DOE/OR/01-2426&D2

Explanation of Significant Differences for the Record of Decision for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee

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U. S. Department of Energy
Oak Ridge Office
Office of Environmental Management

APPROVED FOR PUBLIC RELEASE

This document has been approved for release to the public by:

Larry Sparks 5/13/2010
DOE Oak Ridge Office Classification Officer Date

INTRODUCTION

The *Record of Decision for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee* (DOE 1999a) documents a decision by the U.S. Department of Energy (DOE), the Tennessee Department of Environment and Conservation (TDEC), and the U.S. Environmental Protection Agency (EPA) to construct a dedicated disposal facility on the Oak Ridge Reservation (ORR) to receive ORR Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) waste.

Soon after the Record of Decision (ROD) was signed on November 2, 1999, construction began on this disposal facility, known as the Environmental Management Waste Management Facility (EMWMF). The EMWMF has been actively accepting ORR CERCLA waste in compliance with the approved EMWMF waste acceptance criteria (WAC) since May 2002.

The ROD specifies a conceptual design for the EMWMF that is modular in nature. Cells 1 and 2 were initially constructed and went into operation in 2002, with disposal capacity of 400,000 cubic yards. Build-out of Cells 3 and 4 was completed in 2005, increasing total disposal capacity to 1,200,000 cubic yards. Cell 5 is currently under construction and will bring the disposal capacity to 1,650,000 cubic yards. Current waste generation forecasts indicate that current capacity (Cells 1-4) may be exhausted by the end of FY2010, and Cell 5 capacity may be exhausted by approximately FY2014-2015.

While the ROD does not explicitly limit the maximum volume of waste to be disposed of at the EMWMF, the evaluation of alternatives in the Feasibility Study (DOE 1998a) considered a range of waste volume estimates. The in situ waste volume from ORR remedial actions potentially requiring disposal was estimated to range from 223,000 to 1,100,000 cubic yards. Disposal of this waste volume was estimated to require a total disposal capacity (airspace) of 357,000 to 1,700,000 cubic yards, to account for swell of excavated materials, clean fill volumes used for daily cover, and other uncertainties. These volume estimates were based on the ORR remedial action plans at the time the ROD was developed, but were not intended to represent the maximum volume of waste that could potentially be generated by remedial actions.

The purpose of this ESD is to authorize the construction of the final disposal cell planned for the EMWMF. The proposed Cell 6 will increase the total operating capacity to approximately 2,200,000 cubic yards. Additional CERCLA waste disposal capacity is expected to be needed sooner than originally planned due to schedule acceleration and increase in scope of cleanup activities. The proposed expansion of EMWMF will allow adequate time for development of additional disposal capacity for future CERCLA wastes generated at the ORR.

Under CERCLA Section 117(c), DOE is required to publish an explanation of significant differences (ESD) to document a significant change to a component of a remedy selected in a ROD. This ESD is being issued by DOE, as lead agency for remedial activities at ORR, with concurrence by the EPA and TDEC, as support agencies. The content and format of this ESD has been prepared in accordance with EPA guidance for documenting post-decision changes (EPA 1999).

In accordance with Sections 300.435(c)(2)(i) and 300.825(a)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), DOE is issuing this explanation for the change to the 1999 ROD for the EMWMF, and making it available to the public in the Administrative Record File and at the DOE Information Center. The purpose of this ESD is to change the selected remedy by expansion of the disposal unit to add increased disposal capacity.

This ESD is part of the Administrative Record File and is available for review during normal business hours (Monday-Friday, 8 AM to 5 PM) at the DOE Information Center, 475 Oak Ridge Turnpike, Oak Ridge, Tennessee, 37830, (865) 241-4780.

SUMMARY OF SITE HISTORY, CONTAMINATION PROBLEMS REQUIRING REMEDIATION, AND SELECTED REMEDY

The 34,516-acre DOE ORR is located within and adjacent to the corporate limits of Oak Ridge,

Tennessee, in Roane and Anderson Counties, about 12 miles west-northwest of Knoxville, Tennessee. The ORR houses three major industrial research and production facilities originally constructed as part of the World War II-era Manhattan Project: East Tennessee Technology Park (ETTP, formerly known as the K-25 Site), Oak Ridge National Laboratory (ORNL, formerly known as X-10), and the Y-12 National Security Complex (Figure 1). Wastes from DOE operations at these sites were disposed of in burial trenches, pits, and ponds at various locations throughout the ORR. Some ORR wastes also were sent to other sites in Tennessee. As a result of the processes conducted at ORR facilities and the historical disposal practices, buildings, support facilities, and nearby land became contaminated at all three facilities and at some off-site locations. With placement of the ORR on the National Priorities List in 1989, CERCLA became the legal driver for investigation and cleanup of inactive waste areas and contaminated buildings.

DOE conducted a remedial investigation/ feasibility study (RI/FS) (DOE 1998a) and an RI/FS addendum (DOE 1998b) to evaluate alternative strategies for managing this future cleanup waste. Two alternatives were developed for disposal of the wastes: (1) on-site disposal at a new facility, or (2) disposal at existing off-site facilities. Both alternatives support CERCLA cleanup through placement of wastes in engineered disposal cells. A no-action alternative also was evaluated for comparison with the on-site and off-site disposal alternatives. A proposed plan (DOE 1999b) described the alternatives and their evaluation and indicated that DOE, EPA, and TDEC had selected on-site disposal as the preferred alternative. After public review and comment on the proposed plan, the ROD was signed on November 2, 1999, and issued.

The ROD approved the design, construction, operation, and closure of an ORR disposal facility as the selected remedy for on-site disposal of CERCLA cleanup wastes. Principle elements of the selected remedy include the following:

- An engineered, above-grade, earthen disposal cell, leachate collection and transfer facility, support facilities, access roads, stormwater detention basins, and monitoring systems (i.e., EMWMF) would be constructed west of the Y-12 Plant in east Bear Creek Valley.

- The EMWMF would be designed to receive low-level radioactive waste (LLW), hazardous waste regulated under the Resource Conservation and Recovery Act of 1976 (RCRA), waste regulated under the Toxic Substances Control Act of 1976 (TSCA), and mixed waste in accordance with applicable or relevant and appropriate requirements (ARARs).

- Final waste acceptance criteria (WAC) for the EMWMF would be developed during the design process in accordance with ARARs, risk/performance assessments, and worker protection requirements. Upon approval by EPA and TDEC, these criteria would govern what wastes could be disposed of in the facility. These criteria are documented in the EMWMF WAC attainment plan (DOE 2001a), a post-ROD primary document that describes requirements for acceptance and placement of waste.

- A waste certification program would be implemented in accordance with the WAC attainment plan to ensure that only waste certified for disposal would be accepted for on-site disposal.

- Waste that could not be treated to meet the EMWMF WAC would be disposed of at DOE-approved or, as appropriate, EPA-approved off-site facilities.

- The EMWMF would be closed by placing an enhanced RCRA-compliant cover (i.e., enhanced to meet U.S. Nuclear Regulatory Commission performance requirements for LLW facilities specified in 10 CFR Part 61) over the waste. The cover enhancements would further prevent direct exposure to the waste and would include systems designed to minimize infiltration of rainwater, resist erosion, and resist penetration by burrowing animals. The cover also would be designed and constructed to minimize the potential for future inadvertent human intrusion through excavation.

- Long-term institutional controls, air and groundwater monitoring, and surveillance and maintenance would be implemented

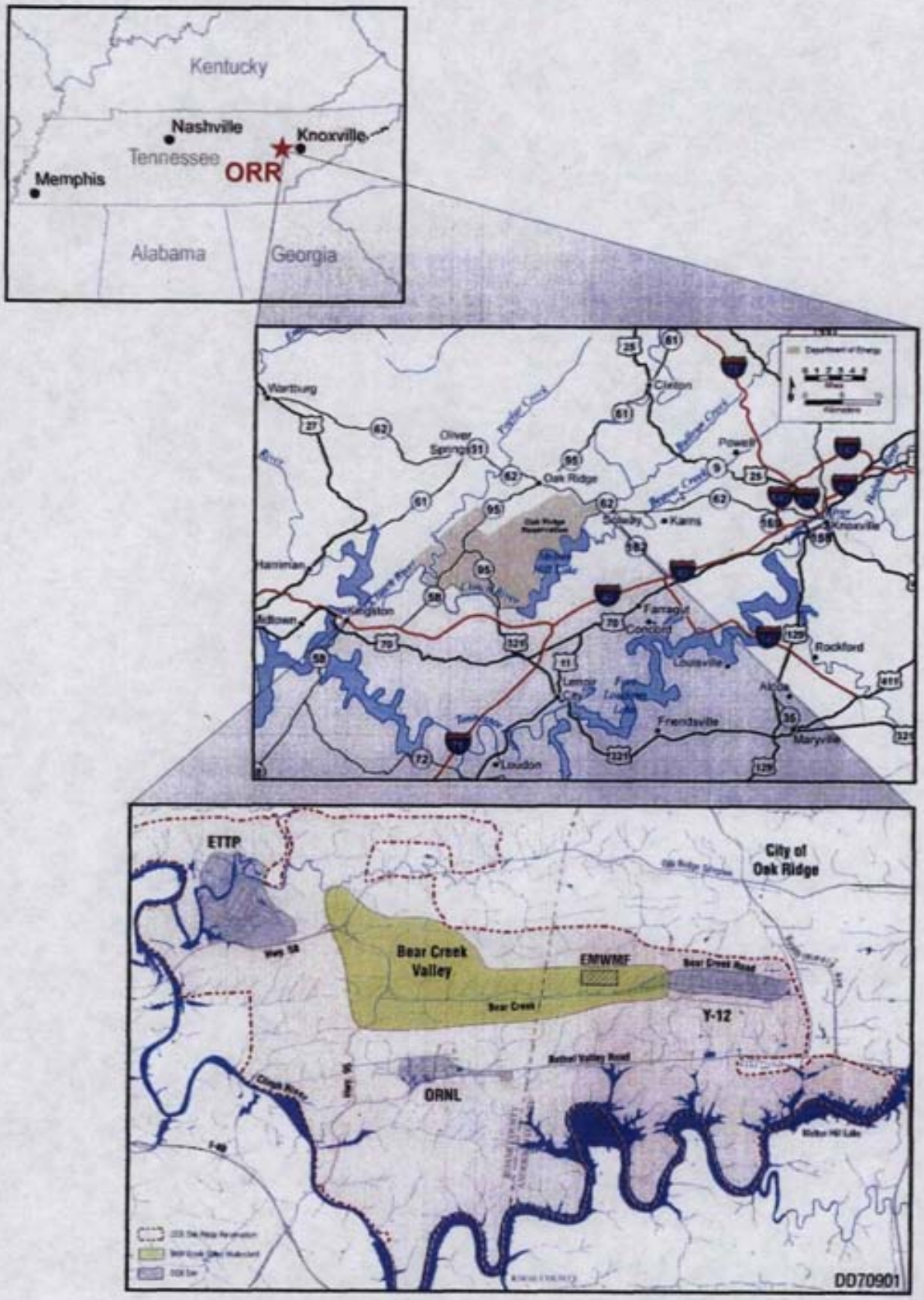

Figure 1. Location of EMWMF in Bear Creek Valley.

during construction and operations; this could continue indefinitely after closure to restrict public access and verify cell performance.

- Facility design would contain contingencies for shallow groundwater collection and treatment. A shallow/deep groundwater monitoring program would be established.

The remedy, as selected in the 1999 ROD, has been amended by publication of two prior ESDs that have resulted in the following modifications:

- Addition of DOE security-classified wastes to the description of wastes approved for disposal in the EMWMF (DOE 2001b).

- Construction of a dedicated haul road between the ETTP and the EMWMF (DOE 2005a).

Appendix A contains a list of documents developed after the ROD that establish the design, construction, operation, and monitoring activities for the EMWMF.

DESCRIPTION OF THE SIGNIFICANT DIFFERENCES AND THE BASIS FOR THOSE DIFFERENCES

The proposed action under this ESD is the expansion of the EMWMF to a design capacity of approximately 2,200,000 cubic yards, through the construction of one final disposal cell, designated Cell 6. This ESD supports a significant increase (~30%) in the waste disposal capacity at EMWMF. The cost of the Cell 6 construction is estimated at approximately $35 million. As noted previously, Cells 1 through 4 were constructed from 2002 to 2005, with a total disposal capacity of approximately 1,200,000 cubic yards. Cell 5 is currently under construction to bring the total disposal capacity to 1,650,000 cubic yards. Figure 2 depicts the currently approved EMWMF footprint, with Cells 1 through 5. Figure 3 depicts the conceptual design for Cell 6. The post-closure footprint of the EMWMF area committed to long-term waste management would remain consistent with the estimates evaluated in the ROD, with the lined area of Cells 1-6 at 28.5 acres and a total area under the final cover system at ~43 acres.

Figure 4 provides an overview of the most recent waste generation forecast from DOE-ORO Environmental Management Programs (DOE 2009), and initial estimates for a major new program currently undergoing conceptual design, the Integrated Facility Disposition Program (IFDP). Current waste generation forecasts indicate that current design capacity (Cells 1-5) may be exhausted by approximately FY2014 to FY2015. Additional CERCLA waste disposal capacity will be needed sooner than originally planned due to acceleration of the schedule and increase in the scope of cleanup activities from the previous baseline. The proposed expansion of EMWMF will allow adequate time for the evaluation of additional disposal capacity to meet longer term requirements for future CERCLA wastes generated at the ORR. However, the total CERCLA waste generation volume estimate, including IFDP, exceeds the capacity of the EMWMF, including the additional capacity provided by this ESD. This ESD capacity increase represents the maximum potential capacity of the landfill under the scope of the ROD.

The *Engineering Evaluation of Alternatives for Expansion of the Environmental Management Waste Management Facility* (BJC 2008) was developed to evaluate whether the physical and topographical characteristics of the EMWMF site would permit the construction of additional disposal capacity beyond that described in the ROD. The objective of this analysis was to provide as much additional capacity as is economically feasible based on known site constraints. These site constraints include: the steep slopes of Pine Ridge to the north; the high berm on the east side of Cell 1; North Tributary 5 to the west; existing facilities such as the West Bear Creek Storage Pads and the Haul Road; and the decreasing depth to groundwater to the south of the Haul Road. These site features act as constraints on lateral expansion of the facility to the north, south, east, and west. In addition, vertical expansion of the facility – i.e., building the landfill higher within the existing footprint area – was considered but was determined not to be a desirable option due to the difficulty in re-opening the liner anchor trenches, removing liner components, and constructing horizontal seams while working in a contaminated area, and also the need for relocating roads and leachate collection manholes to permit enlarging the facility berms.

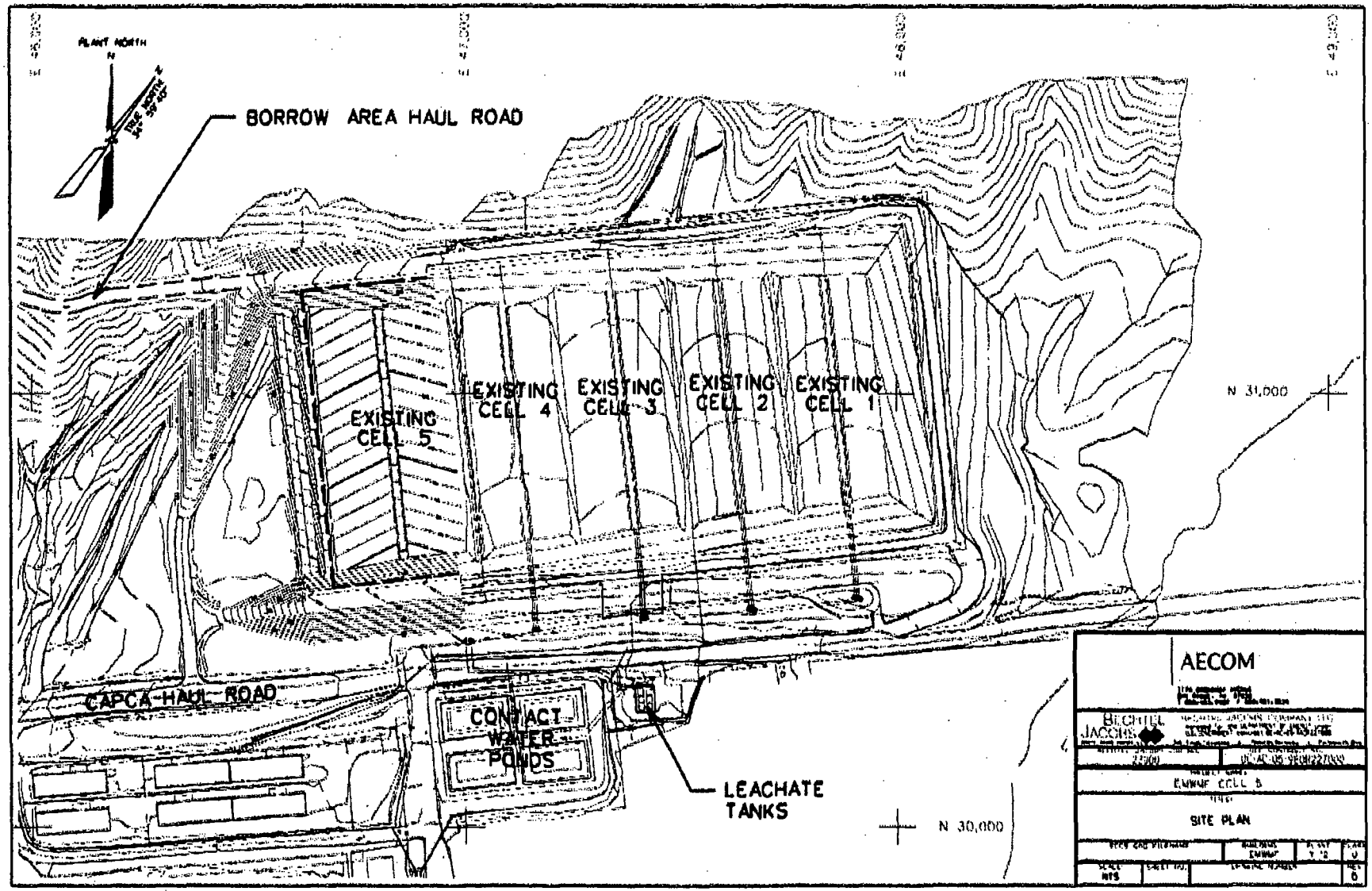

Figure 2. EMWMF Design Plan – Existing Cells 1-4 & New Cell 5 Currently Under Construction.

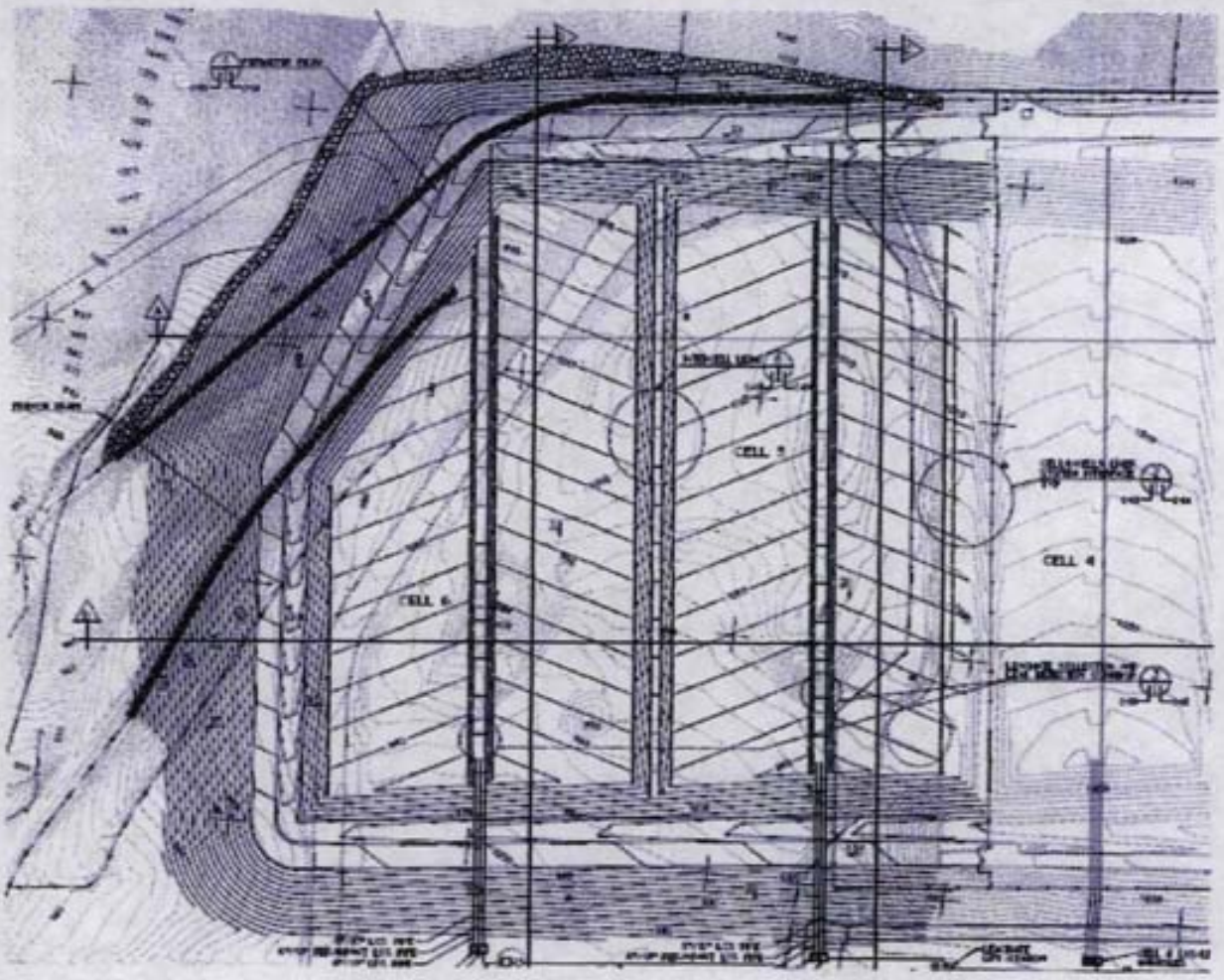

Figure 3. EMWMF Cell 6 Conceptual Design.

The *Engineering Evaluation* considered alternatives including: (1) retaining only the previously constructed/approved Cells 1-5; (2) expanding the facility through construction of one additional disposal cell (Cell 6) to the west of Cell 5; or (3) expanding the facility through the construction of two additional disposal cells (Cells 6 and 7) to the west of Cell 5. Construction of Cells 6 and 7 would provide the greatest potential disposal capacity, at approximately 2,400,000 cubic yards, but also would require extension of these new disposal cells further to the south of the current EMWMF footprint and across the current haul road, where the depth to groundwater becomes increasingly shallow. Construction of only Cell 6 could be accomplished without extending the facility footprint further to the south and impacting the haul road and other current site features, but would provide slightly less disposal capacity at approximately 2,200,000 cubic yards of total airspace. Either of the expansion alternatives would require redesign of Cell 5. The *Engineering Evaluation* recommended that Cell 5 should be redesigned to permit possible future expansion and that such expansion should be accomplished through the construction of one additional disposal cell (Cell 6) with design characteristics very similar to Cells 1-5. This alternative was determined to provide the optimal balance of increased disposal capacity, lack of negative impacts on predicted facility performance (i.e., existing WAC remain protective for the hypothetical future receptor), and cost effectiveness (cost per cubic yard of additional airspace). Based on this analysis and recommendation, Cell 5 was redesigned to preserve the option for further facility expansion and is currently under construction.

Preliminary performance assessment and groundwater transport modeling has been performed to evaluate any potential impact from the increased inventory of disposed waste following expansion. This analysis predicted minimal impact on the groundwater flow regime from the construction of Cells 5 and 6, and no encroachment of groundwater into the 10-foot thick geologic buffer which lies directly beneath the low permeability clay liner.

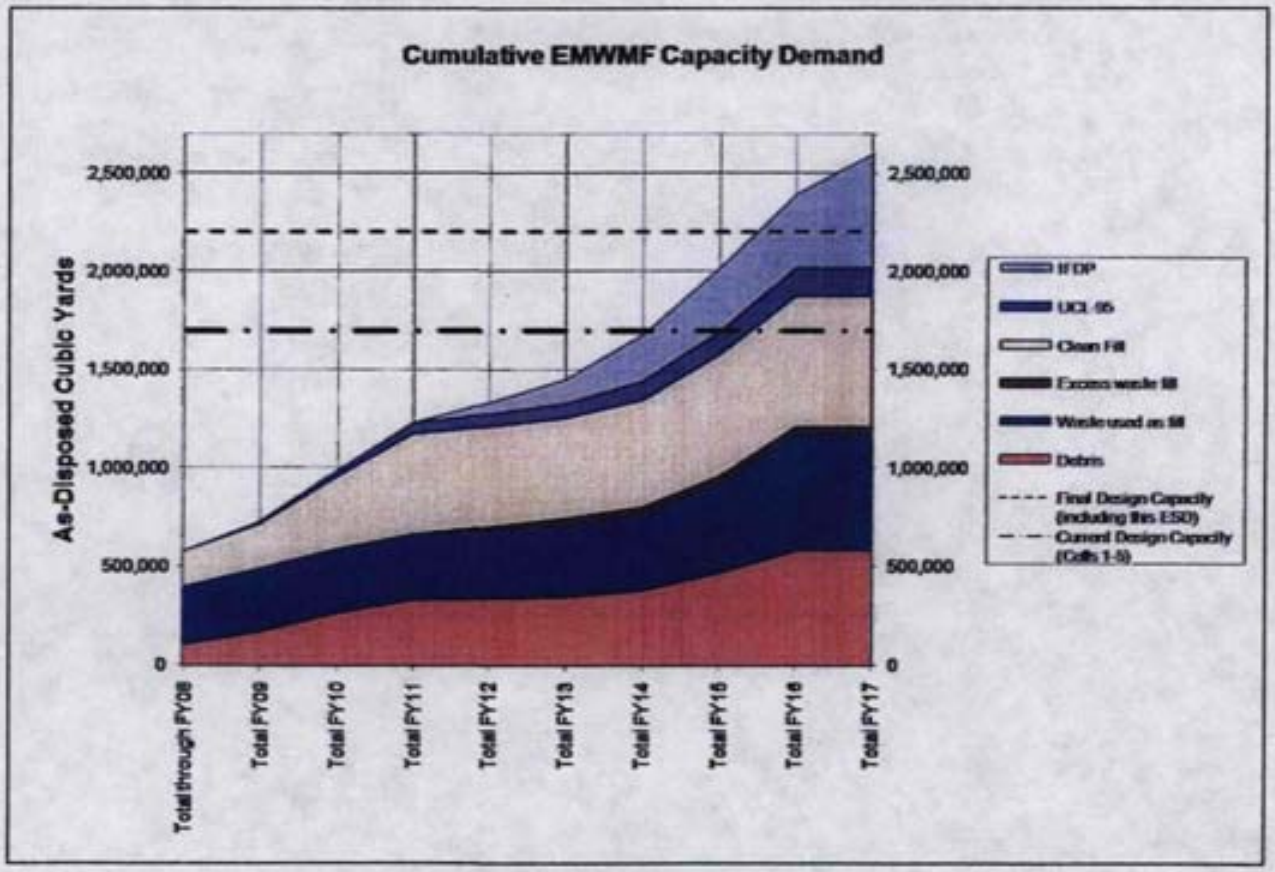

Figure 4. EMWMF Waste Disposal Demand Forecast.

A preliminary performance assessment conducted in 2004 to evaluate potential impacts from disposal of additional waste volume at EMWMF (JEG 2004) predicted that the current EMWMF WAC (DOE 2001a) will remain protective of the hypothetical future receptor.[1] An updated performance assessment for the proposed six-cell configuration has been developed in conjunction with the remedial design report for Cell 6 (DOE 2010) to quantify any impacts to the approved WAC for all potential waste constituents. Several factors cause the risks and doses calculated for the proposed six-cell configuration to be lower than those that formed the basis for the approved waste acceptance criteria (WAC):

- The constructed footprint of the EMWMF has moved north and east of the footprint evaluated in the RI/FS, which was the basis for establishing the WAC. This moves the source of contamination further from the future receptor well.

- An underdrain that was constructed in 2003-2004 collects a significant fraction of the groundwater beneath Cells 1, 2, and 3 and directs it into Bear Creek via the remnant of NT-4 into which the underdrain discharges. This underdrain significantly decreases the concentrations of constituents reaching the well of the hypothetical future receptor. Any reduction of constituent concentrations in groundwater at the well, such as that achieved by the underdrain, reduces the projected risk and dose to the hypothetical future receptor, which is predominantly driven by the drinking water pathway for most constituents.

The updated performance assessment for Cell 6 indicates that no revision of the currently approved WAC would be needed to maintain protection of the hypothetical future receptor due to the proposed construction of Cell 6.

[1] The 2004 analysis identified one contaminant, carbazole, which could require a reduced WAC limit. However, this difference was subsequently determined to be due to a change in the distribution coefficient (K_d) value, rather than the increased waste volume. Carbazole has not been identified as a significant constituent in wastes disposed at EMWMF to date, and the reduction of this WAC limit is not expected to result in significant impacts (i.e., is not expected to require more waste to be shipped offsite at higher cost).

SUPPORT AGENCY COMMENTS

DOE and its subcontractors have worked closely with EPA and TDEC throughout the siting, design, and operation of the EMWMF to build consensus prior to formal regulatory review and approval. Facility regulators have concurred that construction of the additional disposal capacity would be acceptable, and have reviewed a previous version of this ESD. Comments provided to date are incorporated in the current version of this document. Through signature of this document, regulators concur with this ESD and with this modification to the EWMWF ROD.

Under the Consent Order between DOE and the State of Tennessee signed on December 2, 1999, DOE committed to making 14 equal and consecutive annual payments of $1 million to the State of Tennessee for purposes of establishing a permanent trust fund for long-term surveillance and maintenance (S&M) activities after closure of the EMWMF. While DOE does not anticipate significant increases in post-closure S&M costs to be associated with the proposed construction of Cell 6, some relatively minor increases may occur. In consideration of the increased disposal capacity and prolonged operational life of EMWMF, DOE proposes that the current payment schedule of $1 million per year, which is currently scheduled to end in FY2013, will be extended for an additional 4 years. This will increase the basis of the permanent trust fund to $18 million.

AFFIRMATION OF STATUTORY DETERMINATIONS

Under CERCLA Section 121, the selected remedy must be protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified and granted), be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery to the maximum extent practicable. The modified remedy meets the requirements of CERCLA Section 121 as described in the ROD.

The remedy selected and described in the ROD is not fundamentally changed by the proposed expansion of disposal capacity. The siting, design, construction, and operation of the proposed Cell 6 at the EMWMF will meet all ARARs identified in the ROD. The assessment of ARARs for this action did not identify any

additional ARARs beyond those already identified in the EMWMF ROD.

SUMMARY OF PUBLIC PARTICIPATION ACTIVITIES

Availability of an Information Sheet that presents a summary of this ESD was announced to the public through local newspapers and to advisory groups through direct mailings. The Oak Ridge Site Specific Advisory Board (ORSSAB) assisted in the development of this Information Sheet through their review and comment.

Upon approval, the availability of this ESD also will be announced to the public through local newspapers and to advisory groups through direct mailings. The approved ESD will be placed in the Administrative Record file for the EMWMF, and made available to the public at the DOE Information Center, 475 Oak Ridge Turnpike, Oak Ridge, Tennessee, 37830, (865) 241-4780.

The ORSSAB also has issued a letter to DOE (ORSSAB 2009), recommending that DOE "proceed expeditiously to expand the current facility and plan for the development of a new facility to meet waste disposal needs forecast as a result of work to be done through the anticipated Integrated Facility Disposition Project." The siting and design of a new disposal facility to accommodate the IFDP wastes is beyond the scope of this ESD.

REFERENCES

BJC (Bechtel Jacobs Company LLC) 2008, *Engineering Evaluation of Alternatives for Expansion of the Environmental Management Waste Management Facility, Oak Ridge, Tennessee*. BJC/OR-3182.

DOE 1998a. *Remedial Investigation/Feasibility Study for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee*, DOE/OR/02-1637&D2.

DOE 1998b. *Addendum to the Remedial Investigation/Feasibility Study for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee*, DOE/OR/02-1637&D2/A1.

DOE 1999a. *Record of Decision for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee*, DOE/OR/01-1791&D3.

DOE 1999b. *Proposed Plan for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee*, DOE/OR/01-1761&D3.

DOE 2001a. *Attainment Plan for Risk/Toxicity-Based Waste Acceptance Criteria at the Oak Ridge Reservation, Oak Ridge, Tennessee*, DOE/OR/01-1909&D3. Supplemented by Table A.1, which is periodically updated and maintained online under configuration control.

DOE 2001b. *Explanation of Significant Difference from the Remedy in the Record of Decision for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee*, DOE/OR/01-1905&D2.

DOE 2005a. *Explanation of Significant Differences for the Record of Decision for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee*, DOE/OR/01-2194&D2.

DOE 2009, Environmental Management Waste Management Facility 2009 Capacity Assurance Remedial Action Report, DOE/OR-01-2403&D1.

DOE 2010. *Addendum to the Remedial Design Report for Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee*, DOE/OR/01-1873/V1-3&D2/A6, February 2010.

EPA 1999. *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Documents, Section 7.0, Documenting Post-ROD Changes: Minor Changes, Explanations of Significant Differences, and ROD Amendments*. EPA-540-R-98-031, OSWER 9200.1-23P, July 1999.

JEG (Jacobs Engineering Group) 2004. EMWMF Site Maximum Capacity Conceptual Design, Oak Ridge Reservation, Y-12 Plant,

Oak Ridge, TN. Document No. 35T303G9-054-RPT-002, September 2004.

ORSSAB (Oak Ridge Site Specific Advisory Board) 2009. *Recommendation on Expansion of the CERCLA Waste Facility and Sorting and Segregating of Wastes Destined for the Facility.* Steven M. Dixon to Steve McCracken. July 9, 2009.

ACRONYMS

ARAR	applicable or relevant and appropriate requirement
BJC	Bechtel Jacobs Company LLC
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act of 1980
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
EMWMF	Environmental Waste Management Facility
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
ETTP	East Tennessee Technology Park
FS	feasibility study
IFDP	Integrated Facility Disposition Program
K_d	distribution coefficient
LLW	low-level radioactive waste
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act of 1969
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
ORSSAB	Oak Ridge Site Specific Advisory Board
RCRA	Resource Conservation and Recovery Act of 1976
RDR	remedial design report
RI	remedial investigation
ROD	record of decision
S&M	surveillance and maintenance
SSAB	Site Specific Advisory Board
TDEC	Tennessee Department of Environment and Conservation
TSCA	Toxic Substances Control Act of 1976
WAC	waste acceptance criteria

APPENDIX: SUMMARY OF EMWMF POST-ROD DOCUMENTS

Explanation of Significant Differences (ESD) Documents:

Explanation of Significant Difference from the Remedy in the Record of Decision for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-1905&D2, 2001. [Modifies the selected remedy by addition of DOE security-classified wastes to the description of wastes approved for disposal in the EMWMF.]

Explanation of Significant Differences for the Record of Decision for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-2194&D2. [Modifies the selected remedy by construction of a dedicated haul road to transport wastes from the ETTP to the EMWMF.]

Remedial Design Documents:

Remedial Design Work Plan for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-1837&D2, 2000. [Describes the remedial design process that will specify the construction, operation, closure, and long-term monitoring and maintenance of the EMWMF.]

Remedial Design Report for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-1873&D2, Vol. 1-5, 2001. [Describes the design features and specifications for the EMWMF.]

Addendum to the Remedial Design Report for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-1873/D2/A1/R2, 2002. [Addendum to RDR describes the rationale and design concepts to collect and control landfill gas generated from disposal of waste at EMWMF and presents environmental monitoring plan.]

Addendum to the Remedial Design Report for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-1873/D2/A2/R1, 2003. [Addendum presents 60% design package for EMWMF expansion for Cells 3 and 4. Includes information on the construction of underdrain in Cell 3 and subsequent water level monitoring to monitor performance in meeting groundwater suppression goals.]

Addendum to the Remedial Design Report for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-1873/D2/A3/R1, 2004. [Addendum contains the issued-for-construction (IFC) design of the EMWMF build-out for Cells 3 and 4 and associated calculations and specifications; build-out adds ~800,000 yd^3 disposal capacity, bringing total capacity to 1.2M yd^3.]

Addendum to the Remedial Design Report for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-1873/D2/A4/R1, 2006. [Addendum to RDR presents remedial design for EMWMF Cell 5; this build-out adds ~500,000 yd^3 disposal capacity, bringing total capacity to 1.7M yd^3. (Note that this design was not built.)]

Addendum to the Remedial Design Report for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-1873/V1&V2&D2/A5/R1, 2009. [Addendum to RDR presents the final remedial design for EMWMF Cell 5 build-out to add ~500,000 yd^3 disposal capacity, bringing total capacity to 1.7M yd^3.]

Potential H-3 and C-14 Ventilation System Releases and Associated Doses from Waste Dispositioned in the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-1037/R1, 2002. [Evaluates potential impacts from gas released from EMWMF and ventilation system to control gas build-up.]

Engineering Feasibility Plan for Groundwater Suppression at the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-1478/R1, 2003. [Evaluates alternatives for suppression of shallow groundwater beneath EMWMF.]

Test Pad Report for the Construction of the 800,000 Cubic Yard Build-Out of the Environmental Management Waste Management Facility at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-1758, 2004. [Describes test pad program performed to qualify admixed low-permeability soils for liner construction in Cells 3 and 4.]

Construction Quality Assurance Certification Report for the Environmental Management Waste Management Facility Cell 3 Underdrain at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-1803, 2004. [Describes field activities, CQA inspections, and CQA records for the EMWMF Cell 3 underdrain construction.]

Addendum to the Construction Quality Assurance Certification Report for the Environmental Management Waste Management Facility Cell 3 Underdrain at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-1803/A1, 2004. [Addendum responds to BJC nonconformance report for variance in underdrain bottom elevation; evaluates and accepts underdrain.]

Evaluation of the Environmental Management Waste Management Facility Erosion and Sediment Control System at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-1830, 2004. [Provides summary of engineering and visual inspections of site.]

Draft Pre-Design Report for the EMWMF Maximum Site Capacity Design, Oak Ridge Reservation, Y-12 Plant, Oak Ridge, Tennessee, Jacobs Engineering Company, Document No. 35T303G9-054-RPT-001, 2004. [Provides pre-design report to establish the design basis for the maximum site capacity design and to select a preferred option for expansion.]

EMWMF Site Maximum Capacity Conceptual Design, Oak Ridge Reservation, Y-12 Plant, Oak Ridge, Tennessee, Jacobs Engineering Company, Document No. 35T303G9-054-RPT-002, 2004. [Provides 30% conceptual design for expansion of the EMWMF based on a recommended development scenario, which was a 7-cell configuration.]

Remedial Design Report for the Construction of the East Tennessee Technology Park to Environmental Management Waste Management Facility (ETTP-EMWMF) Haul Road on the Oak Ridge Reservation, U.S. Department of Energy, DOE/OR/01-2228&D1, 2005. [Describes activities for the design and construction of the extension to the EMWMF Closure and Post-Closure Activity (CAPCA) haul road to transport CERCLA waste generated by the cleanup of the ETTP to the EMWMF.]

Addendum to the Remedial Design Report for the Construction of the East Tennessee Technology Park to Environmental Management Waste Management Facility (ETTP-EMWMF) Haul Road on the Oak Ridge Reservation, U.S. Department of Energy, DOE/OR/01-2228&D1/A1, 2005. [Addendum provides documentation of correspondence with regulatory agencies not available at the time of issuance of the Remedial Design Report, as well as a Wetlands Mitigation Plan.]

Groundwater Suppression at the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-2384, 2005. [Describes the methods and means used in the design of the Bear Creek diversion project.]

Engineering Evaluation of Alternatives for Expansion of the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-3182, 2008. [Evaluates alternatives for expansion of the EMWMF to its ultimate capacity in excess of 1.7M yd3, including engineering feasibility and potential cost and schedule impacts.]

Remedial Action Operations Documents:

Wetland Mitigation Plan for Bear Creek Valley, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-1850&D1, 1999. [Describes wetlands mitigation activities proposed to offset the planned destruction of wetlands associated with CERCLA-related remediation activities.]

Survey of Stream Restoration Opportunities on the U.S. Department of Energy Oak Ridge Reservation, Bechtel Jacobs Company LLC, BJC/OR-802, 2000. [Describes anticipated impacts from construction of the EMWMF and the TRU Waste Remediation Facility and identifies stream restoration/mitigation opportunities across the ORR.]

Remedial Action Work Plan for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-1874/D2, 2001. [Describes plans for construction and operation of facility for disposal of Oak Ridge Reservation CERCLA waste.]

Attainment Plan for Risk/Toxicity-Based Waste Acceptance Criteria at the Oak Ridge Reservation, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-1909&D3, 2001. [Documents waste acceptance criteria for disposal at EMWMF. Supplemented by Table A.1 for analytic WAC, which is periodically updated and maintained online under configuration control.]

Construction Quality Assurance Incremental Certification Report Geologic Test Pad Summary, Roy F. Weston Inc. for Bechtel Jacobs Company LLC, BJC/OR-1017, 2001. [Geologic Buffer Test Pad was prepared to demonstrate that proposed materials, equipment, and construction procedures can produce a low-permeability layer meeting design specifications.]

Construction Quality Assurance Incremental Certification Report Structural Fill and Geologic Buffer, Roy F. Weston Inc. for Bechtel Jacobs Company LLC, BJC/OR-1016, 2001. [Provides certification that quality assurance (QA) activities for construction of structural fill at EMWMF Cells 1 and 2 were performed in accordance with the Construction Quality Assurance Implementation Plan (CQAIP) and that Cells 1 and 2 were constructed in accordance with project design documents.]

Construction Quality Assurance Incremental Certification Report Soil Liner, Roy F. Weston Inc. for Bechtel Jacobs Company LLC, BJC/OR-1020, 2001. [Provides certification that the QA activities associated with the construction of the soil liner at EMWMF Cells 1 and 2 were performed according to the CQAIP and that Cells 1 and 2 were constructed in accordance with project design documents.]

Construction Quality Assurance Incremental Certification Report Leak Detection System, Roy F. Weston Inc. for Bechtel Jacobs Company LLC, BJC/OR-1025, 2001. [Provides certification that the QA activities associated with the construction of the leak detection system at EMWMF Cells 1 and 2 were performed according to the CQAIP and that Cells 1 and 2 were constructed in accordance with project design documents.]

Construction Quality Assurance Incremental Certification Report Contact Water Ponds, Roy F. Weston Inc. for Bechtel Jacobs Company LLC, BJC/OR-1049, 2002. [Provides certification that the QA activities associated with the construction of the contact water ponds at EMWMF Cells 1 and 2 were performed according to the CQAIP and that Cells 1 and 2 were constructed in accordance with project design documents.]

Construction Quality Assurance Incremental Certification Report Primary Liner System, Roy F. Weston Inc. for Bechtel Jacobs Company LLC, BJC/OR-1048, 2002. [Provides certification that the QA activities

associated with the construction of the primary liner system at EMWMF Cells 1 and 2 were performed according to the CQAIP and that Cells 1 and 2 were constructed in accordance with project design documents.]

Construction Quality Assurance Incremental Certification Report Leachate Collection System, Roy F. Weston Inc. for Bechtel Jacobs Company LLC, BJC/OR-1050, 2002. [Provides certification that the QA activities associated with the construction of the leachate collection system at EMWMF Cells 1 and 2 were performed according to the CQAIP and that Cells 1 and 2 were constructed in accordance with project design documents.]

Construction Quality Assurance Incremental Certification Report Clay Liner Test Pads Summary, Roy F. Weston Inc. for Bechtel Jacobs Company LLC, BJC/OR-1018, 2002. [Clay Liner Test Pads were prepared to demonstrate that proposed materials, equipment, and construction procedures can produce a low-permeability layer meeting design specifications.]

Construction Quality Assurance Incremental Certification Report for Structural Fill and Geologic Buffer – Cells 3 and 4 of the Environmental Management Waste Management Facility, Roy F. Weston Inc. for Bechtel Jacobs Company LLC, BJC/OR-1117, 2002. [Provides certification that the QA activities associated with the construction of the structural fill and geologic buffer at EMWMF Cells 3 and 4 were performed according to the CQAIP and that Cells 3 and 4 were constructed in accordance with project design documents.]

Geosynthetic Manufacturer's Quality Control Certification Data, Bechtel Jacobs Company LLC, BJC/OR-1026, 2002. [Contains manufacturer's quality control documentation and certification for the geosynthetic materials used in the construction of EMWMF Cells 1 and 2 to meet specifications.]

Construction Completion Report for *Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Completion of Construction of the Environmental Management Waste Management Facility,* Bechtel Jacobs Company LLC for U.S. Department of Energy, DOE/OR/01-2022&D1, 2002. [Documents completion of construction of EMWMF Cells 1 and 2.]

EMWMF Build-Out CQA Incremental Certification Report for Structural Fill and Geologic Buffer, SSRS 3.905, Environmental Management Waste Management Facility, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-2031, 2004. [Documents construction quality assurance (CQA) efforts for structural fill and geologic buffer at Cells 3 and 4.]

EMWMF Build-Out CQA Incremental Certification Report for Low Permeability Soil Liner and Test Pad, SSRS 3.906, Environmental Management Waste Management Facility, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-2032/R1, 2005. [Documents construction quality assurance (CQA) efforts for low permeability soil liner and test pad for Cells 3-4.]

EMWMF Build-Out CQA Incremental Certification Report for Secondary Geomembrane, Leak Detection System Geocomposite, and Primary Geomembrane, SSRS 3.907, Environmental Management Waste Management Facility, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-2033 V1 & V2, 2005. [Documents construction quality assurance (CQA) efforts for secondary geomembrane liner, leak detection system geocomposite, and primary geomembrane liner at Cells 3-4.]

Addendum 1 to EMWMF Build-Out CQA Incremental Certification Report for Secondary Geomembrane, Leak Detection System Geocomposite, and Primary Geomembrane, SSRS 3.907, Environmental Management Waste Management Facility, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-2033 Addendum, 2005. [Addendum for construction of secondary geomembrane liner, leak detection system geocomposite, and primary geomembrane liner at Cells 3-4 in response to comments.]

EMWMF Build-Out CQA Incremental Certification Report for LCS/RLCS/LDS Piping, Leachate Collection, Contact Water, and Protective Cover Systems, SSRS 3.910, Environmental Management Waste

Management Facility, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-2180, 2005. [Documents construction quality assurance (CQA) efforts for leachate collection system, redundant leachate collection system, and leak detection system piping; leachate collection system granular drainage layer; contact water piping; and earthen protective cover systems at Cells 3-4.]

Phased Construction Completion Report for Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Completion of Construction of the 800,000 Cubic Yard Build-Out at the Environmental Management Waste Management Facility, U.S. Department of Energy, DOE/OR/01-2255&D1, 2005. [Documents completion of construction of Cells 3 and 4.]

Remedial Action Work Plan for the Operation of the East Tennessee Technology Park to Environmental Management Waste Management Facility (ETTP-EMWMF) Haul Road on the Oak Ridge Reservation, Oak Ridge, Tennessee; U.S. Department of Energy, DOE/OR/01-2220&D2, 2005. [Describes activities for the operation of the haul road to transport CERCLA waste from the ETTP to the EMWMF.]

Phased Construction Completion Report for the Construction of the East Tennessee Technology Park to Environmental Management Waste Management Facility (ETTP-EMWMF) Haul Road on the Oak Ridge Reservation, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-2296&D1, 2006. [Documents construction of the haul road to transport CERCLA waste generated by the cleanup of the ETTP to the EMWMF.]

FY2004 Capacity Assurance Remedial Action Report for the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR-01-2145&D2, 2004. [Presents evaluation of waste disposal capacity at EMWMF relative to DOE-ORR CERCLA waste generation estimates.]

FY2005 Capacity Assurance Remedial Action Report for the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR-01-2234&D1, 2005. [Updates evaluation of waste disposal capacity at EMWMF relative to DOE-ORR CERCLA waste generation estimates.]

FY2006 Capacity Assurance Remedial Action Report for the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR-01-2303&D1, 2006. [Updates evaluation of waste disposal capacity at EMWMF relative to DOE-ORR CERCLA waste generation estimates.]

FY2007 Capacity Assurance Remedial Action Report for the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR-01-2351&D2, 2007. [Updates evaluation of waste disposal capacity at EMWMF relative to DOE-ORR CERCLA waste generation estimates.]

FY2008 Capacity Assurance Remedial Action Report for the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR-01-2377&D2, 2008. [Updates evaluation of waste disposal capacity at EMWMF relative to DOE-ORR CERCLA waste generation estimates.]

FY2009 Capacity Assurance Remedial Action Report for the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR-01-2403&D1, 2009. [Updates evaluation of waste disposal capacity at EMWMF relative to DOE-ORR CERCLA waste generation estimates.]

EMWMF Performance Monitoring Documents:

Baseline Groundwater Monitoring Report for the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-2021&D3, 2002. [Presents

information collected prior to EMWMF operations to establish baseline groundwater conditions for detection monitoring program.]

Environmental Management Waste Management Facility (EMWMF) Environmental Compliance Plan for Bechtel Jacobs Company, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-2711, 2007. [Describes the operational requirements for the groundwater detection monitoring program at EMWMF.]

Environmental Management Waste Management Facility (EMWMF) Environmental Monitoring Plan for Bechtel Jacobs Company, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-2712, 2007. [Describes the operational requirements for the groundwater and surface water monitoring program at EMWMF.]

Annual Report for 2005-2006 Detection Monitoring at the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-2741, 2007. [Summary of environmental monitoring data at EMWMF during FY 2006.]

Annual Report for 2006-2007 Detection Monitoring at the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-3006, 2008. [Summary of environmental monitoring data at EMWMF during FY 2007.]

Annual Report for 2007-2008 Detection Monitoring at the Environmental Management Waste Management Facility, Oak Ridge, Tennessee, Bechtel Jacobs Company LLC, BJC/OR-3216, 2009. [Summary of environmental monitoring data at EMWMF during FY 2008.]

Land Use Control Documents:

Land Use Control Implementation Plan for Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-1884&D3, 2001. [Further develops land use controls (LUCs) outlined in the ROD and describes what must be done to impose and maintain the required LUCs.]

Land Use Control Implementation Plan for Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 Waste, Oak Ridge, Tennessee, U.S. Department of Energy, DOE/OR/01-2319&D1, 2006. [Describes land use controls required at the EMWMF. Originally attached to primary documents Remedial Design Report DOE/OR/01-1873 and Remedial Design Work Plan DOE/OR/01-1760.]

APPROVALS

**Explanation of Significant Differences for the
Record of Decision for the Disposal of Oak Ridge Reservation
Comprehensive Environmental Response, Compensation, and Liability Act of 1980
Waste, Oak Ridge, Tennessee**

May 2010

6/1/10
Date

John R. Eschenberg
Assistant Manager for Environmental Management
Oak Ridge Office
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5/19/10
Date

John A. Owsley, Director
U.S. Department of Energy Oversight Division
Tennessee Department of Environment and Conservation

6/29/10
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