



Department of Energy

Washington, DC 20585

December 13, 1999

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W.
Suite 700
Washington, D.C. 20004

Dear Mr. Chairman:

Enclosed are the compliance evaluation and the disposal authorization for Solid Waste Storage Area 6 (SWSA-6) low-level waste disposal in Tumulus I, Tumulus II, and the Interim Waste Management Facility (IWMF) at the Oak Ridge Reservation (ORR). The Low-Level Waste Disposal Facility Federal Review Group (LFRG) conducted their review of the performance assessment and the composite analysis and recommended that the Department of Energy authorize the continued operation of the IWMF in SWSA-6 subject to the conditions in the disposal authorization statement. The Department accepted the LFRG recommendation and signed the disposal authorization statement for the specified low-level waste disposal facilities in SWSA-6 at ORR.

The Department has completed the following actions related to commitments VII.B.5.b.1, 2, and 3 in the Defense Nuclear Facilities Safety Board Recommendation 94-2 Implementation Plan: "Complete Headquarters Review of the Oak Ridge National Laboratory SWSA-6 Performance Assessment," "Complete Headquarters Review of the Oak Ridge National Laboratory SWSA-6 Composite Analysis," and "Issue Disposal Authorization Statement for the Oak Ridge National Laboratory SWSA-6 Low-Level Waste Disposal Facilities." The Department proposes closure of these commitments.

If you have any questions concerning this information, please contact me at (202) 586-7709 or Mark Frei at (202) 586-0370.

Sincerely,

A handwritten signature in black ink that reads "Carolyn L. Huntoon".

Carolyn L. Huntoon
Assistant Secretary for
Environmental Management

2 Enclosures



**Compliance Evaluation for the Continued
Disposal of Low-Level Waste at Solid Waste Storage Area-6 on the
Oak Ridge Reservation**

From its review of the performance assessment (PA) and the composite analysis (CA) for Solid Waste Storage Area-6 (SWSA-6), and considering commitments made by the Oak Ridge Operations Office (OR), the Low-Level Waste (LLW) Federal Review Group (LFRG) recommends approval of continued LLW disposal operations by OR at SWSA-6 on a case by case basis. This recommendation is subject to the conditions described below and delineated in the SWSA-6 disposal authorization statement.

Background

The SWSA-6 disposal facility is located on 68 acres of land in Melton Valley near the southwestern boundary of the Oak Ridge Reservation (ORR) on the north shore of White Oak Lake (WOL), a small impoundment of White Oak Creek (WOC) resulting from the construction of White Oak Dam (WOD). Since 1969, when waste disposal began in SWSA-6, about 820,000 curies have been disposed (uncorrected for decay).¹ The PA addressed LLW, which has been and will be disposed in SWSA-6 since September 26, 1988. LLW disposed since this date contains about 8,500 curies (uncorrected for decay).

Early disposal methods at SWSA-6 included unlined trenches, wells in silos, concrete silos, and lined wells. Use of below-grade disposal units was discontinued as of January 1, 1994, when OR began to dispose of LLW at SWSA-6 exclusively in above-grade concrete structures: Tumulus I (1988 to 1990), Tumulus II (1990 to 1992), and now the Interim Waste Management Facility (IWMF) (1992 to present). Tumulus I and II have been filled and operationally closed. Their respective inventories are 52 and 16 curies. Current disposal occurs only in the IWMF, into which LLW is solidified and sealed in large steel-reinforced concrete vaults, stacked three-high on a series of six concrete pads. Drainage from each pad is piped to a monitoring station before discharge. Additional independent drainage systems exist under each pad. To date, no cover has been placed over the concrete vaults and they are readily recoverable. Only a few hundred curies (undecayed) have been disposed in the IWMF.

For the PA, it was assumed that contaminants released from the waste advect through the storm flow zone to surface water, downward through the vadose zone to ground water, and through the ground water to surface water. Surface water bodies, including WOL, WOC, and intermittent streams, occur within 100 meters of the disposal units. All ground water from the WOC watershed discharges to WOC. Points of assumed public access (other than an inadvertent intruder) were ground-water wells located outside buffer zones around the disposal units and surface water at WOD. Two alternative buffer zones were considered a "100-meter buffer zone"

¹The SWSA-6 inventory has decayed to about 450,000 curies.

and an "expanded buffer zone."² These assumed points of public access are well within the ORR boundary and not accessible to the public.

The CA considered all residual contamination in the WOC watershed, including upgradient sources emanating from Melton and Bethel Valleys. Contaminants released from source terms in the WOC watershed mix with releases from SWSA-6 in WOC and WOL before being discharged to the Clinch River. Public doses were calculated from assumed use of water at WOD and in the Clinch River 20 kilometers below the confluence of WOC. The estimated CA inventory was 1.2 million curies.

ORR has operated since the early 1940s and is undergoing a variety of actions pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). At the time of CA preparation, a Remedial Investigation report (RI) for Melton Valley had been issued while an RI for Bethel Valley was being prepared. Using Feasibility Studies (FS) now under preparation, the Department of Energy (DOE) must consider alternatives for remediation of Melton and Bethel Valleys based on CERCLA criteria including a 10^{-4} to 10^{-6} lifetime public risk range. Following completion of the FSs and remedy selection, records of decisions (ROD) will be issued to direct remediation activities, on a schedule that works down the WOC watershed.

Summary of PA and CA Results

The PA and CA were prepared by Oak Ridge National Laboratory (ORNL) for OR.

ORNL concluded that there was reasonable assurance that SWSA-6 meets the DOE Order 5820.2A performance objectives for waste disposed since September 26, 1988. For the PA, ORNL calculated doses only from non-IWMF wastes disposed since September 26, 1988. For the IWMF, ORNL calculated waste concentration limits intended, in conjunction with sum-of-fractions calculations, to assure compliance with the performance objectives.

Compliance with the all-pathways performance objective was assessed at three compliance points (Table 1). (The results are herein reported as being less than an upper limit. With the exception of Radon, the PA provides no quantitative results for volatile radionuclides which have been shown to be insignificant. The result for water-dependent pathways is the sum of the maximum doses for different nuclides at different times. ORNL carried out calculations to peak doses no matter when they occur). ORNL concluded that doses were as low as reasonably achievable (ALARA) because individual doses were negligible.

Table 1. Summary of Performance Assessment Results

²Wells and other access locations corresponding to a "100-m" buffer zone were located 100 meters from each set of disposal units, except that a shorter distance was assumed southwest of the IWMF where Tennessee Highway 95 crosses through ORR. The permanent control area assumed for the PA was correspondingly irregular. For the "expanded buffer zone," additional small tracts of land within SWSA-6, and between the individual sets of disposal units, were included in the assumed permanent control area.

Performance Objective	Performance Objective Limit	Disposal Unit	Compliance Point	Result	PA Conclusion
All Pathways	25 mrem/yr	SWSA-6	100-m Buffer Zone	< 14 mrem/yr	Complies
		SWSA-6	Expanded Buffer Zone	< 10 mrem/yr	Complies
		SWSA-6	White Oak Dam	< 10 mrem/yr	Complies
Atmospheric	10 mrem/yr (excluding Rn)	SWSA-6	Expanded Buffer Zone	< 10 mrem/yr	Complies
Rn Flux	20 pCi/(m ² s)	North Low-Range Silo	Cap	2 pCi/(m ² s)	Complies
Protect Ground Water	4 mrem/yr	SWSA-6	100-m Buffer Zone	< 4 mrem/yr	Complies
		SWSA-6	Expanded Buffer Zone	< 0.0013 mrem/yr	Complies
		SWSA-6	White Oak Dam	< 0.012 mrem/yr	Complies

m – meter; mrem/yr – millirem per year; pCi/(m² s) – picocurie per square meter second

Compliance with the 10-mrem atmospheric pathway performance objective is inferred from calculations performed to set waste concentration limits for the IWMF. Compliance with the radon flux performance objective was assessed for the disposal units expected to contain the largest concentration of ^{226}Ra . The maximum flux was estimated to be approximately two $\text{pCi}/(\text{m}^2 \text{ s})$.

Protection of ground-water resources was assessed by calculating a dose from water-dependent pathways that was smaller than four millirem per year (mrem/yr). The dose was estimated for ground water and surface water at three compliance points. Depending on the compliance point, the doses estimated for protection of ground-water resources may have included doses from ingestion of meat and milk and external irradiation from water immersion. (Again, the listed doses are "less-than" values because they are the sums of maximum doses from different nuclides occurring at different times in the future).

The dose to inadvertent human intruders was estimated for one acute scenario and three chronic scenarios. The maximum result for the acute discovery scenario was 40 mrem/yr for the high-range wells (Table 2). The maximum chronic results were 17,000 mrem/yr for the high range wells and 2,000 mrem/yr for the fissile wells, assuming a postdrilling intruder scenario for each set of wells. ORNL dismissed these results based on the low probability of actually drilling into the waste. After eliminating the postdrilling scenario, the maximum chronic results for these wells was 0.1 mrem/yr for the high-range wells and 0.002 mrem/yr for the fissile wells.

Table 2. Summary of Intruder Analysis Results

Performance Objective	Performance Objective Limit	Disposal Unit	Scenario	Result	PA Conclusion
Acute Exposure of Intruder	500 mrem/yr	High Range Wells	Discovery	40 mrem/yr	Complies
Chronic Exposure of Intruder	100 mrem/yr	High Range Wells	Postdrilling	17,000 mrem/yr	Complies
		High Range Wells	Agriculture	0.1 mrem/yr	Complies
		Fissile Wells	Postdrilling	2,000 mrem/yr	Complies
		Fissile Wells	Agriculture	0.002 mrem/yr	Complies

mrem/yr – millirem per year

ORNL concluded that the disposals at the IWMF comply with the performance objectives because the sum of the fractions was smaller than unity for each pad. The sums of the fractions

were 0.23, 0.39, and 0.47 for IWMF pads 1, 2, and 3, respectively. These were the only IWMF pads that were full when the PA was prepared.

For the CA (Table 3), ORNL concluded that compliance with the 100-mrem/yr dose limit and the 30-mrem/yr dose constraint could be assured if the current ORR land-use boundary is maintained throughout the 1,000-year compliance period. Although compliance with the 100 mrem/yr dose limit was not demonstrated at WOD, ORNL concluded that compliance was demonstrated downstream in the Clinch River where complete mixing was assumed to occur. ORNL assumed that complete mixing of WOC effluent occurs in the Clinch River before the effluent reaches the current boundary of DOE- and Tennessee Valley Authority-controlled land which is 20 km (12 mi) downstream. ORNL concluded that the dose in the Clinch River is so low that it is negligible and an ALARA analysis was unnecessary.

Table 3. Summary of the Composite Analysis Results

Performance Objective	Performance Objective Limit	Compliance Point	Maximum Result	Time of Maximum	CA Conclusion
All Pathways -	100 mrem/yr Limit 30 mrem/yr Dose Constraint	White Oak Dam	540 mrem/yr	100 to 500 yr	Complies if current land use is maintained for 1,000 yr
		Clinch River	5 mrem/yr	0 to 100 yr	

mrem/yr – millirem per year; yr – year

Review of PA and CA and Resolution of Some Compliance Issues

A review of the PA and CA was conducted for the Deputy Assistant Secretaries for Waste Management and Environmental Restoration by the LFRG. The LFRG review was assisted by a designated review team. In its Review Team Report (Moore, et al.) dated July 1998, the review team recommended technical acceptance of the PA conditional on resolution of five compliance issues within six months:

- Incomplete closure program and incorrect responsibility assigned to CERCLA;
- Incomplete radionuclide inventory;
- Exclusion of some reasonably foreseeable processes and events;
- Questionable determination of compliance with the intruder performance objective; and
- Inappropriate/unsound method of reduction in waste concentration limits for long-lived radionuclides.

The review team also identified seven lesser technical points that should be addressed to assure the PAs technical defensibility and completeness.

The review team recommended rejection of the CA based on seven compliance issues and two minor technical points. The compliance issues were:

- Incomplete justification for the CA compliance point;
- Inadequate treatment of options analysis;
- Inadequate CA coordination, review, and concurrence by Environmental Restoration (EM-40);
- Possible exclusion of relevant inventory;
- Incomplete treatment of radiological inventory;
- Inadequate treatment and analysis of sediment transport in the CA; and
- Use of unjustified values for Clinch River dilution.

The review team concerns with the PA and CA were discussed at a July 21-22, 1998, LFRG meeting held in Oak Ridge (September 10, 1998, memorandum from R. Curl). The LFRG considered alternatives for proceeding further in its review.

The LFRG subsequently notified OR (August 19, 1998, memorandum from M. Frei and J. Fiore) that the LFRG could not proceed with the approval of the SWSA-6 PA and CA, although there existed no near-term threat of exceeding health, safety, or environmental standards. This memorandum identified the following compliance issues:

- The PA contains an incomplete closure program;
- A clear documented closure responsibility is not defined;
- The PA contains an incomplete estimated radionuclide inventory;
- There is inadequate determination regarding compliance with the intruder performance objective; and
- Some reasonably foreseeable processes and events are excluded which should be analyzed or documented as to why they are not analyzed.

In addition, the memorandum stated that the LFRG review concluded that there was no technical justification for using one percent of the derived waste concentration limits for the WAC. Although the LFRG's immediate concern was the issues surrounding completion of the PA for SWSA-6, the memorandum referred to CA compliance issues, including the exclusion of relevant source terms and an incomplete treatment of radionuclide inventory.

Subsequent documentation provided by OR addressed issues raised by the LFRG and review team. This documentation included a November 16, 1998, memorandum from Nelson; a December 30, 1998, memorandum from Nelson; and a February 3, 1999, memorandum from Riddle and Sleeman. The responses resolved some of the issues, including those associated with coordination between Waste Management and Environmental Restoration and exclusion of

reasonably achievable processes and events. The review team reviewed the OR responses and criticized those addressing closure, inventory, intrusion, and the factor-of-100 reduction (March 26, 1999, memorandum from Moore to Rhoderick and Murphie).

June 15, 1999, Meeting - Principal Remaining Compliance Issues

The principal remaining compliance issues were addressed at a June 15, 1999, meeting (held in Germantown, MD) between OR and LFRG members from DOE Headquarters (HQ) (June 29, 1999, memorandum from Murphie and Rhoderick). The LFRG members other than OR included the LFRG co-chairs and the Office of Environment, Safety and Health (EH). These issues were: (1) an acceptable site inventory; (2) intrusion calculations; (3) closure plans; (4) the factor of hundred reduction in inventory limits for the IWMF; and (5) the CA.

The most difficult issue was inventory uncertainty. There was general agreement that it would be difficult to confidently obtain a high-quality inventory estimate for much of the waste in SWSA-6. This was particularly the case for waste disposal methods other than the IWMF and Tumulus I and II because of poor waste characterization and record keeping practices. Some radionuclides that are difficult to measure, yet important to the analysis, are not identified in the records, and the inventories of some identified radionuclides are suspect.

Some at the meeting felt that the only way to reduce inventory uncertainties would be to exhume and analyze the waste, an action that would be neither environmentally nor economically prudent. Others agreed exhuming the waste would be undesirable but disagreed that exhumation and analysis was the only alternative. Inventory uncertainty could be reduced through a process that considers the sources of the waste and applies scaling factors as appropriate to estimate difficult-to-measure radionuclides. This would help bound the radionuclide inventory. But because such an effort would still leave large uncertainties, many questioned whether the additional information that could be obtained would be of sufficient value to justify the cost in doing so.

Because the uncertainties in the inventory did not directly affect the IWMF (the uncertainty question related to non-IWMF waste), and considering other factors including the paucity of activity in the IWMF compared with the rest of SWSA-6, OR proposed its seeking of an exemption from preparing the PA for all wastes except for those disposed in the Tumuli and the IWMF. The exemption would be submitted and justified in compliance with DOE requirements. The full inventory would continue to be included in the CA, which is a management decision tool rather than a compliance document, and the CERCLA analysis. This approach was agreed to subject to conditions (see below).

With respect to the intruder analysis, there was general agreement that the intruder analyses were overly conservative. Analysis assumptions reduced the upper limits for allowable disposal concentrations and quantities in IWMF and increased the doses for other disposal units such as the 17 rems per year calculated for intrusion by a drilling scenario into the high-range wells (see below).³ OR agreed to revise the intruder analysis to alleviate concerns about conservatism

³ORNL dismissed the well drilling scenario because of the small probability of a well actually hitting waste, which ORNL described as being less than 10 percent. The review team did not believe that a 10 percent probability was sufficient to dismiss the scenario and that even if the 10 percent probability was accepted, the

and submit the analysis to HQ as part of a PA addendum.

With respect to closure, the PA lacked a closure plan under DOE 5820.2A. The analysis in the PA was performed essentially under the assumption that the interim closure status of SWSA-6 would continue. However, the final configuration of SWSA-6 is expected to differ, particularly after implementation of the CERCLA ROD for Melton Valley. This situation raised questions about the usefulness of the PA as a decision document. To better support the PA all-pathway and ground-water analyses and intruder analysis, the PA and CA could have been prepared in a manner that coordinated the needs of DOE 5820.2A with expected or projected remediation alternatives from the CERCLA process. A conceptual final closure configuration could have been assumed consistent with regulatory guidance for calculational purposes.

A related concern is that some of the assumptions for the PA seem overly conservative. For example, questionable credit was given to engineered barriers; no credit was considered for facility repair or maintenance during the institutional control period, and some of the assumed well water points of compliance seemed unrealistic (i.e., the assumed construction of wells either on or very near Tennessee Highway 95 about 65 meters from the southeastern edge of the IWMF). -

OR believed that the closure issue could be addressed by its preparation of a comprehensive stand alone closure plan after completion of the Melton Valley ROD and based on the ROD (expected to be completed in winter 1999). General agreement was reached that this approach was acceptable. It was noted, however, that even though the CERCLA process may be used and is based on the concepts of protection of humans and the environment, DOE is still obligated to comply with the requirements of the Atomic Energy Act (AEA) even if that means taking actions that exceed CERCLA derived agreements. For all DOE requirements satisfied through the CERCLA process, a crosswalk or similar documentation should be prepared to link the DOE requirements to the corresponding CERCLA activity or document. -

With respect to the factor-of-100 reduction in calculated IWMF inventory limits, it was pointed out that the reduction did not properly account for inventory uncertainties. Questions of inventory uncertainty should be addressed in a technically defensible manner. OR agreed to revise the WAC for IWMF to remove the reduction factor.

The CA was prepared in a manner that did not consider the likely outcome of the CERCLA process and may be inconsistent with the DOE guidance for CA preparation.⁴ It was observed

expectation values of the dose exceed the performance objective. The review team also felt that the method used to estimate the probability was conservative. The review team recommended that the estimation of the probability and its assumptions needed to be described and justified, and that the conservatism in the scenario and its probability should be reduced to the extent possible and compliance with the performance objective should be reassessed.

⁴Guidance for preparation of a CA (April 30, 1996 memorandum from Owendoff and Cowan) recommends appropriate and reasonable assumptions about the final configuration of a site when uncertainties exist, such as an uncompleted CERCLA assessment, and specifically warns against overconservatism, as that would bias

that the calculated dose of 540 mrem in a year did not represent a realistic estimate of dose to actual members of the public. Doses of such magnitude are not consistent with the results of monitoring and surveillance programs for ORR and would be precluded because WOD is within ORR and access control is being maintained by DOE in compliance with its AEA requirements. The analysis did demonstrate, however, that DOE must continue to control access to the dam and to conduct other required activities for protection of the public and the environment (e.g., monitoring and surveillance) until such time as the property can be released pursuant to DOE and other applicable requirements, including those of CERCLA.

With respect to CERCLA, it was pointed out that the ROD that will be prepared for Melton and Bethel Valleys will set forth remediation, stabilization, or other programs that will assure that the lifetime residual risk to humans will not exceed a range of 10^{-4} to 10^{-6} . Annual doses after implementation of a remedy corresponding to this risk range will be much smaller than DOE's 100-mrem dose limit. In addition, annual doses will be reduced to levels as far below 100 mrem as is reasonably achievable, pursuant to DOE 5400.5.

Regulatory Direction

In accordance with the discussions and commitments at the June 15, 1999, meeting and the review record, agreement was reached that the best action would be to authorize the continued case-by-case use of the IWMF, subject to several conditions:

1. OR will prepare and submit to DOE-HQ a request for exemption that will omit waste other than that disposed in the IWMF, Tumulus I, and Tumulus II from analysis in the PA. The full inventory will continue to be included in the composite and CERCLA analyses. The justification for the exemption will include information from the Melton Valley CERCLA process to show that the intent of the requirements of DOE Orders 5820.2A and 435.1 will be met as they pertain to current and expected future site risks. (For all DOE requirements satisfied through the CERCLA process, OR will prepare a crosswalk or similar documentation to link the DOE requirements to the corresponding CERCLA activity or document).
2. OR will prepare a comprehensive, stand-alone closure plan for the IWMF and Tumulus I and II after completion of the Melton Valley ROD, expected to be issued in January 2000. The closure plan will be integrated into the CERCLA closure action for SWSA-6.
3. By June 2000, OR will prepare an addendum (or revision) to the PA that will address the remaining PA compliance issues. Also by June 2000, OR will prepare a revised CA that will resolve the compliance issues identified by the LFRG review team. The PA addendum and CA revision will be submitted to DOE-HQ. It will reflect applicable RODs and the comprehensive closure plan, and will:

results and lead to poor decisions.

- Use credible assumptions for radionuclide inventory that address inventory uncertainties;
 - Remove over-conservatism;
 - Develop revised waste acceptance criteria for the IWMF;
 - Reconsider the intruder analysis to identify more plausible intruder assumptions for waste disposed since September 26, 1988, and eliminate the arbitrary reduction factor for the waste to be disposed in the IWMF; and
 - Adjust the compliance points for the PA and CA to incorporate revised model outputs and remediation assumptions; the assumed point of compliance for the CA will be WOD.
4. Pending approval of the PA addendum and CA revision by the Deputy Assistant Secretaries for Waste Management and Environmental Restoration, waste disposal into the IWMF will be restricted in the following manner:
- Except on a case-by-case basis, OR will not dispose of additional LLW in the IWMF until the PA addendum and CA revision are reviewed by the LFRG and appropriately approved;
 - Disposals will be documented to be economically justified, in compliance with the existing WAC, and subject to the approval of the OR manager;
 - A 15-day advance notice of each planned disposal will be provided to the Deputy Assistant Secretary for Waste Management;
 - Any disposals made will be readily retrievable; and
 - The cumulative amount of disposal may not exceed ten percent of the remaining capacity in curies of the IWMF.

This regulatory direction was discussed in detail at a full meeting of the LFRG held during the week of August 16-20, 1999, in Richland, WA, and Las Vegas, NV. No objections from the LFRG members were expressed with respect to the regulatory direction, either at the meeting itself or in any subsequent LFRG-member comments on the draft minutes of the meeting. Final meeting minutes were issued on September 29, 1999.

Request for and Approval of Exemption

In accordance with the June 15, 1999, agreements, OR submitted an exemption request to EM-40 on October 14, 1999 (October 14, 1999, memorandum from Nelson to Fiore). The exemption was approved by EM-40 on October 21, 1999, with concurrence with conditions by EH on October 25, 1999.

Justification for Authorization for Continued Waste Disposal Operations at the IWMF

DOE considered two alternatives for regulatory direction: (1) require the cessation of all disposal activities at the IWMF; and (2) allow for continued use of the IWMF under conditions that would be protective of the public, health, and environment and would address the remaining

compliance issues. DOE judged that the best alternative would be the second. The justification for this action is as follows:

The action is protective of the public and the environment.

1. Disposal is limited to the IWWMF, which is a highly engineered concrete disposal structure equipped with redundant leachate control capability. To prohibit use of the IWWMF would deny OR the operational flexibility of using it for management of small quantities of high-activity waste dominated by short-lived radionuclides. Otherwise, this waste would require transport off site for disposition, frequently in shielded shipping containers, with attendant risks and costs.
2. The contribution of the IWWMF to the total risk represented by the waste and contamination in Bethel and Melton Valleys is minimal. Therefore, discontinuing use of the IWWMF would have essentially no effect on any hazards or theoretical risks that might be associated with ORR.
3. Institutional controls will continue to ensure protection of public health and safety and the environment. DOE requirements in DOE 5400.5 require control of property containing radioactive waste or radioactive material for as long as the waste or material is sufficiently hazardous to require control under AEA requirements. Furthermore, CERCLA requires additional institutional control measures for remedy selections where contamination is left in place, including routine five-year reviews to ensure that the remedy selection determined through the CERCLA process continues to be protective of the public and environment.
4. Monitoring of leachate from IWWMF will continue (no problems have been identified). The comprehensive environmental monitoring and surveillance program implemented for IWWMF and the rest of ORR, including Melton and Bethel Valleys, will continue in compliance with DOE directives (e.g., DOE 5400.5), the CERCLA and RCRA processes, and State, and Environmental Protection Agency agreements.
5. Operating conditions will restrict additional disposals of waste to case-by-case situations, pending preparation and approval of the PA addendum and CA revision. The waste is readily retrievable.

The action will address PA and CA compliance concerns.

1. The action provides a mechanism for addressing the compliance issues and technical points raised by the review team and the LFRG. The alternative action -- closing the IWWMF permanently -- would not have addressed the compliance concerns.
2. Compliance concerns will be addressed in a manner that integrates the CERCLA and

AEA processes and requirements, consistent with ORR land use plans.⁵ All wastes in SWSA-6, along with other contributing sources, will be considered in the CA and in the CERCLA analyses. The CERCLA analyses will consider alternatives for disposition of the waste and contamination in the Melton Valley watershed that will result in a residual lifetime risk to the public in the range of 10^{-4} to 10^{-6} . The CERCLA analysis, and remedial action selected and implemented via a legally binding ROD, will be used to determine a final closure configuration of SWSA-6 (for purposes of CERCLA). This information will be used to develop a final closure plan for the Tumuli and the IWMF.

Institutional conditions that contributed to the difficulties in demonstrating compliance have been alleviated.

1. OR will continue to implement improved requirements for waste characterization and certification and recordkeeping. Inventory uncertainties resulted largely from delays in fully implementing DOE 5820.2A and in delays in appreciating the need for high-quality waste characterization and recordkeeping procedures to support a technically defensible PA.
2. OR will continue to dispose of waste in the IWMF consistent with an analysis that considers inadvertent intrusion. Difficulties in demonstrating compliance with the intruder analyses for the fissile and high range wells resulted largely from delays in fully implementing DOE 5820.2A.
3. The DOE regulatory infrastructure is greatly improved over that which existed under DOE 5820.2A. The Department has revised existing policy into the newly promulgated DOE 435.1 and formed a new Federal review and oversight process with the establishment of the LFRG.

References

Memorandum from J. Owendoff, Deputy Assistant Secretary for Environmental Restoration, and S. Cowan, Deputy Assistant Secretary for Waste Management, on "Guidance for a Composite Analysis of Interacting Source Terms," April 30, 1996.

Oak Ridge National Laboratory, "Performance Assessment for Continuing and Future Operations at Solid Waste Storage Area 6," ORNL-6783/R1 (two volumes), September 1997.

⁵These land use plans will include a Land Use Control Implementation Plan, which is being prepared consistent with EPA CERCLA guidance and which describes the institutional control measures **needed to assure the** long-term adequacy of the remedy selected.

Oak Ridge National Laboratory, "Composite Analysis for Solid Waste Storage Area 6, ORNL-6929, September 1997.

Moore, et al., "Review of the Oak Ridge Performance Assessment for Continuing and Future Operations at Solid Waste Storage Area 6 and Oak Ridge Composite Analysis for the Solid Waste Storage Area 6," Final Interim Report, July 1998.

Memorandum from R.U. Curl, LFRG Technical Secretary, to Distribution, containing minutes for a July 21-22, 1998 LFRG meeting in Oak Ridge, TN, September 10, 1998.

Memorandum from Mark Frei, Acting Deputy Assistant Secretary for Waste Management, and James Fiore, Acting Deputy Assistant Secretary for Environmental Restoration, to R. Nelson, Assistant Manager for Environmental Management, OR, on "Review of the SWSA-6 PA and CA," August 19, 1998.

Memorandum from R. Nelson, Assistant Manager for Environmental Management, OR, to Mark Frei, Acting Deputy Assistant Secretary for Waste Management, and James Fiore, Acting Deputy Assistant Secretary for Environmental Restoration, on "Actions to Address the Performance Assessment for SWSA-6 at ORNL," November 16, 1998.

Memorandum from R. Nelson, Assistant Manager for Environmental Management, OR, to William Murphie, Office of Eastern Area Programs, and Jay Rhoderick, Office of Planning and Analysis, on "Strategy for Development of Closure Criteria for SWSA-6 at the ORNL," December 30, 1998.

Memorandum from S. Riddle, Group Leader, Environmental Sciences Group, and R. Sleeman, Group Leader, ORR Remediation Management Group, to William Murphie, Office of Eastern Area Programs, and Jay Rhoderick, Office of Planning and Analysis, on "Strategy for Development of Closure Criteria for SWSA-6 at ORNL," February 3, 1998.

Memorandum from B. Moore, DOE/NV/WMD, Review Team Leader, to Jay Rhoderick, DOE/HQ/EM-35, and William Murphie, DOE/HQ/EM-42, Co-chairs, LFRG, on "Review Team Responses to a Compendium of DOE/OR Correspondence (August 1998 to February 1999) Regarding the SWSA-6 PA/CA Review Report (Moore, et al., 1998)," March 26, 1999.

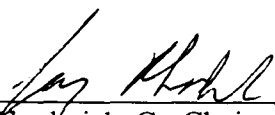
Memorandum from William Murphie, Acting Director, Office of Eastern Area Programs, and Jay Rhoderick, Acting Director, Office of Planning and Analysis, to Distribution, containing "Minutes for the June 15, 1999, Low-Level Waste Federal Review Group," June 29, 1999.

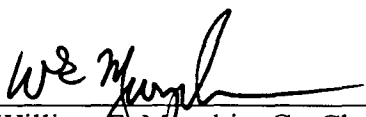
Email from R.U. Curl, LFRG Technical Secretary, to Distribution, containing final minutes for the August 16-20, 1999, LFRG Business Meetings in Richland, WA and Las Vegas, NV, September 29, 1999.

Memorandum from R. Nelson, Assistant Manager for Environmental Management, OR, to James

Fiore, Acting Deputy Assistant Secretary for Environmental Restoration, on "Department of Energy Order Exemption Request for Waste Disposal Units in Solid Waste Storage Area 6, Oak Ridge National Laboratory," October 14, 1999.

Exemption approval signed by EM-40, James J. Fiore, on October 21, 1999; concurrence with conditions signed by EH, Raymond Berube, on October 25, 1999; acknowledged by EM-40 memorandum for the record dated October 27, 1999.


Jay Rhoderick, Co-Chair
Low-Level Waste Federal
Review Group


William E. Murphie, Co-Chair
Low-Level Waste Federal
Review Group

**Disposal Authorization Statement
for the
Department of Energy
Solid Waste Storage Area 6:
Tumulus I, Tumulus II, and the Interim Waste Management Facility for
Low-Level Radioactive Waste Disposal**

Revision No.: 0Effective Date: 11/18

Background

In accordance with Department of Energy (DOE) Orders, a Disposal Authorization Statement (DAS) must be obtained before construction of a new low-level radioactive waste (LLW) disposal facility. Field Elements with existing LLW disposal facilities shall obtain a DAS in accordance with the schedule in the Complex-Wide LLW Management Program Plan. The DAS shall specify the limits and conditions on construction, design, operations, and closure of the LLW disposal facility based on these reviews. A DAS is a part of the required radioactive waste management basis for a disposal facility. Failure to obtain a DAS shall result in shutdown of the disposal facility.

A review of the Performance assessment (PA) and Composite Analysis (CA) for Solid Waste Storage Area 6 (SWSA-6) was conducted for the DOE Headquarters (HQ) Offices of Waste Management (EM-30) and Environmental Restoration (EM-40) by the LLW Federal Review Group (LFRG) with the assistance of a designated review team. Several issues were identified which prevented completion of the review, and additional information was requested from the Oak Ridge Operations Office (OR). The primary issues of concern dealt with the integration of closure plans for waste disposal units being addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program, resolution of concerns about uncertainty in the radionuclide inventory and development of more reliable information, reconsideration of the intruder analyses to identify more plausible intruder assumptions, and elimination of arbitrary activity limits for waste to be disposed. Although these issues prevented approval of the PA and CA, the LFRG later concluded that based upon subsequent OR submissions for the record, the waste disposal operations at the Interim Waste Management Facility (IWMF) within SWSA-6 do not present a risk to health, safety, or the environment, and is an insignificant contributor to overall potential releases from SWSA-6. The IWMF is the only authorized operational disposal facility at SWSA-6.

OR discussed these issues with DOE-HQ and with the LFRG. On June 15, 1999, a plan for resolving the issues was agreed to by OR and several members of LFRG, including those from DOE-EM-HQ and the Office of Environment, Safety and Health (EH). This plan was justified as documented in the compliance evaluation, and subsequently discussed with the full LFRG, which raised no objections. OR would request an exemption from the requirements of DOE 5820.2A (and DOE Order 435.1) to exclude from the PA analysis those SWSA-6 disposal units other than Tumulus I, Tumulus II, and the IWMF. OR would prepare an addendum (or revision) to the PA, and a revision to the CA, that would address remaining concerns identified by the LFRG and review team. OR would provide this addendum and revision to DOE-EM-HQ on a

schedule linked to publication of the record of decision (ROD) for Melton Valley which is being prepared in accordance with the CERCLA. Plans for closure of the Tumulus facilities and IWMF would be integrated with the CERCLA action, consistent with the Melton Valley ROD, and would meet the requirements for closure under DOE 5820.2A and Order 435.1. In the interim, disposal into the IWMF would be subject to several restrictions (listed below).

In accordance with this plan, OR submitted a request to exemption to DOE-HQ on October 14, 1999. This request was approved by EM-40, in consultation with EH-1, on October 21, 1999, concurred with conditions by EH on October 25, 1999, and accepted by EM-40 in a memorandum for the record dated October 27, 1999. This exemption permits the LFRG to approve the Oak Ridge DAS with conditions as discussed at the NV/RL meeting of August 16-20, 1999. Conditional approval of the Disposal Authorization Statement was confirmed by telephone vote of the LFRG members on November 17, 1999.

Disposal Authorization Statement

In partial fulfillment of the requirements of DOE Order 5820.2A (and Order 435.1), this DAS is hereby issued to conditionally authorize OR to transfer, receive, possess, and dispose of LLW in the IWMF. The specific conditions associated with this DAS are described below.

OR shall conduct its LLW disposal program in accordance with the requirements and determinations contained in the following documents:

- "Performance Assessment for Continuing and Future Operations at SWSA-6," ORNL-6783/R1, September 1997.
- Memorandum from Mark Frei and James Fiore to Rod Nelson, Review of the SWSA-6 PA and CA, 8/19/98.
- CA for SWSA-6," ORNL-6929, September 1997.
- Memorandum from William Murphie and Jay Rhoderick to Clayton Gist and others,
- "Minutes for the June 15, 1999 LLW Federal Review Group (LFRG)" (Discussions between Oak Ridge and HQ on SWSA- 6) 6/29/99.
- Memorandum from R. Nelson, Assistant Manager for Environmental Management, OR, to James J. Fiore, Acting Deputy Assistant Secretary for Environmental Restoration, on "Department of Energy Order Exemption Request for Waste Disposal Units in Solid Waste Storage Area 6, Oak Ridge National Laboratory," October 14, 1999.
- The exemption was granted with conditions as detailed in a memorandum for the record signed by James J. Fiore on October 27, 1999.

This DAS is subject to all applicable rules and orders now or hereafter in effect and to all conditions specified below. Also, this authorization is applicable to any subsequent revisions and additions to the PA and the CA provided such revisions and additions are in accordance with this DAS and the PA and CA maintenance programs. Applicable permits and reports that comprise the Radioactive Waste Management Basis shall be approved and continue to be maintained in accordance with applicable DOE orders and regulations.

Facility Construction and Design

SWSA-6 contains over a dozen types of disposal facilities. Although the facilities to be analyzed in the PA addendum will consist of the three above-grade facilities within SWSA-6 (Tumulus I, Tumulus II, and the IWMF), LLW disposal in SWSA-6 is restricted to the IWMF. The design features of each IWMF disposal unit shall conform to the conceptual model used in the PA or its addendum. Any changes in disposal technology, disposal unit, or waste form must be analyzed and authorized according to the PA and CA maintenance program and approved by DOE Oak Ridge.

Radionuclide Limits, Waste Form, and Packaging

Each active disposal unit within SWSA-6 shall have waste acceptance criteria (WAC) which provide specific radionuclide disposal limits, waste form restrictions, and descriptions of acceptable waste packages. The WAC shall be based on facility PA, special analyses, and CA as well as safety documentation and criticality considerations. Waste acceptance procedures shall be in place that describe requirements for waste characterization, waste certification, and record keeping, as well as the process for authorizing deviations from the requirements. All waste received for disposal at these facilities must conform to the waste acceptance procedures. The WAC shall be reviewed and approved through the facility Radioactive Waste Management Basis. Current WAC shall be revised in accordance with the PA addendum and CA revision.

Closure

Closure plans for SWSA-6 shall be approved by OR within one year of completion and approval of the Melton Valley ROD and submitted to DOE-EM-HQ for review. These closure plans must address any outstanding closure commitments associated with the revisions of the SWSA-6 PA and CA. Deviations in the closure plan from the closure concept analyzed in the PA and CA revisions must be analyzed and approved under the PA and CA maintenance program. Closure of the above-ground facilities in SWSA-6 shall be performed in accordance with the requirements of DOE 5820.2A and (Order 435.1) and integrated with the CERCLA closure requirements for the balance of SWSA-6.

Monitoring

Monitoring plans for SWSA-6 shall be prepared and approved by OR and implemented within one year of completion and approval of the Melton Valley ROD. The plans shall be submitted to DOE-EM-HQ for review. These plans shall be updated at least every five years to reflect changing facility conditions. The plans shall include monitoring frequencies and protocols for the existing data collection and any new data collection required to measure the continued performance of the disposal facilities. These plans shall also include a requirement for comparison with the PA results and development of any corrective action necessary.

Performance Assessment and Composite Analysis Maintenance

Maintenance plans shall be written and approved by OR for the SWSA-6 disposal facility PA and CA within one year of completion and approval of the Melton Valley ROD. Changes in the disposal facility operation (e.g., waste form, disposal unit design, radionuclide quantity) or in site policy (e.g., land use plan) or strategy (e.g., closure plans, remedial actions), and consequent changes in disposal facility controls shall be managed per the PA and CA maintenance program.

Copies of the annual review of the adequacy of the PA and the CA shall be provided to the LFRG.

Additional Interim Conditions for IWMF Operation

Prior to completion and approval of the SWSA-6 PA and CA revisions, the following operational conditions apply:

1. Additional disposals into the IWMF will be made on a case-by-case basis.
2. Disposals will be documented to be economically justified, in compliance with the existing WAC and subject to the approval of the Oak Ridge Manager.
3. 15-day advance notice of each planned disposal will be provided to the cognizant Deputy Assistant Secretary, with a copy to the co-chairs of the LFRG.
4. Any disposals made will be readily retrievable to allow final adjustments to be made when revised WAC are available.
5. The cumulative amount of disposal may not exceed ten percent of the remaining capacity in curies of the three above-ground facilities in SWSA-6.

SWSA-6 Performance Assessment Conditions

The PA revision shall be completed and submitted to DOE-EM-HQ within six months of formal approval and signing of the CERCLA ROD for Melton Valley. The four specific PA compliance issues to be resolved in the PA revision are: development of more detailed closure plans (see "Closure" above); resolution of concerns about uncertainty in the radionuclide inventory; and development of more reliable information, reconsideration of the intruder analyses to identify more plausible intruder assumptions, and elimination of the arbitrary reduction of activity limits for waste to be disposed (see "Radionuclide Limits, Waste Form, and Packaging" above). Revised WAC shall be developed for the IWMF using more realistic model inputs.

SWSA-6 Composite Analysis Conditions

OR shall provide to DOE-EM-HQ, within six months of formal approval and signing of the CERCLA ROD for Melton Valley, a revision to the CA that is adjusted to incorporate revised model outputs and remediation assumptions and to resolve the documented concerns of the LFRG review team. The point of compliance for the CA shall be White Oak Dam. The buffer zone and exclusive waste management area shall be integrated with the ORR land use planning documentation.

Violations of Operational Requirements

PA and CA commitments that are not met will result in the review of the applicability of continued disposal authorization.



James J. Fiore
Acting Deputy Assistant Secretary
for Environmental Restoration
Environmental Management

Date: 11-18-99



Mark W. Frei
Acting Deputy Assistant Secretary
for Waste Management
Environmental Management

Date: 11/18/99

Related References

1. Review of the Oak Ridge PA for Continuing and Future Operations at SWSA-6 and Oak Ridge CA for the SWSA-6, Beth A. Moore et al., July 1998.
2. Minutes for the LFRG Meeting, 7/21/98 - 7/22/98
3. Letter to Mark Frei and James Fiore from Rod Nelson, 11/16/98
4. Letter to William Murphie and Jay Rhoderick from Rod Nelson, 12/30/98
5. Minutes for the LFRG Conference Call, 1/27/99
6. Minutes of the June 15, 1999, meeting of OR and HQ LFRG Members, June 29, 1999.
7. Minutes of the August 16-20, 1999, LFRG meeting in Las Vegas, Nevada, and Richland, Washington, September 29, 1999.
8. Memorandum to James Fiore from Rod Nelson with exemption request for waste disposal units in SWSA-6, October 14, 1999.
9. Compliance Evaluation for the Continued Disposal of LLW at SWSA-6 on the ORR.
10. Exemption approved by EM-40 on October 21, 1999. ..



Department of Energy
Washington, DC 20585

October 27, 1999

MEMO FOR THE RECORD

From: James Fiore
Acting Deputy Assistant Secretary
for Environmental Restoration

The Office of Environment, Safety and Health (EH) has concurred on the Department of Energy Order Request for Waste Disposal Units in Solid Waste Storage Area, Oak Ridge National Laboratory (OR). EH has one comment, which is conditional for concurrence. The comment is as follows:

"EH concurs with the proposed exemption per the reasons provided in the justification. However, we concur with comment. The primary concern relates to closing out the old SWSA 6 PA for the record. By granting the exemption the Department separates the Oak Ridge IWMF and Tumulus I and II disposal facilities from the older disposal units. This action permits the closure of the exempted SWSA 6 burial areas under CERCLA and requires that the operation and closure of the IWMF and Tumulus facilities be accomplished under DOE waste management requirements. This will result in a reevaluation and correction of the Performance Assessment (PA) calculations for the IWMF and Tumulus areas and will ensure that overly conservative assumptions or arbitrary disposal restrictions will be corrected. However, it does not ensure that will be done for the exempted areas of SWSA 6. The primary concerns are the intruder calculations from the draft PA that suggest doses to an intruder could be 17 rems for one set of wells and 2 rems for another. These calculated doses are not plausible. We recommend that an additional condition be added to the exemption to require Oak Ridge to prepare an official report or analysis to be made part of the record that corrects the overly conservative assumptions in the old SWSA 6 PA calculations."

If there are questions or concerns, please call Ross Bradley on 301-903-7646.

United States Government

Department of Energy

Oak Ridge Operations Office

memorandum

DATE: October 14, 1999**REPLY TO**
ATTN OF: EM-921:McMillan**SUBJECT:** DEPARTMENT OF ENERGY ORDER REQUEST FOR WASTE DISPOSAL UNITS IN SOLID WASTE STORAGE AREA 6, OAK RIDGE NATIONAL LABORATORY**TO:** James J. Fiore, Deputy Assistant Secretary for Environmental Restoration, EM-40, HQ/FORS

Low-level waste disposal after the issuance of the Department of Energy (DOE) Order 5820.2A, *Radioactive Waste Management* (September 26, 1988), must be compliant with performance objectives and other relevant requirements in Chapter III of the Order. Compliance with corresponding objectives and requirements in the revised DOE Order 435.1, and its associated manual, DOE Manual 435.1-1, will also be required when DOE Order 435.1 is fully implemented within one year of its July 9, 1999, issuance date. Consistent with DOE Manual 251.1-1A *Directives System*, a permanent exemption is requested from specific requirements set forth in DOE Order 5820.2A, or its successor DOE Manual 435.1-1, for certain wastes dispositioned in Solid Waste Management Area 6 (SWSA 6) at the Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee.

Site or Facility Requiring Exemption and Background Information

This exemption request specifically deals with wastes buried in SWSA 6. SWSA 6 is located in Melton Valley southwest of the ORNL. DOE has used Melton Valley for waste management since the 1940s. At least 2,000,000 curies of radioactive waste has been disposed in Melton Valley during that time. Beginning in the 1960s, DOE has disposed of approximately 500,000 curies in SWSA 6. Buried waste units in the SWSA 6 area were used extensively prior to September 1988, and consist of high-range wells/wells-in-silos, low-range wells, fissile wells, asbestos silos, and the biological trenches. Since the inception of DOE Order 5820.2A in September 1988, about 8,500 curies of low-level radioactive waste (LLW) has been disposed of in SWSA 6, primarily in the high-range wells/wells-in-silos, and fissile wells. In addition to those buried or below-grade waste units, aboveground waste disposal has occurred since September 1988 in the Tumulus I and II and Interim Waste Management Facility (IWWMF). Both the Tumulus I and II and the IWWMF are engineered facilities designed primarily to dispose of high-activity waste with short-lived isotopes. The currently active IWWMF in SWSA 6 has received approximately 200 curies of the total waste inventory since startup in 1992. Only the buried waste units are the subjects of this exemption request.

The remediation of buried wastes in SWSA 6, and other contaminant sources in Melton Valley, has been addressed by the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) assessment of the Melton Valley watershed. A watershed record of decision (ROD) is scheduled for approval in December 1999 by DOE Region 4 of the Environmental Protection Agency (EPA) and the Tennessee Department of Environment and

Conservation (TDEC). Currently the draft ROD calls for removal of limited soil "hot spots" and in-situ management for the balance of buried waste in the watershed. Inherent with a decision for the in-situ management of buried waste in Melton Valley, including wastes in SWSA 6, is a commitment by DOE, EPA, and TDEC to maintain active institutional controls for as long as the waste remains hazardous. The CERCLA ROD five-year review requirement, the Land Use Control Assurance Plan (LUCAP), and DOE Order 5400.5 *Radiation Protection of the Public and the Environment* will influence the duration of institutional control. DOE Order 5400.5 provides administrative assurance that DOE property will not be released for inappropriate use as long as buried waste remains hazardous.

Specific DOE Order 5820.2A/DOE 435.1 Requirements for Which Exemption is Sought

DOE radioactive waste disposal requirements were set forth in DOE Order 5820.2A and are in the revised DOE Order 435.1 (and the associated Manual and Guidance, DOE M 435.1-1 and DOE G 435.1-1, respectively). In either case, authorization for continued disposal of low-level waste at a DOE facility requires that a performance assessment (PA) be prepared for any site disposing of waste after September 1988 (DOE Order 5820.2A, III.3.b). The PA and supporting material must demonstrate that the operation and closure of the site is reasonably expected to meet the performance objectives in DOE Order 5820.2A, III.a [or, when implemented, the requirements of DOE M 435.1-1, Section IV.P (1)]. Specifically, this request is to exempt below-grade post-1988 waste disposed in SWSA 6 (e.g., wells, silos, and trenches) from the DOE Order 5820.2A, III.b. requirements, including the need to demonstrate compliance with the performance objectives of the Order, as listed in Chapter III.3.a. (2), a. (3), and a. (4). This exemption is considered permanent and should also apply to the corresponding elements in DOE Order 435.1-1 (DOE M 435.1-1, Section IV.P) when that Order is implemented. The exemption of these requirements is necessary because it is not practical to reasonably characterize all post-1988 buried waste in order to permit a reasonable performance assessment to be developed and approved. Further, the characterization uncertainties in the buried waste detract from the utility of the SWSA 6 performance assessment with respect to setting waste acceptance criteria for the IWMF.

Identification and Justification of Risks in Granting the Exemption

The granting of this exemption will not result in any additional risks to the public or environment. Controls will continue to be maintained over the site and limited access to the site and surrounding areas will ensure DOE requirements for protection of the public will be met. Unlike the multi-generational stewardship issues facing the Department when disposing of long-lived radionuclides (e.g., uranium, thorium), the primary radionuclides in SWSA 6 (i.e., strontium, cesium) will decay sufficiently enough that the site will be safe for an intruder within 350 years. Over the long-term, DOE will use the CERCLA process to close Melton Valley and is committed to ensuring that closure will meet all applicable DOE environment, safety, and health (ES&H) requirements, including the requirements for closure defined by DOE M 435.1-1. In the near-term, this exemption will allow for the appropriate use of the highly engineered IWMF disposal system and will provide further confidence that DOE wastes are being properly managed. If this exemption were not granted, the source term uncertainties associated with the

performance of the buried wastes in SWSA 6 would likely not be resolved and could result in the continued inability to effectively use the IWMF.

SWSA 6 contains an estimated inventory of 500,000 curies. Most of this inventory was dispositioned below-grade in more than 400 unlined trenches and auger holes prior to September 1988. After September 1988, engineered, above-ground facilities (the IWMF and Tumulus I and II) and cement-lined below-grade wells and wells-in-silos were used to disposition about 8,800 curies, or less than two percent of the total SWSA 6 radionuclide inventory. These disposals consisted of about 200 curies in the IWMF, 79 curies in Tumuli I and II, and 8,500 curies mostly contained in the high-range wells/wells-in-silos. The total inventory is dominated by ^3H , ^{60}Co , ^{90}Sr , and ^{137}Cs fission products with half-lives less than 30 years.

The performance assessment (PA) requirements of DOE Order 5820.2A/435.1 are essentially structured for new or operating waste management facilities for which siting studies and waste inventory knowledge may be used to appropriately design and assess the facility's performance relative to appropriate waste acceptance criteria. The intent of the PA for a waste facility is to ensure that the facility, when constructed, operated, and closed, will meet performance objectives designed to protect the public and the environment. In the case of the buried wastes in SWSA 6, there is insufficient knowledge of the waste inventory to confidently perform a quantitative PA. Therefore, it is appropriate to manage the below-grade SWSA 6 wastes as in-situ waste integrated with the Melton Valley watershed CERCLA process. The preferred remedial action alternative derived through the CERCLA process stipulates hydraulic isolation of the buried wastes in SWSA 6 through multi-component covers and groundwater diversion structures, and institutional controls coupled with 5-year CERCLA reviews for as long as the waste remains hazardous to the public. These SWSA 6 actions are crafted in concert with other source actions in the Melton Valley watershed to ensure that the total incremental lifetime cancer risk for all sources in the watershed is within the EPA target risk range of 10^{-6} to 10^{-4} for a public receptor at White Oak Dam. A 10^{-4} risk approximately corresponds to a dose of 4.4 millirem/year for a 30-year exposure period. Since this is the maximum dose permitted under CERCLA for all Melton Valley watershed sources, the dose contribution due to SWSA 6 buried sources will be managed to be far less than the 25 millirem/year performance objective in DOE Order 5820.2A/435.1.

Benefits of the Exemption

This exemption allows for a more consistent and systematic approach to the management of wastes on the Oak Ridge Reservation. The IWMF facility and Tumuli I and II will be authorized under DOE 5820.2A (DOE O 435.1, when it is implemented). Tumuli I and II are filled to capacity and have been in interim closure since 1992. The pre- and post-1988 buried waste in SWSA 6 will be addressed consistently through the CERCLA process, which is logical given that the waste is commingled and already disposed. This exemption will assuage the problem of inadequate characterization of the source term in the below-grade disposal units of SWSA 6 through utilization of the Melton Valley watershed CERCLA process. An integrated approach to waste management, monitoring, and closure of all SWSA 6 will ensure primary radiation protection requirements are met. This approach is anticipated to yield protective, as well as cost-effective, results. Lastly, this exemption will enable the development of more accurate modeling

results for the SWSA 6 PA and hence an IWMF waste acceptance criteria with greater utility and defensibility.

Time Period for the Exemption

The request is for a permanent exemption. The intent of the request is to permanently exempt the post-1988 SWSA 6 below-grade wastes (i.e., those not disposed in IWMF or the Tumuli) from the specific PA requirements. Prior to and following, closure the site will be managed to meet all applicable DOE ES&H requirements for protection of the public and environment.

Circumstances Warranting Exemption and Compensating Actions

The following provides a summary for ascertaining that exclusion of the non-IWMF and Tumuli I and II post-1988 sources from the PA requirements of DOE 5820.2A or DOE M 435.1-1 is justifiable:

- the below-grade wastes have already been disposed (e.g., encased in grout) and there are insufficient data to adequately characterize the wastes;
- the waste is commingled with much larger quantities (in volume and curies) of pre-1988 waste being managed under the CERCLA process to comply with DOE ES&H requirements, and;
- extraction of the waste is not practical or cost-effective, and such an action could increase risk to workers, which would not be supported by ALARA.

The proposed approach to manage these wastes along with the pre-1988 SWSA 6 wastes, including commitments for the following actions, compensate for the lack of an all inclusive performance assessment for the buried and above-ground waste in SWSA 6 and provides reasonable assurance that the Department's ES&H requirements will be met:

- the Melton Valley ROD, subject to review at least every five years, as required by the CERCLA process;
- institutional controls, which are documented and included in land use plans (e.g., LUCAP), for as long as the wastes remain hazardous;
- an active environmental monitoring program, including groundwater monitoring;
- a composite analysis that includes the post-1988 SWSA 6 wastes that are the subject of this exemption (along with the pre-1988 waste);
- completion of a PA for non-exempted waste, and;

- demonstration that all post-1988 sources will meet DOE Order 5820.2A/435.1 performance objectives through varied means.

Summary of Mitigating Actions, Steps to Ensure Adequate Protection, Commitments, and Schedules

Documentation, actions, and tentative schedules that relate to the exemption and demonstrate the commitment to ensure that the public and the environment are protected in accordance with applicable ES&H objectives are as follows:

- preparation of a roadmap (attached) delineating how each DOE Order 5820.2A performance objective, and other relevant requirements, as well as the provisions of DOE M 435.1-1, will be addressed by the proposed actions of the Melton Valley watershed ROD. The ROD sets forth applicable or relevant and appropriate requirements (ARARs) and to-be-considered (TBC) guidance identified for those actions;
- signing of the Melton Valley watershed ROD in December 1999;
- development of an addendum or revision to the *Performance Assessment for Continuing and Future Operations at Solid Waste Storage Area 6, September 1997* to assess the performance of the IWMF/Tumuli disposal units per previous LFRG comments (completion of this document for LFRG review is anticipated within six months of receipt of the Melton Valley CERCLA ROD);
- development of an addendum or revision to the *Composite Analysis for Solid Waste Storage Area 6, September 1997 (CA)* to integrate the projected post-closure releases from IWMF/Tumuli with projected releases from other remediated sources in the Melton Valley and Bethel Valley watersheds to assess and analyze composite impacts to a public receptor at White Oak Dam on the Clinch River (completion of this document for LFRG review is within six months of receipt of the Melton Valley CERCLA ROD);
- development of IWMF/Tumuli I and II PA, CA, and Maintenance, Monitoring, and Closure Plans within one year of receipt of the Melton Valley CERCLA ROD;
- continuous on-site monitoring;
- continuous institutional control, and;
- Maintenance Plan actions, with an annual review to ensure PA/CA conditions, and DOE Order 5820.2A/435.1 performance objectives, continue to be met and additional actions are taken as warranted.

This exemption is not prohibited by law and is justified consistent with DOE directive system requirements (DOE M 251.1-1A, Chapter VII). It will not present an undue risk to public health

and safety, the environment or facility workers. Given the circumstances described above, the exemption is necessary and warranted.

If you have any questions, I may be reached at (423) 576-0742. You or your staff may also contact Bill McMillan at (423) 241-6426.



Rodney R. Nelson
Assistant Manager for
Environmental Management

Exemption Approval:



James J. Fiore
Deputy Assistant Secretary
for Environmental Restoration

10/21/99
Date

Concurrence:



Office of Environment, Safety and Health

10/25/99
Date

Attachment

cc w/attachment:

- W. E. Murphie, EM-42, HQ/CLVRLF
- J. E. Rhoderick, EM-35, HQ/CLVRLF
- A. Wallo, EH-412, HQ/FORS

cc w/o attachment:

- R. E. Bradley II, EM-42, HQ/CLVRLF
- J. M. Talarico, EM-33, HQ/CLVRLF
- C. S. Mims, EM-913, ORO
- R. C. Sleeman, EM-92, ORO
- J. E. Patterson, K-1001, MS 7123
- K. A. Balo, K-1037, MS 7357