

25 TEXAS ADMINISTRATIVE CODE

§289.260

Licensing of Uranium Recovery and Byproduct Material Disposal Facilities

Texas Regulations for Control of Radiation

(revisions effective September 1, 2004
are shown as shaded text)

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§289.260. Licensing of Uranium Recovery and Byproduct Material Disposal Facilities.

(a) Purpose. This section provides for the specific licensing of the receipt, possession, use, or disposal of radioactive material in uranium recovery facilities and other operations that accept byproduct material for disposal. No person shall engage in such activities except as authorized in a specific license issued in accordance with this section unless otherwise provided for in §289.252 of this title (relating to Licensing of Radioactive Material).

(b) Scope. In addition to the requirements of this section, all licensees, unless otherwise specified, are subject to the requirements of §289.201 of this title (relating to General Provisions for Radioactive Material), §289.202 of this title (relating to Standards for Protection Against Radiation from Radioactive Materials), §289.203 of this title (relating to Notices, Instructions, and Reports to Workers; Inspections), §289.204 of this title (relating to Fees for Certificates of Registration, Radioactive Material Licenses, Emergency Planning and Implementation, and Other Regulatory Services), §289.205 of this title (relating to Hearing and Enforcement Procedures), §289.251 of this title (relating to Exemptions, General Licenses, and General License Acknowledgements), §289.252 of this title, and §289.257 of this title (relating to Packaging and Transportation of Radioactive Material).

(c) Definitions. The following words and terms when used in this section shall have the following meaning unless the context clearly indicates otherwise.

(1) Aquifer - A geologic formation, group of formations, or part of a formation capable of yielding a significant amount of groundwater 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:

(A) hydraulically interconnected to a natural aquifer;

(B) capable of discharge to surface water; or

(C) 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 subsection (p) of this section.

(2) As expeditiously as practicable considering technological feasibility - As quickly as possible considering the physical characteristics of the byproduct material and the site, the limits of "available technology" (as defined in this subsection), the need for consistency with mandatory requirements of other regulatory programs, and "factors beyond the control of the licensee" (as defined in this subsection). The phrase permits consideration of the cost of compliance only to the extent specifically provided for by use of the term "available technology."

(3) Available technology - Technologies and methods for emplacing a final radon barrier on byproduct material piles or impoundments. This term shall not be construed to include extraordinary measures or techniques that would impose costs that are grossly excessive as measured by practice within the industry (or one that is reasonably analogous), (for example, by way of illustration only, unreasonable overtime, staffing, or transportation requirements, etc., considering normal practice in the industry; laser fusion of soils; etc.), provided there is reasonable progress toward emplacement of the final radon barrier. To determine grossly excessive costs, the relevant baseline against which costs shall be compared is the cost estimate for tailings impoundment closure contained in the licensee's approved reclamation plan, but costs beyond these estimates shall not automatically be considered grossly excessive.

(4) Byproduct material - Tailings or wastes produced by or resulting from 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 solution extraction processes. Underground ore bodies depleted by such solution extraction operations do not constitute "byproduct material" within this definition.

(5) Capable fault - As used in this section, "capable fault" has the same meaning as defined in Section III(g) of Appendix A of Title 10 Code of Federal Regulations (CFR) Part 100.

(6) Closure - The post-operational activities to decontaminate and decommission the buildings and site used to produce byproduct materials and reclaim the tailings and/or disposal area, including groundwater restoration, if needed.

(7) Closure plan - The plan approved by the agency to accomplish closure. The closure plan consists of a decommissioning plan and may also include a reclamation plan.

(8) Commencement of construction - Any clearing of land, excavation, or other substantial action that would adversely affect the environment of a site, but does not include necessary borings to determine site characteristics or other preconstruction monitoring to establish background information related to the suitability of a site, or to the protection of the environment.

(9) Compliance period - The period of time that begins when the agency sets secondary groundwater protection standards and ends when the owner or operator's license is terminated and the site is transferred to the state or federal government for long-term care, if applicable.

(10) Dike - An embankment or ridge of either natural or man-made materials used to prevent the movement of liquids, sludges, solids, or other materials.

(11) Disposal area - The area containing byproduct materials to which the requirements of subsection (o)(16)-(27) of this section apply.

(12) Existing portion - As used in subsection (o)(9)(A) of this section, "existing portion" is that land surface area of an existing surface impoundment on which significant quantities of byproduct materials had been placed prior to September 30, 1983.

(13) Factors beyond the control of the licensee - Factors proximately causing delay in meeting the schedule in the applicable reclamation plan for the timely emplacement of the final radon barrier notwithstanding the good faith efforts of the licensee to complete the barrier in compliance with subsection (o)(24) of this section. These factors may include but are not limited to:

- (A) physical conditions at the site;
- (B) inclement weather or climatic conditions;
- (C) an act of God;
- (D) an act of war;
- (E) a judicial or administrative order or decision, or change to the statutory, regulatory, or other legal requirements applicable to the licensee's facility that would preclude or delay the performance of activities required for compliance;
- (F) labor disturbances;
- (G) any modifications, cessation or delay ordered by state, federal, or local agencies;

(H) delays beyond the time reasonably required in obtaining necessary government permits, licenses, approvals, or consent for activities described in the reclamation plan proposed by the licensee that result from government agency failure to take final action after the licensee has made a good faith, timely effort to submit legally sufficient applications, responses to requests (including relevant data requested by the agencies), or other information, including approval of the reclamation plan; and

(I) an act or omission of any third party over whom the licensee has no control.

(14) Final radon barrier - The earthen cover (or approved alternative cover) over byproduct material constructed to comply with subsection (o)(16)-(27) of this section (excluding erosion protection features).

(15) Groundwater - Water below the land surface in a zone of saturation. For purposes of this section, groundwater is the water contained within an aquifer as defined in paragraph (1) of this subsection.

(16) Hazardous constituent - Subject to subsection (o)(10)(E) of this section, "hazardous constituent" is a constituent that 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 groundwater in the uppermost aquifer; and

(C) the constituent is listed in 10 CFR Part 40, Appendix A, Criterion 13.

(17) Leachate - Any liquid, including any suspended or dissolved components in the liquid, that has percolated through or drained from the byproduct material.

(18) Licensed site - The area contained within the boundary of a location under the control of persons generating or storing byproduct materials under a license.

(19) Liner - A continuous layer of natural or man-made materials, beneath or on the sides of a surface impoundment that restricts the downward or lateral escape of byproduct material, hazardous constituents, or leachate.

(20) Maximum credible earthquake - That earthquake that would cause the maximum vibratory ground motion based upon an evaluation of earthquake potential considering the regional and local geology and seismology and specific characteristics of local subsurface material.

(21) Milestone - An action or event that is required to occur by an enforceable date.

(22) Operation - The period of time during which a byproduct material disposal area is being used for the continued placement of byproduct material or is in standby status for such placement. A disposal area is in operation from the day that byproduct material is first placed in it until the day final closure begins.

(23) Point of compliance - The site-specific location in the uppermost aquifer where the groundwater protection standard shall be met. The objective in selecting the point of compliance is to provide the earliest practicable warning that an impoundment is releasing hazardous constituents to the groundwater. The point of compliance is selected to provide prompt indication of groundwater contamination on the hydraulically downgradient edge of the disposal area.

(24) Principal activities - Activities authorized by the license that are essential to achieving the purpose(s) for which the license is 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.

(25) Reclamation plan - For the purposes of subsection (o)(16)-(27) of this section, "reclamation plan" is the plan detailing activities to accomplish reclamation of the byproduct material disposal area in accordance with the technical criteria of this section. The reclamation plan shall include a schedule for reclamation milestones that are key to the completion of the final radon barrier, including as appropriate, but not limited to, wind blown tailings retrieval and placement on the pile, interim stabilization (including dewatering or the removal of freestanding liquids and recontouring), and final radon barrier construction. Reclamation of byproduct material shall also be addressed in the closure plan. The detailed reclamation plan may be incorporated into the closure plan.

(26) Security (surety) - The following are examples of security:

- (A) cash deposits;
- (B) surety bonds;
- (C) certificates of deposit;

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- (D) deposits of government securities;
- (E) irrevocable letters of credit; or
- (F) other security acceptable to the agency.

(27) Surface impoundment - A natural topographic depression, man-made excavation, or diked area, which is designed to hold an accumulation of liquid wastes or wastes containing free liquids, and which is not an injection well.

(28) Unrefined and unprocessed ore - Ore in its natural form before any processing, such as grinding, roasting, beneficiating, solution extracting, or refining.

(29) Uppermost aquifer - 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.

(30) Uranium recovery - Any uranium extraction or concentration activity that results in the production of "byproduct material" as it is defined in this subsection. As used in this definition, "uranium recovery" has the same meaning as "uranium milling" in 10 CFR 40.4.

(d) Filing application for specific licenses. Unless otherwise specified, an applicant for a license is subject to the requirements in §289.252(d) of this title. The applicant shall also comply with the following additional filing requirements.

(1) Applications for specific licenses shall be filed in seven copies in a manner specified by the agency.

(2) Each applicant shall demonstrate to the agency that the applicant is financially qualified to conduct the licensed activity, including any required decontamination, decommissioning, reclamation, and disposal, before the agency issues or renews a license. The requirement is different from those in subsection (m) of this section for financial security.

(A) An applicant or licensee shall show financial qualification by submitting one of the following:

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(j) the bonding company report or equivalent (from which information can be obtained to calculate a ratio as described in subparagraph (B) of this paragraph) that was used to obtain the financial security instrument used to meet the financial security requirement specified in subsection (m) of this section. However, if the applicant or licensee posted collateral to obtain the financial instrument used to meet the requirement for financial security specified in subsection (m) of this section, the applicant or licensee shall demonstrate financial qualification by one of the methods specified in clause (ii) or (iii) of this subparagraph;

(ii) SEC documentation (from which information can be obtained to calculate a ratio as described in subparagraph (B) of this paragraph), if the applicant or licensee is a publicly-held company; or

(iii) a self-test (for example, an annual audit report, certifying a company's assets and liabilities and resulting ratio (as described in subparagraph (B) of this paragraph) or, in the case of a new company, a business plan specifying expected expenses versus capitalization and anticipated revenues).

(B) Each applicant or licensee must declare its Standard Industry Classification (SIC) code. Several companies publish lists, on an annual basis, of acceptable assets-to-liabilities (assets divided by liabilities) ratio ranges for each type of SIC code. If an applicant or licensee submits documentation of its current assets and current liabilities or, in the case of a new company, a business plan specifying expected expenses versus capitalization and anticipated revenues, and the resulting ratio falls within an acceptable range as published by generally recognized companies (for example, Almanac of Business and Industrial Financial Ratios, Industry NORM and Key Business Ratios, Dun & Bradstreet Industry publications, and Manufacturing USA: Industry Analyses, Statistics, and Leading Companies), the agency will consider that applicant or licensee financially qualified to conduct the requested or licensed activity.

(C) The agency will consider other types of documentation if that documentation provides an equivalent measure of assurance of the applicant's or licensee's financial qualifications as found in subparagraphs (A) and (B) of this paragraph.

(3) An application for a license shall contain written specifications relating to the uranium recovery facility operations and the disposition of the byproduct material.

(4) Each application shall clearly demonstrate how the requirements of subsections (d)-(g) and (m)-(p) of this section have been addressed.

(5) Applications for new licenses shall be processed in accordance with the following time periods.

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(A) The first period is the time from receipt of an application by the Division of Licensing, Registration and Standards to the date of issuance or denial of the license or a written notice outlining why the application is incomplete or unacceptable. This time period is 180 days.

(B) The second period is the time from receipt of the last item necessary to complete the application to the date of issuance or denial of the license. This time period is 180 days.

(C) These time periods are exclusive of any time period incident to hearings and post-hearing activities required by Government Code, Chapters 2001 and 2002.

(6) Notwithstanding the provisions of §289.204(d)(1) of this title, reimbursement of application fees may be granted in the following manner.

(A) In the event the application is not processed in the time periods as stated in paragraph (10) of this subsection, the applicant has the right to request of the Director of the Radiation Control Program full reimbursement of all application fees paid in that particular application process. If the director does not agree that the established periods have been violated or finds that good cause existed for exceeding the established periods, the request will be denied.

(B) Good cause for exceeding the period established is considered to exist if:

(i) the number of applications for licenses to be processed exceeds by 15% or more the number processed in the same calendar quarter the preceding year;

(ii) another public or private entity utilized in the application process caused the delay; or

(iii) other conditions existed giving good cause for exceeding the established periods.

(C) If the request for full reimbursement authorized by subparagraph (A) of this paragraph is denied, the applicant may then request a hearing by appeal to the Commissioner of Health for a resolution of the dispute. The appeal will be processed in accordance with Title 1, Texas Administrative Code, Chapter 155 (relating to Rules of Procedure) and the Formal Hearing Procedures, §§1.21, 1.23, 1.25, and 1.27 of this title.

(e) General requirements for the issuance of specific licenses. A license application will be approved if the agency determines that the applicant has met the requirements of §289.252(e) of this title and the following:

(1) qualifications of the designated radiation safety officer (RSO) are adequate for the purpose requested in the application and include as a minimum:

(A) possession of a high school diploma or a certificate of high school equivalency based on the GED test; and

(B) training and experience necessary to supervise the radiation safety aspects of the licensed activity;

(2) the applicant satisfies all applicable special requirements in this section.

(f) Special requirements for a license application for uranium recovery and byproduct material disposal facilities. In addition to the requirements in subsection (e) of this section, a license will be issued if the applicant submits the items in paragraph (1) of this subsection for agency approval and meets the conditions in paragraphs (2) and (3) of this subsection.

(1) An application for a license shall include the following:

(A) for new licenses, an environmental report that includes the results of a one-year preoperational monitoring program and for renewal of licenses, an environmental report containing the results of the operational monitoring program. Both shall also include the following:

(i) description of the proposed project or action;

(ii) area/site characteristics including ecology, geology, topography, hydrology, meteorology, historical and cultural landmarks, and archaeology;

(iii) radiological and nonradiological impacts of the proposed project or action, including waterway and groundwater impacts and any long-term impacts;

(iv) environmental effects of accidents;

(v) byproduct material disposal, decommissioning, decontamination, and reclamation and impacts of these activities; and

(vi) site and project alternative;

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(B) a closure plan for decontamination, decommissioning, restoration, and reclamation of buildings and the site to levels that would allow unrestricted use and for reclamation of the byproduct material disposal areas in accordance with the technical requirements of subsection (o) of this section;

(C) proposal of an acceptable form and amount of financial security consistent with the requirements of subsection (m) of this section;

(D) procedures describing the means employed to meet the requirements of subsections (g)(1) and (2) and (o)(15) of this section during the operational phase of any project;

(E) specifications for the emissions control and disposition of the byproduct material; and

(F) for disposal of byproduct material received from others, information on the chemical and radioactive characteristics of the wastes to be received, detailed procedures for receiving and documenting incoming waste shipments, and detailed waste acceptance criteria.

(2) Unless otherwise exempted, the applicant shall not commence construction at the site until the agency has issued the license. Commencement of construction prior to issuance of the license shall be grounds for denial of a license.

(3) Facility drawings submitted in conjunction with the application for a license shall be prepared by a professional engineer or engineering firm. Those drawings shall be final and shall be signed, sealed and dated in accordance with the requirements of the Texas Board of Professional Engineers, 22 Texas Administrative Code, Chapter 131.

(g) Specific terms and conditions of licenses. Unless otherwise specified, each license issued in accordance with this section is subject to the requirements of §289.252(x) of this title and the following.

(1) Daily inspection of any byproduct material retention systems shall be conducted by the licensee. General qualifications for individuals conducting inspections shall be approved by the agency. Records of the inspections shall be maintained for review by the agency.

(2) In addition to the applicable requirements of §289.202(ww)-(yy) of this title, the licensee shall immediately notify the agency of the following:

(A) any failure in a byproduct material retention system that results in a release of byproduct material into unrestricted areas;

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(B) any release of radioactive material that exceeds the concentrations for water listed in Table II, Column 2, of §289.202(ggg)(2) of this title and that extends beyond the licensed boundary;

(C) any spill that exceeds 20,000 gallons and that exceeds the concentrations for water listed in Table II, Column 2, of §289.202(ggg)(2) of this title; or

(D) any release of solids that exceeds the limits in subsection (h)(6) of this section and that extends beyond the licensed boundary.

(3) In addition to the applicable requirements of §289.202(ww)-(yy) of this title, the licensee shall notify the agency within 24 hours of the following:

(A) any spill that extends:

(i) beyond the wellfield monitor well ring;

(ii) more than 400 feet from an injection or production well pipe artery to or from a recovery plant; or

(iii) more than 200 feet from a recovery plant; or

(B) any spill that exceeds 2,000 gallons and that exceeds the concentrations for water listed in Table II, Column 2, of §289.202(ggg)(2) of this title.

(4) A licensee shall submit to the agency at five year intervals from the issuance of the license or at the time of **technical** renewal, if renewal and re-evaluation occur in the same year, continued proof of the licensee's financial qualifications.

(h) Expiration and termination of licenses **and administrative renewal;** decommissioning of sites, separate buildings or outdoor areas.

(1) **Effective September 1, 2004, the term of the specific license is two years.** Except as provided in paragraph (4) of this subsection and subsection (i)(2) of this section, each specific license expires at the end of the day, in the month and year stated in the license. **Except for subsection (i)(5) of this section, upon payment of the fee required by §289.204 of this title and if the agency does not deny the renewal in accordance with §289.252(x)(7) of this title, the specific license will be administratively renewed. The requirements in this subsection are subject to the provisions of Government Code, §2001.054.**

(2) **If the fee is not paid and the license is not renewed in accordance with paragraph (1) of this subsection, the license expires, and the licensee is in violation of the rules and is subject to administrative penalties in accordance with §289.205 of this title.**

(A) If the licensee pays the fee required by §289.204 of this title within 30 days after expiration of the license, the license will be reinstated and the licensee will not be required to file an application in accordance with subsection (d) of this section.

(B) If the licensee fails to pay the fee within 30 days after expiration of the license, the licensee shall file an application in accordance with subsection (d) of this section.

(3) Expiration of the specific license does not relieve the licensee of the requirements of this chapter.

(4) All license provisions continue in effect beyond the expiration date with respect to possession of radioactive material until the agency notifies the former licensee in writing that the provisions of the license are no longer binding. During this time, the former licensee shall:

(A) be limited to actions involving radioactive material that are related to decommissioning; and

(B) continue to control entry to restricted areas until the location(s) is suitable for release for unrestricted use in accordance with the requirements of paragraph (6) of this subsection.

(5) Within 60 days of the occurrence of any of the following, each licensee shall provide notification to the agency in writing and either begin decommissioning its site, or any separate buildings or outdoor areas that contain residual radioactivity in accordance with the closure plan in subsection (f)(1)(B) of this section, so that the buildings or outdoor areas are suitable for release in accordance with paragraph (6) of this subsection if:

(A) the license has expired in accordance with paragraph (1) of this subsection; or

(B) the licensee has decided to permanently cease principal activities, as defined in subsection (c)(24) of this section, at the entire site or in any separate building or outdoor area; or

(C) no principal activities have been conducted for a period of 24 months in any building or outdoor area that contains residual radioactivity such that the building or outdoor area is unsuitable for release in accordance with agency requirements.

(6) Outdoor areas are considered suitable for release for unrestricted use if the following limits are not exceeded.

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(A) The concentration of radium-226 or radium-228 in soil, averaged over any 100 square meters (m²), shall not exceed the background level by more than:

(i) 5 picocuries per gram (pCi/g) (0.185 becquerel per gram (Bq/g)), averaged over the first 15 cm of soil below the surface; and

(ii) 15 pCi/g (0.555 Bq/g), averaged over 15 cm thick layers of soil more than 15 cm below the surface.

(B) The contamination of vegetation shall not exceed 5 pCi/g (0.185 Bq/g), based on dry weight, for radium-226 or radium-228.

(C) The concentration of natural uranium in soil, with no daughters present, averaged over any 100 m², shall not exceed the background level by more than:

(i) 30 pCi/g (1.11 Bq/g), averaged over the top 15 cm of soil below the surface; and

(ii) 150 pCi/g (5.55 Bq/g), average concentration at depths greater than 15 centimeters below the surface so that no individual member of the public will receive an effective dose equivalent in excess of 100 mrem (1 mSv) per year.

(7) Coincident with the notification required by paragraph (5) of this subsection, the licensee shall maintain in effect all decommissioning financial security established by the licensee in accordance with subsection (m) of this section in conjunction with a license issuance or renewal or as required by this section. The amount of the financial security shall be increased, or may be decreased, as appropriate, with agency approval, to cover the detailed cost estimate for decommissioning established in accordance with paragraph (13)(E) of this subsection.

(8) In addition to the provisions of paragraph (7) of this subsection, each licensee shall submit an updated closure plan to the agency within 12 months of the notification required by paragraph (5) of this subsection. The updated closure plan shall meet the requirements of subsections (f)(1)(B) and (m) of this section. The updated closure plan shall describe the actual conditions of the facilities and site and the proposed closure activities and procedures.

(9) The agency may grant a request to delay or postpone initiation of the decommissioning process if the agency determines that such relief is not detrimental to the occupational and public health and safety and is otherwise in the public interest. The request shall be submitted no later than 30 days before notification in accordance with paragraph (5) of this subsection. The schedule for decommissioning in paragraph (5) of this subsection may not begin until the agency has made a determination on the request.

(10) 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 agency and these procedures could increase potential health and safety impacts to workers or to the public, such as in any of the following cases:

(A) procedures would involve techniques not applied routinely during cleanup or maintenance operations;

(B) workers would be entering areas not normally occupied where surface contamination and radiation levels are significantly higher than routinely encountered during operation;

(C) procedures could result in significantly greater airborne concentrations of radioactive materials than are present during operation; or

(D) procedures could result in significantly greater releases of radioactive material to the environment than those associated with operation.

(11) The agency may approve an alternate schedule for submittal of a decommissioning plan required in accordance with paragraph (5) of this subsection if the agency determines that the alternative schedule is necessary to the effective conduct of decommissioning operations and presents no undue risk from radiation to the occupational and public health and safety and is otherwise in the public interest.

(12) The procedures listed in paragraph (10) of this subsection may not be carried out prior to approval of the decommissioning plan.

(13) The proposed decommissioning plan for the site or separate building or outdoor area shall include:

(A) a description of the conditions of the site, separate buildings, or outdoor area sufficient to evaluate the acceptability of the plan;

(B) a description of planned decommissioning activities;

(C) a description of methods used to ensure protection of workers and the environment against radiation hazards during decommissioning;

(D) a description of the planned final radiation survey;

(E) 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 decommissioning; and

(F) for decommissioning plans calling for completion of decommissioning later than 24 months after plan approval, a justification for the delay based on the criteria in paragraph (17) of this subsection.

(14) The proposed decommissioning plan will be approved by the agency if the information in the plan demonstrates that the decommissioning will be completed as soon as practicable and that the occupational health and safety of workers and the public will be adequately protected.

(15) Except as provided in paragraph (17) of this subsection, licensees shall complete decommissioning of the site or separate building or outdoor area as soon as practicable but no later than 24 months following the initiation of decommissioning.

(16) Except as provided in paragraph (17) of this subsection, when decommissioning involves the entire site, the licensee shall request license termination as soon as practicable but no later than 24 months following the initiation of decommissioning.

(17) The agency may approve a request for an alternate schedule for completion of decommissioning of the site or separate buildings or outdoor areas and the license termination if appropriate, if the agency determines that the alternative is warranted by the 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; and

(C) other site-specific factors that the agency may consider appropriate on a case-by-case basis, such as the regulatory requirements of other government agencies, lawsuits, groundwater treatment activities, monitored natural groundwater restoration, actions that could result in more environmental harm than deferred cleanup, and other factors beyond the control of the licensee.

(18) As the final step in decommissioning, the licensee shall:

(A) certify the disposition of all radioactive material, including accumulated byproduct material;

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(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 that the premises are suitable for release in accordance with paragraph (6) of this subsection. The licensee shall, as appropriate:

(j) report the following levels:

(I) gamma radiation in units of microroentgen per hour (μ R/hr) (millisieverts per hour (mSv/hr)) at 1 meter (m) from surfaces;

(II) radioactivity, including alpha and beta, in units of disintegrations per minute (dpm) or microcuries (μ Ci) (megabecquerels (MBq)) per 100 square centimeters (cm^2) for surfaces;

(III) μ Ci (MBq) per milliliter for water; and

(IV) picocuries (pCi) (becquerels (Bq)) per gram (g) for solids such as soils or concrete; and

(ii) specify the manufacturer's name, and model and serial number of survey instrument(s) used and certify that each instrument is properly calibrated and tested.

(19) The agency will provide written notification to specific licensees, including former licensees with license provisions continued in effect beyond the expiration date in accordance with paragraph (4) of this subsection, that the provisions of the license are no longer binding. The agency will provide such notification when the agency determines that:

(A) radioactive material has been properly disposed;

(B) reasonable effort has been made to eliminate residual radioactive contamination, if present;

(C) a radiation survey has been performed that demonstrates that the premises are suitable for release in accordance with agency requirements;

(D) other information submitted by the licensee is sufficient to demonstrate that the premises are suitable for release in accordance with the requirements of paragraph (6) of this subsection;

(E) all records required by §289.202(n)(2) of this title have been submitted to the agency;

(F) the licensee has paid any outstanding fees required by §289.204 of this title and has resolved any outstanding notice(s) of violation issued to the licensee;

(G) the licensee has met the applicable technical and other requirements for closure and reclamation of a byproduct material disposal site; and

(H) the United States Nuclear Regulatory Commission (NRC) has made a determination that all applicable standards and requirements have been met.

(20) Licenses for uranium recovery and/or byproduct material disposal are exempt from paragraphs (5)(C), (8), and (9) of this subsection with respect to reclamation of byproduct material impoundments and/or disposal areas. Timely reclamation plans for byproduct material disposal areas shall be submitted and approved in accordance with subsection (o)(16)-(27) of this section.

(21) A licensee may request that a subsite or a portion of a licensed site be released for unrestricted use before full license termination as long as release of the area of concern will not adversely impact the remaining unaffected areas and will not be recontaminated by ongoing authorized activities. When the licensee is confident that the area of concern will be acceptable to the agency for release for unrestricted use, a written request for release for unrestricted use and agency confirmation of closeout work performed shall be submitted to the agency. The request should include a comprehensive report, accompanied by survey and sample results that show contamination is less than the limits specified in paragraph (6) of this subsection and an explanation of how ongoing authorized activities will not adversely affect the area proposed to be released. Upon confirmation by the agency that the area of concern is releasable for unrestricted use, the licensee may apply for a license amendment, if required.

(i) Technical renewal of licenses.

(1) Application for a technical renewal of specific licenses shall be filed in accordance with subsections (d)(1)-(5) and (f)(1) of this section. Application for a technical renewal of a specific license shall be filed by the date specified in the license. If the licensee fails to apply for a technical renewal and fails to pay the fee required by §289.204 of this title, the license expires and the licensee shall comply with the requirements of subsection (h) of this section. In any application for renewal, the applicant may incorporate drawings by clear and specific reference (for example, title, date and unique number of drawing), if no modifications have been made since previously submitted.

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(2) In any case in which a licensee, prior to expiration of the existing license, has filed a request in proper form for a technical 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 agency. In any case in which a licensee, not more than 30 days after the expiration of an existing license, has filed an application for technical renewal or for a new license authorizing the same activities and paid the fee required by §289.204 of this title, the agency may reinstate the license and extend the expiration until the request has been finally determined by the agency.

(3) An application for technical renewal of a license will be approved if the agency determines that the requirements of subsection (e) of this section have been satisfied.

(4) When the date for administrative renewal in accordance with subsection (h)(1) of this section and the date for the technical renewal in accordance with paragraph (1) of this subsection occur at the same time, the license will be renewed if the fee required by §289.204 of this title is paid, the technical renewal is approved by the agency in accordance with paragraph (3) of this subsection, and the agency does not deny the renewal in accordance with §289.252(x)(7) of this title.

(5) When the date for the administrative renewal in accordance with subsection (h)(1) of this section and the date for the technical renewal in accordance with paragraph (1) of this subsection occur at the same time, the specific license renewal may be denied by the agency if any one of the following conditions apply:

(A) the fee required by §289.204 of this title is not paid;

(B) the agency denies the renewal in accordance with §289.252(x)(7) of this title; or

(C) the agency does not approve the technical renewal in accordance with paragraph (3) of this subsection.

(6) Expiration of the specific license does not relieve the former licensee of the requirements of this chapter.

(7) The requirements in this subsection are subject to the provisions of Government Code, §2001.054.

(j) Amendment of licenses at request of licensee. Requests for amendment of a license shall be filed in accordance with subsection (d) of this section and §289.252(d)(1)-(3) of this title. Such requests shall be signed by the RSO and specify how the licensee desires the license to be amended and the basis for such amendment.

(k) Agency action on applications to renew or amend. In considering a request by a licensee to renew or amend a license, the agency will apply the appropriate criteria in subsections (e) and (f) of this section.

(l) Transfer of material.

(1) No licensee shall transfer radioactive material except as authorized in accordance with this chapter.

(2) Except as otherwise provided in a license and subject to the provisions of paragraphs (3) and (4) of this subsection, any licensee may transfer radioactive material:

(A) to the agency after receiving prior approval from the agency;

(B) to the United States Department of Energy;

(C) to any person exempt from the licensing requirements of the Act and these requirements or exempt from the licensing requirements of the NRC or an agreement state, to the extent permitted by these exemptions;

(D) to any person authorized to receive such material in accordance with terms of a general license or its equivalent, a specific license or equivalent licensing document issued by the agency, NRC, any agreement state, any licensing state, or to any person otherwise authorized to receive such material by the federal government or any agency of the federal government, or the agency;

(E) to any person abroad pursuant to an export license issued under Title 10, Chapter 1, CFR Part 110; or

(F) as otherwise authorized by the agency in writing.

(3) Before transferring radioactive material to a specific licensee of the agency, NRC, an agreement state, a licensing state, or to a general licensee who is required to register with the agency, the licensee transferring the radioactive 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 of paragraph (3) of this subsection are acceptable:

(A) the transferor may possess and have 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 the license or certificate of registration 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; or

(D) when none of the methods of verification described in subparagraphs (A)-(C) of this paragraph are readily available or when a transferor desires to verify that information received by one of these methods is correct or up-to-date, the transferor may obtain and record confirmation from the agency, or the NRC, that the transferee is licensed to receive the radioactive material.

(5) Preparation for shipment and transport of radioactive material shall be in accordance with the provisions of §289.257 of this title.

(m) Financial security requirements.

(1) Financial security for decontamination, decommissioning, reclamation, restoration, disposal, and any other requirements of the agency shall be established by each licensee prior to the commencement of operations to assure that sufficient funds will be available to carry out the decontamination and decommissioning of buildings and the site and for the reclamation of any byproduct material disposal areas. The amount of funds to be ensured by such security arrangements shall be based on agency-approved cost estimates in an agency-approved closure plan for:

(A) decontamination and decommissioning of buildings and the site to levels that allow unrestricted use of these areas upon decommissioning; and

(B) the reclamation of byproduct material disposal areas in accordance with technical criteria delineated in subsection **(o)** of this section.

(2) The licensee shall submit this **closure** plan in conjunction with an environmental report that addresses the expected environmental impacts of the licensee's operation, decommissioning and reclamation, and evaluates alternatives for mitigating these impacts.

(3) The security shall also cover the payment of the charge for long-term surveillance and control for byproduct material disposal areas required by subsection (n)(3) of this section.

(4) In establishing specific security arrangements, the licensee's cost estimates must take into account total costs that would be incurred if an independent contractor were hired to perform the decommissioning and reclamation work. In order to avoid unnecessary duplication and expense, the agency may accept financial securities that have been consolidated with financial or security arrangements established to meet requirements of other federal or state agencies and/or local governing bodies for such decommissioning, decontamination, reclamation, and long-term site surveillance and control, provided such arrangements are considered adequate to satisfy these requirements and that the portion of the security that covers the decommissioning and reclamation of the buildings, site, and byproduct material disposal areas, and the long-term funding charge is clearly identified and committed for use in accomplishing these activities.

(5) The security shall be continuous for the term of the license and shall be payable in the State of Texas to the Radiation and Perpetual Care Account.

(6) The licensee's security mechanism will be reviewed annually by the agency to assure that sufficient funds would be available for completion of the reclamation plan if the work had to be performed by an independent contractor. The amount of security liability should be adjusted to recognize any increases or decreases resulting from inflation, changes in engineering plans, activities performed, and any other conditions affecting costs.

(7) Regardless of whether reclamation is phased through the life of the operation or takes place at the end of operations, an appropriate portion of security liability shall be retained until final compliance with the reclamation plan is determined. This will yield a security that is at least sufficient at all times to cover the costs of decommissioning and reclamation of the areas that are expected to be disturbed before the next license technical renewal. The term of the security mechanism shall be open ended. This assurance would be provided with a security instrument that is written for a specified period of time (for example, five years) yet which shall be automatically renewed unless the security notifies the agency and the licensee some reasonable time (for example, 90 days) prior to the renewal date of their intention not to renew. In such a situation, the security requirement still exists and the licensee would be required to submit an acceptable replacement security within a brief period of time to allow at least 60 days for the agency to collect.

(8) Proof of forfeiture shall not be necessary to collect the security so that in the event that the licensee could not provide an acceptable replacement security within the required time, the security shall be automatically collected prior to its expiration. The conditions described above would have to be clearly stated on any security instrument, and shall be agreed upon by all parties.

(9) Self-insurance, or any arrangement that essentially constitutes self insurance (for example, a contract with a state or federal agency), will not satisfy the security requirement since this provides no additional assurance other than that which already exists through license requirements.

(n) Long-term care and maintenance requirements.

(1) Unless otherwise provided by the agency, each licensee licensed in accordance with this part for disposal of byproduct material shall make payments into the Radiation and Perpetual Care **Account** in amounts specified by the agency. The agency shall make such determinations on a case-by-case basis.

(2) The final disposition of byproduct material should be such that the need for ongoing active maintenance is eliminated to the maximum extent practicable.

(3) A minimum charge of \$250,000 (1978 dollars) or more, if demonstrated as necessary by the agency, shall be paid into the Radiation and Perpetual Care **Account** to cover the costs of long-term care and maintenance. The total charge shall be paid prior to the termination of a license. With agency approval, the charge may be paid in installments. The total or unpaid portion of the charge shall be covered during the term of the license by additional security meeting the requirements of subsection **(m)** of this section. If site surveillance, control, or maintenance requirements at a particular site are determined, on the basis of a site-specific evaluation, to be significantly greater (for example, if fencing or monitoring is determined to be necessary), the agency may specify a higher charge. The total charge shall be such that, with an assumed 1.0% annual real interest rate, the collected funds will yield interest in an amount sufficient to cover the annual costs of site care, surveillance, and where necessary, maintenance. Prior to actual payment, the total charge will be adjusted annually for inflation. The inflation rate to be used is that indicated by the change in the Consumer Price Index published by the United States Department of Labor, Bureau of Labor Statistics.

(4) The requirements of this subsection shall apply only to those sites whose ownership is subject to being transferred to the state or the federal government. The total amount of funds collected by the agency in accordance with this subsection shall be transferred to the federal government if title and custody of the byproduct material disposal site is transferred to the federal government upon termination of the license.

(o) Technical requirements.

(1) Byproduct material handling and disposal systems shall be designed to accommodate full-capacity production over the lifetime of the facility. When later expansion of systems or operations may be likely, capability of the disposal system to be modified to accommodate increased quantities without degradation in long-term stability and other performance factors shall be evaluated.

(2) In selecting among alternative byproduct material disposal sites or judging the adequacy of existing sites, the following site features which would assure meeting the broad objective of isolating the tailings and associated contaminants without ongoing active maintenance shall be considered:

(A) remoteness from populated areas;

(B) hydrogeologic and other environmental conditions conducive to continued immobilization and isolation of contaminants from usable groundwater sources; and

(C) potential for minimizing erosion, disturbance, and dispersion by natural forces over the long term.

(3) The site selection process shall be an optimization to the maximum extent reasonably achievable in terms of these site features.

(4) In the selection of disposal sites, primary emphasis shall be given to isolation of the byproduct material, a matter having long-term impacts, as opposed to consideration only of short-term convenience or benefits (e.g., minimization of transportation of land acquisition costs). While isolation of byproduct material will also be a function of both site and engineering design, overriding consideration shall be given to siting features.

(5) Byproduct material should be disposed of in a manner such that no active maintenance is required to preserve conditions of the site.

(6) The applicant's environmental report shall evaluate alternative sites and disposal methods and shall consider disposal of byproduct material by placement below grade. Where full below grade burial is not practicable, the size of retention structures, and size and steepness of slopes associated with exposed embankments shall be minimized by excavation to the maximum extent reasonably achievable or appropriate given the geologic and hydrologic conditions at a site. In these cases, it shall be demonstrated that an above grade disposal program will provide reasonably equivalent isolation of the byproduct material from natural erosional forces.

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(7) To avoid proliferation of small waste disposal sites and thereby reduce perpetual surveillance obligations, byproduct material from in situ extraction operations, such as residues from solution evaporation or contaminated control processes, and wastes from small remote above ground extraction operations shall be disposed of at existing large mill tailings disposal sites; unless, considering the nature of the wastes, such as their volume and specific activity, and the costs and environmental impacts of transporting the wastes to a large disposal site, such offsite disposal is demonstrated to be impracticable or the advantages of onsite burial clearly outweigh the benefits of reducing the perpetual surveillance obligations.

(8) The following site and design requirements shall be adhered to whether byproduct material is disposed of above or below grade:

(A) the upstream rainfall catchment areas shall be minimized to decrease erosion potential by flooding that could erode or wash out sections of the byproduct material disposal area;

(B) the topographic features shall provide good wind protection;

(C) the embankment and cover slopes shall be relatively flat after final stabilization to minimize erosion potential and to provide conservative factors of safety assuring long term stability. The objective should be to contour final slopes to grades that are as close as possible to those that would be provided if byproduct material was disposed of below grade. Slopes shall not be steeper than 5 horizontal to 1 vertical (5h:1v), except as specifically authorized by the agency. Where steeper slopes are proposed, reasons why a slope steeper than 5h:1v would be as equally resistant to erosion shall be provided, and compensating factors and conditions that make such slopes acceptable shall be identified;

(D) a full self-sustaining vegetative cover shall be established or rock cover employed to reduce wind and water erosion to negligible levels;

(E) where a full vegetative cover is not likely to be self-sustaining due to climatic conditions, such as in semi-arid and arid regions, rock cover shall be employed on slopes of the impoundment system. The agency will consider relaxing this requirement for extremely gentle slopes, such as those that may exist on the top of the pile;

(F) the following factors shall be considered in establishing the final rock cover design to avoid displacement of rock particles by human and animal traffic or by natural processes, and to preclude undercutting and piping:

(i) shape, size, composition, gradation of rock particles (excepting bedding material, average particles size shall be at least cobble size or greater);

(ii) rock cover thickness and zoning of particles by size; and

(iii) steepness of underlying slopes.

(G) individual rock fragments shall be dense, sound, and resistant to abrasion, and shall be free from cracks, seams, and other defects that would tend to unduly increase their destruction by erosion and weathering action. Local rock materials are permissible provided the characteristics under local climatic conditions indicate similar long-term performance as a protective layer. Weak, friable, or laminated aggregate may not be used;

(H) rock covering of slopes may not be required where top covers are very thick (on the order of 10 m or greater); impoundment slopes are very gentle (on the order of 10h:1v or less); bulk cover materials have inherently favorable erosion resistance characteristics; there is negligible drainage catchment area upstream of the pile; and there is good wind protection;

(I) all impoundment surfaces shall be contoured to avoid areas of concentrated surface runoff or abrupt or sharp changes in slope gradient. In addition to rock cover on slopes, areas toward which surface runoff might be directed shall be well protected with substantial rock cover (riprap). In addition to providing for stability of the impoundment system itself, overall stability, erosion potential, and geomorphology of surrounding terrain shall be evaluated to assure that there are no ongoing or potential processes, such as gully erosion, which would lead to impoundment instability;

(J) the impoundment shall not be located near a capable fault that could cause a maximum credible earthquake larger than that which the impoundment could reasonably be expected to withstand; and

(K) the impoundment should be designed to incorporate features that will promote deposition. Design features that promote deposition of sediment suspended in any runoff which flows into the impoundment area might be utilized. The object of such a design feature would be to enhance the thickness of cover over time.

(9) Groundwater protection. The following groundwater protection requirements and those in paragraphs (10) and (11) of this subsection and subsection (q) of this section apply during operations and until closure is completed. Groundwater monitoring to comply with these standards is required by paragraphs (28) and (29) of this subsection.

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(A) The primary groundwater protection standard is a design standard for surface impoundments used to manage byproduct material. Unless exempted under paragraph (9)(C) of this subsection, surface impoundments (except for an existing portion) shall have a liner that is designed, constructed, and installed to prevent any migration of wastes out of the impoundment to the adjacent subsurface soil, groundwater, or surface water at any time during the active life (including the closure period) of the impoundment. If the liner is constructed of materials that may allow wastes to migrate into the liner during the active life of the facility, impoundment closure shall include removal or decontamination of all waste residues, contaminated containment system components (liners, etc.), contaminated subsoils, and structures and equipment contaminated with waste and leachate. For impoundments that will be closed with the liner material left in place, the liner shall be constructed of materials that can prevent wastes from migrating into the liner during the active life of the facility.

(B) The liner required by subparagraph (A) of this paragraph shall be:

(i) constructed of materials that have appropriate chemical properties and sufficient strength and thickness to prevent failure due to pressure gradients (including static head and external hydrogeologic forces), physical contact with the waste or leachate to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation;

(ii) placed upon a foundation or base capable of providing support to the liner and resistance to pressure gradients above and below the liner to prevent failure of the liner due to settlement, compression, or uplift; and

(iii) installed to cover all surrounding earth likely to be in contact with the wastes or leachate.

(C) The applicant or licensee will be exempted from the requirements of subparagraph (A) of this paragraph if the agency finds, based on a demonstration by the applicant or licensee, that alternate design and operating practices, including the closure plan, together with site characteristics will prevent the migration of any hazardous constituents into groundwater or surface water at any future time. In deciding whether to grant an exemption, the agency will consider:

(i) the nature and quantity of the wastes;

(ii) the proposed alternate design and operation;

(iii) the hydrogeologic setting of the facility, including the attenuative capacity and thickness of the liners and soils present between the impoundment and groundwater or surface water; and

(iv) all other factors that would influence the quality and mobility of the leachate produced and the potential for it to migrate to groundwater or surface water.

(D) A surface impoundment shall be designed, constructed, maintained, and operated to prevent overtopping resulting from normal or abnormal operations, overfilling, wind and wave actions, rainfall, or run-off; from malfunctions of level controllers, alarms, and other equipment; and from human error.

(E) When dikes are used to form the surface impoundment, the dikes shall be designed, constructed, and maintained with sufficient structural integrity to prevent massive failure of the dikes. In ensuring structural integrity, it shall not be presumed that the liner system will function without leakage during the active life of the impoundment.

(10) Byproduct materials shall be managed to conform to the following secondary groundwater protection requirements.

(A) **Hazardous** constituents, as defined in subsection **(c)(16)** of this section, entering the groundwater from a licensed site shall not exceed the specified concentration limits in the uppermost aquifer beyond the point of compliance during the compliance period.

(B) **Specified** concentration limits are those limits established by the agency as indicated in subparagraph (G) of this paragraph.

(C) **The** agency will also establish the point of compliance and compliance period on a site-specific basis through license conditions and orders.

(D) **When** the detection monitoring established under paragraphs (28) and (29) of this section indicates leakage of hazardous constituents from the disposal area, the agency will perform the following:

(i) identify hazardous constituents;

(ii) establish concentration limits;

(iii) set the compliance period; and

(iv) may adjust the point of compliance if needed in accordance with developed data and site information regarding the flow of groundwater or contaminants.

(E) **Even** when constituents meet all three tests in the definition of hazardous constituent, the agency 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 agency will consider the following:

(i) potential adverse effects on groundwater quality, considering the following:

(I) physical and chemical characteristics of the waste in the licensed site, including its potential for migration;

(II) hydrogeological characteristics of the licensed site and surrounding land;

(III) quantity of groundwater and the direction of groundwater flow;

(IV) proximity of groundwater users and groundwater withdrawal rates;

(V) current and future uses of groundwater in the area;

(VI) existing quality of groundwater, including other sources of contamination and cumulative impact on the groundwater quality;

(VII) potential for human health risks caused by human exposure to waste constituents;

(VIII) potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and

(IX) persistence and permanence of potential adverse effects; **and**

(ii) potential adverse effects on quality of hydraulically-connected surface water, considering the:

(I) volume and physical and chemical characteristics of the byproduct material in the licensed site;

(II) hydrogeological characteristics of the licensed site and surrounding land;

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(III) quantity and quality of groundwater and the direction of groundwater flow;

(IV) patterns of rainfall in the region;

(V) proximity of the licensed site to surface waters;

(VI) current and future uses of surface waters in the area and any water quality standards established for those surface waters;

(VII) existing quality of surface water, including potential impacts from other sources of contamination and the cumulative impact on surface water quality;

(VIII) potential for human health risks caused by human exposure to waste constituents;

(IX) potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and

(X) persistence and permanence of the potential adverse effects.

(F) In making any determinations under subparagraphs (E) and (H) of this paragraph about the use of groundwater in the area around the facility, the agency will consider any identification of underground sources of drinking water and exempted aquifers made by the United States Environmental Protection Agency (EPA) and the Texas Commission on Environmental Quality.

(G) At the point of compliance, the concentration of a hazardous constituent shall not exceed the following:

(i) the agency approved background concentration in the groundwater of the constituents listed in 10 CFR 40, Appendix A, Criterion 13;

(ii) the respective value given in subsection (q) of this section if the constituent is listed in the table and if the background level of the constituent is below the value listed; or

(iii) an alternate concentration limit established by the agency.

(H) Alternate concentration limits to background concentration or to the drinking water limits in subsection (q) of this section that present no significant hazard may be proposed by licensees for agency consideration. Licensees shall provide the basis for any proposed limits including consideration of practicable corrective actions, evidence that limits are as low as reasonably achievable, and information on the factors the agency shall consider. The agency will establish a site-specific alternate concentration limit for a hazardous constituent, as provided in subparagraph (G) of this paragraph, 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 agency will consider the factors listed in subparagraph (D) of this paragraph.

(11) If the groundwater protection standards established under subparagraph (D) of this paragraph are exceeded at a licensed site, a corrective action program shall be put into operation as soon as is practicable, and in no event later than 18 months after the agency finds that the standards have been exceeded. The licensee shall submit the proposed corrective action program and supporting rationale for agency approval prior to putting the program into operation, unless otherwise directed by the agency. The licensee's proposed program shall address removing or treating in place any hazardous constituents that exceed concentration limits in groundwater between the point of compliance and downgradient licensed site boundary. The licensee shall continue corrective action measures to the extent necessary to achieve and maintain compliance with the groundwater protection standard. The agency will determine when the licensee may terminate corrective action measures based on data from the groundwater monitoring program and other information that provides reasonable assurance that the groundwater protection standard will not be exceeded.

(12) In developing and conducting groundwater protection programs, applicants and licensees shall also consider the following:

(A) **installation of bottom liners.** Where synthetic liners are used, a leakage-detection system shall be installed immediately below the liner to ensure detection of any major failures. This is in addition to the groundwater monitoring program conducted as provided in paragraph (29) of this subsection. Where clay liners are proposed or relatively thin, in situ clay soils are to be relied upon for seepage control, tests shall 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 byproduct material solutions. Tests shall be run for a sufficient period of time to reveal any effects that may occur;

(B) mill process designs that provide the maximum practicable recycle of solutions and conservation of water to reduce the net input of liquid to the byproduct material impoundment;

(C) dewatering of byproduct material solutions by process devices and/or in situ drainage systems. At new sites, byproduct material solutions shall 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 byproduct material solutions are not amenable to such a system. Where in situ dewatering is to be conducted, the impoundment bottom shall be graded to assure that the drains are at a low point. The drains shall be protected by suitable filter materials to assure that drains remain free-running. The drainage system shall also be adequately sized to assure good drainage; and

(D) neutralization to promote immobilization of hazardous constituents.

(13) Technical specifications shall be prepared for installation of seepage control systems. A quality assurance, testing, and inspection program, which includes supervision by a qualified engineer or scientist, shall be established to assure that specifications are met. If adverse groundwater impacts or conditions conducive to adverse groundwater impacts occur due to seepage, action shall be taken to alleviate the impacts or conditions and restore groundwater quality to levels consistent with those before operations began. The specific seepage control and groundwater protection method, or combination of methods, to be used shall be worked out on a site-specific basis.

(14) In support of a byproduct material disposal system proposal, the applicant/licensee shall supply the following information:

(A) the chemical and radioactive characteristics of the waste solutions;

(B) the characteristics of the underlying soil and geologic formations particularly as they will control transport of contaminants and solutions. This shall include detailed information concerning extent, thickness, uniformity, shape, and orientation of underlying strata. Hydraulic gradients and conductivities of the various formations shall be determined. This information shall be gathered by borings and field survey methods taken within the proposed impoundment area and in surrounding areas where contaminants might migrate to groundwater. The information gathered on boreholes shall include both geologic and geophysical logs in sufficient number and degree of 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 shall not be determined on the basis of laboratory analysis of samples alone. A sufficient amount of field testing (e.g., pump tests) shall be conducted to assure actual field properties are adequately understood. Testing shall be conducted to make possible estimates of chemisorption attenuation properties of underlying soil and rock; and

(C) location, extent, quality, capacity, and current uses of any groundwater at and near the site.

(15) If ore is stockpiled, methods shall be used to minimize penetration of radionuclides and other substances into underlying soils.

(16) In disposing of byproduct material, licensees shall place an earthen cover over the byproduct material at the end of the facility's operations and shall close the waste disposal area in accordance with a design that provides reasonable assurance of control of radiological hazards to the following:

(A) be effective for 1,000 years to the extent reasonably achievable and, in any case, for at least 200 years; and

(B) limit releases of radon-222 from uranium byproduct materials and radon-220 from thorium byproduct materials to the atmosphere so as not to exceed an average release rate of 20 picocuries per square meter per second (pCi/m²s) to the extent practicable throughout the effective design life determined in accordance with subparagraph (A) of this paragraph. This average applies to the entire surface of each disposal area over a period of at least one year, but a period short compared to 100 years. Radon will come from both byproduct materials and cover materials. Radon emissions from cover materials should be estimated as part of developing a closure plan for each site. The standard, however, applies only to emissions from byproduct materials to the atmosphere.

(17) In computing required byproduct material cover thicknesses, moisture in soils in excess of amounts found normally in similar soils in similar circumstances shall not be considered. Direct gamma exposure from the byproduct material should be reduced to background levels. The effects of any thin synthetic layer shall not be taken into account in determining the calculated radon exhalation level. Cover shall not include materials that contain elevated levels of radium. Soils used for near-surface cover shall be essentially the same, as far as radioactivity is concerned, as that of surrounding surface soils. If non-soil materials are proposed as cover materials, the licensee shall demonstrate that such materials will not crack or degrade by differential settlement, weathering, or other mechanisms over the long term.

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(18) As soon as reasonably achievable after emplacement of the final cover to limit releases of radon-222 from uranium byproduct material and prior to placement of erosion protection barriers of other features necessary for long-term control of the tailings, the licensee shall verify through appropriate testing and analysis that the design and construction of the final radon barrier is effective in limiting releases of radon-222 to a level not exceeding 20pCi/m²s averaged over the entire pile or impoundment using the procedures described in Appendix B, method 115 of 40 CFR Part 61, or another method of verification approved by the agency as being at least as effective in demonstrating the effectiveness of the final radon barrier.

(19) When phased emplacement of the final radon barrier is included in the applicable reclamation plan, as defined in subsection (c)(25) of this section, the verification of radon-222 release rates required in paragraph (30) of this subsection shall be conducted for each portion of the pile or impoundment as the final radon barrier for that portion is emplaced.

(20) Within 90 days of the completion of all testing and analysis relevant to the required verification in paragraphs (30)(C) and (30)(D) of this subsection, the uranium recovery licensee shall report to the agency the results detailing the actions taken to verify that levels of release of radon-222 do not exceed 20 pCi/m²s when averaged over the entire pile or impoundment. The licensee shall maintain records documenting the source of input parameters, including the results of all measurements on which they are based, the calculations and/or analytical methods used to derive values for input parameters, and the procedure used to determine compliance. These records shall be maintained until termination of the license and shall be kept in a form suitable for transfer to the custodial agency at the time of transfer of the site to the state or federal government in accordance with subsection (p) of this section.

(21) Near-surface cover materials may not include waste, rock, or other materials that contain elevated levels of radium. Soils used for near-surface cover shall be essentially the same, as far as radioactivity is concerned, as surrounding surface soils. This is to ensure that surface radon exhalation is not significantly above background because of the cover material itself.

(22) The design requirements for longevity and control of radon releases apply to any portion of a licensed and/or disposal site unless such portion contains a concentration of radium in land averaged over areas of 100 square meters (m²), that, as a result of byproduct material, does not exceed the background level by more than:

(A) 5 picocuries per gram (pCi/g) of radium-226, or in the case of thorium byproduct material, radium-228, averaged over the first 15 centimeters (cm) below the surface; and

(B) 15 pCi/g of radium-226, or in the case of thorium byproduct material, radium-228, averaged over 15-cm thick layers more than 15 cm below surface.

(23) The licensee shall also address the nonradiological hazards associated with the waste in planning and implementing closure. The licensee shall ensure that disposal areas are closed in a manner that minimizes the need for further maintenance. To the extent necessary to prevent threats to human health and the environment, the licensee shall control, minimize, or eliminate post-closure escape of nonradiological hazardous constituents, leachate, contaminated rainwater, or waste decomposition products to groundwater or surface waters or to the atmosphere.

(24) For impoundments containing uranium byproduct materials, the final radon barrier shall be completed as expeditiously as practicable considering technological feasibility after the pile or impoundment ceases operation in accordance with a written reclamation plan, as defined in subsection (c)(25) of this section, approved by the agency, by license amendment. (The term "as expeditiously as practicable considering technological feasibility" includes "factors beyond the control of the licensee.") Deadlines for completion of the final radon barrier and applicable interim milestones shall be established as license conditions. Applicable interim milestones may include, but are not limited to, the retrieval of windblown byproduct material and placement on the pile and the interim stabilization of the byproduct material (including dewatering or the removal of freestanding liquids and recontouring). The placement of erosion protection barriers or other features necessary for long-term control of the byproduct material shall also be completed in a timely manner in accordance with a written reclamation plan approved by the agency by license amendment.

(25) The agency may approve by license amendment a licensee's request to extend the time for performance of milestones related to emplacement of the final radon barrier if, after providing an opportunity for public participation, the agency finds that the licensee has adequately demonstrated in the manner required in paragraph (18) of this subsection that releases of radon-222 do not exceed an average of 20 pCi/m²s. If the delay is approved on the basis that the radon releases do not exceed 20 pCi/m²s, a verification of radon levels, as required by paragraph (18) of this subsection, shall be made annually during the period of delay. In addition, once the agency has established the date in the reclamation plan for the milestone for completion of the final radon barrier, the agency may by license amendment extend that date based on cost if, after providing an opportunity for public participation, the agency finds that the licensee is making good faith efforts to emplace the final radon barrier, the delay is consistent with the definition of "available technology," and the radon releases caused by the delay will not result in a significant incremental risk to the public health.

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(26) The agency may authorize by license amendment, upon licensee request, a portion of the impoundment to accept uranium byproduct material, or such materials that are similar in physical, chemical, and radiological characteristics to the uranium mill tailings and associated wastes already in the pile or impoundment, from other sources during the closure process. No such authorization will be made if it results in a delay or impediment to emplacement of the final radon barrier over the remainder of the impoundment in a manner that will achieve levels of radon-222 releases not exceeding 20 pCi/m²s averaged over the entire impoundment. The verification required in paragraph (18) of this subsection may be completed with a portion of the impoundment being used for further disposal if the agency makes a final finding that the impoundment will continue to achieve a level of radon-222 release not exceeding 20 pCi/m²s averaged over the entire impoundment. After the final radon barrier is complete except for the continuing disposal area, only byproduct material will be authorized for disposal, and the disposal will be limited to the specified existing disposal area. This authorization by license amendment will only be made after providing opportunity for public participation. Reclamation of the disposal area, as appropriate, shall be completed in a timely manner after disposal operations cease in accordance with paragraph (16) of this subsection. These actions are not required to be complete as part of meeting the deadline for final radon barrier construction.

(27) The licensee's closure plan shall provide reasonable assurance that institutional control will be provided for the length of time found necessary by the agency to ensure the requirements of paragraph (16) of this subsection are met.

(28) Prior to any major site construction, a preoperational monitoring program shall be conducted for one full year to provide complete baseline data on the site and its environs. Throughout the construction and operating phases of the project, an operational monitoring program shall be conducted to measure or evaluate compliance with applicable standards and rules; to evaluate performance of control systems and procedures; to evaluate environmental impacts of operation; and to detect potential long-term effects.

(29) The licensee shall establish a detection monitoring program needed for the agency to set the site-specific groundwater protection standards in paragraph (10)(D) of this subsection. For all monitoring under this paragraph, the licensee or applicant will propose, as license conditions for agency approval, which constituents are to be monitored on a site-specific basis. The data and information shall provide a sufficient basis to identify those hazardous constituents that require concentration limit standards and to enable the agency to set the limits for those constituents and compliance period. They may provide the basis for adjustments to the point of compliance. The detection monitoring program shall be in place when specified by the agency in orders or license conditions. Once groundwater protection standards have been established in accordance with paragraph (10)(D) of this subsection, the licensee shall establish and implement a compliance monitoring program. In conjunction with a corrective action program, the licensee shall establish and implement a corrective action monitoring program 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.

(30) Systems shall be designed and operated so that all airborne effluent releases are as low as is reasonably achievable. The primary means of accomplishing this shall be by means of emission controls. Institutional controls, such as extending the site boundary and exclusion area, may be employed to ensure that offsite exposure limits are met, but only after all practicable measures have been taken to control emissions at the source.

(A) During operations and prior to closure, radiation doses from radon emissions from surface impoundments of byproduct materials shall be kept as low as is reasonably achievable.

(B) Checks shall be made and logged hourly of all parameters which determine the efficiency of emission control equipment operation. It shall be determined whether or not conditions are within a range prescribed to ensure that the equipment is operating consistently near peak efficiency. Corrective action shall be taken when performance is outside of prescribed ranges. Effluent control devices shall be operative at all times during drying and packaging operations and whenever air is exhausting from the uranium dryer stack. Drying and packaging operations shall terminate when controls are inoperative. When checks indicate the equipment is not operating within the range prescribed for peak efficiency, actions shall be taken to restore parameters to the prescribed range. When this cannot be done without shutdown and repairs, drying and packaging operations shall cease as soon as practicable. Operations may not be restarted after cessation due to off-normal performance until needed corrective actions have been identified and implemented. All such cessations, corrective actions, and re-starts shall be reported to the agency in writing within ten days of the subsequent restart.

(C) To control dusting from byproduct material, that portion not covered by standing liquids shall be wetted or chemically stabilized to prevent or minimize blowing and dusting to the maximum extent reasonably achievable. This requirement may be relaxed if byproduct material are effectively sheltered from wind, as in the case of below-grade disposal. Consideration shall be given in planning byproduct material disposal programs to methods for phased covering and reclamation of byproduct material impoundments. To control dusting from diffuse sources, applicants/licensees shall develop written operating procedures specifying the methods of control that will be utilized.

(D) Uranium recovery facility operations producing or involving thorium byproduct material shall be conducted in such a manner as to provide reasonable assurance that the annual dose equivalent does not exceed 25 millirems (mrem) to the whole body, 75 mrem to the thyroid, and 25 mrem to any other organ of any member of the public as a result of exposures to the planned discharge of radioactive materials to the general environment, radon-220 and its daughters excepted.

(E) Byproduct materials shall be managed so as to conform to the applicable provisions of 40 CFR 440, as codified on January 1, 1983.

(31) Licensees/applicants may propose alternatives to the specific requirements in subsections (m)-(p) of this section. The alternative proposals may take into account local or regional conditions including geology, topography, hydrology, and meteorology.

(32) The agency may find that the proposed alternatives meet the agency's requirements if the alternatives will achieve a level of stabilization and containment of the sites concerned and a level of protection for the public health and safety and the environment from radiological and nonradiological hazards associated with the sites, which is equivalent to, to the extent practicable, or more stringent than the level that would be achieved by the requirements of subsections (m)-(p) of this section and the standards promulgated by EPA in 40 CFR Part 192, Subparts D and E.

(33) All site-specific licensing decisions based on the criteria in subsections (m)-(p) of this section, or alternatives proposed by licensees/applicants shall take into account the risk to the public health and safety and the environment with due consideration to the economic costs involved and any other factors the agency determines to be appropriate.

(34) Any proposed alternatives to the specific requirements in subsections (m)-(p) of this section shall meet the requirements of 10 CFR 150.31(d).

(35) No new site shall be located in a 100-year floodplain or wetland as defined in "Floodplain Management Guidelines for Implementing Executive Order 11988."

(p) Land ownership of byproduct material disposal sites.

(1) These criteria relating to ownership of byproduct material and their disposal sites apply to all licenses terminated, issued, or renewed after November 8, 1981.

(2) Unless exempted by NRC, title to land (including any affected interests therein) that is used for the disposal of byproduct material or that is essential to ensure the long-term stability of the disposal site and title to the byproduct material shall be transferred to the State of Texas or the United States prior to the termination of the license. Material and land transferred shall be transferred without cost to the State of Texas or the United States. In cases where no ongoing site surveillance will be required, surface land ownership transfer requirements may be waived. For licenses issued before November 8, 1981, NRC may take into account the status of the ownership of the land and interests therein, and the ability of a licensee to transfer title and custody thereof to the State.

(3) Any uranium recovery facility license shall contain terms and conditions as the agency determines necessary to assure that, prior to termination of the license, the licensee will comply with ownership requirements of this subsection for sites used for tailings disposal.

(4) For surface impoundments only, the applicant/licensee shall demonstrate a serious effort to obtain severed mineral rights and shall, in the event that fee simple title including all mineral rights cannot be obtained, provide notification in local public land records of the fact that the land is being used for the disposal of radioactive material and is subject to a NRC license prohibiting the disruption and disturbance of the tailings.

(5) If NRC, subsequent to title transfer, determines that use of the surface or subsurface estates, or both, of the land transferred to the state or federal government will not endanger the public health and safety or the environment, NRC may permit the use of the surface or subsurface estates, or both, of such land in a manner consistent with the provisions of this section. If NRC permits the use of such land, it will provide the person who transferred the land with the first refusal with respect to the use of such land.

(q) Maximum values for use in groundwater protection. The following is a list of the maximum concentration values to be used for groundwater protection.

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§289.260(q)

Constituent or Property	Maximum (mg/l)	Concentration (pCi/l)
Arsenic	0.05	
Barium	1.0	
Cadmium	0.01	
Chromium	0.05	
Lead	0.05	
Mercury	0.002	
Selenium	0.01	
Silver	0.05	
Endrin 1,2,3,4,10,10-hexachloro-6, 7- exoxy-1,4,4a,5,6,7,8, 8a-octahydro-endo, endo-1,4:5,8-dimethanonaphthalene	0.0002	
Lindane 1,2,3,4,5, 6-hexachlorocyclohexane	0.004	
Methoxychlor 1,1,1-trichloro-2,2-bis- (p-methoxyphenyl) ethane	0.1	
Toxaphene Chlorinated camphene	0.005	
2,4-D (2,4, 5-Trichlorophenoxy) acetic acid	0.1	
Silvex 2-(2,4,5-Trichlorophenoxy) propionic acid	0.01	
Combined radium-226 and radium-228		5
Gross alpha-particle activity (excluding radon and uranium when producing uranium byproduct material or radon and thorium when producing thorium byproduct material)		15