	Last Date of EPA Promulgation: 11/8/00 (verbatim listing)				
	Common name	Chemical abstracts name	CAS No	HW No.
238	**Hexachlorodibenzofurans**			
240	Hexachloroethane	Ethane, hexachloro-	67-72-1	U131
241	Hexachlorophene	Phenol, 2,2'-methylenebis[3,4,6-trichloro-	70-30-4	U132
242	Hexachloropropene	1-Propene, 1,1,2,3,3,3-hexachloro-	1888-71-7	U243
243	Hexaethyl tetraphosphate	Tetraphosphoric acid, hexaethyl ester	757-58-4	P062
244	Hydrazine	Same	302-01-2	U133
245	Hydrogen cyanide	Hydrocyanic acid	74-90-8	P063
246	Hydrogen fluoride	Hydrofluoric acid	7664-39-3	U134
247	Hydrogen sulfide	Hydrogen sulfide H2S	7783-06-4	U135
248	Indeno(1,2,3-cd)pyrene	Same	193-39-5	U137
249	**3-Iodo-2-propynyl n-butylcarbamate**	Carbamic acid, butyl-, 3-iodo-2-propynyl ester	55406-53-6	
250	Isobutyl alcohol	1-Propanol, 2-methyl-	78-83-1	U140
251	Isodrin	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-,(1alpha,4alpha,4abeta,5beta,8beta,8abeta)-	465-73-6	P060
252	Isolan	Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester	119-38-0	P192
253	Isosafrole	1,3-Benzodioxole, 5-(1-propenyl)	120	U141

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC since 1987			EPA	EPA	Last Date of EPA Promulgation: 11/6/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No	HW No.
253	Nickel cyanide (Nickel (II) cyanide)	Nickel cyanide	Nickel (II) cyanide	308	254	Kepone	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-	143-50-0	U142
254	Nicotine and salts (Pyridine, (S)-3-(1-methyl-2-pyrrolidinyl)-, and salts)	Nicotine and salts	Pyridine, (S)-3-(1-methyl-2-pyrrolidinyl)-, and salts	309 & 310	255	Lasiocarpine	2-Butenoic acid, 2-methyl-,7-[[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester,[1S-[1a(Z),7(2S*,3R*),7aa]]-	303-34-1	4143
255	Nitric oxide (Nitrogen (II) oxide)	Nitric oxide	Nitrogen (II) oxide	311	256	Lead	Same	7439-92-1	
256	p-Nitroaniline (Benzenamine, 4-nitro-)	p-Nitroaniline	Benzenamine, 4-nitro-	312	257	Lead compounds, N.O.S.1			
257	Nitrobenzine (Benzene, nitro-)	Nitrobenzine	Benzene, nitro-	313	258	Lead acetate	Acetic acid, lead(2+) salt	301-04-2	U144
258	Nitrogen dioxide (Nitrogen (IV) oxide)	Nitrogen dioxide	Nitrogen (IV) oxide	314	259	Lead phosphate	Phosphoric acid, lead(2+) salt (2:3)	7446-27-7	U145
259	Nitrogen mustard and hydrochloride salt (Ethanamine, 2-chloro-, N-(2-chloroethyl)- N-methyl-, and hydrochloride salt)	Nitrogen mustard and hydrochloride salt	Ethanamine, 2-chloro-, N-(2-chloroethyl)- N-methyl-, and hydrochloride salt	315 & 316	260	Lead subacetate	Lead, bis(acetato-O)tetrahydroxytri-	1335-32-6	U146
260	Nitrogen mustard N-Oxide and hydrochloride salt (Ethanamine, 2-chloro-, N-(2-chloroethyl)-N-methyl-, and hydrochloride salt)	Nitrogen mustard N-Oxide and hydrochloride salt	Ethanamine, 2-chloro-, N-(2-chloroethyl)-N-methyl-, and hydrochloride salt	317 & 318	261	Lindane	Cyclohexane, 1,2,3,4,5,6-hexachloro-,(1a,alpha,2a,alpha,3beta,4a,alpha,5a,alpha,6beta)-	58-89-9	U129
261	Nitroglycerine (1,2,3-Propanetriol, trinitrate)	Nitroglycerine	1,2,3-Propanetriol, trinitrate	319	262	Maleic anhydride	2,5-Furandione	108-31-6	U147
262	4-Nitrophenol (Phenol, 4-nitro-)	4-Nitrophenol	Phenol, 4-nitro-	320	263	Maleic hydrazide	3,6-Pyridazinedione, 1,2-dihydro-	123-33-1	U148
263	4-Nitroquinoline-1-oxide (Quinoline, 4-nitro-1-oxide-)	4-Nitroquinoline-1-oxide	Quinoline, 4-nitro-1-oxide-	N.C.	264	Malononitrile	Propanedinitrile	109-77-3	U149
264	Nitrosamine, N.O.S.3	Nitrosamine, N.O.S.3	Same	322	265	Manganese, bis(dimethylcarbamodithioato-S,S')-	Manganese, bis(dimethylcarbamodithioato-S,S')-	15339-36-3	P196
265	N-Nitrosodi-n-butylamine (1-Butanamine, N-butyl-N-nitroso-)	N-Nitrosodi-n-butylamine	1-Butanamine, N-butyl-N-nitroso-	323	266	Melphalan	L-Phenylalanine, 4-[bis(2-chloroethyl)amino]-	148-82-3	U150

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
265	N-Nitrosodiethanolamine (Ethanol, 2,2-(nitrosoimino)bis-)	N-Nitrosodiethanolamine	Ethanol, 2,2-(nitrosoimino)bis-	324	267	Mercury	Same	7439-97-6	U151
267	N-Nitrosodiethylamine (Ethanamine, N-ethyl-N-nitroso-)	N-Nitrosodiethylamine	Ethanamine, N-ethyl-N-nitroso-	325	268	Mercury compounds, N.O.S.1			
268	N-Nitrosodimethylamine (Dimethylnitrosamine)	N-Nitrosodimethylamine	Dimethylnitrosamine	326	269	Mercury fulminate	Fulminic acid, mercury(2+) salt	628-86-4	P065
269	N-Nitroso-N-ethylurea (Carbamide, N-ethyl-N-nitroso-)	N-Nitroso-N-ethylurea	Carbamide, N-ethyl-N-nitroso-	327	270	Metam Sodium	Carbamodithioic acid, methyl-, monosodium salt	137-42-8	
270	N-Nitrosomethylethylamine (Ethanamine, N-methyl-N-nitroso-)	N-Nitrosomethylethylamine	Ethanamine, N-methyl-N-nitroso-	328	271	Methacrylonitrile	2-Propenenitrile, 2-methyl-	126-98-7	U152
271	N-Nitroso-N-methylurea (Carbamide, N-methyl-N-nitroso-)	N-Nitroso-N-methylurea	Carbamide, N-methyl-N-nitroso-	329	272	Methapyrilene	1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-	91-80-5	U155
272	N-Nitroso-N-methylurethane (Carbamic acid, methylnitroso-, ethyl ester)	N-Nitroso-N-methylurethane	Carbamic acid, methylnitroso-, ethyl ester	330	273	Methiocarb	Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate	2032-65-7	P199
273	N-Nitrosomethylvinylamine (Ethenamine, N-methyl-N-nitroso-)	N-Nitrosomethylvinylamine	Ethenamine, N-methyl-N-nitroso-	331	274	Methomyl	Ethanimidothioic acid, N-[[(methylamino)carbonyl]oxy]-, methyl ester	16752-77-5	P066
274	N-Nitrosomorpholine (Morpholine, N-nitroso-)	N-Nitrosomorpholine	Morpholine, N-nitroso-	332	275	Methoxychlor	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-methoxy-	72-43-5	U247
275	N-Nitrosonornicotine (Nornicotine, N-nitroso-)	N-Nitrosonornicotine	Nornicotine, N-nitroso-	333	276	Methyl bromide	Methane, bromo-	74-83-9	U029
276	N-Nitrosopiperidine (Pyridine, hexahydro-, N-nitroso-)	N-Nitrosopiperidine	Pyridine, hexahydro-, N-nitroso-	334	277	Methyl chloride	Methane, chloro-	74-87-3	U045
277	Nitrosopyrrolidine (Pyrrole, tetrahydro-, N-nitroso-)	Nitrosopyrrolidine	Pyrrole, tetrahydro-, N-nitroso-	335	278	Methyl chlorocarbonate	Carbonochloridic acid, methyl ester	79-22-1	U156
278	N-Nitrososarcosine (Sarcosine, N-nitroso-)	N-Nitrososarcosine	Sarcosine, N-nitroso-	336	279	Methyl chloroform	Ethane, 1,1,1-trichloro-	71-55-6	U226
279	5-Nitro-o-toluidine (Benzenamine, 2-methyl-5-nitro-)	5-Nitro-o-toluidine	Benzenamine, 2-methyl-5-nitro-	337	280	3-Methylcholanthrene	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	56-49-5	U157
280	Octamethylpyrophosphoramide (Diphosphoramide, octamethyl-)	Octamethylpyrophosphoramide	Diphosphoramide, octamethyl-	340	281	4,4'-Methylenebis(2-chloroaniline)	Benzenamine, 4,4'-methylenebis[2-chloro-	101-14-4	U158
281	Osmium tetroxide (Osmium (VIII) oxide)	Osmium tetroxide	Osmium (VIII) oxide	341	282	Methylene bromide	Methane, dibromo-	74-95-3	U068
282	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid (Endothal)	Endothall	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	[illegible]	283	Methylene chloride	Methane, dichloro-	75-[illegible]	U080

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	Last Date of EPA Promulgation: 11/8/00				
Order No.	Hazardous Constituent (verbatim listing)	Compound Names Parsed by DRC: Chemical Name	Synonym	Order No.	EPA Order No.	(verbatim listing) Common name	Chemical abstracts name	CAS No.	HW No.
283	Paraldehyde (1,3,5-Trioxane, 2,4,6-trimethyl-)	Paraldehyde	1,3,5-Trioxane, 2,4,6-trimethyl-	343	284	Methyl ethyl ketone (MEK)	2-Butanone	78-93-3	U159
284	Parathion (Phosphorothioic acid, O,O-diethyl O-(p-nitrophenyl)ester)	Parathion	Phosphorothioic acid, O,O-diethyl O-(p-nitrophenyl)ester	344	285	Methyl ethyl ketone peroxide	2-Butanone, peroxide	1338-23-4	U160
285	Pentachlorobenzene (Benzene, pentachloro-)	Pentachlorobenzene	Benzene, pentachloro-	346	286	Methyl hydrazine	Hydrazine, methyl-	60-34-4	P068
286	Pentachloroethane (Ethane, pentachloro-)	Pentachloroethane	Ethane, pentachloro-	349	287	Methyl iodide	Methane, iodo-	74-88-4	U138
287	Pentachloronitrobenzene (PCNB) (Benzene, pentachloronitro-)	Pentachloronitrobenzene	Benzene, pentachloronitro-	350	288	Methyl isocyanate	Methane, isocyanato-	624-83-9	P064
288	Pentachlorophenol (Phenol, pentachloro-)	Pentachlorophenol	Phenol, pentachloro-	351	289	2-Methyllactonitrile	Propanenitrile, 2-hydroxy-2-methyl-	75-86-5	P069
289	Phenacetin (Acetamide, N-(4-ethoxyphenyl)-)	Phenacetin	Acetamide, N-(4-ethoxyphenyl)-	352	290	Methyl methacrylate	2-Propenoic acid, 2-methyl-, methyl ester	80-62-6	U162
290	Phenol (Benzene, hydroxy-)	Phenol	Benzene, hydroxy-	353	291	Methyl methanesulfonate	Methanesulfonic acid, methyl ester	66-27-3	
291	Phenylenediamine (Benzenediamine)	Phenylenediamine	Benzenediamine	354	292	Methyl parathion	Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester	298-00-0	P071
292	Phenylmercury acetate (Mercury, acetatophenyl-)	Phenylmercury acetate	Mercury, acetatophenyl-	355	293	Methylthiouracil	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	56-04-2	U164
293	N-Phenylthiourea (Thiourea, phenyl-)	N-Phenylthiourea	Thiourea, phenyl-	356	294	**aposicarb**	Carbamic acid, methyl-, 3-methylphenyl ester	1129-41-5	P128
294	Phosgene (Carbonyl chloride)	Phosgene	Carbonyl chloride	357	295	**Mexacarbate**	Phenol, 4-(dimethylamino)-3,5-dimethyl-, methylcarbamate (ester)	315-18-4	P128
295	Phosphine (Hydrogen phosphide)	Phosphine	Hydrogen phosphide	358	296	Mitomycin C	Azirino[2',3':3,4]pyrrolo[1,2-a]indole-4,7-dione, 6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-, [1aS-(1aalpha,8beta,8aalpha,8balpha)]-	50-07-7	U010
296	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester (Phorate)	Phorate	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester	359	297	MNNG	Guanidine, N-methyl-N'-nitro-N-nitroso-	70-25-7	U163
297	Phosphorothioic acid, O,O-dimethyl O-[p-((dimethylamino)sulfonyl)phenyl] ester (Famphur)	Famphur	Phosphorothioic acid, O,O-dimethyl O-[p-((dimethylamino)sulfonyl)phenyl] ester	218	298	**Molinate**	1H-Azepine-1-carbothioic acid, hexahydro-, S-ethyl ester	2212-67-1	
298	Phthalic acid esters, N.O.S.3 (Benzene, 1,2-dicarboxylic acid, esters, N.O.S.3)	Phthalic acid esters, N.O.S. 3	Benzene, 1,2-dicarboxylic acid, esters, N.O.S.3	360	299	Mustard gas	Ethane, 1,1'-thiobis[2-chloro-	505-60-2	

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
299	Phthalic anhydride (1,2-Benzenedicarboxylic acid anhydride)	Phthalic anhydride	1,2-Benzenedicarboxylic acid anhydride	361	300	Naphthalene	Same	91-20-3	U165
300	2-Picoline (Pyridine, 2-methyl-)	2-Picoline	Pyridine, 2-methyl-	364	301	1,4-Naphthoquinone	1,4-Naphthalenedione	130-15-4	U166
301	Polychlorinated biphenyl, N.O.S.3	Polychlorinated biphenyl, N.O.S.3	Same	365	302	alpha-Naphthylamine	1-Naphthalenamine	134-32-7	U167
302	Potassium cyanide	Potassium cyanide	Same	366	303	beta-Naphthylamine	2-Naphthalenamine	91-59-8	U168
303	Potassium silver cyanide (Argentate(1-), dicyano-, potassium)	Potassium silver cyanide	Argentate(1-), dicyano-, potassium	371	304	alpha-Naphthylthiourea	Thiourea, 1-naphthalenyl-	86-88-4	P072
304	Pronamide (3,5-Dichloro-N-(1,1-dimethyl-2-propynyl)benzamide)	Pronamide	3,5-Dichloro-N-(1,1-dimethyl-2-propynyl)benzamide	373	305	Nickel	Same	7440-02-0	
305	1,3-Propane sultone (1,2-Oxathiolane, 2,2-dioxide)	1,3-Propane sultone	1,2-Oxathiolane, 2,2-dioxide	374	306	Nickel compounds, N.O.S.1			
306	n-Propylamine (1-Propanamine)	n-Propylamine	1-Propanamine	375	307	Nickel carbonyl	Nickel carbonyl Ni(CO)4, (T-4)-	13463-39-3	P073
307	Propylthiouracil (Undecamethylenediamine, N,N'-bis(2-chlorobenzyl-), dihydrochloride)	Propylthiouracil	Undecamethylenediamine, N,N'-bis(2-chlorobenzyl-), dihydrochloride	381	308	Nickel cyanide	Nickel cyanide Ni(CN)2	557-19-7	P074
308	2-Propyn-1-ol (Propargyl alcohol)	Propargyl alcohol	2-Propyn-1-ol	376	309	Nicotine	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-	54-11-5	P075
309	Pyridine	Pyridine	Same	383	310	Nicotine salts			P075
310	Radium -226 and -228	Radium -226 and -228	Same	N.C.	311	Nitric oxide	Nitrogen oxide NO	10102-43-9	P076
311	Reserpine (Yohimban-16-carboxylic acid, 11,17-dimethoxy 18-[3,4,5-trimethoxybenzoyl)oxy]-, methyl ester)	Reserpine	Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[3,4,5-trimethoxybenzoyl)oxy]-, methyl ester	384	312	p-Nitroaniline	Benzenamine, 4-nitro-	100-01-6	P077
312	Resorcinol (1,3-Benzenediol)	Resorcinol	1,3-Benzenediol	386	313	Nitrobenzene	Benzene, nitro-	98-95-3	U169
313	Saccharin and salts (1,2-Benzoisothiazolin-3-one, 1,1-dioxide, and salts)	Saccharin and salts	1,2-Benzoisothiazolin-3-one, 1,1-dioxide, and salts	386 & 387	314	Nitrogen dioxide	Nitrogen oxide NO2	10102-44-0	P078
314	Safrole (Benzene, 1,2-methylenedioxy-4-allyl-)	Safrole	Benzene, 1,2-methylenedioxy-4-allyl-	388	315	Nitrogen mustard	Ethanamine, 2-chloro-N-(2-chloroethyl)-N-methyl-	51-75-2	
315	Selenious acid (Selenium dioxide)	Selenious acid	Selenium dioxide	391	316	Nitrogen mustard, hydrochloride salt			
316	Selenium and compounds, N.O.S.3	Selenium and compounds, N.O.S.3	Same	389 & 390	317	Nitrogen mustard N-oxide	Ethanamine, 2-chloro-N-(2-chloroethyl)-N-methyl-, N-oxide.	126-85-2	
317	Selenium sulfide (Sulfur selenide)	Selenium sulfide	Sulfur selenide	[illegible]	318	Nitrogen mustard, N-oxide, hydro- chloride salt			

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1997			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
318	Selenourea (Carbamimidoselenoic acid)	Selenourea	Carbamimidoselenoic acid	394	319	Nitroglycerin	1,2,3-Propanetriol, trinitrate	55-63-0	P081
319	Silver and compounds, N.O.S.3	Silver and compounds, N.O.S.3	Same	395 & 396	320	p-Nitrophenol	Phenol, 4-nitro-	100-02-7	U170
320	Silver cyanide	Silver cyanide	Same	397	321	2-Nitropropane	Propane, 2-nitro-	79-46-9	U171
321	Sodium cyanide	Sodium cyanide	Same	398	322	Nitrosamines, N.O.S.1		35576-91-1D	
322	Streptozotocin (D-Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-)	Streptozotocin	D-Glucopyranose, 2-deoxy-2-[3-methyl-3-nitrosoureido]-	404	323	N-Nitrosodi-n-butylamine	1-Butanamine, N-butyl-N-nitroso-	924-16-3	U172
323	Strontium sulfide	Strontium sulfide	Same	N.C.	324	N-Nitrosodiethanolamine	Ethanol, 2,2'-(nitrosoimino)bis-	1116-54-7	U173
324	Strychnine and salts (Strychnidin-10-one, and salts)	Strychnine and salts	Strychnidin-10-one, and salts	405 & 406	325	N-Nitrosodiethylamine	Ethanamine, N-ethyl-N-nitroso-	55-18-5	U174
325	1,2,4,5-Tetrachlorobenzene (Benzene, 1,2,4,5-tetrachloro-)	1,2,4,5-Tetrachlorobenzene	Benzene, 1,2,4,5-tetrachloro-	410	326	N-Nitrosodimethylamine	Methanamine, N-methyl-N-nitroso-	62-75-9	P082
326	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) (Dibenzo-p-dioxin, 2,3,7,8-tetrachloro-)	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	Dibenzo-p-dioxin, 2,3,7,8-tetrachloro-	406 & 411	327	N-Nitroso-N-ethylurea	Urea, N-ethyl-N-nitroso-	759-73-9	U176
327	Tetrachloroethane, N.O.S.3 (Ethane, tetrachloro-, N.O.S.3)	Tetrachloroethane, N.O.S. 3	Ethane, tetrachloro-, N.O.S.3	413	328	N-Nitrosomethylethylamine	Ethanamine, N-methyl-N-nitroso-	10595-95-6	
328	1,1,1,2-Tetrachloroethane (Ethane, 1,1,1,2-tetrachloro-)	1,1,1,2-Tetrachloroethane	Ethane, 1,1,1,2-tetrachloro-	414	329	N-Nitroso-N-methylurea	Urea, N-methyl-N-nitroso-	684-93-5	U177
329	1,1,2,2-Tetrachloroethane (Ethane, 1,1,2,2-tetrachloro-)	1,1,2,2-Tetrachloroethane	Ethane, 1,1,2,2-tetrachloro-	415	330	N-Nitroso-N-methylurethane	Carbamic acid, methylnitroso-, ethyl ester	615-53-2	U178
330	Tetrachloroethane (Ethene, 1,1,2,2-tetrachloro-)	Tetrachloroethane	Ethene, 1,1,2,2-tetrachloro-	415	331	N-Nitrosomethylvinylamine	Vinylamine, N-methyl-N-nitroso-	4549-40-0	P084
331	Tetrachloromethane (Carbon tetrachloride)	Tetrachloromethane	Carbon tetrachloride	73	332	N-Nitrosomorpholine	Morpholine, 4-nitroso-	59-89-2	
332	2,3,4,6,-Tetrachlorophenol (Phenol, 2,3,4,6-tetrachloro-)	2,3,4,6,-Tetrachlorophenol	Phenol, 2,3,4,6-tetrachloro-	417	333	N-Nitrosonornicotine	Pyridine, 3-(1-nitroso-2-pyrrolidinyl)-, (S)-	16543-55-8	
333	Tetraethyldithiopyrophosphate (Dithiopyrophosphoric acid, tetraethyl-ester)	Tetraethyldithiopyrophosphate	Dithiopyrophosphoric acid, tetraethyl-ester	420	334	N-Nitrosopiperidine	Piperidine, 1-nitroso-	100-75-4	U179
334	Tetraethyl lead (Plumbane, tetraethyl-)	Tetraethyl lead	Plumbane, tetraethyl-	421	335	N-Nitrosopyrrolidine	Pyrrolidine, 1-nitroso-	930-55-2	U180
335	Tetraethylpyrophosphate (Pyrophosphoric acids, tetraethyl ester)	Tetraethylpyrophosphate	Pyrophosphoric acids, tetraethyl ester	422	336	N-Nitrososarcosine	Glycine, N-methyl-N-nitroso-	13256-22-9	...
336	Tetranitromethane (Methane, tetranitro-)	Tetranitromethane	Methane, tetranitro-	424	337	5-Nitro-o-toluidine	Benzenamine, 2-methyl-5-nitro-	99-55-8	U181
337	Thallium and compounds, N.O.S.3	Thallium and compounds, N.O.S.3	Same	425 & 426	338	Octachlorodibenzo-p-dioxin (OCDD)	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	3268-87-9	

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
338	Thallic oxide (Thallium (III) oxide)	Thallic oxide	Thallium (III) oxide	427	339	Octachlorodibenzofuran (OCDF)	1,2,3,4,6,7,8,9-Octachlordibenzfuran	39001-02-0	
339	Thallium (I) acetate (Acetic acid, thallium (I) salt)	Thallium (I) acetate	Acetic acid, thallium (I) salt	428	340	Octamethylpyrophosphoramide	Diphosphoramide, octamethyl-	152-16-9	P085
340	Thallium (I) carbonate (Carbonic acid, dithallium (I) salt)	Thallium (I) carbonate	Carbonic acid, dithallium (I) salt	429	341	Osmium tetroxide	Osmium oxide OsO4, (T-4)-	20816-12-0	P087
341	Thallium (I) chloride	Thallium (I) chloride	Same	430	342	Oxamyl	Ethanimidothioc acid, 2-(dimethylamino)-N-[[(methylamino)carbonyl]oxy]-2-oxo-,methyl ester	23135-22-0	P194
342	Thallium (I) nitrate (Nitric acid, thallium (I) salt)	Thallium (I) nitrate	Nitric acid, thallium (I) salt	431	343	Paraldehyde	1,3,5-Trioxane, 2,4,6-trimethyl-	123-63-7	U182
343	Thallium selenite	Thallium selenite	Same	432	344	Parathion	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	56-38-2	P089
344	Thallium (I) sulfate (Sulfuric acid, thallium (I) salt)	Thallium (I) sulfate	Sulfuric acid, thallium (I) salt	433	345	Pebulate	Carbamothioic acid, butylethyl-, S-propyl ester	1114-71-2	
345	Thioacetamide (Ethanethioamide)	Thioacetamide	Ethanethioamide	434	346	Pentachlorobenzene	Benzene, pentachloro-	608-93-5	U183
346	Thiosemicarbazide (Hydrazinecarbothioamide)	Thiosemicarbazide	Hydrazinecarbothioamide	440	347	Pentachlorodibenzo-p-dioxins			
347	Thiourea (Carbamide thio-)	Thiourea	Carbamide thio-	441	348	Pentachlorodibenzofurans			
348	Thiuram (Bis(dimethylthiocarbamoyl) disulfide)	Thiuram	Bis(dimethylthiocarbamoyl) disulfide	442	349	Pentachloroethane	Ethane, pentachloro-	76-01-7	U184
349	Thorium and compounds, N.O.S.,3 when producing thorium byproduct material	Thorium and compounds, N.O.S.,3 when producing thorium byproduct material	Same	N.C.	350	Pentachloronitrobenzene (PCNB)	Benzene, pentachloronitro-	82-68-8	U185
350	Toluene (Benzene, methyl-)	Toluene	Benzene, methyl-	444	351	Pentachlorophenol	Phenol, pentachloro-	87-86-5	See F027
351	Toluenediamine (Diaminotoluene)	Toluenediamine	Diaminotoluene	445	352	Phenacetin	Acetamide, N-(4-ethoxyphenyl)-	62-44-2	U187
352	o-Toluidine hydrochloride (Benzenamine, 2-methyl-, hydrochloride)	o-Toluidine hydrochloride	Benzenamine, 2-methyl-, hydrochloride	451	353	Phenol	Same	108-95-2	U188
353	Tolylene diisocyanate (Benzene, 1,3-diisocyanatomethyl-)	Tolylene diisocyanate	Benzene, 1,3-diisocyanatomethyl-	449	354	Phenylenediamine	Benzenediamine	25265-76-3	
354	Toxaphene (Camphene, octachloro-)	Toxaphene	Camphene, octachloro-	453	355	Phenylmercury acetate	Mercury, (acetato-O)phenyl-	62-38-4	P092
355	Tribromomethane (Bromoform)	Tribromomethane	Bromoform		356	Phenylthiourea	Thiourea, phenyl-	103-85-5	P093

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1967			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
356	1,2,4-Trichlorobenzene (Benzene, 1,2,4-trichloro-)	1,2,4-Trichlorobenzene	Benzene, 1,2,4-trichloro-	455	357	Phosgene	Carbonic dichloride	75-44-5	P095
357	1,1,1-Trichloroethane (Methyl chloroform)	1,1,1-Trichloroethane	Methyl chloroform	279	358	Phosphine	Same	7803-51-2	P096
358	1,1,2-Trichloroethane (Ethane, 1,1,2-trichloro-)	1,1,2-Trichloroethane	Ethane, 1,1,2-trichloro-	456	359	Phorate	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester	298-02-2	P094
359	Trichloroethene (Trichloroethylene)	Trichloroethene	Trichloroethylene	457	360	Phthalic acid esters, N.O.S.1			
360	Trichloromethanethiol (Methanethiol, trichloro-)	Trichloromethanethiol	Methanethiol, trichloro-	458	361	Phthalic anhydride	1,3-Isobenzofurandione	85-44-9	U190
361	Trichloromonofluoromethane (Methane, trichlorofluoro-)	Trichloromonofluoromethane	Methane, trichlorofluoro-	459	362	Physostigmine	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8ahexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)-	57-47-6	P204
362	2,4,5-Trichlorophenol (Phenol, 2,4,5-trichloro-)	2,4,5-Trichlorophenol	Phenol, 2,4,5-trichloro-	460	363	Physostigmine salicylate	Benzoic acid, 2-hydroxy-, compd with (3aScis) - 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo [2,3-b]indol-5-yl methylcarbamate ester (1:1)	57-64-7	P188
363	2,4,6-Trichlorophenol (Phenol, 2,4,6-trichloro-)	2,4,6-Trichlorophenol	Phenol, 2,4,6-trichloro-	461	364	2-Picoline	Pyridine, 2-methyl-	109-06-8	U191
364	2,4,5-Trichlorophenoxyacetic acid (2,4,5-T) (Acetic acid, 2,4,5-trichlorophenoxy-)	2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	Acetic acid, 2,4,5-trichlorophenoxy-	462	365	Polychlorinated biphenyls, N.O.S.1			
365	2,4,5-Trichlorophenoxypropionic acid (2,4,5-TP) (Silvex) (Propionic acid, 2-(2,4,5-trichlorophenoxy)-)	Silvex (2,4,5-Trichlorophenoxypropionic acid or 2,4,5-TP)	Propionic acid, 2-(2,4,5-trichlorophenoxy)-	398	366	Potassium cyanide	Potassium cyanide K(CN)	151-50-8	P098
366	Trichloropropane, N.O.S.3 (Propane, trichloro-, N.O.S.3)	Trichloropropane, N.O.S. 3	Propane, trichloro-, N.O.S.3	463	367	Potassium dimethyldithiocarbamate	Carbamodithioic acid, dimethyl-, potassium salt	128-03-0	
367	1,2,3-Trichloropropane (Propane, 1,2,3-trichloro-)	1,2,3-Trichloropropane	Propane, 1,2,3-trichloro-	464	368	Potassium n-hydroxymethyl-n-methyldithiocarbamate	Carbamodithioic acid (hydroxymethyl)methyl-, monopotassium salt	51026-28-9	
368	O,O,O-Triethyl phosphorothioate (Phosphorothioic acid, O,O,O-triethyl ester)	O,O,O-Triethyl phosphorothioate	Phosphorothioic acid, O,O,O-triethyl ester	466	369	Potassium n-methyldithiocarbamate	Carbamodithioic acid, methylmonopotassium salt	137-41-7	
369	sym-Trinitrobenzene (Benzene, 1,3,5-trinitro-)	sym-Trinitrobenzene	Benzene, 1,3,5-trinitro-	467	370	Potassium pentachlorophenate	Pentachlorophenol, potassium salt	7778736	None

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
370	Tris(1-aziridinyl) phosphine sulfide (Phosphine sulfide, tris(1-aziridinyl-)	Tris(1-aziridinyl) phosphine sulfide	Phosphine sulfide, tris(1-aziridinyl-	468	371	Potassium silver cyanide	Argentate(1-), bis(cyano-C)-, potassium	506-61-6	P099
371	Tris(2,3-dibromopropyl) phosphate (1-Propanol, 2,3-dibromo-, phosphate)	Tris(2,3-dibromopropyl) phosphate	1-Propanol, 2,3-dibromo-, phosphate	469	372	Promecarb	Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate	2631-37-0	P201
372	Trypan blue (2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl (1,1'-biphenyl)-4,4'-diyl)bis(azo)]bis(5-amino-4-hydroxy-, tetrasodium salt)	Trypan blue	2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl (1,1'-biphenyl)- 4,4'-diyl)bis(azo)]bis(5-amino-4-hydroxy-, tetrasodium salt	470	373	Pronamide	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-	23950-58-5	U192
373	Uracil mustard (Uracil 5-[bis(2-chloroethyl)amino]-)	Uracil mustard	Uracil 5-[bis(2-chloroethyl)amino]-	471	374	1,3-Propane sultone	1,2-Oxathiolane, 2,2-dioxide	1120-71-4	U193
374	**Uranium and compounds, N.O.S.3**	**Uranium and compounds, N.O.S.3**	**Same**	**N.C.**	375	n-Propylamine	1-Propanamine	107-10-8	U194
375	Vanadic acid, ammonium salt (ammonium vanadate)	Vanadic acid	ammonium vanadate	21	376	Propargyl alcohol	2-Propyn-1-ol	107-19-7	P102
376	Vanadium pentoxide (Vanadium (V) oxide)	Vanadium pentoxide	Vanadium (V) oxide	472	377	Propham	Carbamic acid, phenyl-, 1-methylethyl ester	122-42-9	U373
377	Vinyl chloride (Ethene, chloro-)	Vinyl chloride	Ethene, chloro-	474	378	Propoxur	Phenol, 2-(1-methylethoxy)-,methylcarbamate	114-26-1	U411
378	Zinc cyanide	Zinc cyanide	Same	479	379	Propylene dichloride	Propane, 1,2-dichloro-	78-87-5	U083
379	Zinc phosphide	Zinc phosphide	Same	480 & 481	380	1,2-Propylenimine	Aziridine, 2-methyl-	75-55-8	P067
		= Total Number of NRC Hazardous Constituents (circa 1987)			381	Prop ylthiouracil	4(1H)-Pyrimidinone, 2,3-dihydro-6-propyl-2-thioxo-	51-52-5	
		= Number of 1987 Parameters Removed by EPA			382	Prosulfocarb	Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester.	52888-80-9	U387
					383	Pyridine	Same	110-86-1	U196
					384	Reserpine	Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy)-smethyl ester,(3beta,16beta,17alpha,18beta,20alpha)-,	50-55-5	U200
					385	Resorcinol	1,3-Benzenediol	108-46-3	U201
					386	Saccharin	1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide	81-[illegible]	U202

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	Last Date of EPA Promulgation: 11/8/00				
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No	No.	Common name	Chemical abstracts name	CAS No.	HW No.
					387	Saccharin salts			U202
					388	Safrole	1,3-Benzodioxole, 5-(2-propenyl)	94-59-7	U203
					389	Selenium	Same	7782-49-2	
					390	Selenium compounds, N.O.S.1			
					391	Selenium dioxide	Selenous acid	7783-00-8	U204
					392	Selenium sulfide	Selenium sulfide SeS2	7488-56-4	U205
					393	Selenium, tetrakis(dimethyl-dithiocarbamate)	Carbamodithioic acid, dimethyl-, tetraanhydrosulfide with orthothioselenious acid	144-34-3	
					394	Selenourea	Same	630-10-4	P103
					395	Silver	Same	7440-22-4	
					396	Silver compounds, N.O.S.1			
					397	Silver cyanide	Silver cyanide Ag(CN)	506-64-9	P104
					398	Silvex (2,4,5-TP)	Propanoic acid, 2-(2,4,5-trichlorophenoxy)-	93-72-1	See F027
					399	Sodium cyanide	Sodium cyanide Na(CN)	143-33-9	P106
					400	Sodium dibutyldithiocarbamate	Carbamodithioic acid, dibutyl-, sodium salt	136-30-1	
					401	Sodium diethyldithiocarbamate	Carbamodithioic acid, diethyl-, sodium salt	148-18-5	
					402	Sodium dimethyldithiocarbamate	Carbamodithioic acid, dimethyl-, sodium salt	128-04-1	
					403	Sodium pentachlorophenate	Pentachlorophenol, sodium salt	131522	None
					404	Streptozotocin	D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)carbonyl]amino]-	18883-66-4	U206
					405	Strychnine	Strychnidin-10-one	57-24-9	P108
					406	Strychnine salts			P108
					407	Sulfallate	Carbamodithioic acid, diethyl-, 2-chloro-2-propenyl ester	95-06-7	
					408	TCDD	Dibenzo[b,e][1,4]dioxin, 2,3,7,8-tetrachloro-	1746-01-6	
					409	Tetrabutylthiuram disulfide	Thioperoxydicarbonic diamide, tetrabutyl	1634-02-2	
					410	1,2,4,5-Tetrachlorobenzene	Benzene, 1,2,4,5-tetrachloro-	95-94-3	U207
					411	Tetrachlorodibenzo-p-dioxins			
					412	Tetrachlorodibenzofurans			
					413	Tetrachloroethane, N.O.S.1	Ethane, tetrachloro-, N.O.S.	25322-20-7	
					414	1,1,1,2-Tetrachloroethane	Ethane, 1,1,1,2-tetrachloro-	630-20-6	U208
					415	1,1,2,2-Tetrachloroethane	Ethane, 1,1,2,2-tetrachloro-	79-34-5	U209
					416	Tetrachloroethylene	Ethene, tetrachloro-	127-18-4	U210

NRC Order No.	Hazardous Constituent (verbatim listing)	Compound Names Parsed by DRC: Chemical Name	Compound Names Parsed by DRC: Synonym	EPA Order No.	EPA Order No.	Common name	Chemical abstracts name	CAS No.	HW No.
					417	2,3,4,6-Tetrachlorophenol	Phenol, 2,3,4,6-tetrachloro-	58-90-2	See F027
					418	2,3,4,6-tetrachlorophenol, potassium salt	same	53535276	None
					419	2,3,4,6-tetrachlorophenol, sodium salt	same	25567559	None
					420	Tetraethyldithiopyrophosphate	Thiodiphosphoric acid, tetraethyl ester	3689-24-5	P109
					421	Tetraethyl lead	Plumbane, tetraethyl-	78-00-2	P110
					422	Tetraethyl pyrophosphate	Diphosphoric acid, tetraethyl ester	107-49-3	P111
					423	Tetramethylthiuram monosulfide	Bis(dimethylthiocarbamoyl) sulfide	97-74-5	
					424	Tetranitromethane	Methane, tetranitro-	509-14-8	P112
					425	Thallium	Same	7440-28-0	
					426	Thallium compounds, N.O.S.1			
					427	Thallic oxide	Thallium oxide Tl2 O3	1314-32-5	P113
					428	Thallium(I) acetate	Acetic acid, thallium(1+) salt	563-68-8	U214
					429	Thallium(I) carbonate	Carbonic acid, dithallium(1+) salt	6533-73-9	U215
					430	Thallium(I) chloride	Thallium chloride TlCl	7791-12-0	U216
					431	Thallium(I) nitrate	Nitric acid, thallium(1+) salt	10102-45-1	U217
					432	Thallium selenite	Selenious acid, dithallium(1+) salt	12039-52-0	P114
					433	Thallium(I) sulfate	Sulfuric acid, dithallium(1+) salt	7446-18-6	P115
					434	Thioacetamide	Ethanethioamide	62-55-5	U218
					435	Thiodicarb	Ethanimidamioic acid, N,N'-[thiobis [(methylimino) carbonyloxy]] bis-, dimethyl ester	59669-26-0	U410
					436	Thiofanox	2-Butanone, 3,3-dimethyl-1-(methylthio)-, O-[(methylamino)carbonyl] oxime.	39196-18-4	P045
					437	Thiomethanol	Methanethiol	74-93-1	U153
					438	Thiophanate-methyl	Carbamic acid, [1,2-phenylenebis (iminocarbonothioyl)] bis-, dimethyl ester	23564-05-8	U409
					439	Thiophenol	Benzenethiol	108-98-5	P014
					440	Thiosemicarbazide	Hydrazinecarbothioamide	79-19-6	P116
					441	Thiourea	Same	62-56-6	U219
					442	Thiram	Thioperoxydicarbonic diamide [(H2 N)C(S)]2 S2, tetramethyl-	137-[illegible]6	U244

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by ORC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
					443	Tirpate	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-,O-[(methylamino) carbonyl] oxime	26419-73-8	P185
					444	Toluene	Benzene, methyl-	108-88-3	U220
					445	Toluenediamine	Benzenediamine, ar-methyl-	25376-45-8	U221
					446	Toluene-2,4-diamine	1,3-Benzenediamine, 4-methyl-	95-80-7	
					447	Toluene-2,6-diamine	1,3-Benzenediamine, 2-methyl-	823-40-5	
					448	Toluene-3,4-diamine	1,2-Benzenediamine, 4-methyl-	496-72-0	
					449	Toluene diisocyanate	Benzene, 1,3-diisocyanatomethyl-	26471-62-5	U223
					450	o-Toluidine	Benzenamine, 2-methyl-	95-53-4	U328
					451	o-Toluidine hydrochloride	Benzenamine, 2-methyl-, hydrochloride	636-21-5	U222
					452	p-Toluidine	Benzenamine, 4-methyl-	106-49-0	U353
					453	Toxaphene	Same	8001-35-2	P123
					454	Trialiate	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2-propenyl) ester	2303-17-5	U389
					455	1,2,4-Trichlorobenzene	Benzene, 1,2,4-trichloro-	120-82-1	
					456	1,1,2-Trichloroethane	Ethane, 1,1,2-trichloro-	79-00-5	U227
					457	Trichloroethylene	Ethene, trichloro-	79-01-6	U228
					458	Trichloromethanethiol	Methanethiol, trichloro-	75-70-7	P118
					459	Trichloromonofluoromethane	Methane, trichlorofluoro-	75-69-4	U121
					460	2,4,5-Trichlorophenol	Phenol, 2,4,5-trichloro-	95-95-4	See F027
					461	2,4,6-Trichlorophenol	Phenol, 2,4,6-trichloro-	88-06-2	See F027
					462	2,4,5-T	Acetic acid, (2,4,5-trichlorophenoxy)-	93-76-5	See F027
					463	Trichloropropane, N.O.S.1		25735-29-9	
					464	1,2,3-Trichloropropane	Propane, 1,2,3-trichloro-	96-18-4	
					465	Triethylamine	Ethanamine, N,N-diethyl-	121-44-8	U404
					466	O,O,O-Triethyl phosphorothioate	Phosphorothioic acid, O,O,O-triethyl ester	126-68-1	
					467	1,3,5-Trinitrobenzene	Benzene, 1,3,5-trinitro-	99-35-4	U234
					468	Tris(1-aziridinyl)phosphine sulfide	Aziridine, 1,1',1''-phosphinothioylidynetris-	52-24-4	
					469	Tris(2,3-dibromopropyl) phosphate	1-Propanol, 2,3-dibromo-, phosphate (3:1)	126-72-7	U235

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC	Promulgated by NRC circa 1987			EPA	EPA	Last Date of EPA Promulgation: 11/8/00			
Order	Hazardous Constituent	Compound Names Parsed by DRC		Order	Order	(verbatim listing)			
No.	(verbatim listing)	Chemical Name	Synonym	No.	No.	Common name	Chemical abstracts name	CAS No.	HW No.
					470	Trypan blue	2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl[1,1'-biphenyl]-4,4'-diyl)bis(azo)]-bis[5-amino-4-hydroxy-, tetrasodium salt	72-57-1	U236
					471	Uracil mustard	2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-	66-75-1	U237
					472	Vanadium pentoxide	Vanadium oxide V2 O5	1314-62-1	P120
					473	Vernolate	Carbamothioic acid, dipropyl-,S-propyl ester	1929-77-7	
					474	Vinyl chloride	Ethene, chloro-	75-01-4	U043
					475	Warfarin	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, when present at concentrations less than 0.3%	81-81-2	U248
					476	Warfarin	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, when present at concentrations greater than 0.3%	81-81-2	P001
					477	Warfarin salts, when present at concentrations less than 0.3%			U248
					478	Warfarin salts, when present at concentrations greater than 0.3%			P001
					479	Zinc cyanide	Zinc cyanide Zn(CN)2	557-21-1	P121
					480	Zinc phosphide	Zinc phosphide Zn3 P2, when present at concentrations greater than 10%	1314-84-7	P122
					481	Zinc phosphide	Zinc phosphide Zn3 P2, when present at concentrations of 10% or less.	1314-84-7	U249
					482	Ziram	Zinc, bis(dimethylcarbamodithioato-S,S')-,(T-4)-	137-30-4	P205
						482	= Total Number of Current EPA Parameters		
						84	= Number of New EPA Parameters (post-1987)		

Cell: H2
Comment: Current EPA Hazardous Constituents from EPA rules found on Internet at:
http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_40/40cfr261_00.html
Downloaded on 7/30/02.

History of Changes to this EPA Rule is as follows:
[53 FR 13388, Apr. 22, 1988, as amended at 53 FR 43881, Oct. 31, 1988; 54 FR 50978, Dec. 11, 1989; 55 FR 50483, Dec. 6, 1990; 56 FR 7568, Feb. 25, 1991; 59 FR 468, Jan. 4, 1994; 59 FR 31551, June 20, 1994; 60 FR 7853, Feb. 9, 1995; 60 FR 19165, Apr. 17, 1995; 62 FR 32977, June 17, 1997; 63 FR 24625, May 4, 1998; 65 FR 14475, Mar. 17, 2000; 65 FR 67127, Nov. 8. 2000].

Cell: B3
Comment: NRC Criterion 13, Hazardous Constituent: the name listed in this column is verbatim from the NRC regulation. The name in parentheses constitutes the chemical synonym for the compound listed.

Cell: A4
Comment: NRC Order Number: given by the DRC in this spreadsheet to serve as a sequential identification number for the various compounds published in the NRC rule, 10 CFR 40, Appendix A, Criterion 13.

Cell: D4
Comment: NRC Criterion 13, Chemical Synonym: this equivalent compound name was originally found in parentheses in 10 CFR 40, Appendix A, Criterion 13.

Cell: G4
Comment: EPA Order Number: given by the DRC in this spreadsheet to serve as a sequential identification number for the various compounds published in the EPA rule, 40 CFR 261, Appendix VIII.

Cell: B23
Comment: 4-Aminopyridine (or 4-Pyridinamine): error made in 10 CFR 40, Appendix A, Criterion 13 in that this compound was mistakenly combined with the one ahead of it on the Criterion 13 list [5-(Aminomethyl)-3-Isoxazolol].

Cell: H30
Comment: 1 The abbreviation N.O.S. (not otherwise specified) signifies those members of the general class not specifically listed by name in this appendix.

Cell: E62
Comment: N.C. = No Correlation

Cell: H207
Comment: Other Synonyms for Epichlorohydrin Include*:
1-chlor-2,3-epoxypropane
chloromethyloxirane
2-chloropropylene oxide
γ-chloropropyleneoxide
epichlorhydrin

* EPA IRIS database for Epichlorohydrin at Internet address:

http://www.epa.gov/iris/subst/0050.htm#syn.

Cell: C247
Comment: Another Synonym = Aldicarb.

Cell: I303
Comment: Other Synonyms for MNNG:
1-METHYL-1-NITROSO-3-NITROGUANIDINE
(from EPA Envirofacts Master Chemical Integrator database at Internet address:
http://www.epa.gov/enviro/html/emci/chemref/70257.html)

Cell: C337
Comment: Other Synonyms for Tetrachloroethane *:
79-34-5
ACETYLENE TETRACHLORIDE
BONOFORM
CELLON
1,1,2,2-CZTEROCHLOROETAN
1,1-DICHLORO-2,2-DICHLOROETHANE
ETHANE, 1,1,2,2-TETRACHLORO-
NCI-C03554
RCRA WASTE NUMBER U209
TCE
1,1,2,2-TETRACHLOORETHAAN
1,1,2,2-TETRACHLORAETHAN
TETRACHLORETHANE
1,1,2,2-TETRACHLORETHANE
1,1,2,2-Tetrachloroethane
Tetrachloroethane, 1,1,2,2-
sym-TETRACHLOROETHANE
TETRACHLORURE D'ACETYLENE
1,1,2,2-TETRACLOROETANO
UN 1702
WESTRON

* From EPA IRIS Internet database at:
http://www.epa.gov/iris/subst/0193.htm#syn

Cell: B360
Comment: Tolylene diisocyanate: this compound is mis-spelled in 10 CFR 40, Appendix A, Criterion 13. Comparison of the synonyms from both the NRC and EPA lists shows this compound is Toluene diisocyante.

Cell: H422
Comment: Ot[illegible]ynonyms for Tetrachloroethylene *:

127-18-4
Ankilostin
Antisal 1
Antisol 1
Carbon bichloride
Carbon dichloride
Czterochloroetylen
Dee-Solv
Didakene
Didokene
Dowclene EC
Dow-Per
ENT 1,860
Ethene, tetrachloro-
Ethylene tetrachloride
Ethylene, tetrachloro-
Fedal-Un
NCI-C04580
Nema
PCE
PER
Perawin
PERC
Perchloorethyleen, per
Perchlor
Perchloraethylen, per
Perchlorethylene
Perchlorethylene, per
Perchloroethylene
Perclene
Percloroetilene
Percosolv
Percosolve
PERK
Perklone
Persec
Tetlen
Tetracap
Tetrachlooretheen
Tetrachloraethen
Tetrachlorethylene
Tetrachloroethene
Tetrachloroethylene
1,1,2,2-Tetrachloroethylene.

Tetracloroetene
Tetraguer
Tetraleno
Tetralex
Tetravec
Tetroguer
Tetropil
WLN: GYGUYGG

* from EPA IRIS Internet database at:
http://www.epa.gov/iris/subst/0106.htm#syn.

Cell: H463
Comment: Other synonyms for Trichloroethylene *:
79-01-6
ACETYLENE TRICHLORIDE
ALGYLEN
ANAMENTH
BENZINOL
BLACOSOLV
BLANCOSOLV
CECOLENE
CHLORILEN
1-CHLORO-2,2-DICHLOROETHYLENE
CHLORYLEA
CHLORYLEN
CHORYLEN
CIRCOSOLV
CRAWHASPOL
DENSINFLUAT
1,1-DICHLORO-2-CHLOROETHYLENE
DOW-TRI
DUKERON
ETHINYL TRICHLORIDE
ETHYLENE TRICHLORIDE
ETHYLENE, TRICHLORO-
FLECK-FLIP
FLOCK FLIP
FLUATE
GEMALGENE
GERMALGENE
LANADIN
LETHURIN
NAF GEN

NARKOGEN
NARKOSOID
NCI-C04546
NIALK
PERM-A-CHLOR
PERM-A-CLOR
PETZINOL
PHILEX
RCRA WASTE NUMBER U228
TCE
THRETHYLEN
THRETHYLENE
TRETHYLENE
TRI
TRIAD
TRIAL
TRIASOL
TRICHLOORETHEEN
TRICHLOORETHYLEEN, TRI
TRICHLORAETHEN
TRICHLORAETHYLEN, TRI
TRICHLORAN
TRICHLOREN
TRICHLORETHENE
TRICHLORETHYLENE
TRICHLORETHYLENE, TRI
TRICHLOROETHENE
Trichloroethylene
1,1,2-TRICHLOROETHYLENE
1,2,2-TRICHLOROETHYLENE
TRICHLOROETHYLENE
TRICLORETENE
TRICLOROETILENE
TRIELENE
TRIELIN
TRIELINA
TRIKLONE
TRILEN
TRILENE
TRILINE
TRIMAR
TRIOL
TRI-PLUS
TR[illegible]US M

UN 1710
VESTROL
VITRAN
WESTROSOL

* from EPA IRIS Internet database at:
http://www.epa.gov/iris/subst/0199.htm#syn.

ATTACHMENT 3

Selected Citations from the Utah Water Quality Act

and the

Utah Ground Water Quality Protection Regulations

Selected Citations from the Utah Water Quality Act (UCA 19-5) - listed in published order:

19-5-102(3): "Discharge" means the addition of any pollutant to any waters of the state.

19-5-102 (9): "Pollution" means any man-made or man-induced alteration of the chemical, physical, biological, or radiological integrity of any waters of the state, unless the alteration is necessary for the public health and safety.

19-5-102(10): "Publicly owned treatment works" means any facility for the treatment of pollutants owned by the state, its political subdivisions, or other public entity.

19-5-102 (14): "Treatment works" means any plant, disposal field, lagoon, dam, pumping station, incinerator, or other works used for the purpose of treating, stabilizing, or holding wastes.

19-5-102 (17): "Waste" or "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.

19-5-102 (18): "Waters of the state":

(a) means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion of the state; and

(b) does not include bodies of water confined to and retained within the limits of private property, and which do not develop into or constitute a nuisance, a public health hazard, or a menace to fish or wildlife.

19-5-104(1)(e), (h), and (i): Powers and duties of board.

(1) The board has the following powers and duties, but the board shall give priority to pollution that results in hazards to the public health:

...

(e) adopt, modify, or repeal standards of quality of the waters of the state and classify those waters according to their reasonable uses in the interest of the public under conditions the board may prescribe for the prevention, control, and abatement of pollution; ...

(h) review plans, specifications, or other data relative to disposal systems or any part of disposal systems, and issue construction permits for the installation or modification of treatment works or any parts of them;

(i) after public notice and opportunity for a public hearing, issue, continue in effect, revoke, modify, or deny discharge permits under reasonable conditions the board may prescribe to control the management of sewage sludge or to prevent or control the discharge of pollutants, including effluent limitations for the discharge of wastes into the waters of the state;

19-5-107 (1)(a): Except as provided in this chapter or rules made under it, it is unlawful for any person to discharge a pollutant into waters of the state or to cause pollution which constitutes a menace to public health and welfare, or is harmful to wildlife, fish or aquatic life, or impairs domestic, agricultural, industrial, recreational, or other beneficial uses of water, or to place or cause to be placed any wastes in a location where there is probable cause to believe it will cause pollution.

19-5-107 (3) and (3)(b): It is unlawful for any person, without first securing a permit from the executive secretary as authorized by the board, to:

...

...(b) construct, install, modify, or operate any treatment works or part of any treatment works or any extension or addition to any treatment works, or construct, install, or operate any establishment or extension or modification of or addition to any treatment works, the operation of which would probably result in a discharge.

Selected Citations from the Utah Ground Water Quality Protection Regulations – listed in published order:

R317-6-1.1: "Aquifer" means a geologic formation, group of geologic formations or part of a geologic formation that contains sufficiently saturated permeable material to yield usable quantities of water to wells and springs.

R317-6-1.3: "Best Available Technology" means the application of design, equipment, work practice, operation standard or combination thereof at a facility to effect the maximum reduction of a pollutant achievable by available processes and methods taking into account energy, public health, environmental and economic impacts and other costs.

R317-6-1.10: "Compliance Monitoring Point" means a well, seep, spring, or other sampling point used to determine compliance with applicable permit limits.

R317-6-1.13: "Discharge" means the release of a pollutant directly or indirectly into subsurface waters of the state.

R317-6-1.19: "Ground Water" means subsurface water in the zone of saturation including perched ground water.

R317-6-1.20: "Ground Water Quality Standards" means numerical contaminant concentration levels adopted by the Board in or under R317-6-2 for the protection of the subsurface waters of the State.

R317-6-1.28: "Point of Discharge" means the area within outermost location at which effluent or leachate has been stored, applied, disposed of, or discharged; for a diked facility, the outermost edge of the dikes.

R317-6-1.30: "Pollution" means such contamination, or other alteration of the physical, chemical, or biological properties of any waters of the State, or such discharge of any liquid, gaseous, or solid substance into any waters of the state as will create a nuisance or render such waters harmful or detrimental or injurious to public health, safety, or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life.

R317-6-1.39: "Water Table" means the top of the saturated zone of a body of unconfined ground water at which the pressure is equal to that of the atmosphere.

R317-6-1.40: "Water Table Aquifer" means an aquifer extending downward from the water table to the first confining bed.

R317-6-2: Ground Water Quality Standards

2.1: The following Ground Water Quality Standards as listed in Table I are adopted for protection of ground water quality.

TABLE I

GROUND WATER QUALITY STANDARDS

Parameter	Milligrams per liter (mg/l) unless noted otherwise and based on analysis of filtered sample except for Mercury and organic compounds
PHYSICAL CHARACTERISTICS	

Color (units)	15.0
Corrosivity (characteristic)	noncorrosive
Odor (threshold number)	3.0
pH (units)	6.5-8.5
INORGANIC CHEMICALS	
Cyanide (free)	0.2
Fluoride	4.0
Nitrate (as N)	10.0
Nitrite (as N)	1.0
Total Nitrate/Nitrite (as N)	10.0
METALS	
Arsenic	0.05
Barium	2.0
Cadmium	0.005
Chromium	0.1
Copper	1.3
Lead	0.015
Mercury	0.002
Selenium	0.05
Silver	0.1
Zinc	5.0
ORGANIC CHEMICALS	
Pesticides and PCBs	
Alachlor	0.002
Aldicarb	0.003
Aldicarb sulfone	0.002
Aldicarb sulfoxide	0.004
Atrazine	0.003
Carbofuran	0.04
Chlordane	0.002
Dibromochloropropane	0.0002
2, 4-D	0.07
Diquat	0.02
Dichlorophenoxyacetic acid (2, 4-) (2,4D)	0.07
Endothall	0.1
Endrin	0.002
Ethylene Dibromide	0.00005
Heptachlor	0.0004
Heptachlor epoxide	0.0002
Lindane	0.0002
Methoxychlor	0.04

Polychlorinated Biphenyls	0.0005
Pentachlorophenol	0.001
Toxaphene	0.003
2, 4, 5-TP (Silvex)	0.05

VOLATILE ORGANIC CHEMICALS

Benzene	0.005
Carbon tetrachloride	0.005
1, 2 – Dichloroethane	0.005
1, 1 –Dichloroethylene	0.007
1, 1, 1-Trichloroethane	0.200
para – Dichlorobenzene	0.075
o-Dichlorobenzene	0.6
cis-1,2 dichloroethylene	0.07
trans-1,2 dichloroethylene	0.1
1,2 Dichloropropane	0.005
Ethylbenzene	0.7
Monochlorobenzene	0.1
Styrene	0.1
Tetrachloroethylene	0.005
Toluene	1
Trichloroethylene	0.005
Vinyl chloride	0.002
Xylenes (Total)	10

OTHER ORGANIC CHEMICALS

Trihalomethanes	0.1

RADIONUCLIDES

The following are the maximum contaminant levels for Radium-226 and Radium-228, and gross alpha particle radioactivity, beta particle radioactivity, and photon radioactivity:

Combined Radium-226 and Radium-228	5pCi/l
Gross alpha particle activity, including Radium-226 but excluding Radon and Uranium	15pCi/l

Beta particle and photon radioactivity

The average annual concentration from man-made radionuclides of beta particle and photon radioactivity from man-made radionuclides shall not produce an annual dose equivalent to the total body or any internal organ greater than four millirem/year.

Except for the radionuclides listed below, the concentration of man-made radionuclides causing four millirem total body

or organ dose equivalents shall be calculated on the basis of a two liter per day drinking water intake using the 168 hour data listed in "Maximum Permissible Body Burden and Maximum Permissible Concentration Exposure", NBS Handbook 69 as amended August 1962, U.S. Department of Commerce. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed four millirem/year.

Average annual concentrations assumed to produce a total body or organ dose of four millirem/year:

Radionuclide	Critical Organ	pCi per liter
Tritium	Total Body	20,000
Strontium-90	Bone Marrow	8

R317-6-2.2: A permit specific ground water quality standard for any pollutant not specified in Table 1 may be established by the Executive Secretary at a level that will protect public health and the environment. This permit limit may be based on U.S. Environmental Protection Agency maximum contaminant level goals, health advisories, risk based contaminant levels, standards established by other regulatory agencies and other relevant information.

R317-6-3: Ground Water Classes

3.1 GENERAL

The following ground water classes are established: Class IA - Pristine Ground Water; Class IB - Irreplaceable Ground Water; Class IC - Ecologically Important Ground Water; Class II - Drinking Water Quality Ground Water; Class III - Limited Use Ground Water; Class IV - Saline Ground Water.

3.2 CLASS IA - PRISTINE GROUND WATER

Class IA ground water has the following characteristics:

A. Total dissolved solids of less than 500 mg/l.

B. No contaminant concentrations that exceed the ground water quality standards listed in Table 1.

3.3 CLASS IB - IRREPLACEABLE GROUND WATER

Class IB ground water is a source of water for a community public drinking water system for which no reliable supply of comparable quality and quantity is available because of economic or institutional constraints.

3.4 CLASS IC - ECOLOGICALLY IMPORTANT GROUND WATER

Class IC ground water is a source of ground water discharge important to the continued existence of wildlife habitat.

3.5 CLASS II - DRINKING WATER QUALITY GROUND WATER

Class II ground water has the following characteristics:

A. Total dissolved solids greater than 500 mg/l and less than 3000 mg/l.

B. No contaminant concentrations that exceed ground water quality standards in Table 1.

3.6 CLASS III - LIMITED USE GROUND WATER

Class III ground water has one or both of the following characteristics:

A. Total dissolved solids greater than 3000 mg/l and less than 10,000 mg/l, or;

B. One or more contaminants that exceed the ground water quality standards listed in Table 1.

3.7 CLASS IV - SALINE GROUND WATER

Class IV ground water has total dissolved solids greater than 10,000 mg/l.

R317-6-4: Ground Water Class Protection Levels

4.1 GENERAL

A. Protection levels are ground water pollutant concentration limits, set by ground water class, for the operation of facilities that discharge or would probably discharge to ground water.

B. For the physical characteristics (color, corrosivity, odor, and pH) and radionuclides listed in Table 1, the values listed are the protection levels for all ground water classes.

4.2 CLASS IA PROTECTION LEVELS

A. Class IA ground water will be protected to the maximum extent feasible from degradation due to facilities that discharge or would probably discharge to ground water.

B. The following protection levels will apply:

1. Total dissolved solids may not exceed the lesser of 1.1 times the background value or 500 mg/l.

2. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.1 times the ground water quality standard value, or the limit of detection.

3. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.1 times the background concentration or 0.1 times the ground water quality standard; however, in no case will the concentration of a pollutant be allowed to exceed the ground water quality standard.

4.3 CLASS IB PROTECTION LEVELS

A. Class IB ground water will be protected as an irreplaceable source of drinking water.

B. The following protection levels will apply:

1. Total dissolved solids may not exceed the lesser of 1.1 times the background value or 2000 mg/l.

2. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.1 times the ground water quality standard, or the limit of detection.

3. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.1 times the background concentration or 0.1 times the ground water quality standard; however, in no case will the concentration of a pollutant be allowed to exceed the ground water quality standard.

4.4 CLASS IC PROTECTION LEVELS

Class IC ground water will be protected as a source of water for potentially affected wildlife habitat. Limits on increases of total dissolved solids and organic and inorganic chemical compounds will be determined in order to meet applicable surface water standards.

4.5 CLASS II PROTECTION LEVELS

A. Class II ground water will be protected for use as drinking water or other similar beneficial use with conventional treatment prior to use.

B. The following protection levels will apply:

1. Total dissolved solids may not exceed 1.25 times the background value.

2. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.25 times the ground water quality standard, or the limit of detection.

3. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.25 times the background concentration or 0.25 times the ground water quality standard; however, in no case will the concentration of a pollutant be allowed to exceed the ground water quality standard.

4.6 CLASS III PROTECTION LEVELS

A. Class III ground water will be protected as a potential source of drinking water, after substantial treatment, and as a source of water for industry and agriculture.

B. The following protection levels will apply:

1. Total dissolved solids may not exceed 1.25 times the background concentration level.

2. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.5 times the ground water quality standard, or the limit of detection.

3. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.5 times the background concentration or 0.5 times the ground water quality standard; however, in no case will the concentration of a pollutant be allowed to exceed the ground water quality standard. If the background concentration exceeds the ground water quality standard no increase will be allowed.

4.7 CLASS IV PROTECTION LEVELS
Protection levels for Class IV ground water will be established to protect human health and the environment.

R317-6-5: Ground Water Classification for Aquifers.
5.1 GENERAL
A. When sufficient information is available, entire aquifers or parts thereof may be classified by the Board according to the quality of ground water contained therein and commensurate protection levels will be applied.
B. Ground water sources furnishing water to community drinking water systems with ground water meeting Class IA criteria are classified as Class IA.

5.2 CLASSIFICATION AND RECLASSIFICATION PROCEDURE
A. The Board may initiate classification or reclassification.
B. Any person may petition the Board for classification and reclassification.
C. Boundaries for class areas will be delineated so as to enclose distinct ground water classes as nearly as known facts permit. Boundaries will be based on hydrogeologic properties, existing ground water quality and for Class IB and IC, current use. Parts of an aquifer may be classified differently.
D. The petitioner requesting reclassification will provide sufficient information to determine if reclassification is in the best interest of the beneficial users.
E. A petition for classification or reclassification shall include:
1. factual data supporting the proposed classification;
2. a description of the proposed ground waters to be classified or reclassified;
3. potential contamination sources;
4. ground water flow direction;
5. current beneficial uses of the ground water; and
6. location of all water wells in the area to be classified or reclassified.
F. One or more public hearings will be held to receive comment on classification and reclassification proposals.
G. The Board will determine the disposition of all petitions for classification and reclassification, except as provided in R317-6-5.2.H.
H. Ground water proximate to a facility for which an application for a ground water discharge permit has been made may be classified by the Executive Secretary for purposes of making permitting decisions.

R317-6-6.1: DUTY TO APPLY FOR A GROUND WATER DISCHARGE PERMIT
A. No person may construct, install, or operate any new facility or modify an existing or new facility, not permitted by rule under R317-6-6.2, which discharges or would probably result in a discharge of pollutants that may move directly or indirectly into ground water, including, but not limited to land application of wastes; waste storage pits; waste storage piles; landfills and dumps; large feedlots; mining, milling and metallurgical operations, including heap leach facilities; and pits, ponds, and lagoons whether lined or not, without a ground water discharge permit from the Executive Secretary. A ground water discharge permit application should be submitted at least 180 days before the permit is needed.
B. All persons who constructed, modified, installed, or operated any existing facility, not permitted by rule under R317-6-6.2, which discharges or would probably result in a discharge of pollutants that may move directly or indirectly into ground water, including, but not limited to: land application of wastes; waste storage pits; waste storage piles; landfills and dumps; large feedlots; mining, milling and metallurgical operations, including heap leach facilities; and pits, ponds, and lagoons whether lined or not, must have submitted a notification of the nature and location of the discharge to the Executive Secretary before February 10, 1990 and must submit an application for a ground water discharge permit within one year after receipt of written notice from the Executive Secretary that a ground water discharge permit is required.

R317-6-6.2(A), (A)(1), and (A)(25): Except as provided in R317-6-6.2.C, the following facilities are considered to be permitted by rule and are not required to obtain a discharge permit under R317-6-6.1 or comply with R317-6-6.3 through R317-6-6.7, R317- 6-6.9 through R317-6-6.11, R317-6-6.13, R317-6-6.16, R317-6-6.17 and R317-6-6.18:

1. facilities with effluent or leachate which has been demonstrated to the satisfaction of the Executive Secretary to conform and will not deviate from the applicable class TDS limits, ground water quality standards, protection levels or other permit limits and which does not contain any contaminant that may present a threat to human health, the environment or its potential beneficial uses of the ground water. The Executive Secretary may require samples to be analyzed for the presence of contaminants before the effluent or leachate discharges directly or indirectly into ground water. If the discharge is by seepage through natural or altered natural materials, the Executive Secretary may require samples of the solution be analyzed for the presence of pollutants before or after seepage;

...

25. facilities and modifications thereto which the Executive Secretary determines after a review of the application will have a de minimis actual or potential effect on ground water quality.

R317-6-6.3: APPLICATION REQUIREMENTS FOR A GROUND WATER DISCHARGE PERMIT

Unless otherwise determined by the Executive Secretary, the application for a permit to discharge wastes or pollutants to ground water shall include the following complete information:

A. The name and address of the applicant and the name and address of the owner of the facility if different than the applicant. A corporate application must be signed by an officer of the corporation. The name and address of the contact, if different than above, and telephone numbers for all listed names shall be included.

B. The legal location of the facility by county, quarter-quarter section, township, and range.

C. The name of the facility and the type of facility, including the expected facility life.

D. A plat map showing all water wells, including the status and use of each well, topography, springs, water bodies, drainages, and man-made structures within a one-mile radius of the discharge. The plat map must also show the location and depth of existing or proposed wells to be used for monitoring ground water quality.

E. Geologic, hydrologic, and agricultural description of the geographic area within a one-mile radius of the point of discharge, including soil types, aquifers, ground water flow direction, ground water quality, aquifer material, and well logs.

F. The type, source, and chemical, physical, radiological, and toxic characteristics of the effluent or leachate to be discharged; the average and maximum daily amount of effluent or leachate discharged (gpd), the discharge rate (gpm), and the expected concentrations of any pollutant (mg/l) in each discharge or combination of discharges. If more than one discharge point is used, information for each point must be given separately.

G. Information which shows that the discharge can be controlled and will not migrate into or adversely affect the quality of any other waters of the state, including the applicable surface water quality standards, that the discharge is compatible with the receiving ground water, and that the discharge will comply with the applicable class TDS limits, ground water quality standards, class protection levels or an alternate concentration limit proposed by the facility.

H. For areas where the ground water has not been classified by the Board, information on the quality of the receiving ground water sufficient to determine the applicable protection levels.

I. The proposed monitoring plan, which includes a description, where appropriate, of the following:

1. ground water monitoring to determine ground water flow direction and gradient, background quality at the site, and the quality of ground water at the compliance monitoring point;

2. installation, use and maintenance of monitoring devices;

3. description of the compliance monitoring area defined by the compliance monitoring points including the dimensions and hydrologic and geologic data used to determine the dimensions;

4. monitoring of the vadose zone;

5. measures to prevent ground water contamination after the cessation of operation, including post- operational monitoring;

6. monitoring well construction and ground water sampling which conform to A Guide to the Selection of Materials for Monitoring Well Construction and Ground Water Sampling, (1983) and RCRA Ground Water Monitoring Technical Enforcement Guidance Manual (1986), unless otherwise specified by the Executive Secretary;

7. description and justification of parameters to be monitored.

J. The plans and specifications relating to construction, modification, and operation of discharge systems.

K. The description of the ground water most likely to be affected by the discharge, including water quality information of the receiving ground water prior to discharge, a description of the aquifer in which the ground water occurs, the depth to the ground water, the saturated thickness, flow direction, porosity, hydraulic conductivity, and flow systems characteristics.

L. The compliance sampling plan which includes, where appropriate, provisions for sampling of effluent and for flow monitoring in order to determine the volume and chemistry of the discharge onto or below the surface of the ground and a plan for sampling compliance monitoring points and appropriate nearby water wells. Sampling and analytical methods proposed in the application must conform with the most appropriate methods specified in the following references unless otherwise specified by the Executive Secretary:
1. Standard Methods for the Examination of Water and Wastewater, eighteenth edition, 1992; Library of Congress catalogue number: ISBN: 0-87553-207-1.
2. E.P.A. Methods, Methods for Chemical Analysis of Water and Wastes, 1983; Stock Number EPA-600/4- 79-020.
3. Techniques of Water Resource Investigations of the U.S. Geological Survey, (1982); Book 5, Chapter A3.
4. Monitoring requirements in 40 CFR parts 141 and 142, 1991 ed., Primary Drinking Water Regulations and 40 CFR parts 264 and 270, 1991 ed.
5. National Handbook of Recommended Methods for Water-Data Acquisition, GSA-GS edition; Book 85 AD- 2777, U.S. Government Printing Office Stock Number 024-001-03489-1.
6. Manual of Analytical Methods for the Analysis of Pesticide Residues in Humans and Environmental Samples, 1980; Stock Number EPA-600/8-80-038, U.S. Environmental Protection Agency.
M. A description of the flooding potential of the discharge site, including the 100-year flood plain, and any applicable flood protection measures.
N. Contingency plan for regaining and maintaining compliance with the permit limits and for reestablishing best available technology as defined in the permit.
O. Methods and procedures for inspections of the facility operations and for detecting failure of the system.
P. For any existing facility, a corrective action plan or identification of other response measures to be taken to remedy any violation of applicable ground water quality standards, class TDS limits or permit limit established under R317-6-6.4E. which has resulted from discharges occurring prior to issuance of a ground water discharge permit.
Q. Other information required by the Executive Secretary.

R317-6-6.4: ISSUANCE OF DISCHARGE PERMIT
A. The Executive Secretary may issue a ground water discharge permit for a new facility if the Executive Secretary determines, after reviewing the information provided under R317-6-6.3, that:
1. the applicant demonstrates that the applicable class TDS limits, ground water quality standards protection levels, and permit limits established under R317-6-6.4E will be met;
2. the monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;
3. the applicant is using best available technology to minimize the discharge of any pollutant; and
4. there is no impairment of present and future beneficial uses of the ground water.

B. The Board may approve an alternate concentration limit for a new facility if:
1. The applicant submits a petition for an alternate concentration limit showing the extent to which the discharge will exceed the applicable class TDS limits, ground water standards or applicable protection levels and demonstrates that:
a. the facility is to be located in an area of Class III ground water;
b. the discharge plan incorporates the use of best available technology;
c. the alternate concentration limit is justified based on substantial overriding social and economic benefits; and,
d. the discharge would pose no threat to human health and the environment.
2. One or more public hearings have been held by the Board in nearby communities to solicit comment.

C. The Executive Secretary may issue a ground water discharge permit for an existing facility provided:
1. the applicant demonstrates that the applicable class TDS limits, ground water quality standards and protection levels will be met;
2. the monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;
3. the applicant utilizes treatment and discharge minimization technology commensurate with plant process design capability and similar or equivalent to that utilized by facilities that produce similar products or services with similar production process technology; and,
4. there is no current or anticipated impairment of present and future beneficial uses of the ground water.

D. The Board may approve an alternate concentration limit for a pollutant in ground water at an existing facility or facility permitted by rule under R317-6-6.2 if the applicant for a ground water discharge permit shows the extent the discharge exceeds the applicable class TDS limits, ground water quality standards and applicable protection levels that correspond to the otherwise applicable ground water quality standards and demonstrates that:
1. steps are being taken to correct the source of contamination, including a program and timetable for completion;
2. the pollution poses no threat to human health and the environment; and
3. the alternate concentration limit is justified based on overriding social and economic benefits.

E. An alternate concentration limit, once adopted by the Board under R317-6-6.4B or R317-6-6.4D, shall be the pertinent permit limit.

F. A facility permitted under this provision shall meet applicable class TDS limits, ground water quality standards, protection levels and permit limits.

G. The Board may modify a permit for a new facility to reflect standards adopted as part of corrective action.

R317-6-6.5: NOTICE OF INTENT TO ISSUE A GROUND WATER DISCHARGE PERMIT
The Executive Secretary shall publish a notice of intent to approve in a newspaper in the affected area and shall allow 30 days in which interested persons may comment to the Board. Final action will be taken by the Executive Secretary following the 30-day comment period.

R317-6-6.6: PERMIT TERM
A. The ground water discharge permit term will run for 5 years from the date of issuance. Permits may be renewed for 5-year periods or extended for a period to be determined by the Executive Secretary but not to exceed 5 years.

B. In the event that new ground water quality standards are adopted by the Board, permits may be reopened to extend the terms of the permit or to include pollutants covered by new standards. The holder of a permit may apply for a variance under the conditions outlined in R317-6-6.4.D.

R317-6-6.7: GROUND WATER DISCHARGE PERMIT RENEWAL
The permittee for a facility with a ground water discharge permit must apply for a renewal or extension for a ground water discharge permit at least 180 days prior to the expiration of the existing permit. If a permit expires before an application for renewal or extension is acted upon by the Executive Secretary, the permit will continue in effect until it is renewed, extended or denied.

R317-6-6.9: Permit Compliance Monitoring
A. Ground Water Monitoring
The Executive Secretary may include in a ground water discharge permit requirements for ground water monitoring, and may specify compliance monitoring points where the applicable class TDS limits, ground water quality standards, protection levels or other permit limits are to be met. The Executive Secretary will determine the location of the compliance monitoring point based upon the hydrology, type of pollutants, and other factors that may affect the ground water quality. The distance to the compliance monitoring points must be as close as practicable to the point of discharge. The compliance monitoring point shall not be beyond the property boundaries of the permitted facility without written agreement of the affected property owners and approval by the Executive Secretary.

B. Performance Monitoring
The Executive Secretary may include in a ground water discharge permit requirements for monitoring performance of best available technology standards.

R317-6-6.10: BACKGROUND WATER QUALITY DETERMINATION
A. Background water quality contaminant concentrations shall be determined and specified in the ground water discharge permit. The determination of background concentration shall take into account any degradation.

B. Background water quality contaminant concentrations may be determined from existing information or from data collected by the permit applicant. Existing information shall be used, if the permit applicant demonstrates that the quality of the information and its means of collection are adequate to determine background water quality. If existing information is not adequate to determine background water quality, the permit applicant shall submit a plan to determine background water quality to the Executive Secretary for approval prior to data collection. One or more up- gradient, lateral hydraulically equivalent point, or other monitoring wells as approved by the Executive Secretary may be required for each potential discharge site.

C. After a permit has been issued, permittee shall continue to monitor background water quality contaminant concentrations in order to determine natural fluctuations in concentrations. Applicable up-gradient, and on- site ground water monitoring data shall be included in the ground water quality permit monitoring report.

R317-6-6.15 and 6.15(A): CORRECTIVE ACTION
It is the intent of the Board that the provisions of these regulations should be considered when making decisions under any state or federal superfund action; however, the protection levels are not intended to be considered as applicable, relevant or appropriate clean-up standards under such other regulatory programs.

A. Application of R317-6-6.15
1. Generally - R317-6-6.15 shall apply to any person who discharges pollutants into ground water in violation of Section 19-5-107, or who places or causes to be placed any wastes in a location where there is probable cause to believe they will cause pollution of ground water in violation of Section 19-5-107.
2. Corrective Action shall include, except as otherwise provided in R317-6-6.15, preparation of a Contamination Investigation and preparation and implementation of a Corrective Action Plan.
3. The procedural provisions of R-317-6-6.15 shall not apply to any facility where a corrective or remedial action for ground water contamination, that the Executive Secretary determines meets the substantive standards of this rule, has been initiated under any other state or federal program. Corrective or remedial action undertaken under the programs specified in Table 2 are considered to meet the substantive standards of this rule unless otherwise determined by the Executive Secretary.

TABLE 2
PROGRAM
Leaking Underground Storage Tank, Sections 19-6-401, et seq.
Federal Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. Sections 9601, et seq
Hazardous Waste Mitigation Act, Sections 19-6-301 et seq.
Utah Solid and Hazardous Waste Act, Sections 19-6-101 et seq.

R317-6-6.15(B): Notification and Interim Action
1. Notification - A person who spills or discharges any oil or other substance which may cause pollution of ground waters in violation of Section 19-5-107 shall notify the Executive Secretary within 24 hours of the spill or discharge. A written notification shall be submitted to the Executive Secretary within five days after the spill or discharge.
2. Interim Actions - A person is encouraged to take immediate, interim action without following the steps outlined in R317-6-6.15 if such action is required to control a source of pollutants. Interim action is also encouraged if required to protect public safety, public health and welfare and the environment, or to prevent further contamination that would result in costlier clean-up. Such interim actions should include source abatement and control, neutralization, or other actions as appropriate. A person that has taken these actions shall remain subject to R317-6-6.15 after the interim actions are completed unless he demonstrates that:
a. no pollutants have been discharged into ground water in violation of 19-5-107; and
b. no wastes remain in a location where there is probable cause to believe they will cause pollution of ground water in violation of 19-5-107.

R317-6-6.15(C): Contamination Investigation and Corrective Action Plan - General
1. The Executive Secretary may require a person that is subject to R317-6-6.15 to submit for the Executive Secretary's approval a Contamination Investigation and Corrective Action Plan, and may require implementation of an approved Corrective Action Plan. A person subject to this rule who has been notified that the Executive Secretary is exercising his or her authority under R317-6-6.15 to require submission of a Contamination Investigation and Corrective Action Plan, shall, within 30 days of that notification, submit to the

Executive Secretary a proposed schedule for those submissions, which may include different deadlines for different elements of the Investigation and Plan. The Executive Secretary may accept, reject, or modify the proposed schedule.
2. The Contamination Investigation or the Corrective Action Plan may, in order to meet the requirements of this Part, incorporate by reference information already provided to the Executive Secretary in the Contingency Plan or other document.
3. The requirements for a Contamination Investigation and a Corrective Action Plan specified in R317- 6-6.15.D are comprehensive. The requirements are intended to be applied with flexibility, and persons subject to this rule are encouraged to contact the Executive Secretary's staff to assure its efficient application on a site-specific basis.
4. The Executive Secretary may waive any or all Contamination Investigation and Corrective Action Plan requirements where the person subject to this rule demonstrates that the information that would otherwise be required is not necessary to the Executive Secretary's evaluation of the Contamination Investigation or Corrective Action Plan. Requests for waiver shall be submitted to the Executive Secretary as part of the Contamination Investigation or Corrective Action Plan, or may be submitted in advance of those reports.

R317-6-6.15(D): Contamination Investigation and Corrective Action Plan - Requirements
1. Contamination Investigation - The contamination investigation shall include a characterization of pollution, a characterization of the facility, a data report, and, if the Corrective Action Plan proposes standards under R317-6-6.15.F.2. or Alternate Corrective Action Concentration Limits higher than the ground water quality standards, an endangerment assessment.
a. The characterization of pollution shall include a description of:
(1) The amount, form, concentration, toxicity, environmental fate and transport, and other significant characteristics of substances present, for both ground water contaminants and any contributing surficial contaminants;
(2) The areal and vertical extent of the contaminant concentration, distribution and chemical make- up; and
(3) The extent to which contaminant substances have migrated and are expected to migrate.
b. The characterization of the facility shall include descriptions of:
(1) Contaminant substance mixtures present and media of occurrence;
(2) Hydrogeologic conditions underlying and, upgradient and downgradient of the facility;
(3) Surface waters in the area;
(4) [illegible]
(5) Type, location and description of possible sources of the pollution at the facility;
(6) Groundwater withdrawals, pumpage rates, and usage within a 2-mile radius.
c. The report of data used and data gaps shall include:
(1) Data packages including quality assurance and quality control reports;
(2) A description of the data used in the report; and
(3) A description of any data gaps encountered, how those gaps affect the analysis and any plans to fill those gaps.
d. The endangerment assessment shall include descriptions of any risk evaluation necessary to support a proposal for a standard under R317-6-6.15.F.2 or for an Alternate Corrective Action Concentration Limit.
e. The Contamination Investigation shall include such other information as the Executive Secretary requires.
2. Proposed Corrective Action Plan
The proposed Corrective Action Plan shall include an explanation of the construction and operation of the proposed Corrective Action, addressing the factors to be considered by the Executive Secretary as specified in R317- 6-6.15.E. and shall include such other information as the Executive Secretary requires. It shall also include a proposed schedule for completion.

R317-6-6.15(E): Approval of the Corrective Action Plan
After public notice in a newspaper in the affected area and a 30-day period for opportunity for public review and comment, the Executive Secretary shall issue an order approving, disapproving, or modifying the proposed Corrective Action Plan. The Executive Secretary shall consider the following factors and criteria in making that decision:
1. Completeness and Accuracy of Corrective Action Plan.
The Executive Secretary shall consider the completeness and accuracy of the Corrective Action Plan and of the information upon which it relies.
2. Action Protective of Public Health and the Environment

a. The Corrective Action shall be protective of the public health and the environment.
b. Impacts as a result of any off-site activities shall be considered under this criterion (e.g., the transport and disposition of contaminated materials at an off-site facility).
3. Action Meets Concentration Limits
The Corrective Action shall meet Corrective Action Concentration Limits specified in R317-6-6.15.F, except as provided in R317-6-6.15.G.
4. Action Produces a Permanent Effect
a. The Corrective Action shall produce a permanent effect.
b. If the Corrective Action Plan provides that any potential sources of pollutants are to be controlled in place, any cap or other method of source control shall be designed so that the discharge from the source following corrective action achieves ground water quality standards or, if approved by the Board, alternate corrective action concentration limits (ACACLs). For purposes of this paragraph, sources of pollutants are controlled "in place" even though they are moved within the facility boundaries provided that they are not moved to areas with unaffected ground water.
5. Action May Use Other Additional Measures
The Executive Secretary may consider whether additional measures should be included in the Plan to better assure that the criteria and factors specified in R317-6-6.15.E are met. Such measures may include:
a. Requiring long-term ground water or other monitoring;
b. Providing environmental hazard notices or other security measures;
c. Capping of sources of ground water contamination to avoid infiltration of precipitation;
d. Requiring long-term operation and maintenance of all portions of the Corrective Action; and
e. Periodic review to determine whether the Corrective Action is protective of public health and the environment.

R317-6-6.15(F): Corrective Action Concentration Limits
1. Contaminants with specified levels
Corrective Actions shall achieve ground water quality standards or, where applicable, alternate corrective action concentration limits (ACACLs).
2. Contaminants without specified levels
For contaminants for which no ground water quality standard has been established, the proposed Corrective Action Plan shall include proposed Corrective Action Concentration Limits. These levels shall be approved, disapproved or modified by the Executive Secretary after considering U.S. Environmental Protection Agency maximum contaminant level goals, health advisories, risk-based contaminant levels or standards established by other regulatory agencies and other relevant information.

R317-6-6.15(G): Alternate Corrective Action Concentration Limits
An Alternate Corrective Action Concentration Limit that is higher or lower than the Corrective Action Concentration Limits specified in R317-6-6.15.F may be required as provided in the following:
1. Higher Alternate Corrective Action Concentration Limits
A person submitting a proposed Corrective Action Plan may request approval by the Board of an Alternate Corrective Action Concentration Limit higher than the Corrective Action Concentration Limit specified in R317-6- 6.15.F. The proposed limit shall be protective of human health, and the environment, and shall utilize best available technology.
The Corrective Action Plan shall include the following information in support of this request:
a. The potential for release and migration of any contaminant substances or treatment residuals that might remain after Corrective Action in concentrations higher than Corrective Action Concentration Limits;
b. An evaluation of residual risks, in terms of amounts and concentrations of contaminant substances remaining following implementation of the Corrective Action options evaluated, including consideration of the persistence, toxicity, mobility, and propensity to bioaccumulate such contaminants substances and their constituents; and
c. Any other information necessary to determine whether the conditions of R317-6-6.15.G have been met.
2. Lower Alternate Corrective Action Concentration Limits
The Board may require use of an Alternate Corrective Action Concentration Limit that is lower than the Corrective Action Concentration Limit specified in R317-6-6.15.F if necessary to protect human health or the environment. Any person requesting that the Board consider requiring a lower Alternate Corrective Action Concentration Limit shall provide supporting information as described in R317-6-6.15.G.3.
3. Protective of human health and the environment

The Alternate Corrective Action Concentration Limit must be protective of human health and the environment. In making this determination, the Board may consider:
a. Information presented in the Contamination Investigation;
b. Other relevant cleanup or health standards, criteria, or guidance;
c. Relevant and reasonably available scientific information;
d. Any additional information relevant to the protectiveness of a Corrective Action; and
e. The impact of additional proposed measures, such as those described in R317-6-6.15.E.5.
4. Good cause
An Alternate Corrective Action Concentration Limit shall not be granted without good cause.
a. The Board may consider the factors specified in R317-6-6.15.E in determining whether there is good cause.
b. The Board may also consider whether the proposed remedy is cost-effective in determining whether there is good cause. Costs that may be considered include but are not limited to:
(1) Capital costs;
(2) Operation and maintenance costs;
(3) Costs of periodic reviews, where required;
(4) Net present value of capital and operation and maintenance costs;
(5) Potential future remedial action costs; and
(6) Loss of resource value.
5. Conservative
An Alternate Corrective Action Concentration Limit that is higher than the Corrective Action Concentration Limits specified in R317-6-6.15.F must be conservative. The Board may consider the concentration level that can be achieved using best available technology if attainment of the Corrective Action Concentration Limit is not technologically achievable.
6. Relation to background and existing conditions
a. The Board may consider the relationship between the Corrective Action Concentration Limits and background concentration limits in considering whether an Alternate Corrective Action Concentration Limit is appropriate.
b. No Alternate Corrective Action Concentration Limit higher than existing ground water contamination levels or ground water contamination levels projected to result from existing conditions will be granted.

R317-6-6.16(A) and (B): OUT-OF-COMPLIANCE STATUS
A. Accelerated Monitoring for Probable Out-of-Compliance Status
If the concentration of a pollutant in any compliance monitoring sample exceeds an applicable permit limit, the facility shall:
1. Notify the Executive Secretary in writing within 30 days of receipt of data;
2. Initiate monthly sampling, unless the Executive Secretary determines that other periodic sampling is appropriate, for a period of two months or until the compliance status of the facility can be determined.

B. Violation of Permit Limits
Out-of-compliance status exists when:
1. two consecutive samples from a compliance monitoring point exceed:
a. one or more permit limits; and
b. the mean ground water pollutant concentration for that pollutant by two standard deviations (the standard deviation and mean being calculated using values for the ground water pollutant at that compliance monitoring point); or
2. the concentration value of any pollutant in two or more consecutive samples is statistically significantly higher than the applicable permit limit. The statistical significance shall be determined using the statistical methods described in Statistical Methods for Evaluating Ground Water Monitoring Data from Hazardous Waste Facilities, Vol. 53, No. 196 of the Federal Register, Oct. 11, 1988.

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Michael O Leavitt
Governor
Dianne R. Nielson, Ph D.
Executive Director
Steven G. Higley, CPA
Director

MEMORANDUM

TO: See Distribution

FROM: Curtis White
Laurie Leib

DATE: November 7, 2002

SUBJECT: Final FY 2004 Fee Document

Attached please find the ***final*** approved fee document for the FY 2004 budget request with changes from the October 24 Fee Hearing.

Distribution:

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WQ - Don Ostler
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OSS - Curtis White
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Attachments

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
All Divisions					
Request for copies over 10 pages, per page	0.25				
Copies made by the requestor, per page	0 05				
Compiling, tailoring, searching, etc., a record in another format (at rate of lowest paid staff employee who, has the necessary skill and training to perform the request, after the first quarter hour)	Actual Cost				
Special computer data requests	70 00				
Computer Disks, each	2.00				
Digital Video Disks, each		*8.00*	*25*	*200*	*200*
Air Quality					
Compact disk with rules, State Implementation Plan, and Air Conservation Act	20 00				
Rules, paper copy	10 00				
State Implementation Plan, paper copy	40 00				
Utah Air Conservation Act, paper copy	5 00				
Instructions and Guidelines for notice of Intent, Modeling, Asbestos, Lead					
Printed copy	10 00				
Floppy disk	2 00				
Emission Inventory Report					
Printed	10 00				
Computer disk	7.50				
Emission Inventory Workshop (attendance)	15 00				
Air Emissions Fees, per ton	35 05	*36.31*	*82,000 tons*	*2,977,400*	*Recover costs*
Major and Minor Source Compliance Inspection	Actual Cost				
Certification for Vapor Tightness Tester	300 00				
Asbestos and Lead-Based Paint (LBP) Abatement					
Course Review Fee, actual cost per hour	70 00				
Asbestos Company/Lead-Based Paint Firm Certification per year	200 00				
Asbestos individual (employee) certification	100 00				
Asbestos individual (employee) certification surcharge, non-Utah certified training provider	25 00				
LBP abatement worker certification (per year).	75 00				
LBP Inspector Certification (per year)	100 00				
LBP Risk Assessor, Supervisor, Project Designer Certification (per year)	150 00				
Lost Certification card replacement	25.00				
Annual asbestos notification	400 00				
Asbestos/LBP Abatement Project notification Base Fee	140 00				
Asbestos/LBP Abatement Project notification Base Fee for Owner-occupied residential structures	40 00				
Abatement unit fee/100 units (square feet/linear feet) up to 10,000 units (School building AHERA abatement unit fees will be waved)	5 00				
Abatement unit fee/100 units (square feet/linear feet)10,000 or more units (School building AHERA abatement unit fees will be waved)	2 00				
Demolition Notification Base Fee	50 00				
Demolition unit fee per 5,000 square feet above 5,000 square feet	25 00				
Alternative Work Practice Review	100 00				
Permit Category					
Filing fees:					
Name Changes	100 00				
Small Sources and Soil Remediation	250 00				
New Sources, Minor & Major Modifications to Existing Sources	500.00				
Any Unpermitted Sources at an Existing Facility	1,500 00				
New Major PSD Sources (Monitoring Plan Review and site Visit)	5,000 00				
New Major source or major modification to major source in nonattainment area, up to 450 hours	31,500 00				
New Major source or major modification to major source in attainment area, up to 300 hours	21,000 00				
New Minor source or minor modification to minor source, up to 20 hours	1,400.00				
Generic permit for minor source or minor modification of minor source, up to 8 hours (Sources for which engineering review/Bact standardized)	560 00				
Minor sources (new or modified) with less than 3 tons per year uncontrolled emissions, up to 5 hours	350 00				
Permitting cost for additional hours	70 00				
Technical review of and assistance given for sales/use tax exemptions, soils remediations, experimental approvals, impact analyses, etc., per hour	70 00				
Air Quality Training	Actual Cost				
Environmental Response and Remediation					
CERCLIS Lists Disk or Paper, refer to internet	15.00				
Underground Storage Tank Program List					
Underground Storage Tank Facility List (paper only)	30 00				
Underground Storage Tank Facility List (computer disk)	25 00				
Leaking Underground Storage Tank Facility List (paper only)	18 00				
Leaking Underground Storage Tank Facility List (computer disk)	15.00				
Postage for one or both	3 00				
Emergency Planning and Community Right to Know Act Reports	15 00				
EPCRA Technical Assistance per hour	70 00				

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
Environmental Project Technical Assistance and PST Claim Preparation Assistance, per hour	70 00				
Voluntary Environmental Cleanup Program Application Fee	2,000 00				
Review/Oversight/Participation in Voluntary Agreements	Actual Cost				
Annual Underground Storage Tank (UST) Fee					
Tanks on PST Fund	100 00				
Tanks not on PST Fund	200 00				
Tanks Significantly out of Compliance with Leak Detection Requirements	300 00				
Oversight for tanks failing to pay UST fee, per hour	70 00				
UST Compliance Follow-up Inspection, per hour	70 00				
PST Fund Reapplication Fee, Certificates of Compliance Reapplication fee or both	300 00				
Initial Approval of Alternate UST Financial Assurance Mechanisms (Non-PST Participants)	420 00				
Approval of Alternate UST Financial Assurance Mechanisms after Initial Year (with No Mechanism Changes)	240 00				
Apportionment of Liability requested by responsible parties. Preparing, administering and conducting the Administrative process, per hour	70.00				
Certification or Certification Renewal for UST Consultants UST Installers, Removers and Groundwater and Soil Samplers and non-government UST Inspectors and Testers	150 00				
Environmental Response and Remediation Program Training	Actual Cost				
Log in and processing time to access UST database, per minute	5 00				
Radiation Control					
Utah Radiation Control Rules, complete set	20 00				
Utah Radiation Control Rules, partial set, Machine-Generated Radiation	15 00				
Utah Radiation Control Rules, partial set, Radioactive Materials	15 00				
List of all radioactive material licensees	10 00				
List of all x-ray machine registrants	10 00				
Machine-Generated Radiation					
Hospital/Therapy					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15 00				
Division Conducted Inspection, per tube	105 00				
Medical					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15.00				
Division Conducted Inspection, per tube	105 00				
Chiropractic					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15 00				
Division Conducted Inspection, per tube	105 00				
Podiatry/Veterinary					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15 00				
Division Conducted Inspection, per tube	75 00				
Dental					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15 00				
Division Conducted Inspection, per tube					
First tube on a single control unit	45.00				
Additional tubes on a control unit, per tube	12.50				
Industrial Facility with High and/or Very High Radiation Areas Accessible to Individuals					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15 00				
Division Conducted Inspection, per tube	105 00				
Industrial Facility with Cabinet X-Ray Units or Units Designed for other Purposes					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15 00				
Division Conducted Inspection, per tube	75 00				
Other					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15 00				
Division Conducted Annual or Biannual Inspection, per tube	105 00				
Division Conducted Inspection, once every five years, per tube	75.00				
Inspection reports submitted by independent qualified experts or registrants using qualified experts, per tube	15.00				
Radioactive Material					
Special Nuclear Material					
Possession and use of special nuclear material in sealed sources contained in devices used in industrial measuring systems, including x-ray fluorescence analyzers and neutron generators					
New License/Renewal	440 00				
Annual Fee	740 00				

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
Possession and use of less than 15 grams special nuclear material in unsealed form for research and development					
New License/Renewal	730 00				
Annual Fee	740 00				
Special nuclear material to be used as calibration and reference sources					
New License/Renewal	180 00				
Annual Fee	240 00				
All other special nuclear material licenses					
New License/Renewal	1,150 00				
Annual Fee	1,600 00				
Source Material					
Licenses for concentrations of uranium from other areas (i e. copper, phosphates, etc.) for the production of uranium yellow cake (moist, solid)					
New License/Renewal	5,510 00				
Annual Fee	4,220 00				
Regulation of source and byproduct material at uranium mills or commercial waste facilities					
(1) Uranium mills or commercial sites disposing of or reprocessing by product material, per month		*6,667/month*	*2*	*160,000.00*	*160,000.00*
(2) Uranium mills the Executive Secretary has determined are on standby status, per month		*4,167/month*	*1*	*50,004.00*	*50,004.00*
Fees are applicable when the Nuclear Regulatory Commission grants the amendment to Agreement State Status					
Licenses for possession and use of source material for shielding					
New License/Renewal	230 00				
Annual Fee	320 00				
All other source material licenses					
New License/Renewal	1,000 00				
Annual Fee	1,120 00				
Radioactive Material other than Source Material and Special Nuclear Material Licenses of broad scope for possession and use of radioactive material for processing or manufacturing of items containing radioactive material for commercial distribution					
New License/Renewal	2,320 00				
Annual Fee	2,960 00				
Other licenses for possession and use of radioactive material for processing or manufacturing of items containing radioactive material for commercial distribution					
New License/Renewal	1,670 00				
Annual Fee	2,040 00				
Licenses authorizing the processing or manufacturing and distribution or redistribution of radiopharmaceuticals, generators, reagent kits, or sources or devices containing radioactive material					
New License/Renewal	2,320 00				
Annual Fee	2,960 00				
Licenses authorizing distribution or redistribution of radiopharmaceuticals, generators, reagent kits, or sources or devices not involving processing of radioactive material					
New License/Renewal	860 00				
Annual Fee	1,000 00				
Licenses for possession and use of radioactive material for industrial radiography operations					
New License/Renewal	1,670 00				
Annual Fee	2,560 00				
Licenses for possession and use of radioactive material in sealed sources for irradiation of materials in which the source is not removed from its shield (self-shielded units)					
New License/Renewal	700 00				
Annual Fee	940 00				
Licenses for possession and use of less than 10,000 curies of radioactive material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes					
New License/Renewal	1,670 00				
Annual Fee	1,740 00				
Licenses for possession and use of 10,000 curies or more of radioactive material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes					
New License/Renewal	3,340 00				
Annual Fee	3,480 00				
Licenses to distribute items containing radioactive material that require device					

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
review to persons exempt from the licensing requirements of R313-19, except specific licenses authorizing redistribution of items that have been authorized for istribution to persons exempt from the icensing requirements of R313-19					
New License/Renewal	700 00				
Annual Fee	580 00				
Licenses to distribute items containing radioactive material or quantities of radioactive material that do not require device evaluation to persons exempt from the licensing requirements of R313-19, except for specific licenses authorizing redistribution of items that have been authorized for distribution to persons exempt from the licensing requirements of R313-19					
New License/Renewal	700 00				
Annual Fee	580 00				
Licenses to distribute items containing radioactive material that require sealed source and/or device review to persons generally licensed under R313-21, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons generally licensed under R313-21					
New License/Renewal	700 00				
Annual Fee	580.00				
Licenses to distribute items containing radioactive material or quantities of radioactive material that do not require sealed source and/or device review to persons generally licensed under R313-21, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons generally licensed under R313-21					
ew License/Renewal	700 00				
Annual Fee	580 00				
Licenses of broad scope for possession and use of radioactive material for research and development which do not authorize commercial distribution					
New License/Renewal	2,320 00				
Annual Fee	2,960 00				
Licenses for possession and use of radioactive material for research and development, which do not authorize commercial distribution					
New License/Renewal	700 00				
Annual Fee	940 00				
All other specific radioactive material licenses					
New License/Renewal	440 00				
Annual Fee	520 00				
Licenses that authorize services for other licensees, except licenses that authorize leak testing or waste disposal services which are subject to the fees specified for the listed services					
New License/Renewal	320 00				
Annual Fee	420 00				
Licenses that authorize services for leak testing only					
New License/Renewal	150 00				
Annual Fee	160 00				
Radioactive Waste Disposal					
Licenses specifically authorizing the receipt of waste radioactive material from other persons for the purpose of commercial disposal by land by the licensee					
New Application					
(a) Siting application	Actual costs up to 250,000 00				
(b) License application	Actual costs up to 1,000,000 00				

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
Renewal	Actual cost up to 1,000,000 00				
Pre-licensing and operations review and consultation on commercial low-level radioactive waste facilities, per hour	70 00				
Review of commercial low-level radioactive waste disposal and uranium recovery special projects. Applicable when the licensee and the Division agree that a review be conducted by a contractor in support of the efforts of Division staff	Actual Cost				
Review of topical reports submitted by a licensee or manufacturer to certify waste casks for transportation or disposal, per hour	70 00				
Generator Site Access Permits					
Generators transferring 1001 or more cubic feet of radioactive waste, per year	1,300 00				
Generators transferring 1000 cubic feet or less of radioactive waste, per year	500 00				
Brokers, (waste collectors or processors), per set	5,000 00				
Review of licensing or permit actions, amendments, environmental monitoring reports, and miscellaneous reports for uranium recovery facilities, per hour	70 00				
Licenses specifically authorizing the receipt of waste radioactive material from other persons for the purpose of packaging/repackaging the material. The licensee will dispose of the material by transfer to another person authorized to receive or dispose of the material					
New License/Renewal	3,190.00				
Annual Fee	2,760 00				
Licenses specifically authorizing the receipt of prepackaged waste radioactive material from other persons The licensee will dispose of the material by transfer to another person authorized to receive or dispose of the material					
New License/Renewal	700 00				
Annual Fee	1,100 00				
Licenses authorizing packing of radioactive waste for shipment to waste disposal site where licensee does not take possession of waste material					
New License/Renewal	440 00				
Annual Fee	520 00				
Well Logging, Well Surveys, and Tracer Studies					
Licenses for possession and use of radioactive material for well logging, well surveys, and tracer studies other than field flooding tracer studies					
New License/Renewal	1,670 00				
Annual Fee	2,100 00				
Licenses for possession and use of radioactive material for field flooding tracer studies					
New License/Renewal	Actual Cost				
Annual Fee	4,000 00				
Nuclear Laundries					
Licenses for commercial collection and laundry of items contaminated with radioactive material					
New License/Renewal	1,670 00				
Annual Fee	2,380 00				
Human Use of Radioactive Material					
Licenses for human use of radioactive material in sealed sources contained in teletherapy devices					
New License/Renewal	1,090 00				
Annual Fee	1,280 00				
Licenses of broad scope issued to medical institutions or two or more physicians authorizing research and development, including human use of radioactive material, except licenses for radioactive material in sealed sources contained in teletherapy devices					
New License/Renewal	2,320 00				
Annual Fee	2,960 00				
Other licenses issued for human use of radioactive material, except licenses for use of radioactive material contained in teletherapy devices					
New License/Renewal	700.00				
Annual Fee	1,100 00				
Civil Defense					
Licenses for possession and use of radioactive material for civil defense activities					
New License/Renewal	700 00				
Annual Fee	380 00				
Power Source					
Licenses for the manufacture and distribution of encapsulated					

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
radioactive material wherein the decay energy of the material is used as a source for power					
New License/Renewal	5,510 00				
Annual Fee	2,520 00				
Plan Reviews					
Review of plans for decommissioning, decontamination, reclamation, waste disposal pursuant to R313-15-1002, or site restoration activities	400 00				
Plus added cost above 8 hours, per hour	70 00				
Investigation of a misadministration by a third party as defined in R313-30-5 or in R313-32-2, as applicable	Actual Cost				
General License					
Measuring, gauging and control devices					
Initial registration/renewal for first year	20 00				
Annual fee after initial registration/renewal	20 00				
In Vitro Testing					
Initial registration/renewal for first year	20 00				
Annual fee after initial registration/renewal	20 00				
Depleted Uranium					
Initial registration/renewal for first year	20 00				
Annual fee after initial registration/renewal	20 00				
Charge for Late Payment of Fees, for all fees, per 30 days late	25.00				
Publication costs for making public notice of required actions	Actual Cost				
Reciprocity Fees					
Licensees who conduct the activities under the reciprocity provisions of R313-19-30					
Initial Filing of Application	Full Annual for Specific Category of User Listed Above				
Expedited application review Applicable when, by mutual consent of the applicant and affected staff, an application request is taken out of date order and processed by staff. per hour	75.00				
Management and oversight of impounded radioactive material	Actual Cost				
License amendment, for greater than three applications in a calendar year	200 00				
Water Quality					
Water Quality Regulations					
Complete set	30 00				
Water Quality Regulations					
R317-1, 2, 5, 6, 7; R317-4, 10 and 100	2 00				
Water Quality Regulations, R317-3	10 00				
Water Quality Regulations, R317-8	10 00				
305(b) Water Quality Report	20.00				
Report Entitled Utah's Lakes and Reservoirs- Inventory and Classification of Utah's Priority Lakes and Reservoirs	50 00				
Operator Certification					
Certification Examination	35 00				
Renewal of Certificate	10 00				
Renewal of Lapsed Certificate -late fee (per month, $30 00 maximum	10 00				
Duplicate Certificate	20 00				
New Certificate - change in status	20 00				
Certification by reciprocity with another state	20 00				
Grandfather Certificate	20 00				
Underground Wastewater Disposal Systems					
New Systems Fee	25.00				
Certificate Issuance	10 00				
~~Water Quality Data Requests~~					
~~-Individual Site/Each Year~~	~~1.00~~				
UPDES Permits					
Cement Manufacturing					
Major	3,600.00				
Minor	900 00				
Coal Mining and Preparation					
General Permit*	1,800 00				
*Fees for general permits issued for less than 5 years will be prorated based on a 5 -year permit, $100 00 minimum					
Individual Major	5,400 00				
Individual Minor	3,600 00				
Concentrated Animal Feeding Operation (CAFO)					
General Permit*	500 00				
*Fees for general permits issued for less than 5 years will be prorated based on a 5 -year permit, $100 00 minimum					
Construction Dewatering/Hydrostatic Testing					
General Permit*	500.00				

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
*Fees for general permits issued for less than 5 years will be prorated based on a 5 -year permit, $100 00 minimum					
Dairy Products					
Major	3,600 00				
Minor	1,800 00				
Electric					
Major	4,500.00				
Minor	1,800 00				
Fish Hatcheries					
General Permit*	500 00				
*Fees for general permits issued for less than 5 years will be prorated based on a 5 -year permit, $100 00 minimum					
Food and Kindred Products					
Major	4,500 00				
Minor	1,800 00				
Hazardous Waste Clean-up Sites	10,800 00				
Geothermal					
Major	3,600 00				
Minor	1,800 00				
Inorganic Chemicals					
Major	5,400 00				
Minor	2,700 00				
Iron and Steel Manufacturing					
Major	10,800 00				
Minor	2,700 00				
Leaking Underground Storage Tank Cleanup					
General Permit*	1,800 00				
*Fees for general permits issued for less than 5 years will be prorated based on a 5 -year permit, $100 00 minimum					
Individual Permit	3,600 00				
Meat Products					
Major	5,400 00				
Minor	1,800 00				
Metal Finishing and Products					
Major	5,400 00				
Minor	2,700 00				
neral Mining and Processing					
and and Gravel	1,000.00				
Salt Extraction	1,000.00				
Other Majors	3,600 00				
Other Minors	1,800 00				
Manufacturing					
Major	7,200 00				
Minor	2,700 00				
Oil and Gas Extraction					
flow rate <= 0.5 MGD	1,000 00				
flow rate > 0 5 MGD	2,700 00				
Ore Mining					
Major	5,400 00				
Minor	2,700.00				
Major w/Conc. Process	10,800.00				
Organic Chemicals Manufacturing					
Major	9,000 00				
Minor	2,700 00				
Petroleum Refining					
Major	7,200 00				
Minor	2,700 00				
Pharmaceutical Preparations					
Major	7,200 00				
Minor	2,700 00				
Rubber and Plastic Products					
Major	4,500 00				
Minor	2,700.00				
Space Propulsion					
Major	10,000.00				
Minor	2,700 00				
Steam and/or Power Electric Plants					
Major	3,600 00				
Minor	1,800 00				
ter Treatment Plants (Except Political Subdivisions)					
neral Permit*	500 00				
*Fees for general permits issued for less than 5 years will be prorated based on a 5 -year permit, $100 00 minimum					
Non-contact Cooling Water					
Flow rate <= 10,000 gpd	500.00				
10,000 gpd < Flow rate <100,000 gpd - $500 up to $1,000	1,000 00				
100,000 gpd < Flow rate <1 0 MGD - $1,000 up to $2,000	2,000.00				

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
Flow Rate > 1.0 MGD	3,000 00				
Note: Fee amt will be prorated based on flow rate.					
General Multi-Sector Industrial Storm Water Permit*	500 00				
eral Construction Storm Water Permit > 5 Acres*	500 00				
*Fees for general permits issued for less than 5 years will be					
prorated based on a 5 -year permit, $100 00 minimum					
General Construction Storm Water Permit < 5 Acres	100 00				
Municipal Storm Water Annual Fee:					
0-5,000 Population	500 00				
5,001-10,000 Population	800.00				
10,001-50,000 Population	1,200 00				
50,001-125,000 Population	2,000.00				
> 125,000 Population	3,000.00				
Industrial Users	2,700 00				
Total Containment (Except Political Subdivisions)	500 00				
Annual Ground Water Permit Administration Fee					
Tailings/Evap/Process Ponds, Heaps (per each**)					
0-1 Acre	350 00				
1-15 Acres	700 00				
15-50 Acres	1,400 00				
50-300 Acres	2,100 00				
Over 300 Acres	2,800 00				
All Others					
Base (one regulated facility)	700 00				
Per each ** additional regulated facility	700 00				
**(Multi-celled pond system or grouping of facilities					
with common compliance point is considered one facility)					
UPDES, Ground Water, Underground Injection					
Control, and construction permits not listed above					
and permit modifications (Except political subdivisions), per hour	70 00				
Complex Facilities where the anticipated permit issuance costs					
will exceed the above categorical fees by 25 percent, per hour					
(Permittee to be notified upon receipt of application)	70 00				
Water Quality Cleanup Activities					
Corrective Action, Site *Investigation/Remediation Oversight*					
dministration of Consent Orders and Agreements	70.00				
lieu of fees for ~~UPDES through Loan~~ *established above*					
~~dministration (see preceding pages).~~					
the applicant or responsible party may					
voluntarily make advance payment for more					
than the established fee to facilitate oversight					
activities or permit issuance.					
Loan Administration Fees, ~~per hour~~	Actual Costs				
Technical review of and assistance given for sales/use					
tax exemptions, per hour	70.00				
Domestic Sewage Sludge Permits (number of resident connections),					
annual fee					
0 - 4,000	500 00				
4,001 - 15,000	1,018 00				
More than 15,000	1,538 00				
Drinking Water					
Safe Drinking Water Regulations Rules					
Bound	20.00				
Part I	10.00				
Part II	10 00				
Computer Disk	10 00				
Special Surveys	Actual Cost				
File Searches	Actual Cost				
Well Sealing Inspection (per hour + mileage + per diem)	70 00				
Special Consulting/Technical Assistance, per hour	70.00				
Operator Certification Program Fees					
Record application fee (one time only)	20 00				
Examination fee (any level)	50 00				
Renewal of certification (every 3 years					
if applied for during designated period)	50 00				
Grandfather Certification Application fee	50 00				
Reinstatement of lapsed certificate	75.00				
ertificate of reciprocity with another state	50 00				
Conversion Fee (Specialist to Operator-Operator to Specialist)	20 00				
Cross Connection Control Program					
Record application fee (one time only)	10.00				
Examination fee	25 00	*60 00*	*75*	4,500	Recover Costs
Certification fee	75.00				
Renewal fee					
Class I	75 00				

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
Class II	100 00	*135 00*	250	8,750	
Class III	100 00	*135 00*	5	175	
All fees will be deposited in a special account to defray the costs of administering the Cross Connection Control and Certification programs					
Financial Assistance Program Fees					
Application processing	Actual Cost				
Solid and Hazardous Waste					
Utah Hazardous Waste Rules	10 00				
Utah Solid Waste Rules	10 00				
Solid Waste Management Plan	5.00				
Utah Used Oil Rules	5.00				
RCRA Facility List	5 00				
Solid and Hazardous Waste Program Administration: (including Used Oil and Waste Tire Recycling Programs)					
The following fees do not apply to municipalities counties, or special service districts seeking Division of Solid and Hazardous Waste reviews					
Professional, per hour (This fee includes but is not limited to Review of Site Investigation and Site Remediation Plans, Review of permit applications and permit modifications, Review and Oversight of Consent Orders and Agreements and their related compliance activities and Review and Oversight of Construction Activities)	70 00				
Solid Waste Permit Filing Fees					
The following fees *do not* apply to municipalities, counties, or specia service districts seeking Division of Solid and Hazardous Waste reviews					
New Comm Facility - Class V *and Class VI* Landfills	1,000.00				
New Non-Commercial Facility	750 00				
New Incinerator:					
Commercial	5,000 00				
Industrial or Private	1,000.00				
Plan Renewals and Plan Modifications	100 00				
Variance Requests	500 00				
Waste Tire Recycling Fees					
Waste Tire Recycler Registration Fee, annual	100 00				
Waste Tire Transporter Registration Fee, annual	100 00				
Used Oil Fees:					
Do It Your Self'er and Used Oil Collection Center Registration Fee	No Charge				
Used Oil Permit Filing Fee for Transporter, Transfer Facility, Off-Spec Burner, and Land Application	100 00				
Used Oil Registration Fee for Transporter, Transfer Facility, Processor/Re-refiner, Off-Spec Burner, and land Application, annual	100 00				
Used Oil Marketer Registration Fee, annual	50 00				
Used Oil Marketer Permit Filing Fee	50 00				

END

URANIUM MILL TAILINGS OVERSIGHT

2002 GENERAL SESSION

STATE OF UTAH

Sponsor: Bill Wright

This act modifies the Radiation Control Act to authorize the Department of Environmental Quality to regulate uranium recovery and specified related operations. The act imposes a fee on these operations, with specified contingencies. This act also increases the size of the Radiation Control Board by two members.

This act affects sections of Utah Code Annotated 1953 as follows:

AMENDS:

19-1-108, as last amended by Chapter 314, Laws of Utah 2001

19-3-103, as last amended by Chapter 243, Laws of Utah 1996

19-3-104, as last amended by Chapter 311, Laws of Utah 2001

Be it enacted by the Legislature of the state of Utah:

Section 1. Section **19-1-108** is amended to read:

19-1-108. Creation of Environmental Quality Restricted Account -- Purpose of restricted account -- Sources of funds -- Uses of funds.

(1) There is created the Environmental Quality Restricted Account.

(2) The sources of monies for the restricted account are:

(a) radioactive waste disposal fees collected under Sections 19-3-106 and 19-3-106.4 and other fees collected under Subsection 19-3-104(5);

(b) hazardous waste disposal fees collected under Section 19-6-118;

(c) PCB waste disposal fees collected under Section 19-6-118.5;

(d) nonhazardous solid waste disposal fees collected under Section 19-6-119; and

(e) all investment income derived from money in the restricted account created in this section.

(3) In each fiscal year, the first $500,000 collected from all waste disposal fees listed in Subsection (2), collectively, shall be deposited in the General Fund as free revenue. The balance shall be deposited in the restricted account created in this section.

(4) The Legislature may annually appropriate monies from the Environmental Quality Restricted Account to:

(a) the department for the costs of administering radiation control programs;

(b) the department for the costs of administering solid and hazardous waste programs; and

(c) the Hazardous Substances Mitigation Fund, up to $400,000, for purposes set forth in Title

19, Chapter 6, Part 3, Hazardous Substances Mitigation Act.

(5) In order to stabilize funding for the radiation control program and the solid and hazardous

waste program, the Legislature shall in years of excess revenues reserve in the restricted account sufficient monies to meet departmental needs in years of projected shortages.

(6) The Legislature may not appropriate money from the General Fund to the department as a supplemental appropriation to cover the costs of the radiation control program and the solid and hazardous waste program in an amount exceeding 25% of the amount of waste disposal fees collected during the most recent prior fiscal year.

(7) The Legislature may annually appropriate not more than $200,000 from this account to the Department of Public Safety, created in Section 53-1-103, to be used by that department solely for hazardous materials:

(a) management training; and

(b) response preparation and emergency response training.

(8) All funds appropriated under this part that are not expended at the end of the fiscal year lapse into the account created in Subsection (1).

(9) For fiscal year 1998-99, up to $537,000 in the Environmental Quality Restricted Account may be appropriated by the Legislature to fund legislative priorities.

Section 2. Section **19-3-103** is amended to read:

19-3-103. Radiation Control Board -- Members -- Organization -- Meetings -- Per diem and expenses.

(1) The board created under Section 19-1-106 comprises [~~11~~] 13 members, one of whom shall be the executive director, or his designee, and the remainder of whom shall be appointed by the governor, with the advice and consent of the Senate.

(2) No more than [~~five~~] six appointed members shall be from the same political party.

(3) The appointed members shall be knowledgeable about radiation protection and shall be as follows:

(a) one physician;

(b) one dentist;

(c) one health physicist or other professional employed in the field of radiation safety;

(d) [~~two~~] three representatives of regulated industry, at least one of whom represents the radioactive waste management industry, and at least one of whom represents the uranium milling industry;

(e) one registrant or licensee representative from academia;

(f) one representative of a local health department;

(g) one elected county official; and

(h) [~~two~~] three members of the general public, at least one of whom represents organized environmental interests.

(4) (a) Except as required by Subsection (4)(b), as terms of current board members expire, the governor shall appoint each new member or reappointed member to a four-year term.

(b) Notwithstanding the requirements of Subsection (4)(a), the governor shall, at the time of appointment or reappointment, adjust the length of terms to ensure that the terms of board members are staggered so that approximately half of the board is appointed every two years.

(5) Each board member is eligible for reappointment to more than one term.

(6) Each board member shall continue in office until the expiration of his term and until a successor is appointed, but not more than 90 days after the expiration of his term.

(7) When a vacancy occurs in the membership for any reason, the replacement shall be appointed for the unexpired term by the governor, after considering recommendations by the department and with the consent of the Senate.

(8) The board shall annually elect a chair and vice chair from its members.

(9) The board shall meet at least quarterly. Other meetings may be called by the chair, by the executive secretary, or upon the request of three members of the board.

(10) Reasonable notice shall be given each member of the board prior to any meeting.

(11) [~~Six~~] Seven members constitute a quorum. The action of a majority of the members present is the action of the board.

(12) (a) (i) Members who are not government employees [~~shall~~] receive no compensation or benefits for their services, but may receive per diem and expenses incurred in the performance of the member's official duties at the rates established by the Division of Finance under Sections 63A-3-106 and 63A-3-107.

(ii) Members may decline to receive per diem and expenses for their service.

(b) (i) State government officer and employee members who do not receive salary, per diem, or expenses from their agency for their service may receive per diem and expenses incurred in the performance of their official duties from the board at the rates established by the Division of Finance under Sections 63A-3-106 and 63A-3-107.

(ii) State government officer and employee members may decline to receive per diem and expenses for their service.

(c) (i) Local government members who do not receive salary, per diem, or expenses from the entity that they represent for their service may receive per diem and expenses incurred in the performance of their official duties at the rates established by the Division of Finance under Sections 63A-3-106 and 63A-3-107.

(ii) Local government members may decline to receive per diem and expenses for their service.

Section 3. Section **19-3-104** is amended to read:

19-3-104. Registration and licensing of radiation sources by department -- Assessment of fees -- Rulemaking authority and procedure -- Siting criteria.

(1) As used in this section:

(a) "Decommissioning" includes financial assurance.

(b) "Source material" and "byproduct material" have the same definitions as in 42 U.S.C.A. 2014, Atomic Energy Act of 1954, as amended.

[~~(1)~~] (2) The board may require the registration or licensing of radiation sources that

constitute a significant health hazard.

[~~(2)~~] (3) All sources of ionizing radiation, including ionizing radiation producing machines, shall be registered or licensed by the department.

[~~(3)~~] (4) The board may make rules:

(a) necessary for controlling exposure to sources of radiation that constitute a significant health hazard;

(b) to meet the requirements of federal law relating to radiation control to ensure the radiation control program under this part is qualified to maintain primacy from the federal government; [~~and~~]

(c) to establish:

(i) board accreditation requirements and procedures for mammography facilities; and

(ii) certification procedure and qualifications for persons who survey mammography equipment and oversee quality assurance practices at mammography facilities[~~.~~]; and

(d) as necessary regarding the possession, use, transfer, or delivery of source and byproduct material and the disposal of byproduct material to establish requirements for:

(i) the licensing, operation, decontamination, and decommissioning, including financial assurances; and

(ii) the reclamation of sites, structures, and equipment used in conjunction with the activities described in this Subsection (4).

(5) (a) On and after January 1, 2003, a fee is imposed for the regulation of source and byproduct material and the disposal of byproduct material at uranium mills or commercial waste facilities, as provided in this Subsection (5).

(b) On and after January 1, 2003 through March 30, 2003:

(i) $6, 667 per month for uranium mills or commercial sites disposing of or reprocessing byproduct material; and

(ii) $4,167 per month for those uranium mills the executive secretary has determined are on standby status.

(c) On and after March 31, 2003 through June 30, 2003 the same fees as in Subsection (5)(b)

apply, but only if the federal Nuclear Regulatory Commission grants to Utah an amendment for agreement state status for uranium recovery regulation on or before March 30, 2003.

(d) If the Nuclear Regulatory Commission does not grant the amendment for state agreement status on or before March 30, 2003, fees under Subsection (5)(e) do not apply and are not required to be paid until on and after the later date of:

(i) October 1, 2003; or

(ii) the date the Nuclear Regulatory Commission grants to Utah an amendment for agreement state status for uranium recovery regulation.

(e) For the payment periods beginning on and after July 1, 2003, the department shall establish the fees required under Subsection (5)(a) under Section 63-38-3.2, subject to the restrictions under Subsection (5)(d).

(f) The department shall deposit fees it receives under this Subsection (5) into the Environmental Quality Restricted Account created in Section 19-1-108.

[~~(4)~~] (6) (a) The department shall assess fees for registration, licensing, and inspection of radiation sources under this section.

(b) The department shall comply with the requirements of Section 63-38-3.2 in assessing fees for licensure and registration.

[~~(5)~~] (7) The department shall coordinate its activities with the Department of Health rules made under Section 26-21a-203.

[~~(6)~~] (8) (a) Except as provided in Subsection [~~(7)~~] (9), the board may not adopt rules, for the purpose of the state assuming responsibilities from the United States Nuclear Regulatory Commission with respect to regulation of sources of ionizing radiation, that are more stringent than the corresponding federal regulations which address the same circumstances.

(b) In adopting those rules, the board may incorporate corresponding federal regulations by reference.

[~~(7)~~] (9) (a) The board may adopt rules more stringent than corresponding federal regulations for the purpose described in Subsection [~~(6)~~] (8) only if it makes a written finding after public comment and hearing and based on evidence in the record that corresponding federal regulations are

not adequate to protect public health and the environment of the state.

(b) Those findings shall be accompanied by an opinion referring to and evaluating the public health and environmental information and studies contained in the record which form the basis for the board's conclusion.

[~~(8)~~] (10) (a) The board shall by rule:

(i) authorize independent qualified experts to conduct inspections required under this chapter of x-ray facilities registered with the division; and

(ii) establish qualifications and certification procedures necessary for independent experts to conduct these inspections.

(b) Independent experts under this Subsection [~~(8)~~] (10) are not considered employees or representatives of the division or the state when conducting the inspections.

[~~(9)~~] (11) (a) The board may by rule establish criteria for siting commercial low-level radioactive waste treatment or disposal facilities.

(b) Any facility under Subsection (11)(a) for which a radioactive material license is required by this section shall comply with those criteria.

(c) A facility may not receive a radioactive material license until siting criteria have been established by the board. The criteria also apply to facilities that have applied for but not received a radioactive material license.

[~~(10)~~] (12) The board shall by rule establish financial assurance requirements for closure and postclosure care of radioactive waste land disposal facilities, taking into account existing financial assurance requirements.

Utah!
Where ideas connect
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Michael O. Leavitt
Governor
Dianne R. Nielson, Ph.D.
Executive Director
William J. Sinclair
Director

October 9, 2002

Via Federal Express

Dennis Sollenberger
Office of State and Tribal Programs
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Sollenberger:

As recently requested, enclosed is a packet of information concerning the uranium mills and mill tailings rulemakings just completed by the Division of Radiation Control. Enclosed are:

(1). Summary of the rulemakings which show publication dates, public comment periods response to comments, effective dates, etc.

(2). A copy of all final rulemakings, from the Utah Division of Administrative Rules website. As you are aware, some of the rulemakings were re-proposed in response to comments.

(3). A copy of three responses by the Division to the various rulemakings including comment letters.

We are in the midst of preparation of the final application to be submitted to NRC. As a part of the final application, Utah will be submitting an alternate groundwater standard. We would appreciate any guidance that NRC could provide in a timely manner that will aid us in filing of the necessary documentation regarding this alternate standard. Since all necessary statutory changes and rulemakings have been completed, this information is needed so that the final application may be filed as soon as possible. Thank you for your cooperation.

Sincerely,

William J. Sinclair, Director

Summary of Uranium Mills/Tailings Rulemakings as a result of SB96
Division of Radiation Control - 2002

Rule	Approved by RCB for pc Published in State Bulletin	Commence Public Comment Period	Public comment period ends or extended to	Written comments/ Response to comments	Final approval by RCB Effective Date
R313-22-33(1)(e)	4/5/2002 5/1/2002	5/1/2002	6/5/2002	No	6/7/2002 6/14/2002
R313-70-7(2)(b)(c)(d)	4/5/2002 5/1/2002	5/1/2002	6/5/2002	Yes 6/4/2002	
R313-17-2(1)(a)	4/5/2002 5/1/2002	5/1/2002	6/5/2002	Yes 6/4/2002	
R313-15-1001	4/23/2002 5/15/2002	5/15/2002	6/28/2002	No	7/22/2002 7/22/2002
R313-19-2	4/23/2002 5/15/2002	5/15/2002	6/28/2002	Yes 7/12/2002	
R313-22-39	4/5/2002 5/15/2002	5/15/2002	6/28/2002	No	7/22/2002 7/22/2002
R313-24	4/5/2002 5/1/2002	5/1/2002	6/28/2002	Yes 7/12/2002	

Summary of Uranium Mills/Tailings Rulemakings as a result of SB96
Division of Radiation Control - 2002

Rule	Approval by RCB Re-published in State Bulletin	Commence Public Comment Period	Public comment period ends	Written comments/ Response to comments	Final approval by RCB Effective Date
R313-22-33(1)(e)	N/A	N/A	N/A	N/A	N/A
R313-70-7(2)(b)(c)(d)	6/7/2002 7/1/2002	7/1/2002	7/31/2002	No	9/6/2002 9/12/2002
R313-17-2(1)(a)	6/7/2002 7/1/2002	7/1/2002	7/31/2002	No	9/6/2002 9/12/2002
R313-15-1001	N/A	N/A	N/A	N/A	N/A
R313-19-2	7/22/2002 8/15/2002	8/15/2002	9/16/2002	No	10/4/02 10/7/02
R313-22-39	N/A	N/A	N/A	N/A	N/A
R313-24	7/22/2002 8/15/2002	8/15/2002	9/16/2002	Yes 9/20/2002	10/4/02 10/7/02

DAR File No. 24716

This filing was published in the 05/01/2002, issue, Vol. 2002, No.9, of the Utah State Bulletin.

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Environmental Quality, Radiation Control

R313-22-33

Specific Licenses

NOTICE OF PROPOSED RULE
DAR File No.: 24716
Filed: 04/15/2002, 09:00
Received by: NL

RULE ANALYSIS

Purpose of the rule or reason for the change:
To maintain rules with are compatible with 10 CFR 40.

Summary of the rule or change:
To add a reference to Rule R313-24 at Subsection R313-22-33(1)(e). The license applicant must satisfy applicable special requirements in this rule for the issuance of a specific license.

State statutory or constitutional authorization for this rule:
Sections 19-3-104 and 19-3-108

Anticipated cost or savings to:
the state budget:
Since the rule change requires the license applicant satisfy applicable special requirements in R313-24 for the issuance of a specific license, there is no cost or savings impact on the State budget associated with this rule change.

local governments:
Since the rule change requires the license applicant satisfy applicable special requirements in R313-24 for the issuance of a specific license, there is no cost or savings impact on the local government associated with this rule change.

other persons:

Since the rule change requires the license applicant satisfy applicable special requirements in R313-24 for the issuance of a specific license, there is no cost or savings impact on other persons associated with this rule change.

Compliance costs for affected persons:
Since the rule change only requires the license applicant satisfy applicable special requirements in R313-24 for the issuance of a specific license, there is no compliance costs for affected persons associated with this rule change.

Comments by the department head on the fiscal impact the rule may have on businesses:
This rule change will have no fiscal impact on businesses.

The full text of this rule may be inspected, during regular business hours, at the Division of Administrative Rules, or at:
Environmental Quality
Radiation Control
168 N 1950 W
SALT LAKE CITY UT 84116-3085

Direct questions regarding this rule to:
Susan Giddings at the above address, by phone at 801-536-4259, by FAX at 801-533-4097, or by Internet E-mail at sgidding@deq.state.ut.us

Interested persons may present their views on this rule by submitting written comments to the address above no later than 5:00 p.m. on:
05/31/2002

This rule may become effective on:
06/10/2002

Authorized by:
William Sinclair, Director

RULE TEXT

R313. Environmental Quality, Radiation Control.

R313-22. Specific Licenses.

R313-22-33. General Requirements for the Issuance of Specific Licenses.

(1) A license application shall be approved if the Executive Secretary determines that:

(a) the applicant and all personnel who will be handling the radioactive material are qualified by reason of training and experience to use the material in question for the purpose requested in accordance with these rules in a manner as to minimize danger to public health and safety or the environment;

(b) the applicant's proposed equipment, facilities, and procedures are adequate to minimize danger to public health and safety or the environment;

(c) the applicant's facilities are permanently located in Utah, otherwise the applicant shall seek reciprocal recognition as required by Section R313-19-30;

(d) the issuance of the license will not be inimical to the health and safety of the public;

(e) the applicant satisfies applicable special requirements in Sections R313-22-50 and R313-22-75, and Rules R313-24, R313-25, R313-32, R313-34, R313-36, or R313-38; and

(f) in the case of an application for a license to receive and possess radioactive material for commercial waste disposal by land burial, or for the conduct of other activities which the Executive Secretary determines will significantly affect the quality of the environment, the Executive Secretary, before commencement of construction of the plant or facility in which the activity will be conducted, has concluded, after weighing the environmental, economic, technical and other benefits against environmental costs and considering available alternatives, that the action called for is the issuance of the proposed license, with any appropriate conditions to protect environmental values. The Executive Secretary shall respond to the application within 60 days. Commencement of construction prior to a response and conclusion shall be grounds for denial of a license to receive and possess radioactive material in the plant or facility. As used in this paragraph the term "commencement of construction" means clearing of land, excavation, or other substantial action that would adversely affect the environment of a site. The term does not mean site exploration, necessary borings to determine foundation conditions, or other preconstruction monitoring or testing to establish background information related to the suitability of the site or the protection of environmental values.

KEY: specific licenses, decommissioning, broad scope, radioactive materials

[~~September 14, 2001~~]2002

Notice of Continuation October 10, 2001

19-3-104

19-3-108

ADDITIONAL INFORMATION

PLEASE NOTE:

- Text to be deleted is struck through and surrounded by brackets (e.g., [~~example~~]). Text to be added is underlined (e.g., example). Some browsers may not depict some or any of these attributes on the screen or when the document is printed.
- Please see the **DISCLAIMER** regarding information available from state web pages.

For questions regarding the *content* or *application* of this rule, please contact Susan Giddings at the above address, by phone at 801-536-4259, by FAX at 801-533-4097, or by Internet E-mail at sgidding@deq.state.ut.us

For questions about the *rulemaking process*, please contact the **Division of Administrative Rules** (801-538-3764). *Please Note:* The Division of Administrative Rules is *NOT* able to answer questions about the content or application of these administrative rules.

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Last modified: 05/01/2002 1:10 AM

DAR File No. 24759

This filing was published in the 05/15/2002, issue, Vol. 2002, No.10, of the Utah State Bulletin.

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Environmental Quality, Radiation Control

R313-15-1001

Waste Disposal - General Requirements

NOTICE OF PROPOSED RULE
DAR File No.: 24759
Filed: 04/25/2002, 08:45
Received by: NL

RULE ANALYSIS

Purpose of the rule or reason for the change:
To maintain rules which are compatible with 10 CFR 40.

Summary of the rule or change:
The rule states that a licensee or registrant shall dispose of licensed material by transfer to an authorized recipient as provided in Rule R313-24 (as well as other rules and sections which are listed in Subsection R313-15-1001(1)(a)). Rule R313-24 has been added to Subsection R313-15-1001(1)(a).

State statutory or constitutional authorization for this rule:
Sections 19-3-104, and 19-3-108

Anticipated cost or savings to:
the state budget:
Since the rule relates to the transfer of licensed material by licensees, there is no cost or savings impact with this rule change for the State budget.

local governments:
Since the rule relates to the transfer of licensed material by licensees, there is no cost or savings impact with this rule change for the local government.

other persons:

The rule states that a licensee or registrant shall dispose of licensed material by transfer to an authorized recipient as provided in Rule R313-24 (as well as other rules and sections which are listed in Subsection R313-15-1001(1)(a)). Since only Rule R313-24 has been added to Subsection R313-15-1001(1)(a) and it applies only to the licensees, there is no cost or savings impact with this rule change for other persons.

Compliance costs for affected persons:
Since the rule relates to the transfer of licensed material by licensees, there are no compliance costs for "affected persons: associated with this rule change.

Comments by the department head on the fiscal impact the rule may have on businesses:
There is no fiscal impact for businesses associated with this rule change.

The full text of this rule may be inspected, during regular business hours, at the Division of Administrative Rules, or at:
Environmental Quality
Radiation Control
168 N 1950 W
SALT LAKE CITY UT 84116-3085

Direct questions regarding this rule to:
Susan Giddings at the above address, by phone at 801-536-4259, by FAX at 801-533-4097, or by Internet E-mail at sgidding@deq.state.ut.us

Interested persons may present their views on this rule by submitting written comments to the address above no later than 5:00 p.m. on:
06/14/2002

This rule may become effective on:
06/17/2002

Authorized by:
William Sinclair, Director

RULE TEXT

R313. Environmental Quality, Radiation Control.

R313-15. Standards for Protection Against Radiation.

R313-15-1001. Waste Disposal - General Requirements.

(1) A licensee or registrant shall dispose of licensed or registered material only:

(a) By transfer to an authorized recipient as provided in Section R313-15-1006 or in Rules R313-21, R313-22, R313-24, or R313-25, or to the U.S. Department of Energy; or

(b) By decay in storage; or

(c) By release in effluents within the limits in Section R313-15-301; or

(d) As authorized pursuant to Sections R313-15-1002, R313-15-1003, R313-15-1004, or R313-15-1005.

(2) A person shall be specifically licensed or registered to receive waste containing licensed or registered material from other persons for:

(a) Treatment prior to disposal; or

(b) Treatment or disposal by incineration; or

(c) Decay in storage; or

(d) Disposal at a land disposal facility licensed pursuant to Rule R313-25; or

(e) Storage until transferred to a storage or disposal facility authorized to receive the waste.

KEY: radioactive material, contamination, waste disposal, safety

[~~November 9, 2001~~]2002

Notice of Continuation April 30, 1998

19-3-104

19-3-108

ADDITIONAL INFORMATION

PLEASE NOTE:

- Text to be deleted is struck through and surrounded by brackets (e.g., [~~example~~]). Text to be added is underlined (e.g., example). Some browsers may not depict some or any of these attributes on the screen or when the document is printed.
- Please see the **DISCLAIMER** regarding information available from state web pages.

For questions regarding the *content* or *application* of this rule, please contact Susan Giddings at the above address, by phone at 801-536-4259, by FAX at 801-533-4097, or by Internet E-mail at sgidding@deq.state.ut.us

For questions about the *rulemaking process*, please contact the **Division of Administrative Rules** (801-538-3764). *Please Note:* The Division of Administrative Rules is *NOT* able to answer questions about the content or application of these administrative rules.

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Last modified: 05/15/2002 10:30 AM

DAR File No. 24757

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Environmental Quality, Radiation Control

R313-22-39

Executive Secretary Action on Applications to Renew or Amend

NOTICE OF PROPOSED RULE

DAR File No.: 24757
Filed: 04/25/2002, 08:30
Received by: NL

RULE ANALYSIS

Purpose of the rule or reason for the change:
To maintain rules which are compatible with 10 CFR 40.

Summary of the rule or change:
Rule R313-24 has been added to Section R313-22-39. The rule states that the Executive Secretary will use the criteria set forth in Rule R313-24 (as well as other rules and subsections cited in the rule) when considering an application by a licensee to renew or amend a license.

State statutory or constitutional authorization for this rule:
Sections 19-3-104, and 19-3-108

Anticipated cost or savings to:
the state budget:
Since the rule requires that the Executive Secretary use the criteria set forth in Rule R313-24 when considering an application by a licensee to renew or amend a license, there will be no costs or savings impact with this rule change for the State budget.

local governments:
Since the rule requires that the Executive Secretary use the criteria set forth in Rule R313-24 when considering an application by a licensee to renew or amend a license, the rule relates only to licensees and not to local government. There will be no costs or savings impact with this rule change to the local government budget.

other persons:

Since the rule requires that the Executive Secretary use the criteria set forth in Rule R313-24 when considering an application by a licensee to renew or amend a license, there will be no costs or savings impact with this rule change to "other persons".

Compliance costs for affected persons:
Since the rule change relates to licenses and not inspections, there will be no compliance costs for "affected persons" associated with this rule change.

Comments by the department head on the fiscal impact the rule may have on businesses:
The rule change will have no fiscal impact on businesses.

The full text of this rule may be inspected, during regular business hours, at the Division of Administrative Rules, or at:
Environmental Quality
Radiation Control
168 N 1950 W
SALT LAKE CITY UT 84116-3085

Direct questions regarding this rule to:
Susan Giddings at the above address, by phone at 801-536-4259, by FAX at 801-533-4097, or by Internet E-mail at sgidding@deq.state.ut.us

Interested persons may present their views on this rule by submitting written comments to the address above no later than 5:00 p.m. on:
06/14/2002

This rule may become effective on:
06/17/2002

Authorized by:
William Sinclair, Director

RULE TEXT

R313. Environmental Quality, Radiation Control.

R313-22. Specific Licenses.

R313-22-39. Executive Secretary Action on Applications to Renew or Amend.

In considering an application by a licensee to renew or amend the license, the Executive Secretary will use the criteria set forth in Sections R313-22-33, R313-22-50, and R313-22-75 and in Rules R313-24, R313-25, R313-32, R313-34, R313-36, or R313-38, as applicable.

KEY: specific licenses, decommissioning, broad scope, radioactive materials

[~~September 14, 2001~~]2002

Notice of Continuation October 10, 2001

19-3-104

19-3-108

ADDITIONAL INFORMATION

PLEASE NOTE:

- Text to be deleted is struck through and surrounded by brackets (e.g., [~~example~~]). Text to be added is underlined (e.g., example). Some browsers may not depict some or any of these attributes on the screen or when the document is printed.
- Please see the **DISCLAIMER** regarding information available from state web pages.

For questions regarding the *content* or *application* of this rule, please contact Susan Giddings at the above address, by phone at 801-536-4259, by FAX at 801-533-4097, or by Internet E-mail at sgidding@deq.state.ut.us

For questions about the *rulemaking process*, please contact the **Division of Administrative Rules** (801-538-3764). *Please Note:* The Division of Administrative Rules is *NOT* able to answer questions about the content or application of these administrative rules.

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Last modified: 05/15/2002 10:30 AM

DAR File No. 24969

This filing was published in the 07/01/2002, issue, Vol. 2002, No.13, of the Utah State Bulletin.

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Environmental Quality, Radiation Control

R313-70-7

License Categories and Types of Fees for Radioactive Materials Licenses

NOTICE OF PROPOSED RULE

DAR File No.: 24969
Filed: 06/14/2002, 10:06
Received by: NL

RULE ANALYSIS

Purpose of the rule or reason for the change:
To add new license categories and types of fees in Subsections R313-70-7(2)(b), and (c) reflecting the new rule, Rule R313-24, Uranium Mills, and Source Material Mill Tailings Disposal Facility Requirements and maintain rules which are compatible with 10 CFR 40. (DAR Note: Rule R313-24 was published in the May 15, 2002, issue of the Utah State Bulletin, beginning on page 23.)

Summary of the rule or change:
The rule change adds two license categories to Subsections R313-70-7(2)(b)and (c) as follows: in Subsection R315-70-7(2)(b), licenses for possession and use of source material in extraction facilities such as conventional milling, in situ leaching, heap leaching, and other processes including licenses authorizing the possession of byproduct (tailings and other wastes) from source material extraction facilities, as well as licenses authorizing the possession and maintenance of a facility in a standby mode and licenses that authorize the receipt of byproduct material, as defined in Section 19-3-102, from other persons for possession and disposal incidental to the disposal of the uranium waste tailings generated by the licensee's milling operations; and in Subsection R317-70-7(2)(c), licenses that authorize the receipt of byproduct material, as defined in Section 19-3-102, from other persons for possession and disposal.

State statutory or constitutional authorization for this rule:
Sections 19-3-103.5, 19-3-104, and 19-3-108

Anticipated cost or savings to:
the state budget:

Since there is a transfer of regulatory authority from federal to state government, there will be a savings impact through the collection of annual and review fees from licensees. The fees approved by the 2002 Utah legislature contained within the Department of Environmental Quality (DEQ) fee schedule set the amounts of fees from $0 to $80,000 year for closing, on standby, or operating facilities and a $70/hour review fee. In comparison, the recently approved Nuclear Regulatory Commission (NRC) fees are approximately $78,000 annual fee with a $152/hour review fee. Licensees will realize savings from the hourly review fee difference. The fees have been set to collect actual state program costs.

local governments:
Local governments are not subject to the provisions of the rule, because no local governments in Utah have uranium recovery radioactive material licenses.

other persons:
There will be a cost impact associated with this rule change. Licensees will pay annual and review fees. Annual fees vary from $0 to $80,000 per year depending on if the facility is closing, on standby, or operating. An hourly review fee of $70 per hour will be charged.

Compliance costs for affected persons:
There will be annual and review fees cost associated with this rule change. Fees are set by the legislature within the DEQ fee schedule and during the 2002 legislative session, annual fees from $0 to $80,000/year were set for closing, on standby, or operating facilities with an hourly review fee of $70/hour. The fees were established to be paid on a monthly basis starting in January 2003 and legislation was crafted such as to avoid licensees from having to pay duplicative fees to the State and the NRC (except for 3 months of startup costs). For the first year, the fees were established through the passage of SB96 during the 2002 legislative session. (DAR Note: S.B. 96 is found at UT L 2002 Ch 297, and was effective May 6, 2002.)

Comments by the department head on the fiscal impact the rule may have on businesses:
There is an annual fee for business that possess radioactive material in license category R313-70-7(2)(b)or (c). There is a per hour review fee authorized in the DEQ fee schedule.

The full text of this rule may be inspected, during regular business hours, at the Division of Administrative Rules, or at:
Environmental Quality
Radiation Control
168 N 1950 W
SALT LAKE CITY UT 84116-3085

Direct questions regarding this rule to:
Craig Jones at the above address, by phone at 801-536-4264, by FAX at 801-533-4097, or by Internet E-mail at cjones@deq.state.ut.us

Interested persons may present their views on this rule by submitting written comments to the address above no later than 5:00 p.m. on:

07/31/2002

This rule may become effective on:
09/10/2002

Authorized by:
William Sinclair, Director

RULE TEXT

R313. Environmental Quality, Radiation Control.

R313-70. Payments, Categories and Types of Fees.

R313-70-7. License Categories and Types of Fees for Radioactive Materials Licenses.

Fees shall be established in accordance with the Legislative Appropriations Act. Copies of established fee schedules may be obtained from the Executive Secretary.

TABLE

LICENSE CATEGORY	TYPE OF FEE
(1) Special Nuclear Material	
(a) Licenses for possession and use of special nuclear material in sealed sources contained in devices used in industrial measuring systems, including x-ray fluorescence analyzers and neutron generators.	New License or Renewal Annual Fee

(b) Licenses for possession and use of less than 15 g special nuclear material in unsealed form for research and development.	New License or Renewal Annual Fee
(c) All other special nuclear material licenses.	New License or Renewal Annual Fee
(d) Special nuclear material to be used as calibration and reference sources.	New License or Renewal Annual Fee
(2) Source Material.	
(a) Licenses for concentrations of uranium from other areas like copper or phosphates for the production of moist, solid, uranium yellow cake.	New License or Renewal Annual Fee
(b) Licenses for possession and use of source material in [~~recovery operations~~] extraction facilities such as [~~milling, in-situ leaching, heap leaching,~~	Annual Fee

~~ore buying stations, and~~
~~ion exchange facilities,~~
~~and in processing of ores~~
~~containing source material~~
~~for extraction of metals~~
~~other than uranium or~~
~~thorium,~~]conventional milling,
in-situ leaching, heap leaching,
and other processes including
licenses authorizing the possession
of byproduct [~~waste~~]material
(tailings and other wastes) from source material
[~~recovery operations~~]extraction facilities, as
well as licenses authorizing
the possession and maintenance
of a facility in a
standby mode[~~.~~], and
[~~(c) Licenses that Annual Fee~~
~~authorize the receipt of~~
~~byproduct material, as~~
~~defined in Section~~
~~19-3-102, from other~~
~~persons for possession~~
~~and disposal.~~
~~(d) B~~] licenses that [~~Annual Fee~~]
authorize the receipt
of byproduct material,
as defined in Section
19-3-102, from other
persons for possession and
disposal incidental to the
disposal of the uranium waste
tailings generated by the
licensee's milling

operations.	
(c) Licenses that authorize the receipt of byproduct material, as defined in Section 19-3-102, from other persons for possession and disposal.	Annual Fee
[~~(c)~~](d) Licenses for possession and use of source material for shielding.	New License or Renewal Annual Fee
[~~(f)~~](e) All other source material licenses.	New License or Renewal Annual Fee
(3) Radioactive Material Other than Source Material and Special Nuclear Material.	
(a)(i) Licenses of broad scope for possession and use of radioactive material for processing or manufacturing of items containing radioactive material for commercial distribution.	New License or Renewal Annual Fee
(a)(ii) Other licenses for	New License or Renewal Annual Fee

possession and use of radioactive material for processing or manufacturing of items containing radioactive material for commercial distribution.	
(b) Licenses authorizing the processing or manufacturing and distribution or redistribution of radio-pharmaceuticals, generators, reagent kits, or sources or devices containing radioactive material.	New License or Renewal Annual Fee
(c) Licenses authorizing distribution or redistribution of radiopharmaceuticals, generators, reagent kits, or sources or devices not involving processing of radioactive material.	New License or Renewal Annual Fee
(d) Licenses for possession and use of radioactive	New License or Renewal Annual Fee

material for industrial radiography operations.	
(e) Licenses for possession and use of sealed sources for irradiation of materials in which the source is not removed from its shield (self-shielded units).	New License or Renewal Annual Fee
(f)(i) Licenses for possession and use of less than 10,000 curies of radioactive material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes.	New License or Renewal Annual Fee
(f)(ii) Licenses for possession and use of 10,000 curies or more of radioactive material in sealed sources for irradiation	New License or Renewal Annual Fee

of materials in which the source is exposed for irradiation purposes.	
(g) Licenses to distribute items containing radioactive material that require device review to persons exempt from the licensing requirements of R313-19, except specific licenses authorizing redistribution of items that have have been authorized for distribution to persons exempt from the licensing requirements of R313-19.	New License or Renewal Annual Fee
(h) Licenses to distribute items containing radioactive material or quantities of radioactive material that do not require	New License or Renewal Annual Fee

device evaluation to persons exempt from the licensing requirements of R313-19, except for specific licenses authorizing redistribution of items that have been authorized for distribution to persons exempt from the licensing requirements of R313-19.	
(i) Licenses to distribute items containing radio-active material that require sealed source or device review to persons generally licensed under R313-21, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons generally licensed under R313-21.	New License or Renewal Annual fee
(j) Licenses to	New License or Renewal

distribute items containing radioactive material or quantities of radioactive material that do not require sealed source or device review to persons generally licensed under R313-21, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons generally licensed under R313-21.	Annual Fee
(k) Licenses for possession and use of radioactive material for research and development, which do not authorize commercial distribution.	New License or Renewal Annual Fee
(l) All other specific radioactive material licenses.	New License or Renewal Annual Fee
(m) Licenses of broad scope for	New License or Renewal

possession and use of radioactive material for research and development which do not authorize commercial distribution.	
(n) Licenses that authorize services for other licensees, except licenses that authorize leak testing or waste disposal services which are subject to the fees specified for the listed services.	New License or Renewal Annual Fee
(o) Licenses that authorize services for leak testing only.	New License or Renewal Annual Fee
(4) Radioactive Waste Disposal:	
(a) Licenses specifically authorizing the receipt of waste radioactive material from other persons for the purpose of commercial disposal	Application Fee New License or Renewal

by land by the licensee.	
(b) Licenses specifically authorizing the receipt of waste radioactive material from other persons for the purpose of packaging or repackaging the material. The licensee will dispose of the material by transfer to another person authorized to receive or dispose of the material.	New License or Renewal Annual Fee
(c) Licenses specifically authorizing the receipt of prepackaged waste radioactive material from other persons. The licensee will dispose of the material by transfer to another person	New License or Renewal Annual Fee

authorized to receive or dispose of the material.	
(d) Licenses authorizing packaging of radioactive waste for shipment to waste disposal site where licensee does not take possession of waste material.	New License or Renewal Annual Fee
(5) Well logging, well surveys and tracer studies.	
(a) Licenses for possession and use of radioactive material for well logging, well surveys and tracer studies other than field flooding tracer studies.	New License or Renewal Annual Fee
(b) Licenses for possession and use of radioactive material for field flooding tracer studies.	New License or Renewal Annual Fee
(6) Nuclear laundries.	
(a) Licenses for commercial	New License or Renewal Annual Fee

collection and laundry of items contaminated with radioactive material.	
(7) Human use of radioactive material.	
(a) Licenses for human use of radioactive material in sealed sources contained in teletherapy devices.	New License or Renewal Annual Fee
(b) Other licenses issued for human use of radioactive material, except licenses for use of radioactive material contained in teletherapy devices.	New License or Renewal Annual Fee
(c) Licenses of broad scope issued to medical institutions or two or more physicians authorizing research and development, including human use of radioactive	New License or Renewal Annual Fee

material, except licenses for radio-active material in sealed sources contained in teletherapy devices.	
(8) Civil Defense.	
(a) Licenses for possession and use of radioactive material for civil defense activities.	New License or Renewal Annual Fee
(9) Power Source.	
(a) Licenses for the manufacture and distribution of encapsulated radioactive material wherein the decay energy of the material is used as a source for power.	New License or Renewal Annual Fee
(10) General License.	
(a) Measuring, gauging and control devices as described in R313-21-22(4), other than hydrogen-3 (tritium) devices and polonium-210	Fee per registration certificate

devices containing no more than 10 millicuries used for producing light or an ionized atmosphere.		
(b) In Vitro testing	Fee per registration certificate	
(c) Depleted uranium	Fee per registration certificate	
(d) Reciprocal recognition, as provided for in R313-19-30, of a license issued by the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State.	Annual fee for license category listed in R313-70-7(1) through (10), per 180 days in one calendar year	

KEY: radioactive materials, x-rays, registration, fees

[~~August 13, 1999~~]2002

Notice of Continuation October 10, 2001

19-3-104~~(4)~~(6)

ADDITIONAL INFORMATION

PLEASE NOTE:

- Text to be deleted is struck through and surrounded by brackets (e.g., [~~example~~]). Text to be added is underlined (e.g., example). Some browsers may not depict some or any of these attributes on the screen or when the document is printed.
- Please see the **DISCLAIMER** regarding information available from state web pages.

For questions regarding the *content* or *application* of this rule, please contact Craig Jones at the above address, by phone at 801-536-4264, by FAX at 801-533-4097, or by Internet E-mail at cjones@deq.state.ut.us

For questions about the *rulemaking process*, please contact the **Division of Administrative Rules** (801-538-3764). *Please Note:* The Division of Administrative Rules is *NOT* able to answer questions about the content or application of these administrative rules.

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Last modified: 07/01/2002 4:21 AM

DAR File No. 24715

This filing was published in the 07/01/2002, issue, Vol. 2002, No.13, of the Utah State Bulletin.

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Environmental Quality, Radiation Control

R313-17-2

Public Notice and Public Comment Period

NOTICE OF CHANGE IN PROPOSED RULE

DAR File No.: 24715
Filed: 06/14/2002, 09:55
Received by: NL

RULE ANALYSIS

Purpose of the rule or reason for the change:
To maintain rules which are compatible with 10 CFR 40.

Summary of the rule or change:
To add two license categories to Subsection R313-17-2(1)(a). Subsection R313-17-2(1)(a) states that the Executive Secretary will give public notice and an opportunity to comment on proposed licensing actions for these license categories. (DAR NOTE: This change in proposed rule has been filed to make additional changes to a proposed amendment that was published in the May 1, 2002, issue of the Utah State Bulletin, on page 9. Underlining in the rule below indicates text that has been added since the publication of the proposed rule mentioned above; strike-out indicates text that has been deleted. You must view the change in proposed rule and the proposed amendment together to understand all of the changes that will be enforceable should the agency make this rule effective.)

State statutory or constitutional authorization for this rule:
Sections 19-3-103.5, 19-3-104, and 19-3-108

Anticipated cost or savings to:
the state budget:
Since this rule change requires only public notice and the opportunity to comment on proposed licensing actions associated with identified license categories, there is no cost or savings impact for the State budget.

local governments:

Since the rule requires only public notice and an opportunity to comment on licensing actions associated with identified license categories, there is no cost or savings impact to the local Government.

other persons:
Since the rule requires only public notice and an opportunity to comment on licensing actions associated with identified license categories, there is no cost or savings impact to other persons.

Compliance costs for affected persons:
Since the rule change only relates to public notice and an opportunity to comment on proposed licensing actions and not inspections, there is no compliance costs for affected persons associated with this rule change.

Comments by the department head on the fiscal impact the rule may have on businesses:
The rule change will have no fiscal impact on businesses.

The full text of this rule may be inspected, during regular business hours, at the Division of Administrative Rules, or at:
Environmental Quality
Radiation Control
168 N 1950 W
SALT LAKE CITY UT 84116-3085

Direct questions regarding this rule to:
Craig Jones at the above address, by phone at 801-536-4264, by FAX at 801-533-4097, or by Internet E-mail at cjones@deq.state.ut.us

Interested persons may present their views on this rule by submitting written comments to the address above no later than 5:00 p.m. on:
07/31/2002

This rule may become effective on:
09/10/2002

Authorized by:
William Sinclair, Director

RULE TEXT

R313. Environmental Quality, Radiation.

R313-17. Administrative Procedures.

R313-17-2. Public Notice and Public Comment Period.

(1) The Executive Secretary shall give public notice of, and an opportunity to comment on the following actions:

(a) Proposed licensing action for license categories 2b[~~,~~] and c,[~~ and d,~~] 4a, b, c, d and 6 identified in R313-70-7 or a proposed approval or denial of a significant radioactive materials license, license amendment, or license renewal.

(b) The initial proposed registration of an ionizing radiation producing machine which operates at a kilovoltage potential (kVp) greater than 200 in an open beam configuration. R313-17-2(1)(b) does not apply to use in the healing arts.

(c) Board activities that may have significant public interest and the Board requests the Executive Secretary to take public comment on those proposed activities.

(2) Public notice shall allow at least 30 days for public comment.

(3) Public notice may describe more than one action listed in R313-17-2(1) and may combine notice of a public hearing with notice of the proposed action.

(4) Public notice shall be given by publication in a newspaper of general circulation in the area affected by the proposed action. Notice shall also be given to persons on a mailing list developed by the Executive Secretary and those who request in writing to be notified.

KEY: administrative procedures, public comment, public hearings, orders

2002

Notice of Continuation July 23, 2001

19-3-103.5

19-3-104

ADDITIONAL INFORMATION

PLEASE NOTE:

- Text to be deleted is struck through and surrounded by brackets (e.g., [~~example~~]). Text to be added is underlined (e.g., example). Some browsers may not depict some or any of these attributes on the screen or when the document is printed.
- Please see the **DISCLAIMER** regarding information available from state web pages.

For questions regarding the *content* or *application* of this rule, please contact Craig Jones at the above address, by phone at 801-536-4264, by FAX at 801-533-4097, or by Internet E-mail at cjones@deq.state.ut.us

For questions about the *rulemaking process*, please contact the **Division of Administrative Rules** (801-538-3764). *Please Note:* The Division of Administrative Rules is *NOT* able to answer questions about the content or application of these administrative rules.

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Last modified: 07/01/2002 2:33 AM

DAR File No. 24758

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Environmental Quality, Radiation Control

R313-19-2

Requirements of General Applicability to Licensing of Radioactive Material

NOTICE OF CHANGE IN PROPOSED RULE

DAR File No.: 24758
Filed: 07/25/2002, 09:40
Received by: NL

RULE ANALYSIS

Purpose of the rule or reason for the change:
The division received public comments that require substantive change to the original rule.

Summary of the rule or change:
A wording change was suggested to ensure consistency with the Section R313-12-3 definitions for source material milling and byproduct material, definition (b) to make it clear which materials are covered using the specific terms as defined in the Utah Radiation Control rules. (DAR NOTE: This change in proposed rule has been filed to make additional changes to a proposed amendment that was published in the May 15, 2002, issue of the Utah State Bulletin, on page 22. Underlining in the rule below indicates text that has been added since the publication of the proposed rule mentioned above; strike-out indicates text that has been deleted. You must view the change in proposed rule and the proposed amendment together to understand all of the changes that will be enforceable should the agency make this rule effective.)

State statutory or constitutional authorization for this rule:
Sections 19-3-104 and 19-3-108

Anticipated cost or savings to:
the state budget:

Since there is a transfer of regulatory authority from federal to state government, there will be a savings impact through the collection of annual and review fees from licensees. The fees approved by the 2002 legislature contained within the Department of Environmental Quality (DEQ) fee schedule set the amounts of fees from $0 to $80,000 per year for closing, on standby, or operating facilities and a $70 per hour review fee. In comparison, the recently approved Nuclear Regulatory Commission (NRC) fees are approximately $78,000 annual fee with a $152 per hour review fee. Licensees will realize savings from the hourly review fee difference. The fees have been set to collect annual state program costs.

local governments:
Local governments are not subject to provisions of this rule, because no local governments in Utah have uranium recovery material licensees.

other persons:
There will be a cost impact associated with this rule change. Licensees will pay annual and review fees. Annual fees vary from $0 to $80,000 per year depending if the facility is closing, on standby, or operating. An hourly review fee of $70 per hour will be charged.

Compliance costs for affected persons:
There will be annual and review fee costs associated with this rule change. Fees are set by the legislature within the DEQ fee schedule and during the 2002 legislative session, annual fees from $0 to $80,000 per year were set for closing, on standby, and operating facilities with an hourly review fee of $70 per hour. The fees were established to pay on a monthly basis starting in January 2003 and legislation was crafted such to avoid licensees from having to pay duplicative fees to the State and to the NRC (except for 3 months of startup costs). For the first year, the fees were established through passage of S.B. 96 during the 2002 legislative session. S.B. 96 is found at UT L 2002 Ch 297, and was effective May 6, 2002.

Comments by the department head on the fiscal impact the rule may have on businesses:
This is an annual fee for businesses that possess radioactive material in license category Subsections R313-70-7(2)(b) or (c). There is a per hour review fee authorized in the DEQ fee schedule.

The full text of this rule may be inspected, during regular business hours, at the Division of Administrative Rules, or at:
Environmental Quality
Radiation Control
168 N 1950 W
SALT LAKE CITY UT 84116-3085

Direct questions regarding this rule to:
William Sinclair at the above address, by phone at 801-536-4250, by FAX at 801-533-4097, or by Internet E-mail at bsinclair@utah.gov

Interested persons may present their views on this rule by submitting written comments to the address above no later than 5:00 p.m. on:

09/16/2002

This rule may become effective on:
10/11/2002

Authorized by:
William Sinclair, Director

RULE TEXT

R313. Environmental Quality, Radiation Control.

R313-19. Requirements of General Applicability to Licensing of Radioactive Material.

R313-19-2. General.

(1) A person shall not receive, possess, use, transfer, own or acquire radioactive material except as authorized in a specific or general license issued pursuant to Rules R313-21 or R313-22 or as otherwise provided in Rule R313-19.

(2) In addition to the requirements of Rules R313-19, R313-21 or R313-22, all licensees are subject to the requirements of Rules R313-12, R313-15, and R313-18. Licensees authorized to use sealed sources containing radioactive materials in panoramic irradiators with dry or wet storage of radioactive sealed sources, underwater irradiators, or irradiators with high dose rates from radioactive sealed sources are subject to the requirements of Rule R313-34, licensees engaged in industrial radiographic operations are subject to the requirements of Rule R313-36, licensees using radionuclides in the healing arts are subject to the requirements of Rule R313-32, licensees engaged in land disposal of radioactive material are subject to the requirements of Rule R313-25, and licensees engaged in wireline and subsurface tracer studies are subject to the requirements of Rule R313-38. Licensees engaged in [~~uranium mill recovery~~]source material milling operations, authorized to possess byproduct [~~waste~~]material, as defined in Section R313-12-3 (see definition (b))[~~(tailings)~~] from source material [~~recovery~~]milling operations, authorized to possess and maintain a source material milling facility in standby mode, authorized to receive byproduct material from other persons for disposal, or authorized to possess and dispose of [~~source~~]byproduct material [~~waste tailings~~]generated by source material milling operations are subject to the requirements of Rule R313-24.

KEY: license, reciprocity, transportation, exemptions

2002

Notice of Continuation October 10, 2001

19-3-104

19-3-108

ADDITIONAL INFORMATION

PLEASE NOTE:

- Text to be deleted is struck through and surrounded by brackets (e.g., [~~example~~]). Text to be added is underlined (e.g., example). Some browsers may not depict some or any of these attributes on the screen or when the document is printed.
- Please see the **DISCLAIMER** regarding information available from state web pages.

For questions regarding the *content* or *application* of this rule, please contact William Sinclair at the above address, by phone at 801-536-4250, by FAX at 801-533-4097, or by Internet E-mail at bsinclair@utah.gov

For questions about the *rulemaking process*, please contact the **Division of Administrative Rules** (801-538-3764). *Please Note:* The Division of Administrative Rules is *NOT* able to answer questions about the content or application of these administrative rules.

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Last modified: 08/14/2002 4:19 PM

DAR File No. 24738

This filing was published in the 08/15/2002, issue, Vol. 2002, No.16, of the Utah State Bulletin.

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Environmental Quality, Radiation Control

R313-24

Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements

NOTICE OF CHANGE IN PROPOSED RULE

DAR File No.: 24738
Filed: 07/23/2002, 03:16
Received by: NL

RULE ANALYSIS

Purpose of the rule or reason for the change:
Received public comments that require substantive changes to the original proposed rule.

Summary of the rule or change:
This change is in response to comments offered by the Nuclear Regulatory Commission (NRC) during the public comment period. Changes made are those suggested by NRC to ensure that this rule is compatible (equivalent) with federal rules. Many of the changes are clarifications to or modifications of the original rule language as suggested by the NRC. NRC also recommended that a reference be added to ensure that the Executive Secretary provides a written analysis of any environmental report and this was accomplished by adding Subsection R313-24-3(3). It distinguishes where it is appropriate for the NRC (under the Commission) to continue jurisdiction and where it is appropriate for the State (under the Executive Secretary) to assume authority. (DAR NOTE: This change in proposed rule has been filed to make additional changes to a proposed new rule that was published in the May 15, 2002, issue of the Utah State Bulletin, on page 23. Underlining in the rule below indicates text that has been added since the publication of the proposed rule mentioned above; strike-out indicates text that has been deleted. You must view the change in proposed rule and the proposed new rule together to understand all of the changes that will be enforceable should the agency make this rule effective.)

State statutory or constitutional authorization for this rule:
Sections 19-3-104 and 19-3-108

Anticipated cost or savings to:
the state budget:

Since there is a transfer of regulatory authority from federal to state government, there will be a savings impact through the collection of annual and review fees from licensees. The fees approved by the 2002 legislature contained within the Department of Environmental Quality (DEQ) fee schedule set the amounts of fees from $0 to $80,000 year for closing, on standby, or operating facilities and a $70/hour review fee. In comparison, the recently approved NRC fees are approximately $78,000 annual fee with a $152/hour review fee. Licensees will realize savings from the hourly review fee difference. The fees have been set to collect annual state program costs.

local governments:
Local governments are not subject to provisions of this rule, because no local governments in Utah have uranium recovery radioactive material licenses.

other persons:
There will be a cost impact associated with this rule change. Licensees will pay annual and review fees. Annual fees vary from $0 to $80,000 per year depending if the facility is closing, on standby, or operating. An hourly review fee of $70 per hour will be charged.

Compliance costs for affected persons:
There will annual and review fees costs associated with this rule change. Fees are set by the legislature within the DEQ fee schedule and during the 2002 legislative session, annual fees from $0 to $80,000/year were set for closing, on standby, or operating facilities with an hourly review fee of $70/hour. The fees were established to be paid on a monthly basis starting in January 2003 and legislation was crafted such as to avoid licensees from having to pay duplicative fees to the State and to the NRC (except for 3 months of startup costs). For the first year, the fees were established through passage of S.B. 96 during the 2002 legislative session. S.B. 96 is found at UT L 2002 Ch 297, and was effective May 6, 2002.

Comments by the department head on the fiscal impact the rule may have on businesses:
This is an annual fee for businesses that possess radioactive material in the license category under Subsections R313-70-7(2)(b) or (c). There is a per hour review fee authorized in the DEQ fee schedule.

The full text of this rule may be inspected, during regular business hours, at the Division of Administrative Rules, or at:
Environmental Quality
Radiation Control
168 N 1950 W
SALT LAKE CITY UT 84116-3085

Direct questions regarding this rule to:
William Sinclair at the above address, by phone at 801-536-4250, by FAX at 801-533-4097, or by Internet E-mail at bsinclair@utah.gov

Interested persons may present their views on this rule by submitting written comments to the address above no later than 5:00 p.m. on:

09/16/2002

This rule may become effective on:
10/11/2002

Authorized by:
William Sinclair, Director

RULE TEXT

R313. Environmental Quality, Radiation Control.

R313-24. Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements.

R313-24-1. Purpose and Authority.

(1) The purpose of this rule is to prescribe requirements for possession and use of source material [~~in recovery~~]milling operations such as conventional milling, in-situ leaching, or heap-leaching[~~, and ion exchange facilities and in processing of ores containing source material for extraction of metals other than uranium or thorium~~]. The rule includes requirements for the possession of byproduct [~~waste material (tailings)~~]material, as defined in Section R313-12-3 (see "byproduct material" definition (b)), from source material [~~recovery~~]milling operations, as well as, possession and maintenance of a facility in standby mode. In addition, requirements are prescribed for the receipt of byproduct material[~~, as defined in Section 19-3-102,~~] from other persons for possession and disposal. The rule also prescribes requirements for receipt of byproduct material[~~, as defined in Section 19-3-102,~~] from other persons for possession and disposal incidental to the [~~uranium waste tailings~~]byproduct material generated by the licensee's source material milling operations.

(2) The rules set forth herein are adopted pursuant to the provisions of Subsections 19-3-104(4) and 19-3-104(8).

(3) The requirements of Rule R313-24 are in addition to, and not substitution for, the other applicable requirements of [~~these rules~~]Title R313. In particular, the provisions of Rules R313-12, R313-15, R313-18, R313-19, R313-21, R313-22, and R313-70 apply to applicants and licensees subject to Rule R313-24.

R313-24-2. Scope.

(1) The requirements in Rule R313-24 apply to [~~uranium mills, uranium mill tailings, and~~]source material milling operations, byproduct material, and byproduct material disposal facilities.

R313-24-3. Environmental Analysis.

(1) Each new license application, renewal, or major amendment shall contain an environmental report describing the proposed action, a statement of its purposes, and the environment affected. The environmental report shall present a discussion of the following.

(a) An assessment of the radiological and nonradiological impacts to the public health from the activities to be conducted pursuant to the license or amendment;

(b) An assessment of any impact on waterways and groundwater resulting from the activities conducted pursuant to the license or amendment;

(c) Consideration of alternatives, including alternative sites and engineering methods, to the activities to be conducted pursuant to the license or amendment; and

(d) Consideration of the long-term impacts including decommissioning, decontamination, and reclamation impacts, associated with activities to be conducted pursuant to the license or amendment.

(2) Commencement of construction prior to issuance of the license or amendment shall be grounds for denial of the license or amendment.

(3) The Executive Secretary shall provide a written analysis of the environmental report which shall be available for public notice and comment pursuant to R313-17-2.

R313-24-4. Clarifications or Exceptions.

For the purposes of Rule R313-24, 10 CFR 40.2a through 40.4; 40.12; 40.20(a); 40.21; 40.26(a) through (c); 40.31(h); 40.41(c); the introduction to 40.42(k) and 40.42(k)(3)(i); 40.61 (a) and (b); 40.65; and Appendix A to Part 40(2002) are incorporated by reference with the following clarifications or exceptions:

(1) The exclusion and substitution of the following:

(a) Exclude 10 CFR 40.26(c)(1) and replace with "(1) The provisions of Sections R313-12-51, R313-12-52, R313-12-53, R313-19-34, R313-19-50, R313-19-61, R313-24-1, Rules R313-14, R313-15, R313-18, and R313-24 (incorporating 10 CFR 40.2a, 40.3, 40.4, and 40.26 by reference)";[~~and~~]

(b) In Appendix A to 10 CFR 40, exclude Criterion 5B(1) through 5H, Criterion 7A, Criterion 13, and replace the excluded Criterion with "Utah Administrative Code, R317-6, Ground Water Quality Protection[~~.~~]"; and

(c) In Appendix A to 10 CFR 40, exclude Criterion 11A through 11F and Criterion 12;

(2) The substitution of the following:

(a) "[~~Board~~]10 CFR 40" for reference to "[~~Commission" in the definition of "compliance period," in paragraph four of the introduction to Appendix A, and in Criterion 5A(3) of Appendix A~~]this part" as found throughout the incorporated text;

(b) "Executive Secretary" for reference to "Commission" in the first and fourth references contained in 10 CFR 40.2a, in 10 CFR 40.3, 40.20(a), 40.26, 40.41(c), 40.61, and 40.65[~~, in the definition of "closure plan", in paragraph five of the introduction to Appendix A, in Criterion 6(2), 6(4), 6(6), 6A(2), 6A(3), 9, 10, 11A through 11E, and 12 of Appendix A~~;

~~(c) "10 CFR 40" for reference to "this part"~~];[

~~(d)~~]

(c) "Rules R313-19, R313-21, or R313-22" for "Section 62 of the Act" as found in 10 CFR 40.12(a);

([e]d) "Rules R313-21 or R313-22" for reference to "the regulations in this part" in 10 CFR 40.41(c);

([f]e) "Section R313-19-100" for reference to "part 71 of this chapter"[~~;~~

~~(g) "Executive Secretary" for reference to "appropriate NRC regional office as indicated in Appendix D to 10 CFR part 20 of this chapter, or the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555", or for reference to "appropriate NRC Regional Office shown in Appendix D to 10 CFR part 20 of this chapter, with copies to the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555" or for reference to "appropriate NRC regional office as indicated in Criterion 8A";~~

~~(h)~~] as found in 10 CFR 40.41(c);

(f) In 10 CFR 40.42(k)(3)(i), "R313-15-401 through R313-15-406" for reference to "10 CFR part 20, subpart E";

([~~t~~]g) "[~~uranium~~]source material milling" for reference to "uranium milling, in production of uranium hexafluoride, or in a uranium enrichment facility"[~~;~~

~~(j) "Utah Administrative Code, Rule R317-6, Ground Water Quality Protection"~~] as found in 10 CFR 40.65(a);

(h) "Executive Secretary" for reference to "[~~Environmental Protection Agency in 40 CFR part 192, subparts D and E" or "Environmental Protection Agency in 40 CFR part 192, subparts D and E (48 FR 45926, October 7, 1983)";~~

~~(k)~~]appropriate NRC Regional Office shown in Appendix D to 10 CFR part 20 of this chapter, with copies to the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555," as stated in 10 CFR 65(a)(1);

(I) "require the licensee to" for reference to "require to" in 10 CFR 40.65(a)(1); and

([I]J) In Appendix A to 10 CFR part 40, the following substitutions:

(i) "R313-12-3" for reference to "Sec. 20.1003 of this chapter"[:

~~(ii)~~] as found in the first paragraph of the introduction to Appendix A;

(ii) "Utah Administrative Code, Rule R317-6, Ground Water Quality Protection" for ground water standards in "Environmental Protection Agency in 40 CFR part 192, subparts D and E" as found in the Introduction, paragraph 4; or "Environmental Protection Agency in 40 CFR part 192, subparts D and E (48 FR 45926; October 7, 1983)" as found in Criterion 5;

(iii) "Board" for reference to "Commission" in the definition of "compliance period," in paragraph five of the introduction and in Criterion 5A(3);

(iv) "Executive Secretary" for reference to "Commission" in the definition of "closure plan", in paragraph five of the introduction, and in Criterions 6(2), 6(4), 6(6), 6A(2), 6A(3), 9, and 10 of Appendix A;

(v) "license issued by the Executive Secretary" for reference to "Commission license" in the definition of "licensed site," in the introduction to Appendix A;

([~~iii~~]vi) "Executive Secretary" for reference to "NRC" in Criterion 4[~~(d)~~]D;

([~~iv~~]vii) "representatives of the Executive Secretary" for reference to "NRC staff" in Criterion 6(6);

([~~v~~]viii) "Executive Secretary-approved" for reference to "Commission-approved" in Criterion 6[~~a~~]A(1) and Criterion 9;

(ix) "Executive Secretary" for reference to "appropriate NRC regional office as indicated in Criterion 8A" as found, Criterion 8, paragraph 2 or for reference to "appropriate NRC regional office as indicated in Appendix D to 10 CFR part 20 of this chapter, or the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555," as stated in Criterion 8A; and

([~~vi~~]x) "Executive Secretary" for reference to "the Commission or the State regulatory agency"[~~; and~~

~~(vii) "general or specific" for the reference to "NRC general or specific."~~] in Criterion 9, paragraph 2.

KEY: environmental analysis, uranium mills, tailings, monitoring

2002

19-3-104

19-3-108

ADDITIONAL INFORMATION

PLEASE NOTE:

- Text to be deleted is struck through and surrounded by brackets (e.g., [~~example~~]). Text to be added is underlined (e.g., example). Some browsers may not depict some or any of these attributes on the screen or when the document is printed.
- Please see the **DISCLAIMER** regarding information available from state web pages.

For questions regarding the *content* or *application* of this rule, please contact William Sinclair at the above address, by phone at 801-536-4250, by FAX at 801-533-4097, or by Internet E-mail at bsinclair@utah.gov

For questions about the *rulemaking process*, please contact the **Division of Administrative Rules** (801-538-3764). *Please Note:* The Division of Administrative Rules is *NOT* able to answer questions about the content or application of these administrative rules.

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Last modified: 08/14/2002 4:19 PM

Response to Comments received during public comment period on Rules R313-17-2(1)(a), R313-22-33(1)(e), and R313-70-7(b)(c)(d)(e)(f)

Division of Radiation Control
June 4, 2002

Response to Comments received during public comment period on Rules R313-17-2(1)(a), R313-22-33(1)(e), and R313-70-7(b)(c)(d)(e)(f)

David R. Bird, Parsons, Behle, and Latimer (for International Uranium Corporation)

1. We understand the Division considers the mechanics for transition from an NRC license to a State issued license to be a process matter and not appropriate for rule making. You have indicated it is the Division's intent to make the transition a simple paper exercise without a new hearing or public comment under the proposed R313-17-2. The State will convert the NRC license to a State license with the same dates (including expiration and renewal dates), terms, conditions without the need for the licensee to file any additional material. As discussed during the stakeholder process we believe that this is the best approach.

Response: The Executive Secretary concurs with the comments. No rulemaking change is needed.

2. The new license categories proposed in R313-70-7 (2) (b),(c), & (d) seem to cover the type of uranium milling and mill tailings activities that will require licensing. We note that the Utah Code Ann. 19-3-104 (5) as enacted by SB 96 establishes the fees that are to be charged during the transition period. During discussions at the stakeholder meetings and. this spring as SB96 was drafted, the Division asserted its belief it could administer the program at a reduced cost to the licensees. As IUC's current NRC license encompasses both new categories 2 (b) and (d), the fee structure must be approtioned to insure IUC does not pay double fees because it fits into two categories.

Response: The original rulemaking categories have been revised to combine (b) and (d) into one category at the request of the NRC and also to address the issue of duplicate fees as posed by Mr. Bird. This will require a reproposal of the rulemaking with the changes made for another 30-day public comment period. The commentor may again access whether the change(s) address the concerns raised.

3. We concur that the Public Notice and Public Comment provisions of R313-17-2, which treat the new license categories like other significant radioactive materials licenses, are appropriate.

Response: The Executive Secretary concurs with the comments. Due to the changes to R313-70-7 (2) (b),(c), & (d) which combine categories (b) and (d) into a single category, this rulemaking will be reproposed which will be subject to another 30-day public comment period.

Josephine M. Piccone, Deputy Director, Office of State and Tribal Programs, Nuclear Regulatory Commission

4. The fee category of (2)(b) mixes licenses covered under UMTRCA and those not covered under UMTRCA. This would not normally concern NRC except that these license categories are

used elsewhere in the regulations that are specific to uranium milling and 11e.(2) byproduct material requirements. We recommend that separate categories be used for licenses subject to UMTRCA (uranium mills, including in situ and heap leach, 11e.(2) disposal sites) and other source material not subject to UMTRCA (rare earth, ore buying stations, secondary extraction[IX]). Changes in license category may change the references in R313-17-2.

Response: We concur with the NRC comments. As a result, the categories have been revised as suggested and the rulemaking is being reproposed which will be subject to another 30-day public comment period.

Sarah M. Fields, Moab Utah

5. R313-17-2 should include a provision that the public notice be noticed in the Utah Bulletin and posted on the DRC web page under a specific section designated for the posting of public notices, providing an opportunity for public comment, hearings, or requests for administrative hearing.

Response: This is beyond the scope of the rulemaking for R313-17-2 which only added license categories that require public notice and/or hearing. The provisions of public notice for rulemakings occur at meetings of the Utah Radiation Control Board. All rulemaking are brought before the Board to obtain approval for a rulemaking to go forward to be filed with the Division of Administrative Rules which requires each Agency to hold a 30-day public comment period. Agendas and minutes for all Board meetings are available on the DRC website. The rulemaking has to come back before the Board following the close of a comment period for final approval which is also part of the notice found in the Board agenda and part of Board minutes. Once a rule is filed by the Agency it is published in the Utah State Bulletin and available electronically.

For the uranium mill rulemaking, as a result of Ms. Fields' comments, the proposed rules were made available on the DRC website. The Executive Secretary will examine the process of public notice from a public availability standpoint and make any necessary changes to the process. However, no changes in terms of the rulemaking will be made as a result of this comment.

5. R313 should clearly differentiate between a notice for comment and public hearing and a notice that would provide an opportunity for an adjudicatory hearing upon the request of a petitioner. and

6. The public noticing provisions of R313-17-2 should cover both types of hearings

Response: This is beyond the scope of the rulemaking for R313-17-2 which only added license categories that require public notice and/or hearing. For licensing action in the categories described in R313-17, there are specific requirements for notice and hearings. Once a licensing action is concluded and the Executive Secretary has made a final decision, a petitioner has 30 days to file for administrative hearing. Final licensing actions for the categories described in

R313-17-2 (which require public notice/hearing) are brought before the Utah Radiation Control Board as an information item at the next available meeting following a final decision. Depending on the public interest, a press release may announce that a final decision has occurred. A petitioner has responsibility to follow the licensing process to the final decision point and then request a hearing if deemed necessary following the procedures outlined in R313-17. The current process has worked satisfactorily for a number of years and no change in rulemaking is required to public notice the opportunity for an administrative hearing.

7. R313-17-2 should clearly state what kind of information should appear in a public notice. For example, a notice should indicate a knowledgeable contact person, state how pertinent information can be obtained from the DRC, or at the DRC, DEQ, or State of Utah web sites, etc.

Response: This is beyond the scope of the rulemaking for R313-17-2 which only added license categories that require public notice and/or hearing. DRC is given and appreciates the latitude it has in preparing public notices and the content of such notices. DRC is not in favor of a prescriptive process. DRC routinely sends all public notices "of all types" so that one public notice does not fit all circumstances. Once again, this is a process issue. Typical public notices do provide the information stated in comment #7. We will examine the public notice process and determine if the public notices can be better written to address some of the issues of the commentor. A change to the rule is not necessary in this case.

The Division of Radiation Control also received a letter from Ms. Sarah Fields on May 20, 2002 concerning rulemaking which is in a separate administrative rulemaking process at this time (R313-24). Ms. Fields requested an extension to the public comment period on the new rule, R313-24. A similar request was received via electronic mail from Mr. Bill Love of Moab. As a result of these requests, the public comment period on four rules filed on May 15, 2002 (which included R313-24) was extended to June 28, 2002. Also in the interest of providing opportunity for additional comment, the comment period was also extended on three rules to June 5, 2002. The extension for the public comment period was noticed in The Salt Lake Tribune, the Deseret News, the Moab Times-Independent, and the Blue Mountain Panorama (Blanding).

Ms. Fields also brought up many process questions which were addressed in a letter to Ms. Fields of May 24, 2002 which is included as part of this rulemaking packet. A copy of the letter to Mr. Love notifying him of the extension of May 24, 2002 is also included in this packet. Also attached are letters from Mr. David Bird, Josephine Piccone, and Ms. Sarah Fields which address issues relating to the rulemaking at hand: R313-17-2(1)(a), R313-22-33(1)(e), and R313-70-7(b)(c)(d)(e)(f)

Parsons Behle & Latimer

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May 30, 2002

VIA FAX 801-533-4097
AND U.S. MAIL

William Sinclair, Director
Division of Radiation Control
Department of Environmental Quality
168 North 1950 West
Salt Lake City, UT 84116-3085

Re: Comments to Proposed Rules: R313-17-2 (1)(a); R313-22-33 (e); and R313-70-7 (2)(b), (c), and (d).

Dear Bill:

Parsons Behle & Latimer is filing these comments on behalf of its client International Uranium (USA) Corporation ("IUC"), owner of the White Mesa Mill in Blanding, Utah.

We are commenting today generally on the process and specifically on the above listed proposed rules. IUC will be filing subsequent comments on the remaining proposed rules before the June 14th deadline.

The Division is to be commended for following the spirit of its agreement with stakeholders and the statutory requirements of Utah Code Ann. §§ 19-3-104(8) & (9) which provide that for the purpose of assuming Nuclear Regulatory Commission ("NRC") responsibilities the Board may adopt rules more stringent than corresponding federal regulations only if it makes a written finding, after public comment and hearing, and based on evidence in the record, that the corresponding federal regulations are not adequate to protect public health and the environment.

IUC believes that the NRC program is technically and scientifically sufficient to protect public health and the environment. However, it looks forward to the opportunity to work with the State of Utah and regulators attuned to the issues of the State and its citizens.

We understand the Division considers the mechanics for transition from an NRC license to a State issued license to be a process matter and not appropriate for rule making. You have indicated it is the Division's intent to make the transition a simple paper exercise without a new hearing or public comment period under proposed R313-17-2. The State will convert the NRC license to a State license with the same dates (including expiration and renewal dates), terms and conditions without the need for the licensee to file any additional material. As discussed during the stakeholder process we believe that this is the best approach.

The new license categories proposed in R313-70-7 (2)(b), (c) & (d) seem to cover the types of uranium milling and mill tailings activities that will require licensing. We note that Utah Code Ann. § 19-3-104 (5) as enacted by SB 96, establishes the fees that are to be charged during the transition period. During discussions at the stakeholder meetings and, this spring as SB 96 was drafted, the Division asserted its belief it could administer the program at a reduced cost to the licensees. As IUC's current NRC license encompasses both new categories 2(b) and (d), the fee structure must be apportioned to insure IUC does not pay double fees because it fits into two categories.

We concur that the Public Notice and Public Comment provisions of R313-17-2, which treat the new license categories like other significant radioactive materials licenses, are appropriate.

IUC appreciates the efforts the State is making in working toward an amended Agreement State Status and the opportunity to comment on these proposed rules.

Very truly yours,

David R. Bird

David R. Bird

DRB/ml

cc: Ron Hochstein
David Frydenlund, Esq.
Anthony Thompson, Esq.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 28, 2002

Mr. William J. Sinclair, Director
Division of Radiation Control
Department of Environmental Quality
168 North 1950 West
P.O. Box 144850
Salt Lake City, UT 84114-4850

Dear Mr. Sinclair:

We have reviewed the draft Utah regulations R313-17-2, "Public Notice and Public Comment Period," R313-22-33, "Generic Requirements for the Issuance of Specific Licenses," and R313-70-7, "License Categories and Types of Fees for Radioactive Materials Licenses" which were sent to us by e-mail dated April 16, 2002. The regulations were reviewed to ensure that the requirements in the Uranium Mill Tailings Radiation Control Act (UMTRCA) are adequately addressed by the Utah regulations. There is no direct NRC regulatory section that could be used for comparison.

As a result of the NRC review, we have one comment regarding the category of licenses in R313-70-7 (see enclosure). Amendment of the Utah regulations is needed to avoid confusion on which licensees are subject to the requirements in UMTRCA. Please note that we have limited our review to regulations required for compatibility and/or health and safety. Under our current procedure, a finding that a State regulation meets the compatibility and health and safety categories of the equivalent NRC regulation may only be made based on a review of the final State regulation. However, we have determined that if your proposed regulations were adopted incorporating the comments and without other significant change, they would meet the compatibility and health and safety categories established in the Office of State and Tribal Programs (STP) Procedure SA-200.

We request that when the proposed regulations are adopted and published as final regulations, a copy of the "as published" regulations be provided to us for review. As requested in STP Procedure SA-201, Review of State Regulations (November 10, 1998), please highlight the final changes and send one copy in a computer readable format, if possible. The State Regulation Status (SRS) Data Sheet will be updated when we have completed the review of the other regulations to implement the amended Agreement for uranium milling and management of 11e.(2) byproduct material.

If you have any questions regarding the comments, the compatibility and health and safety categories, or any of the NRC regulations used in the review, please contact me or Dennis Sollenberger of my staff at 301-415-2819 or DMS4@nrc.gov.

Sincerely,

Josephine M. Piccone

Josephine M. Piccone, Deputy Director
Office of State and Tribal Programs

Enclosure:
As stated

COMMENTS ON DRAFT UTAH REGULATIONS
AGAINST COMPATIBILITY AND HEALTH AND SAFETY CATEGORIES

State Regulation or SSR	NRC Regulation or SSR	RATS ID	Category	Subject and Comments
R313-70-7		NA	NA	Fee Category The fee category of (2)(b) mixes licenses covered under UMTRCA and with those not covered under UMTRCA. This would not normally concern NRC except that these license categories are used elsewhere in the regulations that are specific to uranium milling and 11e.(2) byproduct material requirements. We recommend that separate categories be used for licenses subject to UMTRCA (uranium mills including in situ and heap leach, 11e.(2) disposal sites) and other source material not subject to UMTRCA (rare earth, ore buying stations, secondary extraction [IX]). Changes in license category may change the references in R313-17-2.

From: "Sarah M. Fields" <smfields@moci.net>
To: Bill Sinclair <BSINCLAI.EQRAD.EQDOMAIN@deq.state.ut.us>
Date: 6/4/02 5:34PM
Subject: Comments on R313-17-2

Dear Mr. Sinclair,

Attached are comments on R313-17-2. Hard copy will follow in the mail.

Thank you for extending the comment periods. More extensive comments on the proposed rules noticed on May 15 will be transmitted at a later time.

Thank you also for providing me with all that information and putting information on the DRC web page.

I apologize that some of the information that I asked you about was actually there on your web site. I am sorry to say that I was not as familiar with your web page as I should have been and had not really looked around enough. Web sites often have nooks and crannies. Now I am more familiar with the information you have on your web site and know where to go to find things.

Sincerely,

Sarah Fields

June 4, 2002

Mr. William J. Sinclair
Division of Radiation Control
Department of Environmental Quality
168 North 1950 West
P.O. Box 144850
Salt Lake City, Utah 84114-4850
bsinclai@deq.state.ut.us

Re: Comments on Proposed Rule R313-17-2

R313-17-2 should include a provision that the public notice be noticed in the Utah Bulletin and posted on the DRC web page under a specific section designated for the posting of public notices providing an opportunity for public comment, hearings, or requests for adjudicatory hearing.

R313-17-2 should clearly differentiate between a notice for comment and public hearing and a notice that would provide an opportunity for an adjudicatory hearing upon the request of a petitioner.

The public noticing provisions of R313-17-2 should cover both types of hearings.

R313-17-2 should clearly state what kind of information should appear in a public notice. For example, a notice should indicate a knowledgeable contact person, state how pertinent information can be obtained from the DRC or at the DRC, DEQ, or State of Utah web sites, etc.

Sincerely,

Sarah M. Fields
P.O. Box 143
Moab, Utah 84532

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

DIVISION OF RADIATION CONTROL

Response to Comments regarding rulemaking R313-15-1001, "Waste Disposal - General requirements;" Requirements of General Applicability to Licensing of Radioactive Material - General;" R313-22-39; "Executive Secretary Action on Applications to Renew or Amend;" and R313-24, "Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements"

JULY 2002

Comments from the Nuclear Regulatory Commission, Office of State and Tribal Programs, Josephine Piccone

Reference: R313-24-3

1. The State must perform an analysis of the information and have it available prior to the hearings on the licensing action. We recommend that a new subsection be added to require written analysis be available prior to any hearing on the licensing action. This must be added for compatibility.

Response: A new subsection (3) has been added that states: " The Executive Secretary shall provide a written analysis of the environmental report which shall be available for public notice and comment pursuant to R313-17-2."

Reference: R313-24-4(1)(b)

2. The incorporation of the Utah groundwater standards instead of the 10 CFR Part 40, App. A Criteria will be addressed separately and must be resolved to be compatible.

Response: We understand the incorporation of the Utah groundwater standards will need to be addressed by an additional process other than rulemaking. The process will require that an NRC hearing be held and the Utah groundwater regulations be approved as an appropriate alternative standard for the protection of public health, safety, and the environment. The Executive Secretary will finalize the rulemaking which addresses the groundwater standards and address the separate process with the NRC. The Executive Secretary has committed to provide the NRC staff with an in-depth comparison of the groundwater standards in 10 CFR Part 40, Appendix A and R317-6. This comparison should also satisfy the requirements under the Radiation Control Act Section 104(8) and (9) to determine the equivalency of R317-6 with Appendix A. This information will be available as NRC determines the administrative process for determination of an "alternate standard."

Reference: R313-24-4(1)

3. Utah does not include Appendix A, Criteria 11A.through 11F. which are responsibilities reserved to the NRC in 10 CFR 150.15a(b). These criteria may be in the Utah regulations if referenced as items reserved for NRC affecting Utah licensees. Possible wording for such an exclusion: (c) In Appendix A to 10 CFR Part 40, exclude Criteria 11 and 12. Utah licensees should be aware of the requirements in these sections so that they can comply with the NRC requirements prior to termination of their license." This must be changed for compatibility.

Response: We concur with the NRC comment and will modify the rulemaking language as recommended. All changes to R313-24 as a result of public comment for this initial rulemaking will be accomplished. The rulemaking will be reproposed with a public comment period commencing on August 15, 2002 and ending September 16, 2002. The

Radiation Control Board can give final approval to R313-24 at the October 4, 2002 meeting depending upon stakeholder comments and the need to further address any substantive comments.

Reference: R313-24-4(2)(j)

4. The substitution of R317-6 for 40 CFR 192 standards is not appropriate since the EPA standards cover a broader spectrum of standards than the groundwater protection covered in R317-6. Utah may want to substitute the R317-6 for the groundwater standards in 40 CFR 192. This must be changed for compatibility.

Response: We concur with the NRC comment and will modify the rulemaking language as recommended. All changes to R313-24 as a result of public comment for this initial rulemaking will be accomplished. The rulemaking will be reproposed with a public comment period commencing on August 15, 2002 and ending September 16, 2002. The Radiation Control Board can give final approval to R313-24 at the October 4, 2002 meeting depending upon stakeholder comments and the need to further address any substantive comments.

Reference: R313-24-4(2)(l)(vii)

5. This substitution needs to be deleted. The proposed substitution is to a section that is reserved to NRC (see comment above as it applies to Criteria 11A-F and 12). This must be changed for compatibility.

Response: We concur with the NRC comment and will modify the rulemaking language as recommended. All changes to R313-24 as a result of public comment for this initial rulemaking will be accomplished. The rulemaking will be reproposed with a public comment period commencing on August 15, 2002 and ending September 16, 2002. The Radiation Control Board can give final approval to R313-24 at the October 4, 2002 meeting depending upon stakeholder comments and the need to further address any substantive comments.

Reference: R313-19-2

6. We suggest that the wording be changed to be consistent with the R313-12-3 definitions for source material milling and byproduct material(b) as follows:

"Licensees engaged in source material milling [operations], authorized to possess byproduct(b) material (tailings and other wastes)]from source material milling [operations], authorized to possess and maintain a source material milling facility in standby mode, authorized to received byproduct(b) material from other persons for disposal, or authorized to possess and dispose of byproduct(b) material generated by source material milling [operations] are subject to the requirements of R313-24." This wording would make it clear which materials are covered using the specific terms as defined in the Utah regulations.

Response: We concur with the NRC comment and will modify the rulemaking language as recommended. The change to R313-19-2 as a result of public comment for this initial rulemaking will be accomplished. The rulemaking for R313-19-2 will be reproposed with a public comment period commencing on August 15, 2002 and ending September 16, 2002. The Radiation Control Board can give final approval to R313-19-2 at the October 4, 2002 meeting depending upon stakeholder comments and the need to further address any substantive comments.

Reference: R313-24-1(1)

7. We suggest that the wording be changed to be consistent with the R313-12-3 definitions for source material milling and byproduct(b) material.

Paragraph (1) should read: "The purpose of this rule is to prescribe requirements for possession and use of source material in source material milling [operations] such as conventional milling, in situ leaching, or heap leaching. The rule includes requirements for the possession of byproduct(b) material as defined in R313-12-3 [(tailings and other wastes)] from source material milling [operations] as well as, requirements are prescribed for the receipt of byproduct(b) material from other persons for possession and disposal incidental to the byproduct(b) material generated by the licensee's source material milling operations."

Response: We concur with the NRC comment and will modify the rulemaking language as recommended. All changes to R313-24 as a result of public comment for this initial rulemaking will be accomplished. The rulemaking will be reproposed with a public comment period commencing on August 15, 2002 and ending September 16, 2002. The Radiation Control Board can give final approval to R313-24 at the October 4, 2002 meeting depending upon stakeholder comments and the need to further address any substantive comments.

Reference: R313-24-2

8. To use terms consistently, this section should read: "The requirements in Rule R313-24 apply to source material milling, byproduct(b) material, and byproduct(b) disposal facilities.

Response: We concur with the NRC comment and will modify the rulemaking language as recommended. All changes to R313-24 as a result of public comment for this initial rulemaking will be accomplished. The rulemaking will be reproposed with a public comment period commencing on August 15, 2002 and ending September 16, 2002. The Radiation Control Board can give final approval to R313-24 at the October 4, 2002 meeting depending upon stakeholder comments and the need to further address any substantive comments.

Reference: R313-24-4

9. The incorporation of 40.42(k)(3)(i) without the initial paragraph in 40.42(k) appears out of context and may be confusing to licensees. We suggest adding the introductory paragraph also.

Response: We concur with the NRC comment and will modify the rulemaking language as recommended. All changes to R313-24 as a result of public comment for this initial rulemaking will be accomplished. The rulemaking will be reproposed with a public comment period commencing on August 15, 2002 and ending September 16, 2002. The Radiation Control Board can give final approval to R313-24 at the October 4, 2002 meeting depending upon stakeholder comments and the need to further address any substantive comments.

Reference: R313-24-4(2)(i)

10. As commented above, the Utah terms should be used in the Utah regulations. Substitute "source material milling" for the first "uranium milling." It is not clear which section on 10 CFR Part 40 is being referred to in this substitution (40.65 is assumed). Please clarify by adding a reference to the specific section where the substitution is made.

Response: We concur with the NRC comment and will modify the rulemaking language as recommended. All changes to R313-24 as a result of public comment for this initial rulemaking will be accomplished. The rulemaking will be reproposed with a public comment period commencing on August 15, 2002 and ending September 16, 2002. The Radiation Control Board can give final approval to R313-24 at the October 4, 2002 meeting depending upon stakeholder comments and the need to further address any substantive comments.

Reference: R313-24-1(l)(i)

11. Please clarify in Appendix A the substitution is being made. You may want to add the phrase "in the first paragraph of the introduction to Appendix A."

Response: We concur with the NRC comment and will modify the rulemaking language as recommended. All changes to R313-24 as a result of public comment for this initial rulemaking will be accomplished. The rulemaking will be reproposed with a public comment period commencing on August 15, 2002 and ending September 16, 2002. The Radiation Control Board can give final approval to R313-24 at the October 4, 2002 meeting depending upon stakeholder comments and the need to further address any substantive comments.

Reference: R313-24-1(1)(ii)

12. Please clarify in Appendix A the substitution is being made. You may want to add the phrase "in the definition of licensed site in Appendix A."

Response: We concur with the NRC comment and will modify the rulemaking language as recommended. All changes to R313-24 as a result of public comment for this initial rulemaking will be accomplished. The rulemaking will be reproposed with a public comment period commencing on August 15, 2002 and ending September 16, 2002. The Radiation Control Board can give final approval to R313-24 at the October 4, 2002 meeting depending upon stakeholder comments and the need to further address any substantive comments.

Reference: R313-24-4(2)(l)(vi)

13. Please clarify in Appendix A the substitution is being made. You may want to add the phrase "in Criterion 9."

Response: We concur with the NRC comment and will modify the rulemaking language as recommended. All changes to R313-24 as a result of public comment for this initial rulemaking will be accomplished. The rulemaking will be reproposed with a public comment period commencing on August 15, 2002 and ending September 16, 2002. The Radiation Control Board can give final approval to R313-24 at the October 4, 2002 meeting depending upon stakeholder comments and the need to further address any substantive comments.

Comments from the law offices of Anthony J. Thompson on behalf of International Uranium Corporation

Reference: Proposed Rule R313-24, *Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements*:

14. R313-24-4(1)(b) calls for the replacement of 10 C.F.R. Part 40, Appendix A, Criteria 5B(1) through 5H, 7A, and 13, with Utah Administrative Code R317-6 entitled Groundwater Quality Protection. On this, IUC would like to make several comments.

DEQ's substitution of its groundwater quality regulations for NRC's regulatory program appears to fit the provisions of Section 274(o) of the Atomic Energy Act of 1954, as amended by UMTRCA, allowing an Agreement State under Section 83 to propose alternatives to the regulatory program promulgated by NRC to protect public health, safety, and the environment. IUC notes that, while DEQ may propose regulations in this manner, no regulations falling under these statutory provisions may be finalized or become effective until an NRC hearing is held and such regulations are approved as an appropriate alternative for the protection of public health, safety, and the environment.

Response: See response to comment #2, page 2. In addition, it places the State in a Catch-22 situation. The State must finalize rulemaking prior to submitting its final application for an amended Agreement to the NRC yet it is suggested that statutory provisions prohibit such regulations from becoming final or effective until a hearing is held and such regulations are approved as an appropriate alternative. It is prudent to

finalize the rulemaking, submit the final amended application, and allow the NRC process, including any determination of an alternate standard, to move forward.

15. EQ defines "pollutant" to include any radioactive materials discharged into "waters of the state." Under its NRC-approved groundwater monitoring program, IUC's "point of compliance" ("POC") is at the down gradient edge of the White Mesa Mill's tailings cells in the perched aquifer so that any potential release of radiological or hazardous constituents from the tailings cells into the perched groundwater zone may be detected and remediated. IUC understands that under R317-6-6.9, the Executive Secretary has the discretion to determine where the compliance monitoring point shall be after taking into account the site-specific characteristics of a given site. Please confirm that DEQ will adopt the NRC POC as the State's compliance monitoring point for the White Mesa Mill.

Response: A multiple set of factors are used (defined in R317-6-6.9) which are used to determine the appropriate number and location of the point of compliance (POC) wells. This is established during the groundwater discharge permit process in which International Uranium is currently engaged. DRC will consider all previous work accomplished under the NRC-approved groundwater monitoring program but must factor in changes to site specific conditions (e.g., mounding of groundwater effecting direction of groundwater flow). This issue seems appropriate for discussion during any determination relating to an alternate standard under the NRC process.

16. DEQ's discussion of Alternate Concentration Limits ("ACL") in R317-6-6(6.4) states that an ACL will be allowed for facilities with Class III groundwater if steps are being taken to correct the source of the contamination, including a program and timetable for completion, the "pollution" causes *no* threat to human health and the environment, and the ACL is justified based on *substantial overriding social and economic benefits*. First, NRC's Part 40, Criterion 5B(6) states that an ACL may be established if the constituent at issue will not post a *substantial present or potential hazard to human health or the environment* as long as the ACL is not exceeded. IUC believes that the imposition of a requirement that a pollutant pose *no* threat whatsoever may force licensees to engage in groundwater corrective action that may be too rigorous in light of the potential risk and, in some cases, impossible to achieve. Additionally, a component of DEQ's requirements for ACLs is that it is justified by *substantial overriding social and economic benefits*. An ACL is designed to preserve the quality of groundwater at a site when it can be demonstrated that it is not economically feasible, is impossible or unnecessary to remediate such groundwater to levels of higher quality because the ACL will protect against any significant threat to human health and the environment. This conflict with NRC's requirement for ACLs is significant and should be addressed prior to promulgating any final rule. In many cases, ACLs which are adequately protective of human health and the environment may be the only way sites will be able to fulfill license termination requirements. Thus, to avoid boxing DEQ and licensees into intractable problems in the future, the issue should be addressed now.

Response: DRC agrees with the commentor's characterization of an ACL which is described as "An ACL is designed to preserve the quality of the groundwater at a site

when it can be demonstrated that it is not economically feasible, is impossible, or unnecessary to remediate such groundwater to levels of higher quality because the ACL will protect against any significant threat to human health and the environment." In terms of the applicability of "substantial overriding social and economic benefits", such is limited in terms of it must be a case by case determination by the Utah Water Quality Board.

17. Additionally, there does not appear to be any explanation of the State ACL mechanism. As DEQ is well-aware, NRC has implemented guidance for ACLs which makes it plain how the ACL will function. NRC's ACLs involve a POC and point of exposure ("POE"). DEQ's rules identify a compliance monitoring point which assures protection of public health and the environment at the point of public exposure will be acceptable under DEQ rules but the mechanism is not clear.

Response: The mechanism is simpler than the guidance prepared by the NRC. The staff reviews the information provided by the licensee and in concert with the Executive Secretary makes a recommendation to the Water Quality Board who concurs with, modifies, or rejects the recommendation.

18. In its August 26, 2002 paper entitled *Elements of a Utah Agreement State Program for Uranium Mills Regulation, Divisions of Radiation Control and Water Quality, Utah Department of Environmental Quality*, DEQ stated that "[t]he State of Utah will clarify during rulemaking that there is no distinction between pre and post-1978 uranium and thorium mill tailings and wastes that would otherwise satisfy the definition of 11e.(2) byproduct material."

IUC requests that DEQ provide a citation to the applicable regulation where this will be addressed or a description of when and how this issue will be handled in the future.

Response: After some discussion following the "Elements" paper, it was determined that DRC would not make the pre and post-1978 uranium and thorium mill tailings and waste a rulemaking issue because anything "more stringent" than the current NRC regulatory framework would be judged not to be compatible. Therefore, this one issue could derail the entire rulemaking on compatibility grounds. DRC still maintains its ability to regulate pre-1978 material under certain conditions using its NORM (naturally occurring radioactive material) authority.

Comments from Sarah M. Fields, P.O. Box 143, Moab, Utah

Reference: R313-24

19. The Division of Radiation Control (DRC) should have provided more extensive explanation of the proposed rule. If this were a proposed federal regulation, the notice of the proposed rule would include extensive 'statements of consideration,' which would provide the public with further background information and would explicated and justify

the various sections of the proposed rule. Such explication and justification is missing from the proposed rule.

Response: As part of a final application package to the NRC to amend Utah's current Agreement to regulate uranium mills and tailings, Utah must develop equivalent rules to the NRC. The Division was given the statutory authority to promulgate rules during the 2002 Legislative Session. Seven rules have to be modified to develop the equivalent rules. Six of the rules require only minor changes to current rules such as to add a reference to the new R313-24 or add new licensing categories relating to uranium mills and tailings. R313-24 incorporates applicable parts of 10 CFR Part 40 by reference. The process has followed State of Utah rulemaking requirements which require certain filings that provide "statements of consideration" such as purpose of the rule or reason for a change to a rule, summary of the rule or change, aggregated anticipated cost or saving to the state budget, local government, and other persons, compliance costs for affected persons, fiscal impact on businesses, whether the rule or change is authorized or mandated by state law and indications of how public comment is to be received.

In regards to R313-24 which incorporates applicable parts of 10 CFR Part 40 by reference, the positives and negatives of 10 CFR Part 40 have been extensively discussed over the years since its promulgation at the federal level. The Division is also bound by statutory language in 19-3-104(8)(a) which states:

> "Except as provided in Subsection 9 (which details a process for adopting more stringent rules), for the purposes of the state assuming responsibilities from the United States Nuclear Regulatory Commission, with respect to sources of ionizing radiation, that are more stringent that the corresponding federal regulations which address the same circumstances"

The Division has chosen to adopt the appropriate federal regulations (10 CFR Part 40) by reference except for groundwater authority. This is consistent with recent adoption of other NRC promulgated regulations and is consistent with state policy in this regard. In addition, NRC has indicated in a letter of June 28, 2002 that "However, we have determined that if your proposed regulations were adopted incorporating the comments and without other significant change, they would meet the compatibility and health and safety categories established in the Office of State and Tribal Programs (STP) Procedure SA-200." This confirms that the Division has properly pursued the rulemaking process to allow the eventual decision regarding granting of an amended Agreement by the NRC.

Reference: R313-24-3. Environmental Analysis.

20. At R313-24-3(1), the DRC should explain what is meant by "major amendment" to a license. The DRC should provide clarification regarding what types of amendments to uranium recovery or byproduct disposal site licenses will require environmental reports.

Response: The term "major amendment" is defined in a Division of Radiation Control written policy of November 24, 1993 which states:

"Major amendments to the license require public notice. These amendments are necessary to enable the licensee to respond in a timely manner to common variations in the types and quantities of waste, technological enhancements, changes necessary to comply with new rules, and changes that substantially alter the facility or its operation."

This definition is consistent with the requirements of 40 CFR 270.42 (RCRA permit modification rules).

21. At R313-24-3-1, the DRC should state that environmental reports should include assessment of hazards related to the transportation of materials to and from the facility.

Response: R313-24-3-1(a) requires the licensee in the environmental report to assess the radiological and nonradiological impacts to the public health from the activities to be conducted pursuant to the license or amendment. This is broadly written and would include transportation concerns.

22. At R33-24-3-1, the DRC should state that the environmental report should include an assessment of the cumulative effects of the proposed action when considered with other similar actions. There should not be an attempt by the licensee to segment licensing actions so that an environmental report might not be required, of that the cumulative effects of a number of segmented licensing actions are never considered.

Response: See comment to #20, this is broadly written as mentioned above. In the event of a major license amendment, renewal, or new license application, an environmental report will be required.

23. R313-24-3 does not, but should, provide an opportunity for the public to comment on a draft environmental report.

Response: This has been addressed in comment #1, page 2.

24. R313-24-3 does not explain how the DRC will use the environmental report in making decisions regarding a proposed licensing action. There does not seem to be any provision for the issuance by the DRC of a document equivalent to an Environmental Impact Statement or an Environmental Assessment that are developed pursuant to the National Environmental Protection Act (NEPA). The DRC should have a provision for the development of documents equivalent to the federal NEPA documents.

Response: The Division of Radiation Control and the State of Utah do not have a statute similar to NEPA. The Division will have the licensee produce the environmental report in situations described in response to comment #21, Division staff will evaluate the report and provide comment and basis within the safety evaluation report, which will be subject to public notice and comment.

Reference: R313-24-4. Clarifications or Exceptions.

25. Although there is, apparently a reason, I am dismayed that the proposed rule only refers to certain applicable sections of the U.S. Nuclear Regulatory Commission (NRC) regulations at 10 C.F.R. Part 40 that are to be incorporated into R313-24. R313-24 does not take the applicable parts of Part 40 (as clarified) and turn them into specific sections of R313-24, elimination any reference to Part 40. It is a mistake not to do this and I am surprised that the Office of Tribal and State Programs would permit this. It will cause confusion to the Public, industry, the DRC, and the State Attorney General when there is a need to cite or quote a particular regulation that is only incorporated by reference into the DRC regulations. The DRC is improperly cutting corners. The State of Colorado, a NRC Agreement State, has incorporated all the applicable sections of Part 40 into the state's code of regulations as specific sections of their state regulations.

Response: The Division has followed all applicable state rulemaking procedures, which allows adoption of federal regulations by reference. The Office of State and Tribal Programs (OSTP) has exhaustively reviewed the Utah proposed regulations and has offered constructive comments. This is a responsibility that OSTP has as states apply for agreements or amended agreements. NRC has indicated in a letter of June 28, 2002 that "However, we have determined that if your proposed regulations were adopted incorporating the comments and without other significant change, they would meet the compatibility and health and safety categories established in the Office of State and Tribal Programs (STP) Procedure SA-200." This confirms that the Division has properly pursued the rulemaking process to allow the eventual decision regarding granting of an amended Agreement by the NRC. The public comment process allows parties described above (citizens, industry, Attorney General) to fully review and help identify and eliminate confusion.

26. The proposed rule does not explain what the DRC will rely upon to interpret NRC regulations. The proposed rule gives no information regarding how exactly the DRC intends to implement the NRC regulations. There is no mention of the use of DRC or NRC guidances that would be relied upon by the DRC, industry, and the public.

Response: The procedures that the Division will use have been described in the draft application submitted to the NRC on November 19, 2001.

27. The DRC should recognize the fact that the Part 40 regulations completely failed to assure that the uranium mill at Moab, Utah, was properly regulated, decontaminated, and decommissioned. Contrary to Part 40 regulations, no adequate surety was in place when Atlas went bankrupt. The surety was for $ 6.5 million, where it will take over 20 times that amount to cap the tailing in place and remediate the groundwater– all now at taxpayer expense. Of particular importance is the fact that the regulations did not assure that the balance of site at the former Atlas facility was not contaminated by the operation of the mill. The NRC completely failed to regulate the on-site contamination outside of the tailings impoundment. Therefore, the DRC should pay particular attention to activities at the facilities that could result in various types of on-site contamination. A

section referring to the potential for balance of site contamination and the control of such contamination should be included in DRC regulations.

Response: The DRC is well aware of regulatory issues surrounding the Moab Millsite. It is the intent to regulate uranium mills and tailings in accordance with existing rules to ensure that public health and the environment is protected. As an example of this intent, DRC points to the Corrective Action Order issued to International Uranium Corporation to investigate, delineate, and eventually cleanup a plume of chloroform on the millsite properties.

Reference: Sections of 10 C.F.R. Part 40 Incorporated into R313-24

Reference: 10 C.F.R. Sec. 40.2 Coverage of inactive tailings sites.

28. The DRC should clarify whether § 40.2(b) applies to uranium processing sites that should have been, but were not, included in the Title I remedial action program. I am particularly referring to the Fry Canyon site and the Hite tailings in the Colorado River at the bottom of Lake Powell. Does the DRC intend to use this regulation to assure that these sites are remediated? Does the DRC intend to use its authority under other DRC regulations to see that these former uranium processing site are remediated? Does the DRC intend to try to have these sites placed under the Title I program by the U.S. Congress? Or, does the DRC plan to just forget about them, as they have done for almost 50 years.

Response: It is our understanding that prior to the designation of sites as UMTRCA Title I and Title II that an extensive evaluation process was conducted on candidate sites. In the case of some sites, they were excluded because other materials were processed or in addition to uranium and thorium. An example of this was the Monticello site which was eventually remediated under the Superfund program. As far as the Hite site, this site sits under the waters of Lake Powell and it is impractical and infeasible to disturb the tailings by remediation.

The Fry Canyon site is in a remote location with small potential of risk to human health and the environment. After discovery of the site in June 1982, the site was evaluated under the Preliminary Assessment criteria under the Superfund program in 1987 and determined that it would not be a candidate site for the National Priorities list again because of the small risk and remote location. The Fry Canyon site operated between 1957-60 as a uranium upgrader facility and processed approximately 50,000 tons of ore. Approximately 45,000 tons of tailings remain at the site which also conducted copper leaching operations. The Bureau of Land Management (BLM) has always owned the site, however the site has been operated by Colorado Oil and Gas, Denver for uranium upgrading and Basinare Corporation of Monticello for copper leaching. The Fry Canyon site has also been the site of a groundwater remediation project (uranium) by the Department of Energy and the United States Geological Survey. On June 10, 1999, we provided Ms. Fields with a letter regarding contacts for this remediation project. Since

these sites were not designated as UMTRCA Title I or II sites, the rules that DRC will adopt by reference will not be applicable to these particular sites.

Reference: 10 C.F.R. Sec. 40.20 Definitions.

29. This section contains a number of definitions, such as the definition for "Corporation" that are not applicable to the regulation of uranium of thorium recovery facilities by either the NRC of an Agreement State. The DRC should delete the irrelevant definitions and stick to the applicable ones.

Response: The DRC is bound by SA-200 for compatibility purposes to adopt appropriate sections of 10 CFR Part 40. It is realized that some of this rulemaking may be outdated and not very applicable. NRC has chosen not to update the 10 CFR Part 40 regulations for a variety of reasons and so "no fix" to these issues is on the horizon. An option for any stakeholder is to petition the NRC for rulemaking to "fix" particular parts of 10 CFR Part 40 that a stakeholder feels strongly needs change.

Reference: 10 C.F.R. Sec. 40.20 Types of licenses.

30. This discussion of types of licenses is unclear because it does not explain under what circumstances a general license would be issued.

Response: See response to comment #31.

Reference: 10 C.F.R. Sec. 40.21 General license to receive title to source or byproduct material.

31. This regulation states that a general license is issued, but it does not state to whom, for what, and under what circumstances. It is vague and confusion and appears to come from another time and circumstance.

Response: Uranium has been viewed at times as an important commodity and it is the understanding of the DRC that this rule was intended to allow licensure of a "person" to receive title to (own) any quantity of source material. However, any general licensee would have to apply for and receive a specific license to receive, possess, use or transfer source material. The DRC is bound by SA-200 for compatibility purposes to adopt appropriate sections of 10 CFR Part 40. It is realized that some of this rulemaking may be outdated and not very applicable. NRC has chosen not to update the 10 CFR Part 40 regulations for a variety of reasons and so "no fix" to these issues is on the horizon. An option for any stakeholder is to petition the NRC for rulemaking to "fix" particular parts of 10 CFR Part 40 that a stakeholder feels strongly needs change.

Reference: 10 C.F.R. Sec. 40.26 General license for possession and storage of byproduct material as defined in 10 C.F.R. Part 40.

32. Again, it is unclear from the reading of this regulation as to when and why a general license would be required or useful. This regulation should be clarified. It is especially hard to understand, if an application is not necessary and the license would not be issued to a person, how general licenses are actually issued and why they are issued.

Response: In discussions with NRC staff, this particular section was promulgated during a time of immense statutory and regulatory changes and designed to be a "stop gap" measure in the event a specific license could not be issued in a timely manner to a licensee. The situation for which this rule was designed is not longer applicable. The DRC is bound by SA-200 for compatibility purposes to adopt appropriate sections of 10 CFR Part 40. It is realized that some of this rulemaking may be outdated and not very applicable. NRC has chosen not to update the 10 CFR Part 40 regulations for a variety of reasons and so "no fix" to these issues is on the horizon. An option for any stakeholder is to petition the NRC for rulemaking to "fix" particular parts of 10 CFR Part 40 that a stakeholder feels strongly needs change.

Reference: 10 C.F.R. Sec. 40.31(h) Application for specific licenses.

33. This regulation (as clarified by R313-24) refers to: "An application for a license to receive, possess, and use source material for uranium or thorium milling or by product material, as defined in 10 C.F.R. Part 40, at sites formerly associated with such milling shall contain proposed written specifications relating to milling operations and the disposition of the byproduct material to achieve the requirements and objectives set forth in appendix A of 10 C.F.R. Part 40." Emphasis added. It is unclear if this regulation also applies to applications for new licenses (i.e., at sites other than those formerly associated with such milling). This should be clarified.

Response: Again, this is written for a situation of the past and licensees which applied for a specific license at sites formerly associated with such milling (prior to the authorization of UMTRCA) were bound to upgrade facilities to meet the then new standards in Appendix A, 10 CFR Part 40.

34. This regulation should require an application to "contain proposed written specifications relating to milling operations and the disposition of the byproduct material to achieve the requirements and objectives set forth in "all applicable Division of Radiation Control and Ground Water Quality regulations (not just Appendix A of Part 40). The DRC should list the applicable State regulations.

Response: As part of a licensing process, a prospective or existing licensee will have many opportunities to interact with DRC staff to come to an understanding of the "requirements and objectives" of all applicable state rules. If it appeared that new licensees would come forth, it may be appropriate for DRC to publish a licensing guide that sets forth the criteria for obtaining a license. It is doubtful that any new licensee applications will be processed in the near future by NRC or DRC.

35. This regulation (as clarified by R313-24) states that "each application must clearly demonstrate how the requirements and objectives set forth in appendix A of 10 C.F.R. Part 40 have been addressed." This regulation should require that the applicant demonstrate how the requirements and objectives set forth in all applicable Division of Radiation Control and Ground Water Quality regulations (not just Appendix A) have been addressed. The DRC should list the applicable State regulations.

Response: See response to comment #34.

36. This regulation states that "failure to clearly demonstrate how the requirements and objectives in Appendix A have been addressed shall be grounds for refusing to accept an application." Again, this regulation should refer to and list all applicable Division of Radiation Control and Ground Water Quality regulations (not just refer to Appendix A).

Response: See response to comment #34.

Reference: 10 C.F.R. Sec. 40.61 Records

37. Here, part of the regulation reads: "The licensee shall retain each record of receipt of source or byproduct material as long as the material is possessed and for three years following transfer or disposition of the source or byproduct material." The regulation should require that the licensee keep records following the transfer of disposition of source or byproduct material until at least the termination of the transferees' license. Otherwise, that transfer of source material and byproduct material will be much harder to track historically when such tracking might be required to properly account for materials and characterize source and byproduct material that has been disposed of, or even transferred again. ~~The more complete the transfer and disposal record is, the better.~~

Response: The DRC is bound by SA-200 for compatibility purposes to adopt appropriate sections of 10 CFR Part 40. It is realized that some of this rulemaking may be outdated and not very applicable. NRC has chosen not to update the 10 CFR Part 40 regulations for a variety of reasons and so "no fix" to these issues is on the horizon. An option for any stakeholder is to petition the NRC for rulemaking to address the issue.

Reference: Appendix A to Part 40 – Introduction

38. The Introduction to Appendix A states in part:

> The [~~Commission~~] Executive Secretary may find that the proposed alternatives meet the [~~Commission~~'s] Executive Secretary's requirements if the alternatives will achieve a level of stabilization and containment of the sites concerned, and a level of protection for public health, safety, and the environment from radiological and nonradiological hazards associated with the sites, which is equivalent to, to the extent practicable, or more stringent that the level which would be achieved by the requirements of this appendix and the standards promulgated by the [~~Environmental Protection Agency in 40 CFR part 192,~~

~~subparts D and E~~] Utah Administrative Code, Rule R317-6, Ground Water Quality Protection.

Here the DRC has replaced the standards in 40 C.F.R. Part 192 with the State's Ground Water Quality Protection code. These regulations are not equivalent. 40 C.F.R. Part 192 standards apply to more than ground-water quality. They also apply to air quality. Therefore, the DRC must include a reference to applicable State or Federal air quality standards that must be achieved. Also, the Introduction refers to a level of stabilization and containment "more stringent than the level which would be achieved by the requirements of this appendix." Here the rule should also refer to and list all applicable requirements of the Division of Radiation Control (not just the requirements of "this appendix").

Response: See response to comment #4, the DRC will abide by requirements for other media in 40 CFR Part 192 other than the groundwater which will be addressed by requirement in R317-6.

Reference: Appendix A to Part 40 –Criterion 3

39. Criterion 3 begins by stating "the 'prime option' for disposal of tailings is placement below grade, either in mines or specially excavated pits." Emphasis added.
Here the problem is with the disposal of tailing in "mines." This statements should not longer appear in Part 40. I am sure that the NRC no longer considers the disposal of tailings in mines as an acceptable option. Except for thousands of tons of tailings that were used as backfill in several mines in New Mexico (only one of which has been properly decommissioned under Part 40), I do not believe that licensees have disposed of mill tailings in mines as a prime disposal option. This provision is obsolete and should be deleted.

Response: The DRC is bound by SA-200 for compatibility purposes to adopt appropriate sections of 10 CFR Part 40. It is realized that some of this rulemaking may be outdated and not very applicable. NRC has chosen not to update the 10 CFR Part 40 regulations for a variety of reasons and so "no fix" to these issues is on the horizon. An option for any stakeholder is to petition the NRC for rulemaking to address the issue.

Reference: Appendix A to Part 40 – Criterion 5A(1)

40. Criterion 5A(1) states in part:

> Unless exempted under paragraph 5A(3) of this criterion, surface impoundments (except for an existing portion) must have a liner that is designed, constructed, and installed to prevent any migration of wastes out of the impoundment to the adjacent subsurface soil, ground water, or surface water at any time during the active life (including the closure period) of the impoundment.

Here the regulation should state that the liner should be designed and function to prevent any migration of wastes during the active life of the impoundment and until the impoundment has dried to a specific moisture content that would guarantee that no more leachate will flow from the impoundment. A liner does not last forever. Over time it will degrade and leachate will migrate from the impoundment into the subsurface if there is still moisture within the impoundment. The liner should be designed, constructed, and installed to function as a leachate barrier as long as there is leachate in the pile that will migrate Unless the "closure period" contemplates the drying of the impoundment sufficiently to preclude migration of leachate, the regulation should allow for this drying out period (however long that may take).

There is also a question whether the criteria in Appendix A, particularly those related to tailing impoundment liners, meet the statutory mandate contained in 42 U.S.C. Sec. 2114 Sec. 2114.

42 U.S.C. Sec. 2114 Sec. 2114, Authorities of Commission respecting certain byproduct material" requires:

> (a) Management function
>
> The Commission shall insure that the management of any byproduct material, as defined in section (e)(2) of this title, is carried out in such manner as -
> * * *
> (3) conforms to general requirements established by the Commission, with the concurrence of the [EPA] Administrator, which are, to the maximum extent practicable, at least comparable to requirements applicable to the possession, transfer, and disposal of similar hazardous material regulated by the Administrator under the Solid Waste Disposal Act, as amended.

A discussion in a Commission meeting of June 17, 1999, that was attended by the Director, DRC, would lead one to believe that the NRC requirements with respect the management of byproduct material might no be comparable to the EPA requirements, for similar hazardous material under the Solid Waste Disposal Act ("SWDA"), as amended. It appears that the EPA might require the construction of a double liner for the disposal of similar hazardous material under the SWDA. There is also a question regarding whether the Administrator of the EPA has appropriately concurred with the Commission regulations and found that the Commission. See Transcript of Commission Meeting of June 17, 1999, pages 20 to 25.

Therefore the DRC should make sure the NRC regulation that is proposes to adopt meet the mandate of the statute. If the NRC regulations for the management of byproduct material are not comparable to the EPA requirement s for similar hazardous material, then it is up to the DRC to adopt regulation that are comparable to the requirements of the SWDA. The DRC should not skirt the requirements of the statute.

Response: The DRC will protect human health and the environment. New tailings cells will be constructed using current technology and standards. Existing tailings cells will continue to be monitored to ensure that any release is rapidly detected.

Reference: Appendix A to Part 40 –II. Financial Criteria, Criterion 9

41. The DRC should take a hard look at Criterion 9 in the light of the bankruptcy of the Atlas Corporation, the former owner of the Moab Mil. Criterion 9 and the NRC staff's implementation of that criteria failed completely and absolutely to assure that the funds necessary to decommission and reclaim the Moab Mill site were available.

Criterion 9 states, in part:

> In establishing specific surety arrangements, the licensee's cost estimates must take into account total cost that would be incurred if an independent contractor were hired to reform the decommissioning and reclamation work.

Criterion 9 only requires that the surety cover the costs that would be incurred if an independent contractor were to perform the decommissioning and reclamation of the site. However, Criterion 9 failed to assure that the meager surety funds that were available for reclamation were actually spent on reclamation work at the Moab Mill site. Thirty seven percent of the surety funds were spent on the administration of the surety funds and on legal fees. These costs were not figured into the original surety. Another expense was consultant fees. Again, these costs were not figured into the original surety.

Additionally, when the NRC went to collect the surety of $ 6.5 million, they were not even able to collect the full amount of the surety bone. They were able to collect $5,250,00 because of hanky panky. In other words, only 80 percent of the surety was actually recovered, and, once recovered, most of that money was not spent on actual reclamation work. Something is seriously wrong with Criterion 9. The DRC has an obligation to completely review the Atlas bankruptcy and determine what exactly were the problems with Criterion 9 and NRC's implementation of Criterion 9.

The regulations the DRC adopts to assure that all necessary funds are available to decommission and reclaim a facility and to assure that all funds will actually be spend to the decommissioning and reclamation of the facility cannot be based solely on Criterion 9. Criterion 9 does not provide the assurances that are required by the Atomic Energy Act of 1954, as amended by the Uranium Mill Tailings Act of 1978.
42 U.S.C. Sec. 2201(x) requires that the Commission establish standards and instructions to ensure:

> That an adequate bond, surety, or other financial arrangement (as determined by the Commission) will be provided before termination of any license for byproduct material as defined in section 11e.(2), by a license to permit the completion of all requirements establish by the Commission for the decontamination,

decommissioning, and reclamation of sites, structures, and equipment used in conjunction with byproduct material as so defined.

As has been shown by the experiences related to the Atlas bankruptcy, Criterion 9 does not meet this statutory requirement. Therefore, it is up the DRC to establish regulations that meet the requirement of 42 U.S.C. Sec. 22101(x).

Response: The DRC is bound by SA-200 for compatibility purposes to adopt appropriate sections of 10 CFR Part 40. It is realized that some of this rulemaking may be outdated and not very applicable. NRC has chosen not to update the 10 CFR Part 40 regulations for a variety of reasons and so "no fix" to these issues is on the horizon. An option for any stakeholder is to petition the NRC for rulemaking to "fix" the problem. DRC is very aware of the issues surrounding the Moab Millsite and recognizes the need to insure that appropriate financial assurance mechanisms are in place and evaluated in the event that a site has to be closed by a third party contractor.

42. The DRC has an obligation to make clear to the public what exactly happens when a licensee goes bankrupt. The NRC had to wing it with the Atlas bankruptcy. The public was never given a realistic picture of what was happening. Nothing was aid out before hand in any NRC policy or regulation. The DRC must take into consideration the fact that they will probably no longer be able to recover licensing fees when a licensee seeks bankruptcy. The DRC must make clear whether the State will take the responsibility to hire contractors to decommission a site when the licensee is no longer able to take that action or whether the State will establish a trust where the trustee and its legal advisors will be able to skim off a large portion of the surety in administering such trust. The DRC must make clear how they will assure that they will be able to actually recovery [sic] the whole amount of the surety bond, not just 80 percent. The DRC must make clear how they will assure that the surety will actually cover all decommissioning and reclamation costs, including ground-water reclamation, new studies, and consultant fees.

The DRC must make clear who will make up the deficit if there is not enough money in the surety to cover the costs of reclamation. In the Atlas situation the federal taxpayers will pay the bill. Will the state taxpayers be stuck with the bill when the surety is not sufficient once the State is an Agreement State for uranium recovery? Or, will the State cut corners on the reclamation so the reclamation plan fits the surety amount? Or, will the State go to Congress and ask that the Department of Energy (DOE) take over the site? What exactly will the State do?

Response: The DRC gained invaluable experience by participating in the Atlas bankruptcy proceeding. The State of Utah, through the Attorney General's Office, filed a claim against Atlas in the bankruptcy court proceedings and was awarded judgment in the case. The State and the NRC were signees to an bankruptcy agreement which allowed establishment of a trustee to operate the site until Congress eventually designated the site to the UMTRCA Title I program. There were some valuable lessons learned by the State in participating in this process.

Reference: Appendix A to Part 40 – II. Financial Criteria, Criterion 10

43. Criterion 10 states in part:

> A minimum charge of $250,000 (1978 dollars) to cover the costs of long-term surveillance must be paid by each mill operator to the general treasury of the United States or to an appropriate State agency prior to the termination of a uranium or thorium mill license.

Here the DRC should update the minimum charge to a current dollar amount.
Again, the DRC should review this regulation in the light of the Atlas experience. It is clear that funds for long-term surveillance of the Moab Mill site are not available. It is also clear that even now, the federal agencies have no idea of what long-term surveillance requirements will actually be if the Moab Mill tailings are capped in place.
Criterion 10 falls far short of actually assuring that all the costs of long-term surveillance would actually be paid by the licensee. The DRC financial assurance regulations must state that funds to cover the long-terms surveillance costs must be provided by the licensee prop to the operation of a facility and be periodically updated. The State should not wait until the facility is about to be decommissioned or the license is about to be terminated.

Response: The DRC is bound by SA-200 for compatibility purposes to adopt appropriate sections of 10 CFR Part 40. It is realized that some of this rulemaking may be outdated and not very applicable. NRC has chosen not to update the 10 CFR Part 40 regulations for a variety of reasons and so "no fix" to these issues is on the horizon. An option for any stakeholder is to petition the NRC for rulemaking to address the issue.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 28, 2002

Mr. William J. Sinclair, Director
Division of Radiation Control
Department of Environmental Quality
168 North 1950 West
P.O. Box 144850
Salt Lake City, UT 84114-4850

Dear Mr. Sinclair:

We have reviewed the draft Utah regulations R313-15-1001, "Waste Disposal - General Requirements;" R313-19-2, "Requirements of General Applicability to Licensing of Radioactive Material - General;" R313-22-39, "Executive Secretary Action on Applications to Renew or Amend;" and R313-24, "Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements," which were sent to us by e-mail dated April 24, 2002 for the first three rules and April 17, 2002 for the last rule. The regulations were reviewed to ensure that the requirements in the Uranium Mill Tailings Radiation Control Act (UMTRCA) are adequately addressed by the Utah regulations. The regulations were reviewed by comparison to the equivalent Nuclear Regulatory Commission (NRC) regulations in 10 CFR Part 40 including Appendix A and 10 CFR Part 150. We discussed our review of the regulations with you and your staff on June 3, 2002.

The NRC review has identified five comments required to be addressed for compatibility and several suggestions to clarify the language of the proposed regulations (Enclosed). For the most part, the suggestions provide clarifications to avoid confusion on what materials are covered in the revised regulations. The NRC review does not include comments on the groundwater portion of the regulations which will be addressed separately. Under our current procedure, a finding that a State regulation meets the compatibility and health and safety categories of the equivalent NRC regulation may only be made based on a review of the final State regulation. However, we have determined that if your proposed regulations were adopted incorporating the comments and without other significant change, they would meet the compatibility and health and safety categories established in the Office of State and Tribal Programs (STP) Procedure SA-200.

We request that when the proposed regulations are adopted and published as final regulations, a copy of the "as published" regulations be provided to us for review. As requested in STP Procedure SA-201, Review of State Regulations (November 10, 1998), please highlight the final changes and send one copy in a computer readable format, if possible. The State Regulation Status (SRS) Data Sheet has been updated and is enclosed.

If you have any questions regarding the comments, the compatibility and health and safety categories, or any of the NRC regulations used in the review, please contact me or Dennis Sollenberger of my staff at 301-415-2819 or DMS4@nrc.gov.

Sincerely,

Dennis M. Sollenberger for

Josephine M. Piccone, Deputy Director
Office of State and Tribal Programs

Enclosures:
As stated

COMMENTS ON DRAFT UTAH REGULATIONS
NEEDED FOR COMPATIBILITY

State Regulation or SSR	NRC Regulation or SSR	RATS ID	Category	Subject and Comments
R313-24-3	10 CFR 150.		C	The State must perform an analysis of the information and have it available prior to the hearings on the licensing action. We recommend that a new subsection be added to require written analysis of the environmental report and that the analysis be available prior to any hearing on the licensing action. This must be added for compatibility.
R313-24-4 (1)(b)	App. A, Crit. 5B-F, Crit. 7		C	The incorporation of the Utah groundwater standards instead of the 10 CFR Part 40, App. A Criteria will be addressed separately and must be resolved to be compatible.
R313-24-4 (1)	App. A, Crit.11&12, Part 150.15a(b)		NRC	Utah does not exclude App. A, Criteria 11A through 11F, and Criterion 12 which are responsibilities reserved to the NRC in 10 CFR 150.15a(b). These criteria may be in the Utah regulations if referenced as items reserved for NRC affecting Utah licensees. Possible wording for such an exclusion: "(c) In Appendix A to 10 CFR Part 40, exclude Criteria 11 and 12. Utah licensees should be aware of the requirements in these sections so that they can comply with the NRC requirements prior to termination of their license." This must be changed for compatibility.
R313-24-4 (2)(j)			C	The substitution of R317-6 for 40 CFR 192 standards is not appropriate since the EPA standards cover a broader spectrum of standards than the groundwater protection covered in R317-6. Utah may want to substitute the R317-6 for the groundwater standards in 40 CFR 192. This must be changed for compatibility.
R313-24-4 (2)(l)(vii)			NRC	This substitution needs to be deleted. The proposed substitution is to a section that is reserved to NRC (see comment above as it applies to Criteria 11A-F and 12). This must be changed for compatibility.

CLARIFICATIONS AND SUGGESTIONS

State Regulation	Subject and Comments
R313-19-2	We suggest that the wording be changed to be consistent with the R313-12-3 definitions for source material milling and byproduct material(b) as follows: "Licensees engaged in source material milling [operations], authorized to possess byproduct(b) material [(tailings and other wastes)] from source material milling [operations], authorized to possess and maintain a source material milling facility in standby mode, authorized to receive byproduct(b) material from other persons for disposal, or authorized to possess and dispose of byproduct(b) material generated by source material milling [operations] are subject to the requirements of R313-24." This rewording would make it clear which materials are covered using the specific terms as defined in the Utah regulations.
R313-24-1 (1)	We suggest that the wording be changed to be consistent with the R313-12-3 definitions for source material milling and byproduct(b) material. Paragraph (1) should read: "The purpose of this rule is to prescribe requirements for possession and use of source material in source material milling [operations] such as conventional milling, in situ leaching, or heap-leaching. The rule includes requirements for the possession of byproduct(b) material, as defined in R313-12-3, [(tailings and other wastes)] from source material milling [operations], as well as, possession and maintenance of a facility in standby mode. In addition, requirements are prescribed for the receipt of byproduct(b) material from other persons for possession and disposal. The rule also prescribes requirements for receipt of byproduct(b) material from other persons for possession and disposal incidental to the byproduct(b) material generated by the licensee's source material milling operations."
R313-24-2	To use terms consistently, this section should read: "The requirements in Rule R313-24 apply to source material milling, byproduct(b) material, and byproduct(b) disposal facilities.
R313-24-4	The incorporation of 40.42(k)(3)(i) without the initial paragraph in 40.42(k), appears out of context and may be confusing to licensees. We suggest adding the introductory paragraph also.
R313-24-4 (2)(i)	As commented above, the Utah terms should be used in the Utah regulations. Substitute "source material milling" for the first "uranium milling." It is not clear which section on 10 CFR Part 40 is being referred to in this substitution (40.65 is assumed). Please clarify by adding a reference to the specific section where the substitution is to be made.
R313-24-4 (2)(I)(i)	Please clarify where in Appendix A the substitution is being made. You may want to add the phrase "in the first paragraph of the Introduction to Appendix A."
R313-24-4 (2)(I)(ii)	Please clarify where in Appendix A the substitution is being made. You may want to add the phrase "in the definition of licensed site in Appendix A."
R313-24-4 (2)(I)(vi)	Please clarify where in Appendix A the substitution is being made. You may want to add the phrase "in Criterion 9."

[ ] bracketed material may be left out without changing the meaning of the regulations.

STATE REGULATION STATUS

State: Utah
[Two amendments reviewed are identified by a ★ at the beginning of each equivalent NRC regulation.]

Tracking Ticket Number:
Date: June 28, 2002

NRC Chronology Identification	FR Notic (Due Dat for State Implemetation)	RATS ID	Proposed (P) / Final (F)[1] Rule / ML #[4]	NRC Review / Y, N[2] / Date / ML #[4]	Final State Regulation[1] (Effective Date)
Safety Requirements for Radiographic Equipment-Part 34	55 FR 843 (1/10/94)	1991-1			1/10/94
ASNT Certification of Radiographers-Part 34	56 FR 115 4; (none)	1991-2			Not required[3]
Standards for Protection Against Radiation-Part 20	56 FR 23 0; 56 FR 61352; 57 FR 38 8; 57 FR 57877; 58 FR 67 7; 59 FR 41641; 60 FR 20 3; (1/1/94)	1991-3	F	N 2/10/98	1/23/98
Notification of Incidents-Parts 20, 30, 31, 34, 39, 40, 70	56 FR 64 0; (10/15/94)	1991-4			10/26/94
Quality Management Program and Misadministrations-Part 35	56 FR 34 4; (1/27/95)	1992-1	P	N 1/26/98	3/10/95
Eliminating the Recordkeeping Requirements for Departures from Manufacturer's Instructions-Parts 30, 35	57 FR 45 6; (none)	1992-2			Not required[3]
Decommissioning Recordkeeping and License Termination: Documentation Additions [Restricted areas and spill sites]-Parts 30, 40	58 FR 39 8; (10/25/96)	1993-1	F	N 1/8/97	11/15/96
Licensing and Radiation Safety Requirements for Irradiators-Part 36	58 FR 77 5; (7/1/96)	1993-2	F	N 6/14/00	3/10/00
Definition of Land Disposal and Waste Site QA Program-Part 61	58 FR 33 6; (7/22/96)	1993-3	P	N 9/23/96	5/31/96
Self-Guarantee as an Additional Financial Mechanism-Parts 30, 40, 70	58 FR 68 6; 59 FR 1618; (none)	1994-1			Not required[3]
★Uranium Mill Tailings Regulations: Conforming NRC Requirements to EPA Standards-Part 40	59 FR 28 0; (7/1/97)	1994-2	P ML021780639	Y 6/28/02 ML021790511	
Timeliness in Decommissioning Material Facilities-Parts 30, 40, 70	59 FR 36 6; (8/15/97)	1994-3	F	N 2/10/98	7/18/97
Preparation, Transfer for Commercial Distribution, and Use of Byproduct Material for Medical Use-Parts 30, 32, 35	59 FR 61 7; 59 FR 65243; 60 FR 32 ; (1/1/98)	1995-1	F	N 2/10/98	7/18/97
Frequency of Medical Examinations for Use of Respiratory Protection Equipment-Part 20	60 FR 79 0; (3/13/98)	1995-2	P	N 1/26/98	3/20/98
Low-Level Waste Shipment Manifest Information and Reporting-Parts 20, 61	60 FR 15 9; 60 FR 25983; (3/1/98)	1995-3	P	N 1/26/98	1/23/98
Performance Requirements for Radiography Equipment-Part 34	60 FR 28 3; (6/30/98)	1995-4			7/18/97
Radiation Protection Requirements: Amended Definitions and Criteria-Parts 19, 20	60 FR 36 8; (8/14/98)	1995-5	P	N 1/26/98	3/20/98
Clarification of Decommissioning Funding Requirements-Parts 30, 40, 70	60 FR 38 5; (11/24/98)	1995-6	F	N 2/10/98	7/18/97
Medical Administration of Radiation and Radioactive Materials-Parts 20, 35	60 FR 4 3; (10/20/98)	1995-7	P	N 1/26/98	8/11/98

NRC Chronology Identification	FR Notice (Due Date for State Implementation)	RATS ID	Proposed (P) / Final (F)[1] Rule / ML #[4]	NRC Review / Y[2] N[2] / Date / ML #[4]	Final State Regulation[1] (Effective Date)
10 CFR Part 71: Compatibility with the International Atomic Energy Agency - Part 71	60 FR 50248; 61 FR 28724; (4/1/99)	1996-1	F	N 4/16/99	3/12/99
One Time Extension of Certain Byproduct, Source and Special Nuclear Material Licenses-Parts 30, 40, 70	61 FR 1109; (none)	1996-2	F	N 2/10/98	Not required[3]
Termination or Transfer of Licensed Activities: Recordkeeping Requirements-Parts 20, 30, 40, 61, 70	61 FR 24669; (6/17/99)	1996-3	F Part 30	N 2/10/98	3/20/98
Resolution of Dual Regulation of Airborne Effluents of Radioactive Materials; Clean Air Act-Part 20	61 FR 65120; (1/9/00)	1997-1	P	N 1/26/98	3/20/98
Recognition of Agreement State Licenses in Areas Under Exclusive Federal Jurisdiction Within an Agreement State-Part 150	62 FR 1662; (2/27/00)	1997-2			6/11/99
Criteria for the Release of Individuals Administered Radioactive Material-Parts 20, 35	62 FR 4120; (5/29/00)	1997-3	P	N 1/26/09	3/20/98
Fissile Material Shipments and Exemptions-Part 71	62 FR 5907; (none)	1997-4			Not required[3]
Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiography Operations-Parts 30, 34, 71, 150	62 FR 28947; (6/27/00)	1997-5	F	N 4/1/98	5/15/97
Radiological Criteria for License Termination-Parts 20, 30, 40, 70	62 FR 39057; (8/20/00)	1997-6	F	N 6/14/00	3/10/00
Exempt Distribution of a Radioactive Drug Containing One Microcurie of Carbon-14 Urea-Part 30	62 FR 63634; (1/02/01)	1997-7	F	N 4/16/99	3/12/99
Deliberate Misconduct by Unlicensed Persons-Parts 30, 40, 61, 70, 71, 150	63 FR 1890; 63 FR 13773; (2/12/01)	1998-1	F ML011100015	N 7/31/01 ML012150220	1/26/01
Self-Guarantee of Decommissioning Funding by Nonprofit and Non-Bond-Issuing Licensees- Parts 30, 40, 70	63 FR 29535; (none)	1998-2			Not required[3]
License Term for Medical Use Licenses-Part 35	63 FR 31604; (none)	1998-3			Not required[3]
Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations-Part 34	63 FR 37059, (7/9/01)	1998-4	P ML010870073	N 4/27/01 ML011170330	5/11/01
Minor Corrections, Clarifying Changes, and a Minor Policy Change-Parts 20, 35, 36	63 FR 39477; 63 FR 45393; (10/26/01)	1998-5	F ML013530478	N 2/7/02 ML020390486	9/14/01
Transfer for Disposal and Manifests: Minor Technical Conforming Amendments-Part 20	63 FR 50127; (11/20/01)	1998-6	F ML013530478	N 2/7/02 ML020390486	9/14/01
★Radiological Criteria for License Termination of Uranium Recovery Facilities-Part 40	64 FR 17506; (6/11/02)	1999-1	P ML021780639	N 6/28/02 ML021790511	
Requirements for Those Who Possess Certain Industrial Devices Containing Byproduct Material to Provide Requested Information-Part 31	64 FR 42269; (none)	1999-2			Not required[3]
Respiratory Protection and Controls to Restrict Internal Exposure-Part 20	64 FR 54543; 64 FR 55524; (2/2/03)	1999-3	F ML013530478	Y 2/7/02 ML020390486	9/14/01
Energy Compensation Sources for Well Logging and Other Regulatory Clarifications-Part 39	65 FR 20337; (5/17/03)	2000-1	F ML012850044	Y 12/27/01 ML020020182	9/14/01

NRC Chronology Identification	FR Notice (Due Date for State Implementation)	RATS ID	Proposed (P) / Final (F)[1] Rule / ML #[4]	NRC Review / Y, N[2] / Date / ML #[4]	Final State Regulation[1] (Effective Date)
New Dosimetry Technology-Parts 34, 36, 39	65 FR 63750; (1/8/04)	2000-2	P Part 34 ML010870073	N 4/27/01 ML011170330	
Requirements for Certain Generally Licensed Industrial Devices Containing Byproduct Material-Parts 30, 31, and 32	65 FR 79162; (2/16/04)	2001-1			
Revision of the Skin Dose Limit-Part 20 that became effective April 5, 2002.	67 FR 16298; (4/5/05)	2002-1			
Medical Use of Byproduct Material-Parts 20, 32, and 35	67 FR 20249; (4/24/05)	2002-2			

1. Or other generic Legally Binding Requirements.

2. (Y/N) Y means "Yes," there are comments in the review letter that the State needs to address.
   N means "No," there are no comments in the review letter.

3. Not required means these regulations are not required for purposes of compatibility.

4. ADAMS ML Number

Law Offices of Anthony J. Thompson, P.C.

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June 28, 2002

VIA FACSIMILE, ELECTRONIC-MAIL AND US MAIL

Mr. William Sinclair, Director
Division of Radiation Control
Department of Environmental Quality
168 North 1950 West
Salt Lake City, UT 84116-3085

Re: IUC's Comments on Proposed Rules

Dear Bill:

The Law Offices of Anthony J. Thompson, P.C. is filing these comments on behalf of its client International Uranium (USA) Corporation ("IUC"), owner and operator of the White Mesa Mill in Blanding, Utah.

IUC's specific comments on the Proposed Rules currently out for public comment are the following:

Proposed Rule R313-24, *Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements:*

(1) R313-24-4(1)(b) calls for the replacement of 10 C.F.R. Part 40, Appendix A, Criteria 5B(1) through 5H, 7A, and 13, with Utah Administrative Code R317-6 entitled *Groundwater Quality Protection*. On this point, IUC would like to make several comments.

DEQ's substitution of its groundwater quality regulations for NRC's regulatory program appears to fit the provisions of Section 274(o) of the Atomic Energy Act of 1954, as amended by UMTRCA, allowing an Agreement State under Section 83 to propose alternatives to the regulatory program promulgated by NRC to protect public health, safety, and the environment. IUC notes that, while DEQ may propose regulations in this manner, no regulations falling under these statutory provisions may be finalized or become effective until an NRC hearing is held and such regulations are approved as an appropriate alternative for the protection of public health, safety, and the environment.

DEQ defines "pollutant" to include any radioactive materials discharged into "waters of the state." Under its NRC-approved groundwater monitoring program, IUC's "point of compliance" ("POC") is at the downgradient edge of the White Mesa Mill's tailings cells in the perched aquifer so that any potential release of radiological or hazardous constituents from the tailings cells into the perched groundwater zone may be detected and remediated. IUC understands that under R317-6-6.9, the Executive Secretary has the discretion to determine where the compliance monitoring point shall be after taking into account the site-specific characteristics of a given site. Please confirm that DEQ will adopt the NRC POC as the State's compliance monitoring point for the White Mesa Mill.

(2) DEQ's discussion of Alternate Concentration Limits ("ACL") in R317-6-6(6.4) states that an ACL will be allowed for facilities with Class III groundwater if steps are being taken to correct the source of the contamination, including a program and timetable for completion, the "pollution" causes *no* threat to human health and the environment, and the ACL is justified based on *substantial overriding social and economic benefits*. First, NRC's Part 40, Criterion 5B(6) states that an ACL may be established if the constituent at issue will not pose a *substantial present or potential hazard to human health or the environment* as long as the ACL is not exceeded. IUC believes that the imposition of a requirement that a pollutant pose *no* threat whatsoever may force licensees to engage in groundwater corrective action that may be too rigorous in light of the potential risk and, in some cases, impossible to achieve. Additionally, a component of DEQ's requirements for ACLs is that it is justified by *substantial overriding social and economic benefits*. An ACL is designed to preserve the quality of groundwater at a site when it can be demonstrated that it is not economically feasible, is impossible or unnecessary to remediate such groundwater to levels of higher quality because the ACL will protect against any significant threat to human health and the environment if it is not exceeded. The Utah criteria are vague and undefined and appear to have little or no relation to protection of human health and the environment. This conflict with NRC's requirement for ACLs is significant and should be addressed prior to promulgating any final rule. In many cases, ACLs which are adequately protective of human health and the environment may be the only way sites will be able to fulfill license termination requirements. Thus, to avoid boxing DEQ and licensees into intractable problems in the future, the issue should be addressed now.

(3) Additionally, there does not appear to be any explanation of the State ACL mechanism. As DEQ is well-aware, NRC has implemented guidance for ACLs which makes it plain how the ACL will function. NRC's ACLs involve a POC and point of exposure ("POE"). DEQ's rules identify a compliance monitoring point but no POE. Presumably, the ACL at the compliance monitoring point which assures protection of public health and the environment at the point of public exposure will be acceptable under DEQ rules but the mechanism is not clear.

(4) In its August 26, 2000 paper entitled *Elements of a Utah Agreement State Program for Uranium Mills Regulation, Divisions of Radiation Control and Water Quality, Utah Department of Environmental Quality*, DEQ stated that "[t]he State of Utah

will clarify during rulemaking that there is no distinction between pre and post-1978 uranium and thorium mill tailings and wastes that would otherwise satisfy the definition of 11e.(2) byproduct material."

IUC requests that DEQ provide a citation to the applicable regulation where this will be addressed or a description of when and how this issue will be handled in the future.

IUC appreciates the opportunity to comments on these Proposed Rules and looks forward to working with DEQ in the future.

Very truly yours,

Anthony J. Thompson

June 26, 2002

Mr. William J. Sinclair
Division of Radiation Control
Department of Environmental Quality
168 North 1950 West
P.O. Box 144850
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RE: PROPOSED RULE R313-24 — Comments on Division of Radiation Control, Department of Environmental Quality, State of Utah, Proposed Rule (DAR File No. 24738, published in the 05/15/2002, issue, Vol. 2002, No.10, of the Utah State Bulletin).

I. R313-24

1. General

The Division of Radiation Control (DRC) should have provided more extensive explanation of the proposed rule. If this were a proposed federal regulation, the notice of the proposed rule would include extensive 'statements of consideration,' which would provide the public with further background information and would explicate and justify the various sections of the proposed rule. Such explication and justification is missing from the proposed rule.

2. R313-24-3. Environmental Analysis.

a. At R313-24-3(1), the DRC should explain what is meant by "major amendment" to a license. The DRC should provide clarification regarding what types of amendments to uranium recovery or byproduct disposal site licenses will require environmental reports.

b. At R33-24-3-1, the DRC should state that environmental reports should include assessment of hazards related to the transportation of materials to and from the facility.

c. At R33-24-3-1, the DRC should state that the environmental report should include an assessment of the cumulative effects of the proposed action when considered with other similar actions. There should not be an attempt by the licensee to segment licensing actions so that an environmental report might not be required, or that the cumulative effects of a number of segmented licensing actions are never considered.

d. R313-24-3 does not, but should, provide an opportunity for the public to comment on a draft environmental report.

e. R313-24-3 does not explain how the DRC will use the environmental report in making decisions regarding a proposed licensing action. There does not seem to be any provision for the issuance by the DRC of a document equivalent to an Environmental

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

DIVISION OF RADIATION CONTROL

Response to Comments regarding reproposed rulemaking R313-19-2, "Requirements of General Applicability to Licensing of Radioactive Material" and R313-24, "Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements"

SEPTEMBER 2002

Comments from the law offices of Parsons, Behle, and Latimer (Lindsay Ford) on behalf of International Uranium Corporation

Reference: Proposed Rule R313-24, *Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements*:

1. There was concern expressed regarding the process being used to incorporate the Utah groundwater standards in place of 10 C.F.R. Part 40, Appendix A Criteria.

RESPONSE: It was recognized that in DRC response to comments earlier, it had been indicated the need for NRC to approve the Utah groundwater rules as "an appropriate alternative standard for the protection of public health, safety, and the environment." It was also pointed out the Division is preparing an in depth comparison which should satisfy requirements of the NRC and the Radiation Control Act. DRC indicated that the information will be available as NRC determines the administrative process for determination of an "alternate standard." The commenter accepted the approach DRC has taken and emphasizes the need for requirements of UCA 19-3-104(8) and (9) be met. DRC will work closely with IUC and others in addressing concerns as they may arise during the "groundwater standard approval process."

Parsons
Behle &
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September 16, 2002

VIA FAX 801-533-4097
AND HAND DELIVERY

William Sinclair, Director
Division of Radiation Control
Department of Environmental Quality
168 North 1950 West
Salt Lake City, UT 84116-3085

Re: Comments to Proposed Rules: R313-19-2 and R313-24.

Dear Bill:

Parsons Behle & Latimer is filing these comments on behalf of its client International Uranium (USA) Corporation ("IUC"), operator of the White Mesa Mill in Blanding, Utah.

We are addressing today specifically the process the Division is using to incorporate the Utah groundwater standards in place of 10 C.F.R. Part 40, App. A. Criteria.

Your response to comments made by both the NRC and IUC in the earlier round of rulemaking indicates the need for an NRC hearing to approve the Utah groundwater regulations as "an appropriate alternative standard for the protection of public health, safety and the environment."

You also indicated the Division is preparing "an in-depth comparison of the groundwater standards in 10 CFR Part 40, Appendix A and R317-6" which "should satisfy the requirements under the Radiation Control Act Section 104(8) and (9)" to establish their equivalency. The Response to Comments promises: "This information will be available as NRC determines the administrative process for determination of an 'alternate standard.'"

IUC recognizes the "Catch-22 situation" you feel the state is in where it must finalize rulemaking prior to submitting its final application. We accept the approach the Division is taking but again reiterate our concern that the requirements of Utah Code Ann. §§ 19-3-104(8) & (9) be met.

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Title R15. Administrative Services, Administrative Rules.

As in effect on September 1, 2002

Title table of contents prepared by the Division of Administrative Rules.

For questions regarding the *content* or *application* of rules under Title R15, please contact the promulgating agency. A list of agencies with links to their homepages is available at **http://www.utah.gov/government/agencylist.html**.

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Rule R15-1. Administrative Rule Hearings.

As in effect on September 1, 2002

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R15-1-1. Authority.

(1) This rule establishes procedures and standards for administrative rule hearings as required by Subsection 63-46a-10(1)(a).

(2) The procedures of this rule constitute the minimum requirements for mandatory administrative rule hearings. Additional procedures may be required to comply with any other governing statute, federal law, or federal regulation.

R15-1-2. Definitions.

(1) Terms used in this rule are defined in Section 63-46a-2.

(2) In addition:

(a) "hearing" means an administrative rule hearing; and

(b) "officer" means an administrative rule hearing officer.

R15-1-3. Purpose.

(1) The purpose of this rule is to provide:

(a) procedures for agency hearings on proposed administrative rules or rules changes, or on the need for a rule or change;

(b) opportunity for public comment on rules; and

(c) opportunity for agency response to public concerns about rules.

R15-1-4. When Agencies Hold Hearings.

(1) Agencies shall hold hearings as required by Subsection 63-46a-5(2).

(2) Agencies may hold hearings:

(a) during the public comment period on a proposed rule, after its publication in the bulletin and prior to its effective date;

(b) before initiating rulemaking procedures under Title 63, Chapter 46a, to promote public input prior to a rule's publication;

(c) during a regular or extraordinary meeting of a state board, council, or commission, in order to avoid separate and additional meetings; or

(d) to hear any public petition for a rule change as provided by Section 63-46a-12.

(3) Voluntary hearings, as described in this section, follow the procedures prescribed by this rule or any other procedures the agency may provide by rule.

(4) Mandatory hearings, as described in this section, follow the procedures prescribed by this rule and any additional requirements of state or federal law.

(5) If an agency holds a mandatory hearing under the procedures of this rule during the public comment period described in Subsection 63-46a-4(6), no second hearing is required for the purpose of comment on the same rule or change considered at the first hearing.

R15-1-5. Hearing Procedures.

(1) Notice.

(a) An agency shall provide notice of a hearing by:

(i) publishing the hearing date, time, place, and subject in the bulletin;

(ii) mailing copies of the notice directly to persons who have petitioned for a hearing or rule changes under Section 63-46a-5 or 63-46a-12, respectively; and

(iii) posting for at least 24 hours in a place in the agency's offices which is frequented by the public.

(b) If a rules hearing becomes mandatory after the agency has published the proposed rule in the bulletin, the agency shall notify in writing persons requesting the hearing of the time and place.

(c) An agency may provide additional notice of a hearing, and shall give further notice as may otherwise be required by law.

(2) Hearing Officer.

(a) The agency head shall appoint as hearing officer a person qualified to conduct fairly the hearing.

(b) No restrictions apply to this appointment except the officer shall know rulemaking procedure.

(c) However, if a state board, council, or commission is responsible for agency rulemaking, and holds a hearing, a member or the body's designee may be the hearing officer.

(3) Time. The officer shall open the hearing at the announced time and place and permit comment for a minimum of one hour. The hearing may be extended or continued to another day as necessary in the judgment of the officer.

(4) Comment.

(a) At the opening of the hearing, the officer shall explain the subject and purpose of the hearing and invite orderly, germane comment from all persons in attendance. The officer may set time limits for speakers and shall ensure equitable use of time.

(b) The agency shall have a representative at the hearing, other than the officer, who is familiar with the rule at issue and who can respond to requests for information by those in attendance.

(c) The officer shall invite written comment to be submitted at the hearing or after the hearing, within a reasonable time. Written comment shall be attached to the hearing minutes.

(d) The officer shall conduct the hearing as an open, informal, orderly, and informative meeting. Oaths, cross-examination, and rules of evidence are not required.

(5) The Hearing Record.

(a) The officer shall cause to be recorded the name, address, and relevant affiliation of all persons speaking at the hearing, and cause an electronic or mechanical verbatim recording of the hearing to be made, or make a brief summary, of their remarks.

(b) The hearing record consists of a copy of the proposed rule or rule change, submitted written comment, the hearing recording or summary, the list of persons speaking at the hearing, and other pertinent documents as determined by the agency.

(c) The hearing officer shall, as soon as practicable, assemble the hearing record and transmit it to the agency for consideration.

(d) The hearing record shall be kept with and as part of the rule's administrative record in a file available at the agency offices for public inspection.

R15-1-8. Decision on an Issue Regarding Rulemaking Procedure.

(1) When a hearing issue requires a decision regarding rulemaking procedure, the officer shall

submit a written request for a decision to the director as soon as practicable after, or after recessing, the hearing, as provided in Section R15-5-6. The director shall reply to the agency head as provided in Subsection R15-5-6(2). The director's decision shall be included in the hearing record.

R15-1-9. Appeal and Judicial Review.

(1) Persons may appeal the decision of the agency head or the division by petitioning the district court for judicial review as provided by law.

KEY

administrative law, government hearings

Date of Enactment or Last Substantive Amendment

June 1, 1996

Notice of Continuation

October 16, 2000

Authorizing, Implemented, or Interpreted Law

63-46a-10

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Rule R15-2. Public Petitioning for Rulemaking.

As in effect on September 1, 2002

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R15-2-1. Authority.

As required by Subsection 63-46a-12(2), this rule prescribes the form and procedures for submission, consideration, and disposition of petitions requesting the making, amendment, or repeal of an administrative rule.

R15-2-2. Definitions.

(1) Terms used in this rule are defined in Section 63-46a-2.

(2) In addition, "rule change" means:

(a) making a new rule;

(b) amending, repealing, or repealing and reenacting an existing rule;

(c) amending a proposed rule further by filing a change in proposed rule under the provisions of Section 63-46a-6;

(d) allowing a proposed (new, amended, repealed, or repealed and reenacted) rule or change in proposed rule to lapse; or

(e) any combination of the above.

R15-2-3. Petition Procedure.

(1) The petition shall be addressed and delivered to the head of the agency authorized by law to make the rule change requested.

(2) The agency receiving the petition shall stamp the petition with the date of receipt.

R15-2-4. Petition Form.

The petition shall:

(a) be clearly designated "petition for a rule change";

(b) state the approximate wording of the requested rule change;

(c) describe the reason for the rule change;

(d) include an address and telephone where the petitioner can be reached during regular work days; and

(e) be signed by the petitioner.

R15-2-5. Petition Consideration And Disposition.

(1) The agency head or designee shall:

(a) review and consider the petition;

(b) write a response to the petition stating:

(i) that the petition is denied and reasons for denial, or

(ii) the date when the agency is initiating a rule change consistent with the intent of the petition; and

(c) send the response to the petitioner within 30 days of receipt of the petition.

(2) The petitioned agency may interview the petitioner, hold a public hearing on the petition, or take any action the agency, in its judgement, deems necessary to provide the petition due consideration.

(3) The agency shall retain the petition and a copy of the agency's response as part of the administrative record.

(4) The agency shall mail copies of its decision to all persons who petitioned for a rule change.

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administrative law

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Rule R15-3. Definitional Clarification of Administrative Rule.

As in effect on September 1, 2002

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R15-3-1. Authority, Purpose, and Definitions.

(1) This rule is authorized under Subsection 63-46a-10(1) which requires the division to administer the Utah Administrative Rulemaking Act, Title 63, Chapter 46a.

(2) This rule clarifies when rulemaking is required, and requirements for incorporation by reference within rules.

(3) Terms used in this rule are defined in Section 63-46a-2.

R15-3-2. Agency Discretion.

(1) A rule may restrict agency discretion to prevent agency personnel from exceeding their scope of employment, or committing arbitrary action or application of standards, or to provide due process for persons affected by agency actions.

(2) A rule may authorize agency discretion that sets limits, standards, and scope of employment within which a range of actions may be applied by agency personnel. A rule may also establish criteria for granting exceptions to the standards or procedures of the rule when, in the judgment of authorized personnel, documented circumstances warrant.

(3) An agency may have written policies which broadly prescribe goals and guidelines. Policies are not rules unless they meet the criteria for rules set forth under Section 63-46a-3(2).

(4) Within the limits prescribed by Sections 63-46a-3 and 63-46a-12.1, an agency has full discretion regarding the substantive content of its rules. The division has authority over

nonsubstantive content under Subsections 63-46a-10(2) and (3), and 63-46a-10.5(2) and (3), rulemaking procedures, and the physical format of rules for compilation in the Utah Administrative Code.

R15-3-3. Use of Incorporation by Reference in Rules.

(1) An agency incorporating materials by reference as permitted under Subsection 63-46a-3(7) shall comply with the following standards:

(a) The rule shall state specifically that the cited material is "incorporated by reference."

(b) If the material contains options, or is modified in its application, the options selected and modifications made shall be stated in the rule.

(c) If the incorporated material is substantively changed at a later time, and the agency intends to enforce the revised material, the agency shall amend its rule through rulemaking procedures to incorporate by reference any applicable changes as soon as practicable.

(d) In accordance with Subsection 63-46a-3(7)(c), an agency shall describe substantive changes that appear in the materials incorporated by reference as part of the "summary of rule or change" in the rule analysis.

(2) An agency shall comply with copyright requirements when it provides the division a copy of material incorporated by reference.

R15-3-4. Computer-Prohibited Material.

(1) All rules shall be in a format that permits their compatibility with the division's computer system and compilation into the Utah Administrative Code.

(2) Rules may not contain maps, charts, graphs, diagrams, illustrations, forms, or similar material.

(3) The division shall issue and provide to agencies instructions and standards for formatting rules.

KEY

administrative law

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October 16, 2000

Authorizing, Implemented, or Interpreted Law

63-46a-10; 63-46a-3

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Rule R15-4. Administrative Rulemaking Procedures.

As in effect on September 1, 2002

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R15-4-1. Authority and Purpose.

(1) This rule establishes procedures for filing and publication of agency rules under Sections 63-46a-4, 63-46a-6, and 63-46a-7, as authorized under Subsection 63-46a-10(1).

(2) The procedures of this rule constitute minimum requirements for rule filing and publication. Other governing statutes, federal laws, or federal regulations may require additional rule filing and publication procedures.

R15-4-2. Definitions.

(1) Terms used in this rule are defined in Section 63-46a-2.

(2) Other terms are defined as follows:

(a) "Anniversary date" means the date that is five years from the original effective date of the rule, or the date that is five years from the date the agency filed with the division the most recent five-year review required under Subsection 63-46a-9(3), whichever is sooner.

(b) "Digest" means the Utah State Digest that summarizes the content of the bulletin as

required by Subsection 63-46a-10(1)(f);

(c) "Codify" means the process of collecting and arranging administrative rules systematically in the Utah Administrative Code, and includes the process of verifying that each amendment was marked as required under Subsection 63-46a-4(2)(b);

(d) "Compliance cost" means expenditures a regulated person will incur if a rule or change is made effective;

(e) "Cost" means the aggregated expenses persons as a class affected by a rule will incur if a rule or change is made effective;

(f) "Savings" means:

(i) an aggregated monetary amount that will no longer be incurred by persons as a class if a rule or change is made effective;

(ii) an aggregated monetary amount that will be refunded or rebated if a rule or change is made effective;

(iii) an aggregated monetary amount of anticipated revenues to be generated for state budgets, local governments, or both if a rule or change is made effective; or

(iv) any combination of these aggregated monetary amounts.

(g) "Unmarked change" means a change made to rule text that was not marked as required by Subsection 63-46a-4(2)(b).

R15-4-3. Publication Dates and Deadlines.

(1) For the purposes of Subsections 63-46a-4(2) and 63-46a-6(1), an agency shall file its rule and rule analysis by 11:59:59 p.m. on the fifteenth day of the month for publication in the bulletin and digest issued on the first of the next month, and by 11:59:59 p.m. on the first day of the month for publication on the fifteenth of the same month.

(a) If the first or fifteenth day is a Saturday, or a Tuesday, Wednesday, Thursday, or Friday holiday, the agency shall file the rule and rule analysis by 11:59:59 p.m. on the previous regular business day.

(b) If the first or fifteenth day is a Sunday or Monday holiday, the agency shall file the rule and rule analysis by 11:59:59 p.m. on the next regular business day.

(2) For all purposes, the official date of publication for the bulletin and digest shall be the first and fifteenth days of each month.

R15-4-4. Thirty-day Comment Period.

(1) For the purposes of Subsections 63-46a-4(6) and 63-46a-4(7), and in conformity with Utah Rules of Civil Procedures, Rule 6 (a), "30 days" shall be computed by:

(a) counting the day after publication of the rule as the first day; and

(b) counting the thirtieth consecutive day after the day of publication as the thirtieth day, unless

(c) the thirtieth consecutive day is a Saturday, Sunday, or holiday, in which event the comment period runs until 5 p.m. the next regular business day.

(2) A rule may be made effective on the day after the comment period expires.

R15-4-5. Notice of the Effective Date of a Rule.

(1) (a) Upon expiration of the comment period designated on the rule analysis and filed with the rule, and before expiration of 120 days after publication of a proposed rule, the agency proposing the rule shall notify the division of the date the rule is to become effective and enforceable.

(b) The agency shall notify the division after determining that the proposed rule, in the form published, shall be the final form of the rule, and after informing the division of any nonsubstantive changes in the rule as provided for in Section R15-4-6.

(2) (a) The agency shall notify the division by filing with the division a form designated for that purpose indicating the effective date.

(b) If the form designated is unavailable to the agency, the agency may notify the division by any other form of written communication clearly identifying the proposed rule, stating the date the rule was filed with the division or published in the bulletin, and stating its effective date.

(3) The date designated shall be after the comment period specified on the rule analysis.

(4) The division shall publish the effective date in the next issue of the bulletin and digest. There is no publication deadline for a notice of effective date, nor requirement that it be published prior to the effective date.

R15-4-6. Nonsubstantive Changes in Rules.

(1) Pursuant to Subsections 63-46a-3(4)(d) and 63-46a-6(2), for the purpose of making rule changes that are grammatical or do not materially affect the application or outcome of agency procedures and standards, agencies shall comply with the procedures of this section.

(2) The agency proposing a change shall determine if the change is substantive or nonsubstantive according to the criteria cited in Subsection R15-4-6(1).

(a) The agency may seek the advice of the Attorney General or the division, but the agency is responsible for compliance with the cited criteria.

(3) Without complying with regular rulemaking procedures, an agency may make nonsubstantive changes in:

(a) proposed rules already published in the bulletin and digest but not made effective, or

(b) rules already effective.

(4) To make a nonsubstantive change in a rule, the agency shall:

(a) notify the division by filing with the division the form designated for nonsubstantive changes;

(b) include with the notice the rule text to be changed, with changes marked as required by Section R15-4-9; and

(c) include with the notice the name of the agency head or designee authorizing the change.

(5) A nonsubstantive change becomes effective on the date the division makes the change in the Utah Administrative Code.

(6) The division shall record the nonsubstantive change and its effective date in the administrative rules register.

R15-4-7. Substantive Changes in Proposed Rules.

(1) Pursuant to Section 63-46a-6, agencies shall comply with the procedures of this section when making a substantive change in a proposed rule.

(a) The procedures of this section apply if:

(i) the agency determines a change in the rule is necessary;

(ii) the change is substantive under the criteria of Subsection 63-46a-2(19);

(iii) the rule was published as a proposal in the bulletin and digest; and

(iv) the rule has not been made effective under the procedures of Subsection 63-46a-6(1)(d) and Section R15-4-5.

(b) If the rule is already effective, the agency shall comply with regular rulemaking procedures.

(2) To make a substantive change in a proposed rule, the agency shall file with the division:

(a) a rule analysis, marked to indicate the agency intends to change a rule already published, and describing the change and reasons for it; and

(b) a copy of the proposed rule previously published in the bulletin marked to show only those changes made since the proposed rule was previously published as described in Section R15-4-9.

(3) The division shall publish the rule analysis in the next issue of the bulletin, subject to the publication deadlines of Section R15-4-3. The division may also publish the changed text of the rule.

(4) The agency may make a change in proposed rule effective by following the requirements of Section R15-4-5, or may further amend the rule by following the procedures of Sections R15-4-6 or R15-4-7.

R15-4-8. Temporary 120-day Rules.

(1) Pursuant to Section 63-46a-7, for the purpose of filing a temporary rule, an agency shall comply with the procedures of this section.

(2) The agency proposing a temporary rule shall determine if the need for the rule complies with

the criteria of Subsection 63-46a-7(1).

(a) The division interprets the criteria of Subsection 63-46a-7(1) to include under "welfare" any substantial material loss to the classes of persons or agencies the agency is mandated to regulate, serve, or protect.

(3) The agency shall use the same procedures for filing and publishing a temporary rule as for a permanent rule, except:

(a) the rule shall become effective and enforceable on the day and hour it is recorded by the division unless the agency designates a later effective date on the rule analysis;

(b) no comment period is necessary;

(c) no public hearing is necessary; and

(d) the rule shall expire 120 days after the rule's effective date unless the filing agency notifies the division, on the form or by memorandum, of an earlier expiration date.

(4) A temporary rule is separate and distinct from a rule filed under regular rulemaking procedures, though the language of the two rules may be identical. To make a temporary rule permanent, the agency shall propose a separate rule for regular rulemaking.

(5) When a temporary rule and a similar regular rule are in effect at the same time, any conflict between the provisions of the two are resolved in favor of the rule with the most recent effective date, unless the agency designates otherwise as part of the rule analysis.

(6) A temporary rule has the full force and effect of a permanent rule while in effect, but a temporary rule is not codified in the Utah Administrative Code.

R15-4-9. Underscoring and Striking Out.

(1) (a) Pursuant to Subsection 63-46a-4(2)(b), an agency shall underscore language to be added and strike out language to be deleted in proposed rules.

(b) Consistent with Subsection 63-46a-4(2)(b), an agency shall underscore language to be added and strike out language to be deleted in changes in proposed rules, 120-day rules, and nonsubstantive changes.

(c) Consistent with legislative bill drafting technique, the struck out language shall be surrounded by brackets.

(2) When an agency proposes to make a new rule or section, the entire proposed text shall be underscored.

(3)(a) When an agency proposes to repeal a complete rule it shall include as part of the information provided in the rule analysis a brief summary of the deleted language and a brief explanation of why the rule is being repealed.

(b) The agency shall include with the rule analysis a copy of the text to be deleted in one of the following formats:

(i) each page annotated "repealed in its entirety" or

(ii) the entire text struck out in its entirety and surrounded by one set of brackets.

(c) The division shall not publish repealed rules unless space is available within the page limits of the bulletin.

(4) When an agency fails to mark a change as described in this section, the director or his designee may refuse to codify the change. When determining whether or not to codify an unmarked change, the director shall consider:

(a) whether the unmarked change is substantive or nonsubstantive; and

(b) if the purpose of public notification has been adequately served.

(5) The director's refusal to codify an unmarked change means that the change is not operative for the purposes of Section 63-46a-16 and that the agency must comply with regular rulemaking procedures to make the change.

R15-4-10. Estimates of Anticipated Cost or Savings, and Compliance Cost.

(1) Pursuant to Subsections 63-46a-4(3), 63-46a-6(1), 63-46a-7(2), and 53C-1-201(3), when an agency files a proposed rule, change in proposed rule, 120-day (emergency) rule, or expedited rule and provides anticipated cost or savings, and compliance cost information in the rule analysis, the agency shall:

(a) estimate the incremental cost or savings and incremental compliance cost associated with the changes proposed by the rule or change;

(b) estimate the incremental cost or savings and incremental compliance cost in dollars, except as otherwise provided in Subsections R15-4-10(4) and (5);

(c) indicate that the amount is either a cost or a savings; and

(d) estimate the incremental cost or savings expected to accrue to "state budgets," "local governments," or "other persons" as aggregated cost or savings;

(2) In addition, an agency may:

(a) provide a narrative description of anticipated cost or savings, and compliance cost;

(b) compare anticipated cost or savings, and compliance cost figures, for the rule or change to:

(i) current budgeted costs associated with the existing rule,

(ii) figures reported on a fiscal note attached to a related legislative bill, or

(iii) both (i) and (ii).

(3) If an agency chooses to provide comparison figures, it shall clearly distinguish comparison figures from the anticipated cost or savings, and compliance cost figures.

(4) If dollar estimates are unknown or not available, or the obtaining thereof would impose a substantial unbudgeted hardship on the agency, the agency may substitute a reasoned narrative

description of cost-related actions required by the rule or change, and explain the reason or reasons for the substitution.

(5) If no cost, savings, or compliance cost is associated with the rule or change, an agency may enter "none," "no impact," or similar words in the rule analysis followed by a written explanation of how the agency estimated that there would be no impact, or how the proposed rule, or changes made to an existing rule does not apply to "state budgets," "local government," "other persons," or any combination of these.

(6) If an agency does not provide an estimate of cost, savings, compliance cost, or a reasoned narrative description of cost information; or a written explanation as part of the rule analysis in compliance with this section, the Division may, after making an attempt to obtain the required information, refuse to register and publish the rule or change. If the Division refuses to register and publish a rule or change, it shall:

(a) return the rule or change to the agency with a notice indicating that the Division has refused to register and publish the rule or change;

(b) identify the reason or reasons why the Division refused to register and publish the rule or change; and

(c) indicate the filing deadlines for the next issue of the Bulletin.

KEY

administrative law

Date of Enactment or Last Substantive Amendment

July 1, 1998

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October 16, 2000

Authorizing, Implemented, or Interpreted Law

63-46a-10

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Rule R15-5. Administrative Rules Adjudicative Proceedings.

As in effect on September 1, 2002

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R15-5-1. Purpose.

(1) This rule provides the procedures for informal adjudicative proceedings governing:

(a) appeal and review of a decision by the division not to publish an agency's proposed rule or rule change or not to register an agency's notice of effective date; and

(b) a determination by the division whether an agency rule meets the procedural requirements of Title 63, Chapter 46a, the Utah Administrative Rulemaking Act.

(2) The informal procedures of this rule apply to all other division actions for which an adjudicative proceeding may be required.

R15-5-2. Authority.

This rule is required by Sections 63-46b-4 and 63-46b-5, and is enacted under the authority of Subsection 63-46a-10(1)(m) and Sections 63-46b-4, 63-46b-5, and 63-46b-21.

R15-5-3. Definitions.

(1) The terms used in this rule are defined in Section 63-46b-2.

(2) In addition, "digest" means the Utah State Digest which summarizes the content of the bulletin as required under Subsection 63-46a-10(1)(f).

R15-5-4. Refusal to Publish or Register a Rule or Rule Change.

(1) The division shall not publish a proposed rule or rule change when the division determines the agency has not met the requirements of Title 63, Chapter 46a, or of Rules R15-3 or R15-4.

(2) The division shall not register an agency's notice of effective date, nor codify the rule or rule change in the Utah Administrative Code, if the agency exceeds the 120-day limit required by Subsection 63-46a-4(6)(a) as interpreted in Section R15-4-5.

(3) The division shall notify the agency of a refusal to publish or register a rule or rule change, and shall advise and assist the agency in correcting any error or omission, and in re-filing to meet statutory and regulatory criteria.

R15-5-5. Appeal of a Refusal to Publish or Register a Rule or Rule Change.

(1) An agency may request a review of a division refusal to publish or register a rule or rule change by filing a written petition for review with the division director.

(2) The division director shall grant or deny the petition within 20 days, and respond in writing giving the reasons for any denial.

(3) The agency may appeal the decision of the division director by filing a written appeal to the Executive Director of the Department of Administrative Services within 20 days of receipt of the division director's decision. The Executive Director shall respond within 20 days affirming or reversing the division director's decision.

R15-5-6. Determining the Procedural Validity of a Rule.

(1) A person may contest the procedural validity, or request a determination of whether a rule meets the requirements of Title 63, Chapter 46a, by filing a written petition with the division.

(a) The rule at issue may be a proposed rule or an effective rule.

(b) The petition must be received by the division within the two-year limit set by Section 63-46a- 14.

(c) The petition may emanate from a rulemaking hearing as in Section R15-1-8.

(d) The petition shall specify the rule or rule change at issue and reasons why the petitioner deems it procedurally flawed or invalid.

(e) The petition shall be accompanied by any documents the division should consider in reaching its decision.

(f) The petition shall be signed and designate a telephone number where the petitioner can be contacted during regular business hours.

(2) The division shall respond to the petition in writing within 20 days of its receipt.

(a) The division shall research all records pertaining to the rule or rule change at issue.

(b) The response of the division shall state whether the rule is procedurally valid or invalid and how the agency may remedy any defect.

(c) The division shall send a copy of the petition and its response to the pertinent agency.

(3) The petitioner may request reconsideration of the division's findings by filing a written request for reconsideration with the division director.

(a) The director may respond to the request in writing.

(b) If the petitioner receives no response within 20 days, the request is denied.

R15-5-7. Remedies Resulting from an Adjudicative Proceeding.

(1) A rule the division determines is procedurally invalid shall be stricken from the Utah Administrative Code and notice of its deletion published in the next issues of the bulletin and digest.

(2) The division shall notify the pertinent agency and assist the agency in re-filing or otherwise remedying the procedural omission or error in the rule.

(3) A rule the division determines is procedurally valid shall be published and registered promptly.

KEY

administrative procedure, administrative law

Date of Enactment or Last Substantive Amendment

June 1, 1996

Notice of Continuation

October 16, 2000

Authorizing, Implemented, or Interpreted Law

63-46a-10; 63-46b-4; 63-46b-5; 63-46b-21

Rules. *Please Note:* The Division of Administrative Rules is ***not able*** to answer questions about the content or application of these rules.

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 22, 2002

Mr. William J. Sinclair, Director
Division of Radiation Control
Department of Environmental Quality
168 North 1950 West
P. O. Box 144850
Salt Lake City, UT 84114-4850

Dear Mr. Sinclair:

We have reviewed the final Utah regulations R313-17-2, "Public Notice and Public Comment Period;" R313-22-33, "Generic Requirements for the Issuance of Specific Licenses;" R313-70-7, "License Categories and Types of Fees for Radioactive Materials Licenses;" R313-15-1001, "Waste Disposal - General Requirements;" R313-19-2, "Requirements of General Applicability to Licensing of Radioactive Material - General;" R313-22-39, "Executive Secretary Action on Applications to Renew or Amend;" and R313-24, "Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements," which were sent to us by letter dated October 9, 2002. The regulations were reviewed to ensure that the requirements in the Uranium Mill Tailings Radiation Control Act (UMTRCA) are adequately addressed by the Utah regulations prior to Utah entering into an Agreement with the Nuclear Regulatory Commission (NRC) to relinquish Federal regulatory authority for 11e.(2) byproduct material. The regulations were reviewed by comparison to the equivalent (NRC) regulations in 10 CFR Part 40 including Appendix A and 10 CFR Part 150. We discussed our review of the final regulations with you on October 31, 2002.

As a result of our review, we have no compatibility comments. The review did identify an editorial suggestion to clarify the language of the final regulations. The suggestion is to insert "source material in" following the words "possession and use of" in the first line of R313-24-1, "Purpose and Authority." This would clarify what materials are possessed or used under the revised regulations. The NRC review does not include comments on the groundwater portion of the regulations which are being addressed separately in response to your letter dated October 23, 2002. Please note that we have limited our review to regulations required for compatibility and/or health and safety. We have determined that your final regulations, as adopted, meet the compatibility and health and safety categories established in Office of State and Tribal Programs (STP) Procedure SA-200. However, until NRC and Utah enter into an Agreement for 11e.(2) byproduct material, the 11e.(2) byproduct material rules may not be implemented.

The State Regulation Status (SRS) Data Sheet summarizes our knowledge of the status of other Utah regulations as indicated. This letter including the SRS Data Sheet is posted on the STP Web Site: http://www.hsrd.ornl.gov/nrc/rulemaking.htm.

If you have any questions regarding the comments, the compatibility and health and safety categories, or any of the NRC regulations used in the review, please contact me or Dennis Sollenberger of my staff at 301-415-2819 or DMS4@nrc.gov.

Sincerely,

Cardelia Maupin for

Josephine M. Piccone, Deputy Director
Office of State and Tribal Programs

Enclosure:
As stated

STATE REGULATION STATUS

State: Utah
[Two amendments reviewed are identified by a ★ at the beginning of each equivalent NRC regulation.]

Tracking Ticket Number: 2-248
Date: November 22, 2002

NRC Chronology Identification	FR Notice (Due Date for State Implementation)	RATS ID	Proposed (P) / Final (F)[1] Rule / ML #[4]	NRC Review / Y, N[2] / Date / ML #[4]	Final State Regulation[1] (Effective Date)
Safety Requirements for Radiographic Equipment-Part 34	55 FR 843; (1/10/94)	1991-1			1/10/94
ASNT Certification of Radiographers-Part 34	56 FR 11504; (none)	1991-2			Not required[3]
Standards for Protection Against Radiation-Part 20	56 FR 23360; 56 FR 61352; 57 FR 38588; 57 FR 57877; 58 FR 67657; 59 FR 41641; 60 FR 20183; (1/1/94)	1991-3	F	N 2/10/98	1/23/98
Notification of Incidents-Parts 20, 30, 31, 34, 39, 40, 70	56 FR 64980; (10/15/94)	1991-4			10/26/94
Quality Management Program and Misadministrations-Part 35	56 FR 34104; (1/27/95)	1992-1	P	N 1/26/98	3/10/95
Eliminating the Recordkeeping Requirements for Departures from Manufacturer's Instructions-Parts 30, 35	57 FR 45566; (none)	1992-2			Not required[3]
Decommissioning Recordkeeping and License Termination: Documentation Additions [Restricted areas and spill sites]-Parts 30, 40	58 FR 39628; (10/25/96)	1993-1	F	N 1/8/97	11/15/96
Licensing and Radiation Safety Requirements for Irradiators-Part 36	58 FR 7715; (7/1/96)	1993-2	F	N 6/14/00	3/10/00
Definition of Land Disposal and Waste Site QA Program-Part 61	58 FR 33886; (7/22/96)	1993-3	P	N 9/23/96	5/31/96
Self-Guarantee as an Additional Financial Mechanism-Parts 30, 40, 70	58 FR 68726; 59 FR 1618; (none)	1994-1			Not required[3]
★Uranium Mill Tailings Regulations: Conforming NRC Requirements to EPA Standards-Part 40	59 FR 28220; (7/1/97)	1994-2	F ML023100574	N 11/22/02 ML023290240	10/7/02[5]
Timeliness in Decommissioning Material Facilities-Parts 30, 40, 70	59 FR 36026; (8/15/97)	1994-3	F	N 2/10/98	7/18/97
Preparation, Transfer for Commercial Distribution, and Use of Byproduct Material for Medical Use-Parts 30, 32, 35	59 FR 61767; 59 FR 65243; 60 FR 322; (1/1/98)	1995-1	F	N 2/10/98	7/18/97
Frequency of Medical Examinations for Use of Respiratory Protection Equipment-Part 20	60 FR 7900; (3/13/98)	1995-2	P	N 1/26/98	3/20/98
Low-Level Waste Shipment Manifest Information and Reporting-Parts 20, 61	60 FR 15649; 60 FR 25983; (3/1/98)	1995-3	P	N 1/26/98	1/23/98
Performance Requirements for Radiography Equipment-Part 34	60 FR 28323; (6/30/98)	1995-4			7/18/97
Radiation Protection Requirements: Amended Definitions and Criteria-Parts 19, 20	60 FR 36038; (8/14/98)	1995-5	P	N 1/26/98	3/20/98
Clarification of Decommissioning Funding Requirements-Parts 30, 40, 70	60 FR 38235; (11/24/98)	1995-6	F	N 2/10/98	7/18/97
Medical Administration of Radiation and Radioactive Materials-Parts 20, 35	60 FR 48623; (10/20/98)	1995-7	P	N 1/26/98	8/11/98

NRC Chronology Identification	FR Notice (Due Date for State Implementation)	RATS ID	Proposed (P) / Final (F)[1] Rule / ML #[4]	NRC Review / Y, N[2] / Date / ML #[4]	Final State Regulation[1] (Effective Date)
10 CFR Part 71: Compatibility with the International Atomic Energy Agency - Part 71	60 FR 50248; 61 FR 28724; (4/1/99)	1996-1	F	N 4/16/99	3/12/99
One Time Extension of Certain Byproduct, Source and Special Nuclear Materials Licenses-Parts 30, 40, 70	61 FR 1109; (none)	1996-2	F	N 2/10/98	Not required[3]
Termination or Transfer of Licensed Activities: Recordkeeping Requirements-Parts 20, 30, 40, 61, 70	61 FR 24669; (6/17/99)	1996-3	F Part 30	N 2/10/98	3/20/98
Resolution of Dual Regulation of Airborne Effluents of Radioactive Materials; Clean Air Act-Part 20	61 FR 65120; (1/9/00)	1997-1	P	N 1/26/98	3/20/98
Recognition of Agreement State Licenses in Areas Under Exclusive Federal Jurisdiction Within an Agreement State-Part 150	62 FR 1662; (2/7/00)	1997-2			6/11/99
Criteria for the Release of Individuals Administered Radioactive Material-Parts 20, 35	62 FR 4120; (5/29/00)	1997-3	P	N 1/26/09	3/20/98
Fissile Material Shipments and Exemptions-Part 71	62 FR 5907; (none)	1997-4			Not required[3]
Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiography Operations-Parts 30, 34, 71, 150	62 FR 28947; (6/27/00)	1997-5	F	N 4/1/98	5/15/97
Radiological Criteria for License Termination-Parts 20, 30, 40, 70	62 FR 39057; (8/20/00)	1997-6	F	N 6/14/00	3/10/00
Exempt Distribution of a Radioactive Drug Containing One Microcurie of Carbon-14 Urea-Part 30	62 FR 63634; (1/02/01)	1997-7	F	N 4/16/99	3/12/99
Deliberate Misconduct by Unlicensed Persons-Parts 30, 40, 61, 70, 71, 150	63 FR 1890; 63 FR 13773; (2/12/01)	1998-1	F ML011100015	N 7/31/01 ML012150220	1/26/01
Self-Guarantee of Decommissioning Funding by Nonprofit and Non-Bond-Issuing Licensees- Parts 30, 40, 70	63 FR 29535; (none)	1998-2			Not required[3]
License Term for Medical Use Licenses-Part 35	63 FR 31604; (none)	1998-3			Not required[3]
Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations-Part 34	63 FR 37059; (7/9/01)	1998-4	P ML010870073	N 4/27/01 ML011170330	5/11/01
Minor Corrections, Clarifying Changes, and a Minor Policy Change-Parts 20, 35, 36	63 FR 39477; 63 FR 45393; (10/26/01)	1998-5	F ML013530478	Y 2/7/02 ML020390486	9/14/01
Transfer for Disposal and Manifests: Minor Technical Conforming Amendment-Part 20	63 FR 50127; (1/1/20/01)	1998-6	F ML013530478	N 2/7/02 ML020390486	9/14/01
★Radiological Criteria for License Termination of Uranium Recovery Facilities-Part 40	64 FR 17506; (6/11/02)	1999-1	F ML023100574	N 11/22/02 ML023290240	10/7/02[5]
Requirements for Those Who Possess Certain Industrial Devices Containing Byproduct Material to Provide Requested Information-Part 31	64 FR 42269; (none)	1999-2			Not required[3]
Respiratory Protection and Controls to Restrict Internal Exposure-Part 20	64 FR 54543; 64 FR 55524; (2/2/03)	1999-3	F ML013530478	N 2/7/02 ML020390486	9/14/01

NRC Chronology Identification	FR Notice (Due Date for State Implementation)	RATS ID	Proposed (P) / Final (F)[1] Rule / ML #[4]	NRC Review / Y, N[2] / Date / ML #[4]	Final State Regulation[1] (Effective Date)
Energy Compensation Sources for Well Logging and Other Regulatory Clarifications-Part 39	65 FR 20337; (5/17/03)	2000-1	F ML012850044	N 12/27/01 ML020020182	9/14/01
New Dosimetry Technology-Parts 34, 36, 39	65 FR 63750; (1/8/04)	2000-2	P Part 34 ML010870073	N 4/27/01 ML011170330	
Requirements for Certain Generally Licensed Industrial Devices Containing Byproduct Material-Parts 30, 31, and 32	65 FR 79162; (2/16/04)	2001-1			
Revision of the Skin Dose Limit-Part 20 that became effective April 5, 2002.	67 FR 16298; (4/5/05)	2002-1			
Medical Use of Byproduct Material-Parts 20, 32, and 35	67 FR 20249; (4/24/05)	2002-2			

1. Or other generic Legally Binding Requirements.

2. (Y/N) Y means "Yes," there are comments in the review letter that the State needs to address.
N means "No," there are no comments in the review letter.

3. Not required means these regulations are not required for purposes of compatibility.

4. ADAMS ML Number

5. The regulation package contained several regulations with earlier effective dates. The uranium milling regulations are not to be implemented until the amended Agreement is signed and effective.

From: "Rule Mailbox" <rules@utah.gov>
To: "William Sinclair" <bsinclair@utah.gov>, "William Sinclair" <bsinclair@utah.gov>
Date: 12/23/02 4:03PM
Subject: eRules--Filing Submitted: No. 25882 for the Bulletin

A filing has been submitted.
DAR No. 25882
Department: Environmental Quality
Agency: Radiation Control
Code Ref. No.: R313-24-1
Title: Uranium Mills and Source Material Mill Tailings Disposal Requirements, Purpose and Authority
Available at:
http://filings.rules.state.ut.us/MainRuleFilingPage.asp?strForm=NonSubChange.asp&intKey=41799

The Division of Administrative Rules' staff will review this rule to ensure that the required information has been provided and that the text is correctly marked. If the staff has questions or identifies problems, you will be contacted by E-mail.

Thank you!
Division of Administrative Rules
rules@utah.gov
801-538-3218

CC: <rules@utah.gov>

State of Utah

NOTICE OF NONSUBSTANTIVE RULE CHANGE

DAR file no: Date filed:

Utah Admin. Code ref. (R no.): R 313 - 24 - 1 Time filed:

1. Agency: Environmental Quality/Radiation Control

Room no.: 212

Building:

Street address 1: 168 N 1950 W

Street address 2:

City,state,zip: SALT LAKE CITY, UT 84116-3085

Mailing address 1: PO BOX 144850

Mailing address 2:

City,state,zip: SALT LAKE CITY, UT 84114-4850

Contact person(s):

Name:	Phone:	Fax:	E-mail:	Remove:
William Sinclair	801-536-4250	801-533-4097	bsinclair@utah.gov	Remove

Add Contact

(Interested persons may inspect this filing at the above address or at DAR between 8 00 a m and 5.00 p m on business days)

2. **Title of rule or section (catchline):**

Uranium Mills and Source Material Mill Tailings Disposal Requirements, Purpose and Authority

3. **Purpose of or reason for the nonsubstantive change:**

To provide clarification, by making the sentence grammatically correct,as requested by the Nuclear Regulatory Commission (NRC). NRC must determine if State rules are equivalent to the same federal rules. The Utah Attorney

4. **This change is a response to comments by the Administrative Rules Review Committee.** ○ Ye
   ◉ No

5. **Summary of the nonsubstantive change:**

"in" will be inserted following the words "possession and use of source material" in the first line of R313-24-1.

6. **This rule change adds or updates an incorporated title:** (submit a copy to DAR):

7. **Indexing information - keywords (maximum of four, in lower case):**

tailings, source material, uranium mills, sou

8. **Attach an RTF document containing the text of this rule change (filename):**
There is currently a document associated with this filing. Add/Edit...

To the agency: A nonsubstantive change becomes effective on the date the Division of Administrative Rules makes the change to the rule in the *Utah Administrative Code* (see Subsection R15-4-6(5)).

AGENCY AUTHORIZATION

Agency head or designee, and title:	Sinclair, William Director Change	**Date** (mm/dd/yyyy):	12/23/2002

Submit to DAR | Save as Draft | Cancel | Printable

NONSUBSTANTIVE RULE CHANGE SUBMITTED

You have submitted your filing. Each filing you submit should generate a separate E-mail message confirming that the filing has been received. If you do not receive an E-mail confirmation within the next 30 minutes, please contact Nancy Lancaster (801-538-3218 or nllancaster@utah.gov) or Mike Broschinsky (801-538-3003 or mbroschi@utah.gov).

We recommend that you print this screen for your records.

Please click on "Continue" to return to the rule filing list. On the rule filing list, you should see a line for the filing you just submitted. A five-digit number should appear in the "DAR No." column. If the filing is not listed, or if the word "Draft" appears in the "DAR No." column, please contact Nancy or Mike.

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DAR No.	Status	Type	Submitted	Lock	Operations
24052	**R313-15-502**: Conditions Requiring Individual Monitoring of External and Internal Occupational Dose				
	Codified	Amendment	9/13/2001 2:48:57 PM	ON	
24093	**R313-25**: License Requirements for Land Disposal of Radioactive Waste - General Provisions				
	Codified	5-year Review	10/10/2001 2:16:04 PM	ON	
24094	**R313-19**: Requirements of General Applicability to Licensing of Radioactive Material				
	Codified	5-year Review	10/10/2001 2:31:45 PM	ON	
24095	**R313-22**: Specific Licenses				
	Codified	5-year Review	10/10/2001 2:39.43 PM	ON	
24096	**R313-28**: Use of X-rays in the Healing Arts				
	Codified	5-year Review	10/10/2001 2:48:04 PM	ON	
24097	**R313-32**: Medical Use of Radioactive Material				
	Codified	5-year Review	10/10/2001 2:54:30 PM	ON	
24098	**R313-36**: Special Requirements for Industrial Radiographic Operations				
	Codified	5-year Review	10/10/2001 3:02:16 PM	ON	
24100	**R313-70**. Payments, Categories and Types of Fees				
	Codified	5-year Review	10/10/2001 3:09.32 PM	ON	
24108	**R313-16**: General Requirements Applicable to the Installation, Registration, Inspection, and Use of Radiation Machines				
	Codified	Amendment	10/12/2001 9.29:47 AM	ON	
24109	**R313-28-31**: General and Administrative Requirements				
	Codified	Amendment	10/12/2001 9.36:36 AM	ON	
24360	**R313-35**: Requirements for X-ray Equipment Used for Non-Medical Applications				
	Codified	5-year Review	1/2/2002 2:28:44 PM	ON	
24713	**R313-70-7**: Payments, Categories and Types of Fees				
	Withdrawn	Amendment	4/12/2002 1:30:43 PM	ON	Eff. Date
24715	**R313-17-2**: Public Notice and Public Comment Period				
	Reviewed	Rule Change	6/14/2002 9:55:05 AM	ON	
24715	**R313-17-2**: Public Notice and Public Comment Period				
	Bulletin Pub	Amendment	4/15/2002 8:52:24 AM	ON	
24716	**R313-22-33**: Specific Licenses				
	Codified	Amendment	4/15/2002 9:00:11 AM	ON	
24717	**R313-70-7**: License Categories and Types of Fees for Radioactive Materials Licenses				
	Codified	Amendment	4/15/2002 9:05:02 AM	ON	

24738	**R313-24**: Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements				
	Reviewed	Rule Change	7/23/2002 3:16:29 PM	ON	
24738	**R313-24**: Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements				
	Reviewed	New Rule	4/19/2002 11:42:57 AM	ON	
24757	**R313-22-39**: Executive Secretary Action on Applications to Renew or Amend				
	Codified	Amendment	4/25/2002 8:30:54 AM	ON	
24758	**R313-19-2**: Requirements of General Applicability to Licensing of Radioactive Material				
	Reviewed	Amendment	4/25/2002 8:42:05 AM	ON	
24758	**R313-19-2**: Requirements of General Applicability to Licensing of Radioactive Material				
	Reviewed	Rule Change	7/25/2002 9:40:26 AM	ON	
24759	**R313-15-1001**: Waste Disposal - General Requirements				
	Codified	Amendment	4/25/2002 8:45:29 AM	ON	
24969	**R313-70-7**: License Categories and Types of Fees for Radioactive Materials Licenses				
	Reviewed	Amendment	6/14/2002 10:06:59 AM	ON	
25785	**R313-12-3**: Definitions				
	Bulletin Prep	Amendment	12/12/2002 8:00:54 AM	ON	
25786	**R313-28**: Use of X-Rays in the Healing Arts				
	Bulletin Prep	Amendment	12/12/2002 8:11:40 AM	ON	
25882	**R313-24-1**: Uranium Mills and Source Material Mill Tailings Disposal Requirements, Purpose and Authority				
	New	Nonsubstantive	12/23/2002 4:12:31 PM	ON	
Draft	**R313-15**: Standards for Protection Against Radiation				
	New	5-year Review		OFF	Delete

R313. Environmental Quality, Radiation Control.
R313-24. Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements.
R313-24-1. Purpose and Authority.

(1) The purpose of this rule is to prescribe requirements for possession and use of source material in milling operations such as conventional milling, in-situ leaching, or heap-leaching. The rule includes requirements for the possession of byproduct material, as defined in R313-12-3 (see "byproduct material" definition (b)), from source material milling operations, as well as, possession and maintenance of a facility in standby mode. In addition, requirements are prescribed for the receipt of byproduct material, from other persons for possession and disposal. The rule also prescribes requirements for receipt of byproduct material, from other persons for possession and disposal incidental to the byproduct material generated by the licensee's source material milling operations.

(2) The rules set forth herein are adopted pursuant to the provisions of Subsections 19-3-104(4) and 19-3-104(8).

(3) The requirements of Rule R313-24 are in addition to, and not substitution for, the other applicable requirements of Title R313. In particular, the provisions of Rules R313-12, R313-15, R313-18, R313-19, R313-21, R313-22, and R313-70 apply to applicants and licensees subject to Rule R313-24.

R313-24-2. Scope.

(1) The requirements in Rule R313-24 apply to source material milling operations, byproduct material, and byproduct disposal facilities.

R313-24-3. Environmental Analysis.

(1) Each new license application, renewal, or major amendment shall contain an environmental report describing the proposed action, a statement of its purposes, and the environment affected. The environmental report shall present a discussion of the following:

(a) An assessment of the radiological and nonradiological impacts to the public health from the activities to be conducted pursuant to the license or amendment;

(b) An assessment of any impact on waterways and groundwater resulting from the activities conducted pursuant to the license or amendment;

(c) Consideration of alternatives, including alternative sites and engineering methods, to the activities to be conducted pursuant to the license or amendment; and

(d) Consideration of the long-term impacts including decommissioning, decontamination, and reclamation impacts, associated with activities to be conducted pursuant to the license or amendment.

(2) Commencement of construction prior to issuance of the license or amendment shall be grounds for denial of the license or amendment.

(3) The Executive Secretary shall provide a written analysis of the environmental report which shall be available for public notice and comment pursuant to R313-17-2.

R313-24-4. Clarifications or Exceptions.

For the purposes of Rule R313-24, 10 CFR 40.2a through 40.4; 40.12; 40.20(a); 40.21; 40.26(a) through (c); 40.31(h); 40.41(c); 40.42(k) introduction and 40.42(k)(3)(i); 40.61(a) and (b); 40.65; and Appendix A to Part 40(2002) are incorporated by reference with the following clarifications or exceptions:

(1) The exclusion and substitution of the following:

(a) Exclude 10 CFR 40.26(c)(1) and replace with "(1) The provisions of Sections R313-12-51, R313-12-52, R313-12-53, R313-19-34, R313-19-50, R313-19-61, R313-24-1, Rules R313-14, R313-15, R313-18, and R313-24 (incorporating 10 CFR 40.2a, 40.3, 40.4, and 40.26 by reference)";

(b) In Appendix A to 10 CFR 40, exclude Criterion 5B(1) through 5H, Criterion 7A, Criterion 13, and replace the excluded Criterion with "Utah Administrative Code, R317-6, Ground Water Quality Protection"; and

(c) In Appendix A to 10 CFR 40, exclude Criterion 11A through 11F and Criterion 12;

(2) The substitution of the following:

(a) "10 CFR 40" for reference to "this part" as found throughout the incorporated text;

(b) "Executive Secretary" for reference to "Commission" in the first and fourth references contained in 10 CFR 40.2a, in 10 CFR 40.3, 40.20(a), 40.26, 40.41(c), 40.61, and 40.65;

(c) "Rules R313-19, R313-21, or R313-22" for "Section 62 of the Act" as found in 10 CFR 40.12(a);

(d) "Rules R313-21 or R313-22" for reference to "the regulations in this part" in 10 CFR 40.41(c);

(e) "Section R313-19-100" for reference to "part 71 of this chapter" as found in 10 CFR 40.41(c);

(f) In 10 CFR 40.42(k)(3)(i), "R313-15-401 through R313-15-406" for reference to "10 CFR part 20, subpart E";

(g) "Source material milling" for reference to "uranium milling, in production of uranium hexafluoride, or in a uranium enrichment facility" as found in 10 CFR 40.65(a);

(h) "Executive Secretary" for reference to "appropriate NRC Regional Office shown in Appendix D to 10 CFR part 20 of this chapter, with copies to the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555," as stated in 10 CFR 65(a)(1);

(i) "require the licensee to" for reference to "require to" in 10 CFR 40.65(a)(1); and

(j) In Appendix A to 10 CFR part 40, the following substitutions:

(i) "R313-12-3" for reference to "Sec. 20.1003 of this chapter" as found in the first paragraph of the introduction to Appendix A;

(ii) "Utah Administrative Code, Rule R317-6, Ground Water Quality Protection" for ground water standards in "Environmental Protection Agency in 40 CFR part 192, subparts D and E" as found in the Introduction, paragraph 4; or "Environmental Protection Agency in 40 CFR part 192, subparts D and E (48 FR 45926; October 7, 1983)" as found in Criterion 5;

(iii) "Board" for reference to "Commission" in the definition of "compliance period," in paragraph five of the introduction and in Criterion 5A(3);

(iv) "Executive Secretary" for reference to "Commission" in the definition of "closure plan", in paragraph five of the introduction, and in Criterions 6(2), 6(4), 6(6), 6A(2), 6A(3), 9, and 10;

(v) "license issued by the Executive Secretary" for reference to "Commission license" in the definition of "licensed site," in the introduction to Appendix A;

(vi) "Executive Secretary" for reference to "NRC" in Criterion 4D;

(vii) "representatives of the Executive Secretary" for reference to "NRC staff" in Criterion 6(6);

(viii) "Executive Secretary-approved" for reference to "Commission-approved" in Criterion 6A(1) and Criterion 9;

(ix) "Executive Secretary" for reference to "appropriate NRC regional office as indicated in Criterion 8A" as found, Criterion 8, paragraph 2 or for reference to "appropriate NRC regional office as indicated in Appendix D to 10 CFR part 20 of this chapter, or the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555," as stated in Criterion 8A; and

(x) "Executive Secretary" for reference to "the Commission or the State regulatory agency" in Criterion 9, paragraph 2.

KEY: environmental analysis, uranium mills, tailings, monitoring
2002 19-3-104 **19-3-108**

R313. Environmental Quality, Radiation Control.
R313-24. Uranium Mills and Source Material Mill Tailings Disposal Facility Requirements.
R313-24-1. Purpose and Authority.

(1) The purpose of this rule is to prescribe requirements for possession and use of source material in milling operations such as conventional milling, in-situ leaching, or heap-leaching. The rule includes requirements for the possession of byproduct material, as defined in R313-12-3 (see "byproduct material" definition (b)), from source material milling operations, as well as, possession and maintenance of a facility in standby mode. In addition, requirements are prescribed for the receipt of byproduct material, from other persons for possession and disposal. The rule also prescribes requirements for receipt of byproduct material, from other persons for possession and disposal incidental to the byproduct material generated by the licensee's source material milling operations.

(2) The rules set forth herein are adopted pursuant to the provisions of Subsections 19-3-104(4) and 19-3-104(8).

(3) The requirements of Rule R313-24 are in addition to, and not substitution for, the other applicable requirements of Title R313. In particular, the provisions of Rules R313-12, R313-15, R313-18, R313-19, R313-21, R313-22, and R313-70 apply to applicants and licensees subject to Rule R313-24.

R313-24-2. Scope.

(1) The requirements in Rule R313-24 apply to source material milling operations, byproduct material, and byproduct disposal facilities.

R313-24-3. Environmental Analysis.

(1) Each new license application, renewal, or major amendment shall contain an environmental report describing the proposed action, a statement of its purposes, and the environment affected. The environmental report shall present a discussion of the following:

(a) An assessment of the radiological and nonradiological impacts to the public health from the activities to be conducted pursuant to the license or amendment;

(b) An assessment of any impact on waterways and groundwater resulting from the activities conducted pursuant to the license or amendment;

(c) Consideration of alternatives, including alternative sites and engineering methods, to the activities to be conducted pursuant to the license or amendment; and

(d) Consideration of the long-term impacts including decommissioning, decontamination, and reclamation impacts, associated with activities to be conducted pursuant to the license or amendment.

(2) Commencement of construction prior to issuance of the license or amendment shall be grounds for denial of the license or amendment.

(3) The Executive Secretary shall provide a written analysis of the environmental report which shall be available for public notice and comment pursuant to R313-17-2.

R313-24-4. Clarifications or Exceptions.

For the purposes of Rule R313-24, 10 CFR 40.2a through 40.4; 40.12; 40.20(a); 40.21; 40.26(a) through (c); 40.31(h); 40.41(c); 40.42(k) introduction and 40.42(k)(3)(i); 40.61(a) and (b); 40.65; and Appendix A to Part 40(2002) are incorporated by reference with the following clarifications or exceptions:

(1) The exclusion and substitution of the following:

(a) Exclude 10 CFR 40.26(c)(1) and replace with "(1) The provisions of Sections R313-12-51, R313-12-52, R313-12-53, R313-19-34, R313-19-50, R313-19-61, R313-24-1, Rules R313-14, R313-15, R313-18, and R313-24 (incorporating 10 CFR 40.2a, 40.3, 40.4, and 40.26 by reference)";

(b) In Appendix A to 10 CFR 40, exclude Criterion 5B(1) through 5H, Criterion 7A, Criterion 13, and replace the excluded Criterion with "Utah Administrative Code, R317-6, Ground Water Quality Protection"; and

(c) In Appendix A to 10 CFR 40, exclude Criterion 11A through 11F and Criterion 12;

(2) The substitution of the following:

(a) "10 CFR 40" for reference to "this part" as found throughout the incorporated text;

(b) "Executive Secretary" for reference to "Commission" in the first and fourth references contained in 10 CFR 40.2a, in 10 CFR 40.3, 40.20(a), 40.26, 40.41(c), 40.61, and 40.65;

(c) "Rules R313-19, R313-21, or R313-22" for "Section 62 of the Act" as found in 10 CFR 40.12(a);

(d) "Rules R313-21 or R313-22" for reference to "the regulations in this part" in 10 CFR 40.41(c);

(e) "Section R313-19-100" for reference to "part 71 of this chapter" as found in 10 CFR 40.41(c);

(f) In 10 CFR 40.42(k)(3)(i), "R313-15-401 through R313-15-406" for reference to "10 CFR part 20, subpart E";

(g) "Source material milling" for reference to "uranium milling, in production of uranium hexafluoride, or in a uranium enrichment facility" as found in 10 CFR 40.65(a);

(h) "Executive Secretary" for reference to "appropriate NRC Regional Office shown in Appendix D to 10 CFR part 20 of this chapter, with copies to the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555," as stated in 10 CFR 65(a)(1);

(i) "require the licensee to" for reference to "require to" in 10 CFR 40.65(a)(1); and

(j) In Appendix A to 10 CFR part 40, the following substitutions:

(i) "R313-12-3" for reference to "Sec. 20.1003 of this chapter" as found in the first paragraph of the introduction to Appendix A;

(ii) "Utah Administrative Code, Rule R317-6, Ground Water Quality Protection" for ground water standards in "Environmental Protection Agency in 40 CFR part 192, subparts D and E" as found in the Introduction, paragraph 4; or "Environmental Protection Agency in 40 CFR part 192, subparts D and E (48 FR 45926; October 7, 1983)" as found in Criterion 5;

(iii) "Board" for reference to "Commission" in the definition of "compliance period," in paragraph five of the introduction and in Criterion 5A(3);

(iv) "Executive Secretary" for reference to "Commission" in the definition of "closure plan", in paragraph five of the introduction, and in Criterions 6(2), 6(4), 6(6), 6A(2), 6A(3), 9, and 10;

(v) "license issued by the Executive Secretary" for reference to "Commission license" in the definition of "licensed site," in the introduction to Appendix A;

(vi) "Executive Secretary" for reference to "NRC" in Criterion 4D;

(vii) "representatives of the Executive Secretary" for reference to "NRC staff" in Criterion 6(6);

(viii) "Executive Secretary-approved" for reference to "Commission-approved" in Criterion 6A(1) and Criterion 9;

(ix) "Executive Secretary" for reference to "appropriate NRC regional office as indicated in Criterion 8A" as found, Criterion 8, paragraph 2 or for reference to "appropriate NRC regional office as indicated in Appendix D to 10 CFR part 20 of this chapter, or the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555," as stated in Criterion 8A; and

(x) "Executive Secretary" for reference to "the Commission or the State regulatory agency" in Criterion 9, paragraph 2.

KEY: environmental analysis, uranium mills, tailings, monitoring
2002 19-3-104
19-3-108

AGREEMENT
BETWEEN THE
UNITED STATES NUCLEAR REGULATORY COMMISSION
AND THE
STATE OF UTAH
FOR
DISCONTINUANCE OF CERTAIN COMMISSION REGULATORY AUTHORITY
AND
RESPONSIBILITY WITHIN THE STATE PURSUANT TO
SECTION 274 OF THE ATOMIC ENERGY ACT OF 1954, AS AMENDED

WHEREAS, The United States Nuclear Regulatory Commission (hereinafter referred to as the Commission) is authorized under section 274 of the Atomic Energy Act of 1954, as amended (hereinafter referred to as the Act), to enter into agreements with the Governor of any State providing for discontinuance of the regulatory authority of the Commission within the State under Chapters 6, 7, and 8, and section 161 of the Act with respect to byproduct materials as defined in sections 11e.(1) and (2) of the Act, source materials, and special nuclear materials in quantities not sufficient to form a critical mass; and

WHEREAS, The Governor of the State of Utah is authorized under Utah Code Annotated 26-1-29 to enter into this Agreement with the Commission; and

WHEREAS, The Governor of the State of Utah certified on November 14, 1983, that the State of Utah (hereinafter referred to as the State) has a program for the control of radiation hazards adequate to protect the public health and safety with respect to the materials within the State covered by this Agreement, and that the State desires to assume regulatory responsibility for such materials; and

WHEREAS, The Commission found on March 12, 1984, that the program of the State for the regulation of the materials covered by this Agreement

is compatible with the Commission's program for the regulation of such materials and is adequate to protect the public health and safety; and

WHEREAS, The State and the Commission recognize the desirability and importance of cooperation between the Commission and the State in the formulation of standards for protection against hazards of radiation and in assuring that State and Commission programs for protection against hazards of radiation will be coordinated and compatible; and

WHEREAS, The Commission and the State recognize the desirability of reciprocal recognition of licenses and exemptions from licensing of those materials subject to this Agreement; and

WHEREAS, This Agreement is entered into pursuant to the provisions of the Atomic Energy Act of 1954, as amended;

NOW, THEREFORE, It is hereby agreed between the Commission and the Governor of the State, acting in behalf of the State, as follows:

ARTICLE I

Subject to the exceptions provided in Articles II, IV, and V, the Commission shall discontinue, as of the effective date of this Agreement, the regulatory authority of the Commission in the State under Chapters 6, 7, and 8, and section 161 of the Act with respect to the following materials:

A. Byproduct materials as defined in section 11e.(1) of the Act;

B. Source materials; and

C. Special nuclear materials in quantities not sufficient to form a critical mass.

ARTICLE II

This Agreement does not provide for discontinuance of any authority and the Commission shall retain authority and responsibility with respect to regulation of:

A. The construction and operation of any production or utilization facility;

B. The export from or import into the United States of byproduct, source, or special nuclear material, or of any production or utilization facility;

C. The disposal into the ocean or sea of byproduct, source, or special nuclear waste materials as defined in regulations or orders of the Commission;

D. The disposal of such other byproduct, source, or special nuclear material as the Commission from time to time determines by regulation or order should, because of the hazards or potential hazards thereof, not be so disposed of without a license from the Commission;

E. The land disposal of source, byproduct and special nuclear material received from other persons; and

F. The extraction or concentration of source material from source material ore and the management and disposal of the resulting byproduct material.

ARTICLE III

This Agreement may be amended, upon application by the State and approval by the Commission, to include the additional area(s) specified in Article II, paragraph E or F, whereby the State can exert regulatory control over the materials stated therein.

ARTICLE IV

Notwithstanding this Agreement, the Commission may from time to time by rule, regulation, or order, require that the manufacturer, processor, or producer of any equipment, device, commodity, or other product containing source, byproduct, or special nuclear material shall not transfer possession or control of such product except pursuant to a license or an exemption from licensing issued by the Commission.

ARTICLE V

This Agreement shall not affect the authority of the Commission under subsection 161 b. or i. of the Act to issue rules, regulations, or orders to protect the common defense and security, to protect restricted data or to guard against the loss or diversion of special nuclear material.

ARTICLE VI

The Commission will use its best efforts to cooperate with the State and other Agreement States in the formulation of standards and regulatory programs of the State and the Commission for protection against hazards of radiation and to assure that State and Commission programs for protection against hazards of radiation will be coordinated and compatible. The State will use its best efforts to cooperate with the

Commission and other Agreement States in the formulation of standards and regulatory programs of the State and the Commission for protection against hazards of radiation and to assure that the State's program will continue to be compatible with the program of the Commission for the regulation of like materials. The State and the Commission will use their best efforts to keep each other informed of proposed changes in their respective rules and regulations and licensing, inspection and enforcement policies and criteria, and to obtain the comments and assistance of the other party thereon.

ARTICLE VII

The Commission and the State agree that it is desirable to provide reciprocal recognition of licenses for the materials listed in Article I licensed by the other party or by any Agreement State. Accordingly, the Commission and the State agree to use their best efforts to develop appropriate rules, regulations, and procedures by which such reciprocity will be accorded.

ARTICLE VIII

The Commission, upon its own initiative after reasonable notice and opportunity for hearing to the State, or upon request of the Governor of the State, may terminate or suspend all or part of this Agreement and reassert the licensing and regulatory authority vested in it under the Act if the Commission finds that (1) such termination or suspension is required to protect the public health and safety, or (2) the State has not complied with one or more of the requirements of section 274 of the Act. The Commission may also, pursuant to section 274j. of the Act, temporarily suspend all or part of this Agreement if, in the judgment of the Commission, an emergency situation exists requiring immediate action to protect public health and safety and the State has failed to take

necessary steps. The Commission shall periodically review this Agreement and actions taken by the State under this Agreement to ensure compliance with section 274 of the Act.

ARTICLE IX

This Agreement shall become effective on April 1, 1984, and shall remain in effect unless and until such time as it is terminated pursuant to Article VIII.

Done at Salt Lake City, Utah, in triplicate, this 29th day of March, 1984.

FOR THE UNITED STATES
NUCLEAR REGULATORY COMMISSION

Nunzio J. Palladino, Chairman

FOR THE STATE OF UTAH

Scott M. Matheson, Governor

Amendment to Agreement
Between the United States Nuclear Regulatory Commission
and the State of Utah
for
Discontinuance of Certain Commission Regulatory Authority
and
Responsibility Within the State Pursuant to
Section 274 of the Atomic Energy Act of 1954, as amended.

WHEREAS, the United States Nuclear Regulatory Commission (hereinafter referred to as the Commission) entered into an Agreement (hereinafter referred to as the Agreement of March 29, 1984) with the State of Utah under Section 274 of the Atomic Energy Act of 1954, as amended (hereinafter referred to as the Act), which Agreement became effective on April 1, 1984, and provided for discontinuance of the regulatory authority of the Commission within the State under Chapters 6, 7, and 8 and Section 161 of the Act with respect to byproduct materials as defined in Section 11e.(1) of the Act, source materials, and special nuclear materials in quantities not sufficient to form a critical mass; and

WHEREAS, the Governor of the State of Utah is authorized under Utah Code Annotated 26-1-29 to enter into this amendment to the Agreement of March 29, 1984, between the Commission and the State of Utah; and

WHEREAS, the Governor of the State of Utah has requested this amendment in accordance with Section 274 of the Act by certifying on July 17, 1989 that the State of Utah has a program for the control of radiation hazards adequate to protect the public health and safety with respect to the land disposal within the State of source, byproduct and special nuclear material received from other persons and that the State desires to assume regulatory responsibility for such materials; and

WHEREAS, the Commission found on April 30, 1990 that the program of the State for the regulation of materials covered by this amendment is in accordance with the requirements of the Act and in all other respects compatible with the Commission's program for the regulation of such materials and is adequate to protect the public health and safety; and

WHEREAS, the State and the Commission recognize the desirability and importance of cooperation between the Commission and the State in the formulation of standards for protection against hazards of radiation and in assuring that the State and Commission programs for protection against hazards of radiation will be coordinated and compatible; and

WHEREAS, this amendment to the Agreement of March 29, 1984, is entered into pursuant to the provisions of the Atomic Energy Act of 1954, as amended.

NOW, THEREFORE, it is hereby agreed between the Commission and the Governor of the te, acting on behalf of the State, as follows:

Section 1. Article I of the Agreement of March 29, 1984, is amended by deleting "and" at end of paragraph B., by adding ";and," after the words "critical mass" in paragraph C., and inserting the following new paragraph immediately after paragraph C.:

D. The land disposal of source, byproduct and special nuclear material received from other sons.

ction 2. Article II of the Agreement of March 29, 1984, is amended by deleting para- and by redesignating paragraph F. as paragraph E.

endment shall become effective on May 9, 1990, and shall remain in effect unless ! un h time as it is terminated pursuant to Article VIII of the Agreement of March 29, 4.

D Lake City, Utah, in triplicate, this 8th day of May, 1990.

FOR THE UNITED STATES NUCLEAR REGULATORY COMMISSION

Kenneth M. Carr,
Chairman

FOR THE STATE OF UTAH

Norman H. Bangerter,
Governor

Amendment to Agreement
Between the United States Nuclear Regulatory Commission
and the State of Utah
for
Discontinuance of Certain Commission Regulatory Authority
and
Responsibility Within the State Pursuant to
Section 274 of the Atomic Energy Act of 1954, as amended

WHEREAS, *the United States Nuclear Regulatory Commission (hereinafter referred to as the Commission) entered into an Agreement (hereinafter referred to the Agreement of March 29, 1984) with the State of Utah under Section 274 of the Atomic Energy Act of 1954, as amended(hereafter referred to the Act) which became effective on April 1, 1984, and provided for discontinuance of the regulatory authority of the Commission within the State under Chapters 6,7, and 8 and Section 161 of the Act with respect to byproduct materials as defined in Section 11e.(2) of the Act, source materials, and special nuclear materials in quantities not sufficient to form a critical mass; and*

WHEREAS, *the Commission entered into an amendment to the Agreement of March 29, 1984 pursuant to the Act and provided for discontinuance of regulatory authority of the Commission with respect to the land disposal of source, byproduct, and special nuclear material received from other persons which became effective on May 9, 1990; and*

WHEREAS, *the Governor of the State of Utah is authorized under Utah Code Annotated 19-3-113 to enter into an additional amendment to the Agreement of March 29, 1984, notwithstanding the amendment of May 9, 1990, between the Commission and the State of Utah; and*

WHEREAS, *the Commission found on [insert date] that the program of the State for the regulation of materials covered by this amendment is in accordance with the requirements of the Act and in all other respects compatible with the Commission's program for the regulation of such materials and is adequate to protect the public health and safety; and*

WHEREAS, *the State and Commission recognize the desirability and importance of cooperation between the Commission and the State in the formulation of standards for protection against hazards of radiation and in assuring that the State and Commission programs for protection against hazards of radiation will be coordinated and compatible; and*

WHEREAS, *this additional amendment to the Agreement of March 29, 1984, is entered into pursuant to the provisions of the Atomic Energy Act of 1954, as amended.*

NOW, THEREFORE, *it is hereby agreed between the Commission and the Governor of the State, acting on behalf of the State, as follows:*

Section 1. Article 1 of the amended Agreement of May 9, 1990, is amended by adding "and 11e.(2)" after the words "11e.(1)" in paragraph A

Section 2. Article of the amended Agreement of May 9, 1990, is amended by deleting paragraph E.

This amendment shall become effective on [insert date] and shall remain in effect unless and until such time as it is terminated pursuant to Article VIII of the Agreement of March 29, 1984.

Done, in triplicate, this [insert date, year]

FOR THE UNITED STATES NUCLEAR REGULATORY COMMISSION

[insert new Chairman name]
Chairman

FOR THE STATE OF UTAH

Michael O. Leavitt
Governor

February 10, 2003

The Honorable Michael O. Leavitt
Governor of Utah
Salt Lake City, Utah 84114-0601

Dear Governor Leavitt:

I am responding on behalf of the U.S. Nuclear Regulatory Commission (NRC) to your letter of January 2, 2003, requesting that the NRC and the State of Utah establish an amended Agreement pursuant to Section 274b of the Atomic Energy Act, as amended (AEA). Under your proposal, Utah would assume regulatory authority over the acquisition, possession, use, transfer, and disposal of byproduct material (uranium mills and tailings) as defined in Section 11e.(2) of the AEA and associated facilities, in addition to the authority under the current amended Agreement.

As required by the AEA, the NRC staff is preparing an assessment of the compatibility of the Utah program with the NRC's program and of the adequacy of Utah's program to protect public health and safety. NRC will publish a summary of the assessment along with the proposed amendment to the Agreement in the Federal Register for public comment. The AEA requires that the notice be published once a week for four consecutive weeks. A press release concerning your request will also be issued at that time.

In addition, Utah's proposal to use existing groundwater protection standards in lieu of NRC's groundwater requirements in Appendix A to 10 CFR Part 40 is being evaluated by NRC staff. After the expiration of the comment period on the proposed amendment, the Commission will consider any comments received and the staff's groundwater standard evaluation, and make a final decision on your request. We will promptly inform you of our decision.

If you have any questions on this matter, please contact me.

Sincerely,

/RA/

Richard A. Meserve

OLENE S. WALKER
Governor

GAYLE F. McKEACHNIE
Lieutenant Governor

State of Utah

Department of
Environmental Quality

Dianne R. Nielson, Ph.D.
Executive Director

William J. Sinclair
Deputy Director

STP

03 DEC 30 AM 10:47

December 23, 2003

Paul Lohaus, Director
NRC Office of State and Tribal Programs
Washington, D.C. 20555-0001

Dear Mr. Lohaus:

Thank you for the recent opportunity to discuss the status of the pending Agreement for Utah to regulate uranium mills and tailings. As a result of the discussion, we wish to emphasize the following points:

- The Division of Radiation Control has trained and qualified at least two staff in the areas of health physics, engineering, and hydrogeology. These staff will be available upon the effective date of the Agreement to perform all necessary functions of the uranium mills regulatory program as stated in the application. These staff will serve as mentors to the new staff and will fulfill needed responsibilities in the uranium mill program until new staff is fully trained.
- The Division of Radiation Control has initiated the recruitment process to hire two new technical staff (an engineer and a health physicist) to staff the program. In addition, a support staff (office technician) will be hired. Currently, a hydrogeologist is functioning full-time in the uranium mills regulatory program and will continue that role. We anticipate having the new staff on board as soon as possible, hopefully well in advance of the signing of the Agreement.
- The impact to the existing program of using existing staff until new staff is fully trained is anticipated to be minimal. Staff have been fully engaged in addressing many of the uranium mill issues in concert with NRC staff and have participated in and have accompanied NRC on inspections of the Envirocare facility and International Uranium, especially over the last year
- Staff is already fully engaged at the Envirocare facility in all areas of responsibility. State staff has also been fully engaged with International Uranium to address groundwater issues, including a release of chloroform from the facility. As Plateau Resources and Rio Algom have moved towards completion of reclamation/decommissioning plans and/or groundwater cleanups, state staff has been involved in these projects as well. It is anticipated that upon transfer of the Agreement, a reclamation plan for Plateau Resources and a major modification to a groundwater cleanup plan (alternate concentration limits) for Rio Algom will have been approved by the NRC and implemented by these licensees that will lessen the state plan review workload for those facilities.

If we can provide further clarification, please do not hesitate to contact me.

Sincerely,

William J. Sinclair
Deputy Director

RIDS: SP08

STP-006 Template

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[7590-01-P]

NUCLEAR REGULATORY COMMISSION

State of Utah: NRC Staff Draft Assessment of a Proposed Amendment to Agreement Between the Nuclear Regulatory Commission and the State of Utah

AGENCY: Nuclear Regulatory Commission.

ACTION: First Notice of a Proposed Amendment to the Agreement with the State of Utah; Request for Comment.

SUMMARY: By letter dated January 2, 2003, Governor Michael O. Leavitt of Utah requested that the U. S. Nuclear Regulatory Commission (NRC) enter into an amendment to the Agreement with Utah (the Agreement) as authorized by Section 274 of the Atomic Energy Act of 1954, as amended (Act).

Under the proposed amendment to the Agreement, the Commission would relinquish, and Utah would assume, an additional portion of the Commission's regulatory authority exercised within the State. As required by the Act, NRC is publishing the proposed amendment to the Agreement for public comment. NRC is also publishing the summary of a draft assessment by the NRC staff of the portion of the regulatory program Utah would assume. Comments are requested on the proposed amendment to the Agreement and the staff's draft assessment, which finds the program to be adequate to protect public health and safety and compatible with NRC's program for regulation of 11e.(2) byproduct material.

The proposed amendment to the Agreement would release (exempt) persons who possess or use certain radioactive materials in Utah from portions of the Commission's regulatory authority. The Act requires that NRC publish those exemptions. Notice is hereby

given that the pertinent exemptions have been previously published in the Federal Register and are codified in the Commission's regulations as 10 CFR Part 150.

DATES: The comment period expires (insert date 30 days after date of publication). Comments received after this date will be considered if it is practical to do so, but the Commission cannot assure consideration of comments received after the expiration date.

ADDRESSES: You may submit comments by any one of the following methods. Please include the following phrase [Utah Amendment] in the subject line of your comments. Comments will be made available to the public in their entirety. Personal information will not be removed from your comments.

Mail comments to: Michael T. Lesar, Chief, Rules and Directives Branch, Division of Administrative Services, Office of Administration, Washington, DC 20555-0001.

E-mail comments to: NRCREP@nrc.gov.

Fax comments to: Chief, Rules and Directives Branch, at (301) 415-5144.

Publicly available documents related to this notice, including public comments received, may be viewed electronically on the public computers located at the NRC's Public Document Room (PDR), O1 F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. The PDR reproduction contractor will copy documents for a fee.

Publicly available documents created or received at the NRC after November 1, 1999, are also available electronically at the NRC's Electronic Reading Room at http://www.nrc.gov/reading-rm/adams.html. From this site, the public can gain entry into the NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737 or by email to pdr@nrc.gov.

Documents available in ADAMS include: the request for an amended Agreement by the Governor of Utah including all information and documentation submitted in support of the request (ML030280380); NRC comments on the request (ML031810623), Utah's response to NRC comments (ML032060090); Utah's additional clarification (ML033640565), and the full text of the NRC Staff Draft Assessment **(INSERT ML# prior to publication)**.

FOR FURTHER INFORMATION CONTACT: Dennis M. Sollenberger, Office of State and Tribal Programs, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. Telephone (301) 415-2819 or e-mail DMS4@nrc.gov.

SUPPLEMENTARY INFORMATION: Since Section 274 of the Act was added in 1959, the Commission has entered into Agreements with 33 States. The Agreement States currently regulate approximately 16,850 material licenses, while NRC regulates approximately 4550 licenses. NRC periodically reviews the performance of the Agreement States to assure

compliance with the provisions of Section 274. Under the proposed amendment to the Agreement, four NRC licenses will transfer to Utah.

Section 274e requires that the terms of the proposed amendment to the Agreement be published in the Federal Register for public comment once each week for four consecutive weeks. This first Notice is being published in fulfillment of the requirement.

I. Background

(a) Section 274d of the Act provides the mechanism for a State to assume regulatory authority from the NRC over certain radioactive materials[1] and activities that involve use of the materials.

In a letter dated January 2, 2003, Governor Leavitt certified that the State of Utah has a program for the control of radiation hazards that is adequate to protect public health and safety within Utah for the materials and activities specified in the proposed amendment to the Agreement, and that the State desires to assume regulatory responsibility for these materials and activities. The radioactive materials and activities (which together are usually referred to as the "categories of materials") which the State of Utah requests authority over are: the possession and use of byproduct material as defined in Section 11e.(2) of the Act and the facilities that generate such material (uranium mill tailings and

[1]The radioactive materials are: (a) byproduct materials as defined in Section 11e.(1) of the Act; (b) byproduct materials as defined in Section 11e.(2) of the Act; (c) source materials as defined in Section 11z. of the Act; and (d) special nuclear materials as defined in Section 11aa. of the Act, restricted to quantities not sufficient to form a critical mass.

uranium mills). Included with the letter was the text of the proposed amendment to the Agreement, which has been edited and is shown in Appendix A to this Notice.

(b) The proposed amendment to the Agreement modifies the articles of the Agreement that:

--Specify the materials and activities over which authority is transferred;
--Specify the activities over which the Commission will retain regulatory authority; and
--Specify the effective date of the proposed Agreement.

The Commission reserves the option to modify the terms of the proposed amendment to the Agreement in response to comments, to correct errors, and to make editorial changes. The final text of the amendment to the Agreement, with the effective date, will be published after the amendment to the Agreement is approved by the Commission and signed by the Chairman of the Commission and the Governor of Utah.

(c) Utah currently regulates all radioactive materials covered under the Act, except for conducting sealed source and device evaluations, and the possession and use of 11e.(2) byproduct material, which would be assumed by Utah under the proposed amendment to their Agreement. Section 19-3-113 of the Utah code provides the authority for the Governor to enter into an Agreement with the Commission. Section 19-3-113 also contains provisions for the orderly transfer of regulatory authority over affected licensees from NRC to the State. After the effective date of the Agreement, licenses issued by NRC would continue in effect as Utah licenses until the licenses expire or are replaced by State issued licenses. The regulatory program including 11e.(2) byproduct materials is authorized by law in Section 19-3-104.

(d) The NRC staff draft assessment finds that the Utah program is adequate to protect public health and safety, and is compatible with the NRC program for the regulation of 11e.(2) byproduct material and the facilities that generate such material.

II. Summary of the NRC Staff Draft Assessment of the Utah Program for the Control of 11e.(2) Byproduct Materials

The NRC staff has examined Utah's request for an amendment to the Agreement with respect to the ability of the Utah radiation control program to regulate 11e.(2) byproduct material. The examination was based on the Commission's policy statement "Criteria for Guidance of States and NRC in Discontinuance of NRC Regulatory Authority and Assumption Thereof by States Through Agreement," referred to herein as the "NRC criteria" (46 FR 7540; January 23, 1981, as amended by policy statements published at 46 FR 36969; July 16, 1981 and at 48 FR 33376; July 21, 1983).

(a) Organization and Personnel. The 11e.(2) byproduct material program will be located within the existing Division of Radiation Control (Program) of the Utah Department of Environmental Quality. The Program will be responsible for all regulatory activities related to the proposed amendment to the Agreement.

The Program performed an analysis of the expected Program workload under the proposed amendment to the Agreement and determined that a level of three technical and one administrative staff would be needed to implement the 11e.(2) byproduct

material authority. The distribution of the qualifications of the individual technical staff members will be balanced with the technical expertise needed for 11e.(2) byproduct material (i.e., health physics, hydrology, engineering). The Program currently has and intends to initially use existing qualified staff to conduct the 11e.(2) byproduct materials activities. At least two staff are qualified in each of the three technical areas identified in the Criteria: health physics, engineering, and hydrology.

The educational requirements for the 11e.(2) byproduct material program staff members are specified in the Utah State personnel position descriptions, and meet the NRC criteria with respect to formal education or combined education and experience requirements. All current staff members hold at least bachelor's degrees in physical or life sciences, or have a combination of education and experience at least equivalent to a bachelor's degree. Several staff members hold advanced degrees, and all staff members have had additional training plus working experience in radiation protection.

The Program also plans to hire three new staff into the program to supplement the existing staff (two professional/technical and one administrative). New staff hired into the Program will be qualified in accordance with the Program's training and qualification procedure to function in the areas of responsibility to which the individual is assigned.

Based on the NRC staff review of the State's need analysis, current staff qualifications, and the current staff assignments for the 11e.(2) byproduct material program, the NRC staff concludes that Utah will have an adequate number of qualified staff assigned to

regulate the 11e.(2) byproduct material workload of the Program under the terms of the amendment to the Agreement.

(b) Legislation and Regulations. The Utah Department of Environmental Quality (Department) is designated by law to be the implementing agency. The law establishes a Radiation Control Board (Board) that has the authority to issue regulations and has delegated the authority to the Executive Secretary the authority to issue licenses, issue orders, conduct inspections, and to enforce compliance with regulations, license conditions, and orders. The Executive Secretary is the director of the Division of Radiation Control in the Department. Licensees are required to provide access to inspectors. The law requires the Board to adopt rules that are compatible with equivalent NRC regulations and that are equally stringent. Utah has adopted R313-24 Utah Administrative Code that incorporates NRC uranium milling regulations by reference, with a few exceptions, and other regulatory changes needed for the 11e.(2) byproduct material program. The NRC staff reviewed and forwarded comments on these regulations to the Utah staff. The final regulations were sent to NRC for review. The NRC staff review verified that, with the one exception of the alternative groundwater standards, the Utah rules contain all of the provisions that are necessary in order to be compatible with the regulations of the NRC on the effective date of the Agreement between the State and the Commission. The alternative groundwater standards were addressed in a separate Commission action (see 68 FR 51516; August 27, 2003 and 68 FR 60885; October 24, 2003) and will be resolved prior to the Commission's final approval of an amendment to the Agreement with Utah. The NRC staff also concludes that Utah will not attempt to enforce regulatory matters reserved to the Commission.

(c) Evaluation of License Applications. Utah has adopted regulations compatible with the NRC regulations that specify the requirements which a person must meet in order to get a license to possess or use 11e.(2) byproduct material. Utah will use its general licensing procedures, along with the additional requirements in R313-24 specific to 11e.(2) byproduct material. Utah will use the NRC regulatory guides as guidance in conducting its licensing reviews.

(d) Inspections and Enforcement. The Utah radiation control program has adopted a schedule providing for the inspection of licensees as frequently as the inspection schedule used by NRC. The Program has adopted procedures for the conduct of inspections, the reporting of inspection findings, and the reporting of inspection results to the licensees. The Program has also adopted, by rule based on the Utah Revised Statutes, procedures for the enforcement of regulatory requirements.

(e) Regulatory Administration. The Utah Department of Environmental Quality is bound by requirements specified in State law for rulemaking, issuing licenses, and taking enforcement actions. The Program has also adopted administrative procedures to assure fair and impartial treatment of license applicants. Utah law prescribes standards of ethical conduct for State employees.

(f) Cooperation with Other Agencies. Utah law deems the holder of an NRC license on the effective date of the proposed Agreement to possess a like license issued by Utah. The law provides that these former NRC licenses will expire either 90 days after receipt from the Department of a notice of expiration of such license or on the date of expiration specified in the NRC license, whichever is earlier. Utah also provides for “timely

renewal.'' This provision affords the continuance of licenses for which an application for renewal has been filed more than 30 days prior to the date of expiration of the license. NRC licenses transferred while in timely renewal are included under the continuation provision.

III. Staff Conclusion

Subsection 274d of the Act provides that the Commission shall enter into an agreement under subsection 274b with any State if:

(a) The Governor of the State certifies that the State has a program for the control of radiation hazards adequate to protect public health and safety with respect to the agreement materials within the State, and that the State desires to assume regulatory responsibility for the agreement materials; and

(b) The Commission finds that the State program is in accordance with the requirements of Subsection 274o, and in all other respects compatible with the Commission's program for the regulation of materials, and that the State program is adequate to protect public health and safety with respect to the materials covered by the proposed Agreement.

On the basis of its draft assessment, the NRC staff concludes that the State of Utah meets the requirements of the Act. The State's program, as defined by its statutes, regulations, personnel, licensing, inspection, and administrative procedures, is compatible with the program

of the Commission and adequate to protect public health and safety with respect to the materials covered by the proposed amendment to the Agreement.

NRC will continue the formal processing of the proposed amendment to the Agreement which includes publication of this Notice once a week for four consecutive weeks for public review and comment.

Dated at Rockville, Maryland, this _____ day of _____, 2003.

For the Nuclear Regulatory Commission.

_____, Director
Office of State and Tribal Programs

APPENDIX A

AMENDMENT TO AGREEMENT BETWEEN THE UNITED STATES NUCLEAR REGULATORY COMMISSION AND THE STATE OF UTAH FOR DISCONTINUANCE OF CERTAIN COMMISSION REGULATORY AUTHORITY AND RESPONSIBILITY WITHIN THE STATE PURSUANT TO SECTION 274 OF THE ATOMIC ENERGY ACT, AS AMENDED

WHEREAS, the United States Nuclear Regulatory Commission (hereinafter referred to as the Commission) entered into an Agreement on March 29, 1984 (hereinafter referred to the Agreement of March 29, 1984) with the State of Utah under Section 274 of the Atomic Energy Act of 1954, as amended (hereafter referred to the Act) which became effective on April 1, 1984, providing for discontinuance of the regulatory authority of the Commission within the State under Chapters 6, 7, and 8 and Section 161 of the Act with respect to byproduct materials as defined in Section 11e.(1) of the Act, source materials, and special nuclear materials in quantities not sufficient to form a critical mass; and

WHEREAS, the Commission entered into an amendment to the Agreement of March 29, 1984 (hereinafter referred to as the Agreement of March 29, 1984, as amended) pursuant to the Act providing for discontinuance of regulatory authority of the Commission with respect to the land disposal of source, byproduct, and special nuclear material received from other persons which became effective on May 9, 1990; and

WHEREAS, the Governor requested, and the Commission agreed, that the Commission reassert Commission authority for the evaluation of radiation safety information for sealed sources or devices containing byproduct, source or special nuclear materials and the

registration of the sealed sources or devices for distribution, as provided for in regulations or orders of the Commission; and

WHEREAS, the Governor of the State of Utah is authorized under Utah Code Annotated 19-3-113 to enter into this amendment to the Agreement of March 29, 1984, as amended, between the Commission and the State of Utah; and

WHEREAS, the Governor of the State of Utah has requested this amendment in accordance with Section 274 of the Act by certifying on January 2, 2003 that the State of Utah has a program for the control of radiological and non-radiological hazards adequate to protect the public health and safety and the environment with respect to byproduct material as defined in Section 11e.(2) of the Act and facilities that generate this material and that the State desires to assume regulatory responsibility for such material; and

WHEREAS, the Commission found on [insert date] that the program of the State for the regulation of materials covered by this amendment is in accordance with the requirements of the Act and in all other respects compatible with the Commission's program for the regulation of byproduct material as defined in Section 11e.(2) and is adequate to protect public health and safety; and

WHEREAS, the State and the Commission recognize the desirability and importance of cooperation between the Commission and the State in the formulation of standards for protection against hazards of radiation and in assuring that the State and the Commission programs for protection against hazards of radiation will be coordinated and compatible; and

WHEREAS, this amendment to the Agreement of March 29, 1984, as amended, is entered into pursuant to the provisions of the Act.

NOW, THEREFORE, it is hereby agreed between the Commission and the Governor of the State, acting on behalf of the State, as follows:

Section 1. Article I of the Agreement of March 29, 1984, as amended, is amended by adding a new paragraph B and renumbering paragraphs B through D as C through E. Paragraph B will read as follows:

"B. Byproduct materials as defined in Section 11e.(2) of the Act;"

Section 2. Article II of the Agreement of March 29, 1984, as amended, is amended by deleting paragraph E and inserting a new paragraph E to implement the reassertion of Commission authority over sealed sources and devices to read:

"E. The evaluation of radiation safety information on sealed sources or devices containing byproduct, source, or special nuclear materials and the registration of the sealed sources or devices for distribution, as provided for in regulations or orders of the Commission."

Section 3. Article II of the Agreement of March 29, 1984, as amended, is amended by numbering the current Article as A by placing an A in front of the current Article language. The subsequent paragraphs A through E are renumbered as 1 through 5. After the current amended language, the following new section B is added to read:

"B. Notwithstanding this Agreement, the Commission retains the following authorities pertaining to byproduct material as defined in Section 11e.(2) of the Act:

1. Prior to the termination of a State license for such byproduct material, or for any activity that resulted in the production of such material, the Commission shall have made a determination that all applicable standards and requirements pertaining to such material have been met;

2. The Commission reserves the authority to establish minimum standards governing reclamation, long-term surveillance or maintenance, and ownership of such byproduct material and of land used as a disposal site for such material. Such reserved authority includes:

a. The authority to establish terms and conditions as the Commission determines necessary to assure that, prior to termination of any license for such byproduct material, or for any activity that results in the production of such material, the licensee shall comply with decontamination, decommissioning, and reclamation standards prescribed by the Commission; and with ownership requirements for such materials and its disposal site;

b. The authority to require that prior to termination of any license for such byproduct material or for any activity that results in the production of such material, title to such byproduct material and its disposal site be transferred to the United States or the State of Utah at the option of the

State (provided such option is exercised prior to termination of the license);

c. The authority to permit use of the surface or subsurface estates, or both, of the land transferred to the United States or the State pursuant to 2.b. in this section in a manner consistent with the provisions of the Uranium Mill Tailings Radiation Control Act of 1978, as amended, provided that the Commission determines that such use would not endanger public health, safety, welfare, or the environment.

d. The authority to require, in the case of a license for any activity that produces such byproduct material (which license was in effect on November 8, 1981), transfer of land and material pursuant to paragraph 2.b. in this section taking into consideration the status of such material and land and interests therein, and the ability of the licensee to transfer title and custody thereof to the United States or the State;

e. The authority to require the Secretary of the Department of Energy, other Federal agency, or State, whichever has custody of such byproduct material and its disposal site, to undertake such monitoring, maintenance, and emergency measures as are necessary to protect public health and safety, and other actions as the Commission deems necessary; and

f. The authority to enter into arrangements as may be appropriate to assure Federal long-term surveillance or maintenance of such byproduct

material and its disposal site on land held in trust by the United States for any Indian Tribe or land owned by an Indian Tribe and subject to a restriction against alienation imposed by the United States."

Section 4. Article IX of the 1984 Agreement, as amended, is renumbered as Article X and a new Article IX is inserted to read:

"ARTICLE IX

In the licensing and regulation of byproduct material as defined in Section 11e.(2) of the Act, or of any activity which results in the production of such byproduct material, the State shall comply with the provisions of Section 274o of the Act. If in such licensing and regulation, the State requires financial surety arrangements for reclamation and or long-term surveillance and maintenance of such byproduct material:

A. The total amount of funds the State collects for such purposes shall be transferred to the United States if custody of such byproduct material and its disposal site is transferred to the United States upon termination of the State license for such byproduct material or any activity that results in the production of such byproduct material. Such funds include, but are not limited to, sums collected for long-term surveillance or maintenance. Such funds do not, however, include monies held as surety where no default has occurred and the reclamation or other bonded activity has been performed; and

B. Such surety or other financial requirements must be sufficient to ensure compliance with those standards established by the Commission pertaining to bonds, sureties, and financial arrangements to ensure adequate reclamation and long-term management of such byproduct material and its disposal site."

This amendment shall become effective on [insert date] and shall remain in effect unless and until such time as it is terminated pursuant to Article VIII of the Agreement of March 29, 1984, as amended.

Done at Rockville, Maryland, in triplicate, this [day] day of [month, year]

FOR THE UNITED STATES
NUCLEAR REGULATORY COMMISSION

_____
[insert Chairman's name], Chairman

Done at Salt Lake City, Utah, in triplicate, this [day] day of [month, year]

FOR THE STATE OF UTAH

_____
Olene S. Walker, Governor

3/1/04

ASSESSMENT

of the proposed

UTAH PROGRAM FOR THE REGULATION OF 11e.(2) BYPRODUCT MATERIALS[1]

as described in the

Request for an Amended Agreement

This assessment, prepared by the NRC staff, examines the proposed radiation control program of the State of Utah with respect to the ability of the program to regulate the possession, use, and disposal of 11e.(2) byproduct materials and the facilities that generate such material subject to the Atomic Energy Act of 1954 (Act), as amended. The assessment was performed using the criteria in the Commission's policy statement "Criteria for Guidance of States and NRC in Discontinuance of NRC Regulatory Authority and Assumption Thereof by States Through Agreement" (referred to below as the "criteria")[2] using an internal procedure (SA-700, Processing an Agreement) developed by the Office of State and Tribal Programs. Each criterion applicable to a program for 11e.(2) byproduct material and the NRC staff's assessment related thereto, is addressed separately below.

The staff did not evaluate the first 28 criteria which address the other radioactive material program requirements since Utah has been an Agreement State for those materials since 1984 as well as for low-level radioactive waste since 1990. The staff considered the last Integrated Materials Performance Evaluation Program (IMPEP) review which was satisfactory for all indicators to demonstrate that Utah has a program that meets these criteria. Therefore, the staff has only addressed the criteria for 11e.(2) byproduct material.

OBJECTIVES

Criteria for States Regulating Uranium or Thorium Processors and Wastes Resulting Therefrom After November 8, 1981

29. Authority. **State statutes or duly promulgated regulations should be enacted, if not already in place, to make clear State authority to carry out the requirements or Public Law 95-604, Uranium Mill Tailings Radiation Control Act (UMTRCA) as follows:**

    a. Authority to regulate the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.

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[1] 11e.(2) byproduct materials are those materials as defined in Section 11e.(2) of the Act and the facilities that generate such material over which regulatory authority may be transferred to a State under the provisions of Section 274.

[2] NRC Statement of Policy published in the Federal Register January 23, 1981 (46 FR 7540-7546), a correction was published July 16, 1981 (46 FR 36969) and a revision of Criterion 9 published in the Federal Register July 21, 1983 (48 FR 33376).

The NRC staff review verified that Utah law authorizes the assumption of regulatory authority over "11e.(2) byproduct material" which is defined in the Radiation Control Act at 19-3-102(3) as “byproduct material” as define in 42 U.S.C. Sec. 2014(e)(2), “the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.”

The Governor is authorized in Section 19-3-113 to enter into agreements with the Federal government providing for discontinuance of the Federal government’s responsibilities with respect to sources of ionizing radiation and the assumption thereof by the State. The Utah Department of Environmental Quality, Division of Radiation Control, has been designated as the agency to carry out these responsibilities.

Staff notes that there are four NRC licensees in Utah currently authorized to conduct activity which produce or dispose of 11e.(2) byproduct material as defined in Section 11e.(2) of the Act, as amended.

References: Utah Radiation Control Act, Sections 19-3-104 and 19-3-113.

b. That an adequate surety (under terms established by regulation) will be provided by the licensee to assure the completion of all requirements established by the (cite appropriate State agency) for the decontamination, decommissioning, and reclamation of sites, structures, and equipment used in conjunction with the generation or disposal of such byproduct material.

The NRC staff review verified that Utah law authorizes the Radiation Control Board to adopt rules requiring financial assurance. The Board has adopted the NRC financial assurance requirements in Criteria 9 and 10 of Appendix A to 10 CFR Part 40 by reference in R313-24. The current financial assurances held by NRC for the four current NRC licensees will be transferred to the State of Utah as part of the license transfer process.

Reference: Utah Radiation Control Act, Section 19-3-104(4)(d)(i) and Utah Administrative Code R313-24.

c. If in the States’ licensing and regulation of byproduct material or of any activity which produces byproduct material, the State collects funds from the licensee or its surety for long-term surveillance and maintenance of such material, the total amount of the funds collected by the State shall be transferred to the U.S. if custody of the byproduct material and its disposal site is transferred to the Federal Government upon termination of the State license. (See 10 CFR 150.32.) If no default has occurred and the reclamation or other bonded activity has been performed, funds for the purpose are not to be transferred to the Federal Government. The funds collected by the State shall be sufficient to ensure compliance with the regulations the Commission establishes pursuant to Section 161X of the Atomic Energy Act.

The NRC staff review verified that Utah law authorizes the promulgation of financial assurance requirements for 11e.(2) byproduct material and uranium mills. Utah adopted the NRC financial assurance requirements in Appendix A by reference which require the collection of funds for long-term surveillance. These regulations require that such funds must be transferred to the long-term custodian of the site prior to the State terminating the license.

References: Utah Code Annotated, 19-3-104(4)(d)(i); and Utah Administrative Code R313-24-4.

d. In the issuances of licenses, an opportunity for written comments, public hearing (with transcript) and cross examination is required.

See discussion under e. below.

e. In the issuances of licenses, a written determination of the action to be taken based upon evidence presented during the public comment period and which is subject to judicial review is required.

The NRC staff review determined that Utah, under the Radiation Control Act, requires a notice of the licensing action and opportunity for hearing in accordance with its Administrative Procedures in R313-17. R313-17 is based on and follows the Utah Administrative Procedures Act (UAPA), Section 63-46b-1 et seq. R313-17 provides an opportunity for written comment, as well as public hearing prior to the issuance or amendment of a license. New licenses and major amendments will be available for public comment for at least 30 days following publication of a notice. All licensing actions taken by the Division of Radiation Control may be appealed to the Radiation Control Board. All final decisions of the Radiation Control Board including licensing, enforcement, and rulemaking actions may be appealed within 30 days (UCA 63-46b-14) with the Utah Court of Appeals (UCA 63-46b-60).

References: Utah Radiation Control Act, 19-3; Utah Administrative Procedure Act, 63-46b; Utah Administrative Code, R313-17.

f. A ban on major construction prior to completion of the written environmental analysis stipulated in Criterion 31.

The NRC staff review verified that Utah has addressed banning commencement of construction prior to license issuance in its regulations at R313-24-3(d)(2).

Reference: Utah Administrative Code, R313-24.

g. An opportunity shall be provided for public participation through written comments, public hearings, and judicial review of rules.

In the State of Utah, all State agencies are required to use the State's administrative rulemaking procedures of the State Division of Administrative Rules. These procedures provide the general authority and process for public notice and comment and public

hearings with regard to issuing rules or regulations. Section R15-1-9 states, “Persons may appeal the decision of the agency head or division by petitioning the district court for judicial review as provided by law.” The Division of Radiation Control has implemented this in its regulations at R313-17.

References: Utah Administrative Code, R15-1, Administrative Rules, and R313-17, Administrative Procedures. Utah Code, 63-46b, Administrative Procedure Act.

30. Supporting Legislation. **In the enactment of any supporting legislation, the State should take into account the reservations of authority to the U.S. in UMTRCA as stated in 10 CFR 150.15a and summarized by the following:**

a. The establishment of minimum standards governing reclamation, long-term surveillance or maintenance, and ownership of the byproduct material.

b. The determination that prior to the termination of a license, the licensee has complied with decontamination, decommissioning and reclamation standards, and ownership requirements for sites at which byproduct material is present.

c. The requirement that prior to termination of any license for byproduct material, as defined in Section 11e.(2), of the Atomic Energy Act or for any activity that results in the production of such material, title to such byproduct material and the disposal site be transferred to the Federal Government or State at the option of the State, provided such option is exercised prior to termination of the license.

d. The authority to require such monitoring, maintenance, and emergency measures after the license is terminated as necessary to protect the public health and safety for those materials and property for which the State has assumed custody pursuant to Pub. L. 95-604.

e. The authority to permit use of the surface or subsurface estate, or both of the land transferred to the United States or State pursuant under provision of the Uranium Mill Radiation Tailings Control Act.

f. The authority to exempt land ownership transfer requirements of Section 83(b)(1)(A).

The NRC staff review verified that the Utah Administrative Code does not include the provisions reserved to the Nuclear Regulatory Commission in 10 CFR 150.15a. The NRC staff also verified that the regulatory requirements implementing requirements reserved to NRC in Appendix A to 10 CFR Part 40 were not adopted (see Section R313-24-4(c)). NRC staff concludes that Utah has not adopted any requirements reserved to NRC and, therefore, Utah meets the requirements of criterion 30.

References: Utah Administrative Code, Section R313-24-4(c).

31. Environmental Assessment. **It is preferable that State statutes contain the provisions of Section 6 of the Model Act. But the following may be accomplished by adoption of either procedures by regulation or technical criteria. In any case, authority for their implementation should be adequately supported by statute, regulation or case law as determined by the State Attorney General.**

In the licensing and regulation of ores processed primarily for their source material content and for the disposal of byproduct material, procedures shall be established which provide a written analysis of the impact on the environment of the licensing activity. This analysis shall be available to the public before commencement of hearings and shall include:[3]

a. An assessment of the radiological and nonradiological public health impacts;

b. An assessment of any impact on any body of water or groundwater;

c. Consideration of alternatives to the licensed activities; and

d. Consideration of long-term impacts of licensed activities (see Item 36b. (1).

The NRC staff review verified that Utah has adopted a requirement (R3134-24-3(1)) that an environmental report be part of a license application for a new license, renewal, or major amendment. The environmental report must address areas addressed in criterion 31. The analysis of these aspects will be included in the safety evaluation report for new or renewed licenses and in a statement of basis for major amendments. NRC staff concludes that the Utah program meets the requirements of criterion 31.

References: Utah Administrative Code, R313-24.

32. Regulations. **State regulations should be reviewed for regulatory requirements, and where necessary incorporate regulatory language which is equivalent to the extent practicable or more stringent than regulations and standards adopted and enforced by the Commission, as required by Section 274o (see 10 CFR 40 and 10 CFR 150.31(b)).**

[3]It is strongly recommended that a 30-day period be provided for public review.

The NRC staff review verified that Utah has adopted applicable portions of 10 CFR Part 40 by incorporation by reference into R313-24. Utah has included 11e.(2) byproduct material disposal and uranium milling facility licensing and inspection actions under its basic licensing and inspection procedures as well as the specific requirements in R313-24. The NRC staff has reviewed all the Utah regulation changes to incorporate the requirements for 11e.(2) byproduct material and uranium milling in accordance with the Office of State and Tribal Procedures in SA-200 and SA-201.

The staff identified that Utah has adopted by reference Utah groundwater requirements that were different than the requirements in Appendix A to 10 CFR Part 40. These different requirements are being addressed as alternative standards under Section 274o of the Act. The staff prepared a Federal Register (FR) notice (68 FR 51516) which provides the notice and opportunity for hearing, through the notice and comment process, required in Section 274o. The comment period was extended (68 FR 60885) to allow 30 days following the availability, electronically, of two documents referenced in the August 27, 2003 FR notice. The comments received will be evaluated and the information will be provided to the Commission for a final determination as required in Section 274o.

The NRC staff concludes that Utah meets the requirements of criterion 32 subject to the final determination by the Commission on the alternative groundwater standards.

References: Utah Administrative Code, R313-15, R313-17, R313-22, R313-70, and R313-24. SECY-03-0025 and COMSECY-03-0038. Federal Register notices 68 FR 51516 and 68 FR 60885.

33. Organizational Relationships Within the States. **Organizational relationships should be established which will provide for an effective regulatory program for uranium mills and mill tailings.**

a. Charts should be developed which show the management organization and lines of authority. This chart should define the specific lines of supervision from program management within the radiation control group and any other department within the State responsible for contributing to the regulation of uranium processing and disposal of tailings. When other State agencies or regional offices are utilized, the lines of communication and administrative control between the agencies and/or regions and the Program Director should be clearly drawn.

The Utah Department of Environmental Quality, Division of Radiation Control, has been designated as the agency to carry out these responsibilities. The Low-Level Waste and Environmental Monitoring Section within the Division of Radiation Control will be responsible for implementing the 11e.(2) byproduct material disposal and uranium milling program. The Radiation Control Board is responsible for issuance of all radioactive material licenses and issuance of all regulations implementing the Radiation Control Act (Utah Code Annotated (UCA) 19-3).

The Radiation Control Act (UCA 19-3) created the Radiation Control Board (Board) which is appointed by the Governor with advice and consent of the Senate and guides development of State radiation control policy and rules in the State. The Board members represent the various segments of the regulated community, the general public, and environmental interests. The Board typically meets on a monthly basis except February and July. The Board travels to various areas of Utah to be available to the licensees and the public. Board members are subject to the Utah Public Officers' and Employees' Ethics Act. Information regarding disclosure and conflict of interest for Board members was submitted as Appendix A to the amendment application. The Board has delegated its responsibility for issuance of licenses and enforcement actions to the Executive Secretary of the Board. The Executive Secretary of the Board typically is the Director of the Division of Radiation Control which is the current status. The Division of Radiation Control staff conduct the technical reviews and develop the proposed licenses or amendments for signature by the Director, Division of Radiation Control. The Director, Division of Radiation Control, is also an Executive Secretary for the Water Quality Board for the purposes of addressing water quality issues for uranium milling facilities and 11e.(2) byproduct material. At his time, the Division of Radiation Control does not intend to use other State organizations in their formal technical review process.

b. Those States that will utilize personnel from other State Departments or Federal agencies in preparing the environmental assessment should designate a lead agency for supervising and coordinating preparation of this environmental assessment. It is normally expected that the radiation control agency in Agreement States will be the lead agency. The basic premise is that the lead agency is required to prepare the environmental assessment. Utilization of an applicant's environmental report in lieu of a lead agency assessment of the proposed project is not adequate or appropriate. However, the lead agency may prepare an environmental assessment based upon an applicant's environmental report. Other credible information may be utilized by the State as long as such information is verified and documented by the State.

The Division of Radiation Control will be the lead agency for the preparation of environmental assessments for uranium milling and 11e.(2) byproduct material. The Division may use an outside consultant or contractor for technical review (science and engineering support) after the Division has the mutual consent of the licensee to pay reasonable expenses under Utah fee regulations. Legal assistance from the Attorney General's office is also available as needed. The Division recently informed NRC staff by telephone that they have entered into a new science and engineering support task order contract that can be utilized for low-level radioactive waste or 11e.(2) byproduct material (uranium milling) issues.

c. When a lead agency is designated, that agency should coordinate preparation of the statement. The other agencies involved should provide assistance with respect to their areas of jurisdiction and expertise. Factors relevant in obtaining assistance from other agencies include the applicable

statutory authority, the time sequence in which the agencies become involved, the magnitude of their involvement, and relative expertise with respect to the project's environmental effects.

In order to bring an environmental assessment to a satisfactory conclusion, it is highly recommended that an initial scoping document be developed which clearly delineates the area and scope of work to be performed by each agency within a given time constraint.

The Division environmental review process does not involve other State organizations at this time. The consultant, if it is used, would be under the direct supervision of the Division staff. The Utah process does not follow the Federal process. The Federal process is not a matter of compatibility, but Utah must address the technical review areas and prepare a written environmental assessment. Utah will prepare its environmental assessment as part of the licensing review process and will make the assessment documentation available when it notices its proposed licensing action. The comments on the assessment will be addressed prior to issuing the final licensing action.

d. For those areas in the environmental assessment where the State cannot identify a State agency having sufficient expertise to adequately evaluate the proposal or prepare an assessment, the State should have provisions for obtaining outside consulting services. In those instances where non-governmental consultants are utilized, procedures should be established to avoid conflict of interest consistent with State law and administrative procedures.

Medical consultants recognized for their expertise in emergency medical matters, such as the Oak Ridge and Hanford National Laboratories, relating to the intake of uranium and its diagnosis thereof associated with uranium mining and milling should be identified and available to the State for advice and direct assistance.

During the budget preparation, the State should allow for funding costs incurred by the use of consultants. In addition, consultants should be available for any emergencies which may occur and for which their expertise would be needed immediately.

In addition to the technical contract discussed above, Utah identified two possible medical consultants that could be used by Utah for the uranium milling program. The Division has budgeted for the science and engineering support contractor and has funds available for the other consultants if necessary. Expenses of the contract or consultants may be charged to specific licensees when prior arrangements have been made. The contract has provisions to avoid conflicts of interest. The consultants and task order contract can both be utilized on short notice.

The NRC staff review determined that the provisions of criterion 33 have been addressed by the Utah program.

34. Personnel. **Personnel needed in the processing of the license application can be identified or grouped according to the following skills: Technical; Administrative; and Support.**

a. Administrative personnel are those persons who will provide internal guides, policy memoranda, reviews and managerial services necessary to assure completion of the licensing action. Support personnel are those persons who provide secretarial, clerical support, legal, and laboratory services. Technical personnel are those individuals who have the training and experience in radiation protection necessary to evaluate the engineering and radiological safety aspects of a uranium concentrator. Current indications are that 2 to 2.75 total professional person years' effort is needed to process a new conventional mill license, in situ license, or major renewal, to meet the requirements of UMTRCA. This number includes the effort for the environmental assessment and the in-plant safety review. It also includes the use of consultants. Heap leach applications may take less time and is expected to take 1.0 to 1.5 professional staff years' effort, depending on the circumstances encountered. Current indications are that the person years effort for support and legal services should be one secretary for approximately 2 conventional mills and ½ staff years for legal services for each non-contested mill case. The impact on environmental monitoring laboratory support services is difficult to estimate but should be added into the personnel requirements.

In addition, consideration should be given to various miscellaneous post-licensing ongoing activities including the issuance of minor amendments, inspections, and environmental surveillance. It is estimated that these activities may require about 0.5 to 1 person years effort per licensed facility per year, the latter being the case for a major facility. These figures do not include manpower for Title I activities of UMTRCA.

b. In evaluating license applications the State shall have access to necessary specialities, e.g., radiological safety, hydrology, geology and dam construction and operation.

In addition to the personnel qualifications listed in the "Guide for Evaluation of State Radiation Control Programs," Revision 3, February 1, 1980, the regulatory staff involved in the regulatory process (Radiation) should have additional training in Uranium Mill Health Physics and Environmental Assessments.

c. Personnel in agencies other than the lead agency are included in these total person year numbers. If other agencies are counted in these numbers then it shall be demonstrated that these personnel will be available on a routine and continuing basis to a degree claimed as necessary to successfully comply with the requirements of UMTRCA and these criteria. The arrangements for making such resources available shall be documented, such as an interagency memorandum of understanding and confirmed by budgetary cost centers.

The NRC will be transferring four licenses to Utah. One operational mill, one commercial 11e.(2) byproduct material disposal facility, and two conventional mills in reclamation with approved reclamation plans. Based on the above criteria, the NRC staff estimates that Utah would need about 4-5 technical and support staff to conduct the licensing, including environmental assessment, and inspection activities for these four facilities.

Utah performed a staffing analysis which identified the need for four staff (three technical and one support) to conduct the 11e.(2) byproduct material (uranium milling) program. The staffing analysis included licensing casework (new, renewals, and amendments including environmental assessments), inspections, regulation and guidance updates, and contingency resources for unplanned actions. Utah intends to use the existing technical staff for initial implementation of the uranium milling program. The technical staff in the uranium milling program would include a hydrologist, an engineer, and a health physicist. Support staff would include an office technician and legal support as needed. Management of the uranium milling program would be under the direction of the Low-Level Waste and Environmental Monitoring Section Manager. Utah intends to hire three new staff (health physicist, engineer, and office technician) to supplement the existing staff. The new staff will also assist other programs, as needed.

The Utah staffing analysis identified the type (hydrology, engineering, and health physics) and appropriate number of staff needed to administer the licensing and inspection program for 11e.(2) byproduct material. Utah identified at least two existing staff members that are qualified for each technical area needed. The Utah staff have been working with NRC staff during the time that NRC has been regulating these facilities and have gained experience in uranium milling operations. The Utah staff have previously conducted environmental assessments similar to that appropriate for uranium milling in their licensing of the commercial low-level waste disposal site. They have also conducted reviews of and commented on NRC assessments for the uranium milling facilities. The Division also has a technical assistance contractor that may assist the Division as necessary.

The NRC staff review of the Utah staff qualifications determined that there currently is a sufficient number of trained staff to administer the 11e.(2) byproduct materials (uranium milling) program. Utah has indicated that current technical staff will be used to initially implement the 11e.(2) byproduct material activities. Utah will hire three new staff and train them to support the uranium milling staff. The Utah fee schedule for uranium milling facilities goes into effect upon entering into the amended agreement and these

fees will be used to support the three new positions. Although the new staff will be hired just before the transfer of authority to Utah, the Utah program has sufficient existing qualified staff to implement the 11e.(2) byproduct material activities. The new staff will be trained and be assigned to activities in the Program as they are qualified. Utah stated that the impact to the existing Program of using existing staff until the new staff is fully trained is anticipated to be minimal.

The NRC staff review of Utah's needs analysis, current staff qualifications, and current staff assignments for 11e.(2) byproduct material activities determined that the provisions of criterion 34 for the number staff and qualifications of those staff were addressed by the Utah program. The NRC staff determined that the Utah program has an adequate number of staff and sufficient technical expertise to implement the proposed amended Agreement for 11e.(2) byproduct material.

35. Functions To Be Covered. **The States should develop procedures for licensing, inspection, and preparation of environmental assessments.**

a. Licensing

(1) Licensing evaluations or assessments should include in-plant radiological safety aspects in occupational or restricted areas and environmental impacts to populations in unrestricted areas from the plant.

(2) It is expected that the State will review, evaluate and provide documentation of these evaluations. Items which should be evaluated are:

(a) Proposed activities;
(b) Scope of proposed action;
(c) Specific activities to be conducted;
(d) Administrative procedures;
(e) Facility organization and radiological safety responsibilities, authorities, and personnel qualifications;
(f) Licensee audits and inspections;
(g) Radiation safety training programs for workers;
(h) Radiation safety program, control and monitoring;
(I) Restricted area markings and access control;
(j) At existing mills, review of monitoring data, exposure records, licensee audit and inspection records, and other records applicable to existing mills;
(k) Environmental monitoring;
(l) Emergency procedures, radiological;
(m) Product transportation; and
(n) Site and physical decommissioning procedures, other than tailings.
(o) Employee exposure data and bioassay programs.

Utah will use its Technical Procedures for License Review as well as NRC guidance in the form of Standard Review Plans and Regulatory Guides in the conduct of its licensing program. These procedures and guidance documents include evaluation of the areas listed above. Utah has previously licensed, including the preparation of an environmental assessment for, a commercial low-level waste disposal site with similar waste management practices to those at uranium milling facilities.

b. Environmental Assessment

(1) The environmental evaluation should consist of a detailed and documented evaluation of the following items:

(a) Topography;
(b) Geology;
(c) Hydrology and water quality;
(d) Meteorology;
(e) Background radiation;
(f) Tailings retention system;
(g) Interim stabilization, reclamation, and Site Decommissioning Program;
(h) Radiological Dose Assessment;
(1) Source terms
(2) Exposure pathway
(3) Dose commitment to individuals
(4) Dose commitment to populations
(5) Evaluation of radiological impacts to the public to include a determination of compliance with State and Federal regulations and comparisons with background values
(6) Occupational dose
(7) Radiological impact to biota other than man
(8) Radiological monitoring programs, pre-occupational and operational
(l) Impacts to surface and groundwater, both quality and quantity;
(j) Environmental effects of accidents; and
(k) Evaluation of tailings management alternatives in terms of regulations.

(2) The States are encouraged to examine the need to expand the scope of the assessment into other areas such as:

(a) Ecology;
(b) Environmental effects of site preparation and facility construction on environment and biota;
(c) Environmental effects of use and discharge of chemicals and fuels; and
(d) Economic and social effects.

Section R313-24.3 of the Utah Administrative Code requires the licensee to submit an environmental report that will be reviewed and evaluated by the licensing staff as part of the licensing process. The staff evaluation will be documented in the environmental assessments. The areas of review cover all the areas listed above in (1) and for new facilities, the areas listed above in (2).

c. Inspections

(1) As a minimum, items which should be inspected or included during the inspection of a uranium mill should adhere to the items evaluated in the in-plant safety review. The principal items recommended for inspection are:

- **(a) Administration;**
- **(b) Mill circuit, including any additions, deletions, or circuit changes;**
- **(c) Accidents/Incidents;**
- **(d) Part 19 or equivalent requirements of the State;**
- **(e) Action taken on previous findings;**
- **(f) A mill tour to determine compliance with regulations, and license conditions;**
- **(g) Tailings waste management in accordance with regulations and license conditions (see NRC Reg. Guide 3.11.1);**
- **(h) Records;**
- **(I) Respiratory protection in accordance with license conditions or 10 CFR Part 20.**
- **(j) Effluent and environmental monitoring;**
- **(k) Training programs;**
- **(l) Transportation and shipping;**
- **(m) Internal review and audit by management;**
- **(n) Exit interview; and**
- **(o) Final written report documenting the results of the inspection and findings on each item.**

(2) In addition, the inspector should perform the following:

- **(a) Independent surveys and sampling.**

(3) Additional guidance is contained in appropriate NRC regulatory and inspection guides. A complete inspection should be performed at least once per year.

The Utah uranium milling program will consist of four facilities. Envirocare which is west of Salt Lake City and three facilities in southern Utah. The Envirocare 11e.(2) disposal facility will be incorporated into the overall Envirocare oversight and inspection program now in use for the low-level waste disposal site. The uranium milling health physicist will inspect each facility in southern Utah at least quarterly. This schedule will be adjusted based on the facility status and compliance history. This health physicist will also be responsible for the inspection of the 28 other licensees in southern Utah. The engineer and groundwater hydrologist will provide inspection support as needed in such areas as

groundwater sampling evaluations, split groundwater sampling, oversight of new engineering construction and oversight of closed facilities.

The Utah inspection program for uranium milling facilities will incorporate all the elements of the current materials inspection program and include the above areas. A complete inspection will be performed at least annually and will include independent surveys and sampling. The NRC inspection form for Uranium Mills as well as the NRC Inspection Manual Chapter 2801, "Uranium Mill and 11e.(2) Byproduct Material Disposal Site and Facility Inspection Program," will be used as guidance documents by Utah inspectors. Enforcement actions will be in accordance with Utah Radiation Control Rules and exiting enforcement guidance. All enforcement actions may be appealed through the Utah Radiation Control Board and thereafter, to the appropriate court.

d. Operational Data Review

(1) In addition to the reporting requirements required by the regulations or license conditions, the licensee will submit in writing to the regulatory agency within 60 days after January 1 and July 1 of each year, reports specifying the quantity of each of the principal radionuclides released to unrestricted areas in liquid and in gaseous effluents during the previous six months of operation. This data shall be reported in a manner that will permit the regulatory agency to confirm the potential annual radiation doses to the public.

(2) All data from the radiological and non-radiological environmental monitoring program will also be submitted for the same time periods and frequency. The data will be reported in a manner that will allow the regulatory agency to conform the dose to receptors.

The Division staff will perform operational data reviews of the semi-annual radioactive material effluent reports as well as the semi-annual environmental monitoring reports. The licensee is required to specify the quantity of each of the principle radionuclides released to unrestricted areas in both liquid and gaseous effluents during the previous six months of operation (R313-24-4, incorporates 10 CFR 40.65 by reference). The data for the effluent releases will be required in a manner that will permit the Utah staff to confirm the potential annual radiation doses to the public and confirm the dose to receptors.

The NRC staff review determined that the provisions of criterion 35 are addressed by the Utah program. In general, Utah has adopted NRC regulations by reference or adopted equivalent requirements, and committed to using the NRC guidance in conducting its regulatory program. The staff concludes that the Utah program satisfies the requirements of criterion 35.

36. Instrumentation. **The State should have available both field and laboratory instrumentation sufficient to ensure the licensee's control of materials and to validate the licensee's measurements.**

a. The State will submit its list of instrumentation to the NRC for review. Arrangements should be made for calibrating such equipment.

b. Laboratory-type instrumentation should be available in a State agency or through a commercial service which has the capability for quantitative and qualitative analysis of radionuclides associated with natural uranium and its decay chain, primarily; U-238, Ra-226, Th-320, Pb-210, and Rn-222, in a variety of sample media such as will be encountered from an environmental sampling program.

Analysis and data reduction from laboratory analytical facilities should be available to the licensing and inspection authorities in a timely manner. Normally, the data should be available within 30 days of submittal. State acceptability of quality assurance (QA) programs should also be established for the analytical laboratories.

c. Arrangements should also be completed so that a large number of samples in a variety of sample media resulting from a major accident can be analyzed in a time frame that will allow timely decisions to be made regarding public health and safety.

d. Arrangements should be made to participate in the Environmental Protection Agency quality assurance program for laboratory performance.

The Utah program submitted a list of instruments that are sufficient in number and for the types of field and laboratory instruments needed to implement a uranium milling program (Appendix F of Utah application). The instruments are calibrated at least annually and semi-annually for those used in the materials program (calibration procedures in Appendix F of Utah application). The Division has laboratory instruments for sample analysis as well as the capability at the State Health Laboratory which is sufficient for routine qualitative and quantitative analysis of radionuclides associated with natural uranium and its decay chain in a variety of sample media. In addition, the Division has the capability to contract commercially for analyses of samples when necessary. In the case of a major accident, the State Health Laboratory could perform a large number of sample analyses. If the State Health Laboratory capability is exceeded, the State Health Laboratory may have to contract a commercial laboratory for a timely turn around. The State Health Laboratory participates in the National Environmental Laboratory Accreditation Program and maintains its own quality assurance program. The Environmental Protection Agency's program for laboratory performance is no longer available.

The staff concludes that the Utah program satisfies the requirements of criterion 36.

STAFF CONCLUSION

Section 274d of the Atomic Energy Act of 1954, as amended, states that "The Commission shall enter into an agreement under subsection b of this section with any State if:

(1) The Governor of that State certifies that the State has a program for the control of radiation hazards adequate to protect the public health and safety with respect to the materials within the State covered by the proposed agreement, and that the State desires to assume regulatory responsibility for such materials; and

(2) The Commission finds that the State program is in accordance with the requirements of subsection o. and in all other respects compatible with the Commission's program for the regulation of such materials, and that the State program is adequate to protect the public health and safety with respect to the materials covered by the proposed amendment."

The NRC staff has reviewed the proposed Agreement, the certification of Utah Governor Leavitt, and the supporting information provided by the staff of the Bureau of Radiation Control of the Utah Department of Environmental Quality, and concludes that the State of Utah satisfies the criteria in the Commission's policy statement "Criteria for Guidance of States and NRC in Discontinuance of NRC Regulatory Authority and Assumption Thereof by States Through Agreement," and therefore meets the requirements of Section 274 of the Act. The proposed Utah program to regulate 11e.(2) materials, as comprised of statutes, regulations, procedures, and apparatus, is compatible with the program of the Commission and is adequate to protect public health and safety with respect to the materials covered by the proposed Agreement.