





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
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ATLANTA, GEORGIA 30303-8960

APR 19 2018

MEMORANDUM

SUBJECT: Regional Response to NRRB Comments and Recommendations
Oak Ridge Reservation Superfund Site
Oak Ridge, Tennessee

FROM:  Franklin E. Hill, Director
Superfund Division 

TO: Doug Ammon, Acting Chair
National Remedy Review Board

Region 4 is hereby providing a response to the National Remedy Review Board (NRRB) memorandum dated April 4, 2017, from its review of the Preferred Alternative for the Oak Ridge Reservation Site located in Oak Ridge, Tennessee. Attached is a detailed response to the Board's comments and recommendations.

On July 26, 2016, the Region 4 Remedial Project Manager presented the Department of Energy's Preferred Alternative for disposal of future waste generated by cleanup actions at the Oak Ridge Reservation. In brief, the Department of Energy (DOE) prefers to dispose of future remediation waste on site due to reduced transportation risks and a significant savings in cost, estimated to be around \$1 billion compared to the cost of sending the waste to off-site commercial disposal facilities.

The Remedial Investigation/Feasibility Study (RI/FS) evaluates the broad decision between on-site and off-site disposal. It also evaluates several candidate locations for on-site disposal as separate alternatives, as well as a hybrid option that involves a smaller on-site disposal facility and sending a significant portion of the waste off-site.

There are two aspects of this project that limit how Region 4 is able to respond to some of the NRRB comments. First, the DOE is the lead agency on the Superfund cleanup at Oak Ridge, and they have established this Operable Unit (OU) in a nonconventional way. It is an evaluation of waste disposal alternatives that is discrete from the decisions that DOE has made, or will make, that are actual responses to releases or threatened releases at the site. Other than providing disposal capacity for those other response actions, it does not address many aspects of the responses that will generate the waste. As such, several of the comments that are related to risk and treatment of wastes have been relegated by DOE to the "source" OU decisions. DOE established the precedent for this approach at Hanford in 1995, and has since used this same approach at Oak Ridge and other DOE sites.

Second, the adequacy of the RI/FS for this project was the subject of an informal dispute beginning in May of 2016. On May 22, 2017, DOE invoked a formal dispute in which DOE asserted that a sufficient RI/FS had been provided, and the Federal Facility Agreement Parties should work expediently to issue a

Proposed Plan and Record of Decision (ROD). On June 30, 2017, this dispute was elevated by DOE to the Senior Executive Committee (SEC) level, and on December 7, 2017, the SEC members signed a Dispute Resolution Agreement (DRA). The DOE is required by the terms of the DRA to perform certain additional site characterization work, with the results summarized in a technical memorandum that will be placed into the Administrative Record. No further revisions to the RI/FS are required by the DRA prior to proceeding to a Proposed Plan and ROD.

Thank you for your consideration of Region 4's responses to the Board's recommendations on the preferred remedy for waste disposal at the Oak Ridge Reservation Superfund Site. Any questions or concerns regarding this response should be directed to Richard Campbell, Chief of the Restoration & DOE Coordination Section, at 404-562-8825.

Attachment

cc: Paul Leonard

**REGION 4 RESPONSE TO COMMENTS
NRRB COMMENTS AND RECOMMENDATIONS
OAK RIDGE RESERVATION SUPERFUND SITE
OAK RIDGE, TENNESSEE**

Waste Characterization: *It is unclear from the package submitted to the Board if the proposed disposal facility evaluated waste characteristics, remaining volumes, and prior site decisions made for purposes of amending a decision as opposed to creating onsite disposal capacity for decisions yet to be made. The Board recommends that this distinction be made clear in the action's decision document. Future remedies should not be predisposed to onsite disposal by this action.*

Response: The RI/FS contains tables (see Tables 1 and 2 below) that cross-walk decision documents with waste sources and volumes. DOE also provides volumetric calculations and supporting information on landfill sizing. The proposed landfill capacity does assume that some future CERCLA decisions will select on-site disposal, and the RI/FS states that "...specific volumes and composition of waste that will be generated from the implementation of future CERCLA actions cannot be fully defined at this time. Development of waste volume estimates and characterization for this RI/FS relies on reasonable assumptions for proposed future remedial actions". Also note that the volumetric calculations assume a need for over 800,000 yd³ of clean fill and a 25% uncertainty factor is also added in the determination of landfill capacity required. These conservative estimates should ensure that adequate disposal capacity is available. The landfill could be reduced in size if the actual capacity needs are ultimately less than this design capacity.

The Board also recommends additional consideration be given to strategies that could minimize the overall airspace of the proposed waste disposal area. Waste acceptance criteria should include specification of parameters that minimize waste volumes and/or void spaces. Sequencing of demolition debris and contaminated soils response actions that would maximize the use of contaminated soils to fill voids would also help to minimize the size of the waste disposal area. Minimizing the footprint of the area necessary for waste disposal activities could result in a larger number of areas being suitable for use with less encroachment on currently non-impacted areas.

Response: Region 4 and the State of Tennessee have urged the Department of Energy to emphasize and enhance strategies to segregate waste, sequence the disposal of demolition debris with contaminated soil, conduct size reduction and minimize void space in the existing and proposed future landfill as suggested in this comment. An entire appendix to the RI/FS is devoted to evaluation of volume reduction strategies that can be applied to the various waste sources.

Per the RI/FS: "Volume reduction (VR) approaches and potential benefits for the alternatives are evaluated in this RI/FS. Sequencing of waste generation, as much as possible, is recommended for the on-site and hybrid alternatives to reduce the amount of clean fill required by utilizing soil waste as fill. Waste segregation is recommended for all alternatives, to maximize recycle or disposal of wastes in less costly industrial landfills. Both of these VR methods, sequencing and segregation, are implemented by generators. For the On-site Disposal Alternatives, if one is selected for pursuit as the remedy, the ROD will contain a commitment to waste minimization."

Volume reduction via mechanical debris processors was also considered, but deemed "not advantageous" for on-site disposal. The most significant disadvantages identified include increased risk to workers due to significant handling of contaminated material and operation of heavy equipment, secondary waste generation, and additional net cost.

Finally, the Board recommends that the site's proposed plan include specific information, data and analysis of these issues so that the public has a meaningful opportunity to comment on the proposed approach for waste disposal.

Response: The draft proposed plan does include waste characterization information, a general description of sources and volume.

Human Health Risk: *The information presented to the Board indicated that the need to take action to address risks to human health and the environment at this site, in a manner consistent with CERCLA response authorities, are contained in previous site decision documents. However, specific information regarding the risks to human health and the environment warranting the use of CERCLA response authority to take this action was not included in either the package or the presentation. The Board recommends that the Region and DOE address this lack of specificity in one of several ways: (1) amend the pre-existing decision documents, which, presumably, already include data and analysis supporting a basis for taking a CERCLA response action, to include the new remedy; or (2) the Region and DOE include in this current decision document the data and analysis supporting a basis for taking a CERCLA action to protect human health and the environment (possibly using existing information developed for the original RODs). The Board recommends that the Region ensure that the decision documents for this site-specific response action clearly identify the basis for taking the action, including the present action requiring the construction of the new landfill(s).*

Response: Previous site decision documents that have selected on-site disposal are listed in the attached Table 1 and are available in the Administrative Record. These include Records of Decision that each provide rationale for the actions selected. Each was reviewed and, ultimately, signed by the EPA. The purpose of the subject remedy decision is not to go back and revisit these former decisions. Note that many of these documents are Action Memos for Non-Time Critical Removal Actions, which do not have the same bases for triggering action as remedial decision documents. It should be further recognized that the majority of these are decommissioning actions, for which EPA signed a joint policy memo with the Department of Energy on May 22, 1995. This policy states in part:

“Unless the circumstances at the facility make it inappropriate, decommissioning activities will be conducted as non-time critical removal actions. Non-time critical removal actions generally will provide the most appropriate level of analysis, oversight, public participation, and flexibility to conduct decommissioning in a cost-effective manner that fully protects health and the environment.”

The Region stated during the presentation that, for risk assessment time periods greater than 2,000 years, DOE's preference is to use high non-cancer risk and dose criteria (e.g., HI of 3 and dose limits of 500 mrem/yr). The Region indicated that it believes that DOE does not consider the extended time periods to be part of the CERCLA risk assessment. The Board recommends that the decision documents clearly explain whether these post-2,000-year time frames are considered part of the CERCLA evaluation. If they are part of the CERCLA risk assessment, then they should be based on CERCLA protectiveness standards (e.g., 10^{-4} to 10^{-6} cancer risk range, HI of 1), or ARARs, not 500 mrem/yr. Consistent with EPA CERCLA guidance (e.g., OSWER Directive No. 9285.6-20, June 2014, Radiation Risk Assessment at CERCLA Sites: Q&A, which indicates that ARARs that are greater than 12 mrem/yr effective dose equivalent (EDE) are generally not considered sufficiently protective for developing

cleanup levels under CERCLA at remedial sites), 500 mrem/yr would not be considered protective of human health for CERCLA cleanup purposes.

Response: The "Risk Assessment" addressed in this comment is in reference to the calculations that support establishment of Waste Acceptance Criteria (WAC) for radioactive components of low level waste. In response to this comment, Region 4 will seek to ensure that ARAR identification and any reference to WAC development in the Record of Decision is consistent with the referenced agency policy. The region will specifically ensure that no rules, guidance or DOE orders are cited as ARARs or TBCs in decision documents if they allow greater than 12 mrem/year EDE.

Remedial Action Objectives: *The package provided to the Board included two RAOs for the waste disposal alternative. The Board notes that the second RAO mentions MCLs and groundwater as a drinking water resource, even though the information provided by the Region indicates that there is no groundwater contamination or remedial action being proposed as a part of this remedy decision to address groundwater. The Board recommends that the decision documents clearly explain the role of MCLs as a RAO for purposes of this cleanup and clarify that the scope of this remedial action would not include groundwater.*

Response: The draft proposed plan does not include reference to MCLs in the RAOs. The scope of this remedial action does not include groundwater remediation, although one of the objectives is that an on-site landfill, if selected, would be designed and operated such that it is protective of groundwater.

Principal Threat Waste: *Information provided to the Board indicates the presence of large volumes of mercury in high concentrations, which are to be disposed of in the new unit. The Board notes that specifics of managing PTW (e.g., mercury waste) and/or LLW was not presented. The Board recommends that in its decision documents, the DOE and the Region more thoroughly explain how their reading of Agency guidance and their approach to treatment at this site are consistent with the statute and NCP. This explanation should address specifically how this approach is consistent with CERCLA § 121 (b) (1)'s preference for treatment "to the maximum extent practicable;" CERCLA § 121(d)(1)'s requirements regarding protectiveness and applicable or relevant and appropriate requirements; 40 CFR § 300.430(a)(1)(iii)(A)'s expectation that "treatment [be used] to address the principal threats posed by a site, wherever practicable;" and 40 CFR § 300.430(f)(1)(ii)(E)'s preference for treatment "to the maximum extent practicable" while protecting human health and the environment, attaining applicable or relevant and appropriate (ARAR) standards identified in the decision documents, and providing "the best balance of trade-offs" among the NCP's five balancing criteria.*

Response: See attached Table 2 that has highlighted in yellow the volumes of soil and/or sediment identified by DOE as principal threat waste (PTW). The Phase I UEFPC ROD identified portions of the West End Mercury Area (WEMA) soils, UEFPC bank sediment, and Lake Reality sediment as PTW. The alternative remedies proposed in the RI/FS assume that treatment is provided to meet Land Disposal Restrictions (LDRs) prior to onsite disposal. Treatment is the responsibility of the generator, and is, or will be, captured under the appropriate RODs and remedies selected in those RODs. As these remedies are implemented, appropriate work plans and waste handling plans will address the wastes and treatment thereof. The disposal remedies proposed as alternatives within the RI/FS provide waste acceptance criteria and Applicable or Relevant and Appropriate Requirements (for example the LDRs), which if met allow for the disposal of the waste in a safe and protective manner. However, the implementation of

the “statutory preference for treatment ‘to the maximum extent practicable’” is not part of these RI/FS alternatives.

Mercury waste will include debris and soils/sediments that are characteristically hazardous (carry the D009 hazardous waste code) due to elevated mercury levels based on the toxicity characteristic leaching procedure (TCLP). This waste could be considered to be principal threat waste, and will need to be treated to meet RCRA ARARs, including land disposal restriction treatment standards, or possibly alternate CAMU treatment standards. As noted above, DOE’s intention is that treatment will be conducted as part of the scope of the generating cleanup project, rather than as part of the subject waste disposal alternative remedy. The details of this treatment, and the cost of implementing it, are therefore beyond the scope of the RI/FS, and it is not anticipated to be included in the proposed plan or ROD for waste disposal alternatives.

See also the earlier response regarding consideration of volume reduction techniques. The preferred alternative identified by DOE includes limited debris size reduction efforts as part of building demolition.

Remedy Effectiveness/Alternative Remedies: *The information provided to the Board included a discussion of alternatives for both waste disposal (on-site and off-site) and for landfill wastewater management. The Board recommends that additional alternatives be developed and analyzed. Specifically, for waste disposal, the Board suggests development of a more detailed hybrid waste disposal alternative to address waste streams separately. This approach could allow for a smaller on-site landfill [e.g., Alternative 4: Hybrid Disposal Alternative Site 6(b)] while disposing of certain waste streams (e.g., PCBs) in approved existing off-site facilities (including those for certain radioactive wastes). This approach could also potentially avoid the need to evaluate a potential TSCA ARAR waiver.*

Response: The hybrid disposal alternative would reduce the volume of wastes that could be disposed on-site, requiring a greater portion of the total waste generated to be disposed of off-site. Even with the preferred on-site disposal alternative, it is expected that some wastes will be sent off-site. As described previously, this will be determined in the selection of generator remedies that will partly be driven by the WAC for radionuclides and ROD limits for other hazardous substances. Regarding the TSCA waiver, the FFA parties have entered into a dispute resolution agreement that requires DOE to further characterize the geology/hydrogeology of the preferred location for on-site disposal. This characterization data will be considered in making final determinations on the TSCA ARARs as part of ROD issuance.

Regarding wastewater management, the Board recommends evaluation of an alternative that would use pipeline/truck transport of wastewater to the existing treatment facility while a new treatment plant is built. This approach might also include building additional RCRA-compliant wastewater storage capacity (especially during and after storm events), thereby potentially avoiding the use of a "managed discharge" approach. If a "managed discharge" approach is adopted, the Board recommends that the decision documents explain how it complies with ARARs.

Response: Agreed. The Focused Feasibility Study for wastewater management is currently under dispute. Decision documents for water management, whether through a managed discharge approach or a treatment plant, will establish discharge requirements, including effluent limits, and explain how those limits comply with ARARs. As DOE has represented the facts regarding waste to be disposed at the

landfill, neither the existing, nor the proposed landfill will accept listed hazardous waste, and wastewater generated from landfill operations is not expected to exceed limits that would cause it to be classified as characteristic hazardous waste. While under these facts, the RCRA requirements for storage of waste in a tank system would not be applicable to the remedial action, these requirements have been identified as relevant and appropriate requirements for this action.

The Board also notes that polymeric encapsulation (e.g., spray coating, drum macro-encapsulation in situ injections) have been evaluated by several DOE laboratories, (such as Oak Ridge National Laboratory, Brookhaven National Laboratory and Hanford) and used by commercial firms to treat radioactive waste. This technology also appears to be stable to alpha, beta or gamma radiation. The goal of such encapsulation is to reduce water contact with metals (such as Hg or radioactive elements) to reduce water transport. The Board recommends that these technologies, or equivalent technologies for reducing metal transport to groundwater prior to any landfilling of these materials, be considered and evaluated where appropriate.

Response: The RI/FS contemplates treatment, possibly via macroencapsulation, of mercury containing wastes that fail the TCLP test for mercury. As described in the previous comment on principal threat waste, it is DOE's intent to address such treatment as part of source area operable unit decisions, rather than as part of the subject waste disposal alternative decision.

Regarding low level radioactive waste (LLW) and mixed hazardous/LLW, disposal requirements for the radioactive component of the waste will be largely driven by the Waste Acceptance Criteria. Except for treatment as necessary to meet the WAC, the on-site Disposal Alternative does not establish waste treatment requirements. Decision documents that select on-site disposal for cleanup actions (waste generation) would require treatment of wastes as needed to meet the WAC before on-site disposal. This treatment could reduce the toxicity, mobility, or volume of waste depending on the waste characteristics and treatment applied. For example, waste must be reduced in size according to physical WAC, to be accepted at the landfill. However, these waste generator actions are excluded from the scope of the On-site Disposal Alternative, but instead will be addressed in a limited way in a future ROD, in terms of waste minimization commitments. For portions of waste disposed of off-site, treatment would similarly be applied as needed before shipment or at the receiving facilities. The On-site Disposal Alternatives, for all sites, would reduce the mobility of contaminants through isolation of waste in the EMDF. This isolation is not a treatment, per se, and is addressed under long-term effectiveness and permanence.

Remedy Effectiveness/Remedy Performance: *The information presented to the Board did not identify a Regional preference for any of the three on-site EMDF disposal alternatives within the Bear Creek Valley. When selecting the preferred EMDF site, the Board recommends that consideration should be given to, at a minimum: (1) current and future land use documented in the stakeholder approved land use plan and institutional control implications, (2) a thorough understanding and consideration of hydrogeologic conditions that exist at each of the proposed EMDF sites, (3) the distance from the closest receptors, and (4) numerous siting requirements [TDEC 0400-20-11-.17(1)(b)-(k)] that are identified as relevant and appropriate requirements. For example, TDEC 0400-20-11-.17(1)(f), specifically states that upstream drainage areas must be minimized to decrease the amount of runoff that could erode or inundate waste disposal units.*

Response: All of these factors will be considered in site selection. As mentioned previously, a DRA was entered into that establishes Site 7c as the preferred on-site landfill location, and requires DOE to perform further characterization of that site. This location is preferred because the FFA parties believe it

is the most promising location with respect to the considerations identified here, particularly the hydrogeological setting and siting requirements. The data collected in this characterization effort, along with the factors identified in this comment, will be considered in final remedy and site selection.

(Remedy Effectiveness/Short-term Effectiveness: *The package provided to the Board includes a discussion of short-term effectiveness of the on-site, off-site and hybrid alternatives. Included in that evaluation are risk estimates based on morbidity (non-fatal) and mortality (fatal) risks posed by transporting the waste on-site and off-site. These are risks arising from radiological exposure during routine and accident scenarios to the maximum exposed individual (MEI) and collective populations based on location/miles travelled. Truck and other industrial injuries/fatalities are not generally environmental risks that should be considered in a short-term effectiveness analysis, especially for common earthmoving/hauling alternatives such as these. While potential site-related accidents may be of concern, potential worker accidents are typically addressed through project health and safety plans. The Board acknowledges that DOE has indicated that such an evaluation could be appropriate as a part of a separate National Environmental Policy Act analysis of the activities, which could be presented outside of the CERCLA remedy selection process and its attendant nine criteria analysis. Therefore, the Board recommends that the short-term effectiveness section be re-written consistent with the NCP (e.g., 40 CFR 300.430(e)(9)(iii)(E) consideration of "effectiveness and reliability of mitigative measures during implementation") and OSWER Directive No. 9355.3-01, October 1988, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA.*

Response: The Region examined agency guidance to determine if the DOE has inappropriately included transportation risks in the short term effectiveness portion of the evaluation of alternatives. The RI/FS guidance referenced in the comment, as well as the NCP preamble (55FR 8722), state that "...short-term effectiveness addresses any risk that results from implementation of the proposed remedial action, such as dust from excavation, transportation of hazardous materials... Workers are included in the population that may be affected by short-term exposures." The region was not able to find any place in CERCLA, the NCP or guidance that says otherwise, so we have concluded that DOE appropriately followed agency guidance by considering transportation risk as part of short-term effectiveness.

Applicable or Relevant and Appropriate Requirements: *Based on the information provided to the Board, the waste disposal options would rely in part on a waiver of a portion of the TSCA ARARs (i.e. regulations requiring 50' between bottom of landfill and ground water). The Board notes that, consistent with national program guidance, complying with this location-specific ARAR does not necessarily lead to ensuring protectiveness of human health as required by CERCLA. From both a general statutory perspective, as well as a regulatory one [under 40 CFR 761.61(c)], TSCA uses a "no unreasonable risk" standard. As a legal matter under established TSCA case law, the "no unreasonable risk" standard is based on cost-benefit analysis; however, CERCLA, under section 121, requires a health-based standard that ensures protectiveness of human health (i.e., per NCP and Agency guidance, 10^{-4} to 10^{-6} for cancer risks and an HI no greater than 1) and that does not use cost-benefit analysis. As such, the Board recommends the site's CERCLA decision documents and supporting administrative record demonstrate that construction of the new landfill would be protective of human health and the environment, as required by CERCLA (e.g., explain why the 50' buffer is not needed at this site considering rainfall, hydrogeology, etc).*

Response: Note that the TSCA ARAR in question (50' between the bottom of the landfill and the groundwater) is not a preliminary remediation goal or cleanup level that lends itself to a CERCLA risk range determination. It is a location standard. This ARAR is one of many standards that contribute to the

protectiveness of the proposed landfill. Perhaps most important regarding groundwater protectiveness are the RCRA landfill design and operation requirements and the Subpart F standards, both of which are also ARARs. The region's intent is to select a remedy in the decision documents that, through a combination of all such requirements, will be protective of human health and the environment as required by CERCLA. No cost-benefit analysis will be conducted or considered. In settling a formal dispute with DOE, Region 4 and the State of Tennessee have, however, required the Department of Energy to characterize the hydrogeology and hydrology within the footprint of the preferred onsite landfill location. This characterization data will be used in making a final determination on the suitability of this location, including the protectiveness of human health and appropriateness of the TSCA waiver.

The package identified Tennessee Department of Environment and Conservation (TDEC) 0400-20-11-.16(2) Low Level Waste performance objective as an ARAR. The dose limits for this standard are to ensure that an annual dose to any member of the public does not exceed 25 millirem (mrem) to whole body, 75 mrem to the thyroid and 25 mrem to any organ (25/75/25). The Region indicated that, since these dose based requirements are above the upper bound of the risk range, risk-based evaluations will be used instead (e.g., discharge standards, waste acceptance criteria modeling). This determination was based on EPA statements in OWSER Directive No. 9200.4-18, August 1997, Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination and OSWER Directive No. 9285.6-20, June 2014, Radiation Risk Assessment at CERCLA Sites: Q&A that ARARs that are greater than 12 mrem/yr effective dose equivalent (EDE) are generally not considered sufficiently protective for developing cleanup levels under CERCLA at remedial sites. During discussions with the NRRB, the Region indicated that this standard is likely to not be an ARAR. The Board would like to point out that the statements in OSWER Directives 9200.4-18 and 9285.6-20 are based on effective dose equivalent (EDE) standards and not previous whole body and organ dose limits like the 25/75/25 that EPA considers to correspond to 10 mrem/yr EDE. Also, under OSWER Directive No. 9200.4-23, August 1997, Clarification of the role of Applicable or Relevant and Appropriate Requirements in Establishing Preliminary Radiation Goals under CERCLA, regions should consult with Headquarters when considering going beyond an ARAR unless a prior determination has been made by Headquarters that a particular ARAR should not generally be used to establish preliminary remediation goals at CERCLA sites. The Board recommends that the Region determine whether the TDEC standard is an ARAR. If it is an ARAR, and the Region is considering that it is not sufficiently protective, then it should consult with Headquarters per OSWER Directive No. 9200.4-23.

Response: The region has reconsidered this TDEC requirement and understands that it can be considered sufficiently protective within the bounds of EPA's policy on dose based standards.

Information provided to the Board indicates the presence of large volumes of mercury in high concentrations that are to be disposed of in the new unit. The Board notes that specifics of managing the mercury waste, which is a RCRA hazardous waste, were not presented. The Board recommends that this operable unit's decision documents should explain the basis for the mercury acceptance criteria (as well as other RCRA hazardous wastes), how those acceptance criteria ensure protectiveness of human health and the environment, and how disposal of the mercury waste complies with the RCRA Land Disposal Restrictions ARAR.

Response: See earlier response to the comment on principal threat waste.

Table 1. Risk Evaluation and Decision Documents for Remediation Projects

Site	Subproject	Risk Evaluation Document	Decision Document*	Project
ETTP	Remaining Facilities D&D	<i>Engineering Evaluation/Cost Analysis for the K-25 Auxiliary Facilities Demolition Project Group II Buildings at East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-1765&D4)</i>	<i>Action Memorandum for the Remaining Facilities Demolition Project at East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2049&D2-R)</i>	Central Neutralization Facility K-1037 and K-1037-C Poplar Creek Facilities TSCA Incinerator Facilities
	Site Wide	<i>Final Sitewide Remedial Investigation and Feasibility Study for East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2279&D3)</i>	Record of Decision for Site Wide Remedial Actions	Site Wide Remedial Actions
	Zone 2	<i>Focused Feasibility Study for Zone 2 Soils and Buried Waste, East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2079&D1/R1)</i>	<i>Record of Decision for Soil, Buried Waste, and Subsurface Structure Actions in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2161&D2)</i>	Zone 2 Remedial Actions
ORNL	Melton Valley (MV)	To Be Determined	MV Reactors and Other Facilities Record of Decision	EGCR Complex HPRR Complex MV LGWO Complex MV Waste Storage Facilities MV HRE Facility TWPC Complex

Table 1. Risk Evaluation and Decision Documents for Remediation Projects (Continued)

Site	Subproject	Risk Evaluation Document	Decision Document*	Project
ORNL (cont)	Bethel Valley (BV)	<i>Remedial Investigation/Feasibility Study for Bethel Valley Watershed at Oak Ridge National Laboratory, Oak Ridge, Tennessee, Volume 1. Main Text (DOE/OR/01-1748&D3)</i>	<i>Record of Decision for Interim Actions in Bethel Valley, Oak Ridge, Tennessee (DOE/OR/01-1862&D4)</i>	BV Chemical Development Lab Facilities
				BV Isotope Area Facilities
				BV Reactor Area Facilities
				BV Tank Area Facilities
				BV Remaining Slabs and Soils
				ORNL Non- Hydrofracture Well P&A
				ORNL Remaining Non-Hydrofracture Well P&A
				ORNL Soils and Sediments
				BV Inactive Tanks and Pipelines
			BV Remaining Inactive Tanks and Pipelines	
			<i>Notice of Non-Significant Change to the Record of Decision for Interim Actions in Bethel Valley: Addition of Hot Storage Garden (3597)</i>	Hot Storage Garden
			<i>Notice of Non-Significant Change to the Record of Decision for Interim Actions in Bethel Valley, Oak Ridge, Tennessee (IFDP and ARRA Buildings)</i>	2026 Complex
				2528 Complex
				3019A Complex
3525 Complex				
3544 Complex				
3608 Complex				
4501/4505 Complex				
5505 Building				
6010 and East BV Complex				
Central Stack East Hot Cell Complex				
Central Stack West Hot Cell Complex				
Fire Station Complex				
LLLW Complex				

Table 1. Risk Evaluation and Decision Documents for Remediation Projects (Continued)

Site	Subproject	Risk Evaluation Document	Decision Document*	Project
ORNL (cont)	Bethel Valley (cont)	<i>Remedial Investigation/Feasibility Study for Bethel Valley Watershed at Oak Ridge National Laboratory, Oak Ridge, Tennessee, Volume 1. Main Text (DOE/OR/01-1748&D3)</i>	<i>Notice of Non-Significant Change to the Record of Decision for Interim Actions in Bethel Valley, Oak Ridge, Tennessee (IFDP and ARRA Buildings)</i>	Southeast Lab Support Complex
				Southeast Services Group Complex
				Sewage Treatment Plant Complex
Y-12	Upper East Fork Poplar Creek (UEFPC)	<i>Engineering Evaluation/Cost Analysis for the Y-12 Facilities Deactivation/Demolition Project, Oak Ridge, Tennessee (DOE/OR/01-2424&D2)</i>	<i>Action Memorandum for the Y-12 Facilities Deactivation/Demolition Project, Oak Ridge, Tennessee (DOE/OR/01-2462&D1)</i>	9206 Complex
				9206 Complex LMD
				9212 Complex
				9212 Complex LMD
				Alpha-2 Complex
				Alpha-2 Complex LMD
				Alpha-3 Complex
				Alpha-3 Complex LMD
				Alpha-4 Complex
				Alpha-5 Complex
				Beta-1 Complex
				Beta-1 Complex LMD
				Beta-3 Complex LMD
				Beta-4 Complex
				Biology Complex
Beta-3 Deactivation Only				
9731 LMD				
Steam Plant Complex LMD				
9213 and 9401-2 Demolition				
Tank Facilities Demolition				

Table 1. Risk Evaluation and Decision Documents for Remediation Projects (Continued)

Site	Subproject	Risk Evaluation Document	Decision Document*	Project	
Y-12 (cont)	Upper East Fork Poplar Creek (cont)	<i>Remedial Investigation of the Upper East Fork Poplar Creek Characterization Area at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee, Volume 1 (DOE/OR/01-1641/V1&D2)</i>	<i>Record of Decision for Phase I Interim Source Control Actions in the Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee (DOE/OR/01-1951&D3) (BJC 2002)</i>	UEFPC Sediments - Streambed and Lake Reality	
			Explanation of Significant Differences for the ROD for Phase I Interim Source Control Actions in the UEFPC Characterization Area, Oak Ridge, Tennessee (DOE/OR/01-2539&D2)	UEFPC Soils 81-10 Area	
		<i>Upper East Fork Poplar Creek Soil and Scrapyard Focused Feasibility Study (DOE/OR/01-2083&D2)</i>	<i>Record of Decision for Phase II Interim Remedial Actions for Contaminated Soils and Scrapyard in Upper East Fork Poplar Creek, Oak Ridge, Tennessee (DOE/OR/01-2229&D3) (BJC 2006)</i>	UEFPC Remaining Slabs and Soils	
				UEFPC Soils	
	Bear Creek Valley (BCV)	<i>Remedial Investigation of Bear Creek Valley at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee, Volume 1 (DOE/OR/01-1455/V1&D2)</i>	To Be Determined	Bear Creek Valley White Wing Scrap Yard Record of Decision	BCV White Wing Scrap Yard Remedial Action
				Bear Creek Valley Burial Grounds (Phase II) Record of Decision	BCV Burial Grounds Remedial Action
				<i>Record of Decision for the Phase I Activities in Bear Creek Valley at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee (DOE/OR/01-1750&D4)</i>	BCV S-3 Ponds
					BCV DARA Facility Remedial Action
	Chestnut Ridge		To Be Determined	Chestnut Ridge Record of Decision	Chestnut Ridge Remedial Action

***Bold Red Text** Denotes a Future CERCLA Evaluation or Decision. For these future remediation projects, selected remedies and candidate waste streams have been assumed for planning purposes only and do not predetermine or prejudice the outcome of a future CERCLA evaluation process.

BCV	Bear Creek Valley	LGWO	Liquid Gaseous Waste Operations	TWPC	Transuranic Waste Processing Center
BV	Bethel Valley	LMD	Legacy Material Disposition	UEFPC	Upper East Fork Poplar Creek
EGCR	Experimental Gas Cooled Reactor	MV	Melton Valley		
HPRR	Health Physics Research Reactor	P&A	plugging and abandonment		

Table 2. Base As-generated Waste Volume Estimate by Project (FY 2014 to FY 2043)^a

Work Breakdown Structure Project	Material Type	LLW and LLWTSCA (yd3)			Mixed- LLW/RCRA and LLW/RCRA/TSCA (yd3)			Total EMWMF	Total EMDF	Total All (FY14-43) (yd3)
		FY14-24 (EMWMF)	FY22-43 (EMDF)	Total LLW	FY14-24 (EMWMF)	FY22-43 (EMDF)	Total Mixed			
2026 Complex	Debris		10,012	10,012					10,012	10,012
2528 Complex	Debris		484	484					484	484
3019A & Ancillary Facilities	Debris		62,263	62,263					62,263	62,263
3525 Complex	Debris		7,659	7,659					7,659	7,659
3544 Complex	Debris		295	295					295	295
3608 Complex	Debris		4,466	4,466					4,466	4,466
4501/4505 Complex	Debris		22,814	22,814					22,814	22,814
5505 Building	Debris		3,689	3,689					3,689	3,689
6010 and East BV Complex	Debris		44,916	44,916					44,916	44,916
9206 Complex	Debris		15,490	15,490					15,490	15,490
9212 Complex	Debris		113,571	113,571					113,571	113,571
9213 and 9401-2 Demolition	Debris		8,000	8,000					8,000	8,000
Alpha-2 Complex	Debris		62,800	62,800		10,190	10,190		72,990	72,990
Alpha-3 Complex	Debris		37,108	37,108					37,108	37,108
Alpha-4 Complex	Debris		41,314	41,314		13,771	13,771		55,085	55,085
Alpha-5 Complex	Debris	169	85,836	86,005		36,787	36,787	169	122,623	122,792
Balance of Site Facilities	Debris	25,115		25,115				25,115		25,115
BCV S-3 Ponds	Soil		1,094	1,094					1,094	1,094
BCV White Wing Scrap Yard Remedial Action	Debris		10,017	10,017					10,017	10,017
	Soil		62,506	62,506					62,506	62,506
Beta-1 Complex	Debris		46,920	46,920					46,920	46,920
Beta-3 Deactivation Only	Debris		19,502	19,502					19,502	19,502
Beta-4 Complex	Debris		54,189	54,189		21,598	21,598		75,787	75,787
Beta-4 LMD	Debris	387		387				387		387
Biology Complex	Debris		29,088	29,088				-	29,088	29,088
	Soil		5,069	5,069				-	5,069	5,069
BV Chem Dev Lab Facilities	Debris		1,189	1,189				-	1,189	1,189
BV Inactive Tanks & Pipelines	Debris		405	405				-	405	405
	Soil		158	158				-	158	158
BV Isotope Area Facilities (3038)	Debris		1,825	1,825				-	1,825	1,825
BV Reactor Area Facilities	Debris		7,076	7,076		144	144	-	7,220	7,220

Work Breakdown Structure Project	Material Type	LLW and LLW/TSCA (yd3)			Mixed- LLW/RCRA and LLW/RCRA/TSCA (yd3)			Total EMWMF	Total EMDF	Total All (FY14-43) (yd3)
		FY14-24 (EMWMF)	FY22-43 (EMDF)	Total LLW	FY14-24 (EMWMF)	FY22-43 (EMDF)	Total Mixed			
	Soil		552	552				-	552	552
BV Remaining Inactive Tanks and Pipeline	Debris		23,446	23,446				-	23,446	23,446
BV Remaining Slabs and Soils	Debris		30,024	30,024				-	30,024	30,024
	Soil		46,660	46,660				-	46,660	46,660
BV Tank Area Facilities	Debris		3,433	3,433				-	3,433	3,433
	Soil		182	182				-	182	182
Central Neutralization Facility Closure	Debris	5,743		5,743				5,743		5,743
Central Stack East Hot Cell Complex	Debris		5,647	5,647				-	5,647	5,647
Central Stack West Hot Cell Complex	Debris		4,356	4,356				-	4,356	4,356
Centrifuge Facilities	Debris	27,229		27,229				27,229		27,229
	Debris/ Classified	5,398		5,398				5,398		5,398
EGCR Complex	Debris		45,811	45,811					45,811	45,811
Fire Station Complex	Debris		815	815					815	815
Hot Storage Garden	Debris		190	190					190	190
HPRR Complex	Debris		2,553	2,553					2,553	2,553
K-1037 and K-1037-C	Debris	35,960		35,960				35,960		35,960
	Debris/ Classified	500		500				500		500
K-25 Facility D&D (ETTP)	Debris	38,228		38,228				38,228		38,228
	Debris/ Classified	1,263		1,263				1,263		1,263
K-27 Deactivation Waste	Debris	1,106		1,106				1,106		1,106
K-27 Demolition Waste	Debris	65,911		65,911				65,911		65,911
	Debris/ Classified	5,782		5,782				5,782		5,782
K-27 Tie Lines	Debris	540		540				540		540
K-31 Facility	Debris	55,049		55,049				55,049		55,049
LLLW Complex	Debris		1,773	1,773					1,773	1,773
Material Difference 114-PBS40	Debris	5,010		5,010				5,010		5,010
MV HRE Facility	Debris		725	725					725	725
MV LGWO Complex	Debris		7,859	7,859					7,859	7,859

Work Breakdown Structure Project	Material Type	LLW and LLW/TSCA (yd3)			Mixed- LLW/RCRA and LLW/RCRA/TSCA (yd3)			Total EMWMF	Total EMDF	Total All (FY14-43) (yd3)
		FY14-24 (EMWMF)	FY22-43 (EMDF)	Total LLW	FY14-24 (EMWMF)	FY22-43 (EMDF)	Total Mixed			
MV Waste Storage Facilities	Debris		1,129	1,129					1,129	1,129
New Generated LLW/MLLW&PBS-42	Debris	6		6				6		6
ORNL Non-HF Well P&A	Debris		20	20					20	20
ORNL Remaining Non-HF Well P&A	Debris		14	14					14	14
ORNL Soils and Sediments	Debris		2,053	2,053					2,053	2,053
	Soil		76,563	76,563					76,563	76,563
ORNL Surveillance & Maintenance / Environmental Monitoring	Debris	528		528				528		528
ORNL Water Quality Program	Debris	15		15				15		15
Poplar Creek Facilities	Debris	14,687		14,687				14,687		14,687
	Soil	10,934		10,934				10,934		10,934
SE Services Group Complex	Debris		112	112					112	112
Sewage Treatment Plant Complex	Debris		73	73					73	73
Southeast Lab Support Complex	Debris		39	39					39	39
Steam Plant Complex Leg Disposition	Debris		80	80					80	80
Tank Facilities Demolition	Debris		3,000	3,000					3,000	3,000
TRU Treatment Contract	Debris	50		50				50		50
	Soil	450		450				450		450
TSCA Incinerator Facilities	Debris	5,385		5,385				5,385		5,385
TWPC Complex	Debris		3,106	3,106					3,106	3,106
UEFPC Remaining Slabs and Soils	Debris		116,354	116,354		40,460	40,460		156,814	156,814
	Soil		234,840	234,840		41,692	41,692		276,532	276,532
UEFPC Sediment Streambed & Lake Reality	Soil					11,966	11,966		11,966	11,966
UEFPC Soils	Soil		3,154	3,154					3,154	3,154
UEFPC Soils 81-10 Area	Debris			-		280	280		280	280
	Soil	31,813	1,313	33,126		224	224	31,813	1,537	33,350
Y-12 Surveillance & Maintenance/ Environmental Monitoring	Debris			-	200		200	200		200
Y-12 Salvage Yard	Debris	20		20				20		20
Zone 2 Remedial Action	Debris	105,096		105,096				105,096		105,096
	Soil	80,871		80,871				80,871		80,871
TOTAL VOLUME		523,245	1,381,733	1,904,978	200	177,112	177,312	523,445	1,558,845	2,082,291

LLW = low-level waste; RCRA = Resource Conservation and Recovery Act of 1976; TSCA = Toxic Substance Control Act of 1976

^aThe waste generation forecast does not forecast the volume of classified waste other than for ETPP. Three percent of debris (post-ETTP cleanup) is assumed to be classified (volumes not separated here).