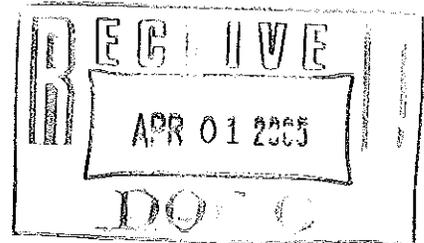


**Amendment to
Removal Action Work Plan
for the
Corehole 8 Plume Source (Tank W-1A)
at Oak Ridge National Laboratory,
Oak Ridge, Tennessee**

Date Issued—March 2005



Prepared for the
U.S. Department of Energy
Office of Environmental Management

BECHTEL JACOBS COMPANY LLC
managing the
Environmental Management Activities at the
East Tennessee Technology Park
Oak Ridge Y-12 Plant Oak Ridge National Laboratory
Paducah Gaseous Diffusion Plant Portsmouth Gaseous Diffusion Plant
under contracts DE-AC05-98OR22700 and DE-AC05-03OR22980
for the
U.S. DEPARTMENT OF ENERGY

PREFACE

This *Removal Action Work Plan for the Corehole 8 Plume Source (Tank W-1A) at Oak Ridge National Laboratory, Oak Ridge, Tennessee* (DOE/OR/01-1800&D1/A1) was prepared in accordance with requirements under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. This work was performed under work breakdown structure 1.12.01.05.02.04 (Cost Center Activity Data Sheet 3300, "WAG 1 Core Hole 8"). This amendment is being issued to address the removal of soil and Tank W-1A that could not be removed during the initial action in 2001 due to high concentrations of transuranic isotopes. Publication of this document will meet a Federal Facility Agreement (DOE 1992) milestone of March 26, 2005. This document provides the work plan necessary to implement the non-time-critical removal action approved in the September 14, 1998, *Action Memorandum for the Core Hole 8 Plume Source (Tank W-1A) at Oak Ridge National Laboratory, Oak Ridge, Tennessee* (DOE 1998a). This document defines the revised schedule for completing the removal action and for submittal of future removal action documentation to regulators. It also provides a crosswalk relating the applicable or relevant and appropriate requirements to the design requirements or specifications implementing them and discusses the goals to be attained and the means of measuring those goals. The removal action involves removal of Tank W1-A and surrounding contaminated soil, not removed during the initial action, and appropriate storage or disposal of generated wastes.

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ACRONYMS

ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirement
BJC	Bechtel Jacobs Company LLC
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
<i>CFR</i>	<i>Code of Federal Regulations</i>
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EDE	effective dose equivalent
EE/CA	Engineering Evaluation/Cost Analysis
EMWMF	Environmental Management Waste Management Facility
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FFA	Federal Facility Agreement
HEPA	high-efficiency particulate air (filter)
LLW	low-level (radioactive) waste
LLLW	liquid low-level (radioactive) waste
M&I	management and integration
mrem	millirem
mSv	milli-Sievert
NPDES	National Pollutant Discharge Elimination System
NTS	Nevada Test Site
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations
ORR	Oak Ridge Reservation
RCRA	Resource Conservation and Recovery Act
RH	remote-handled
RmAWP	Removal Action Work Plan
ROD	Record of Decision
SWSA	Solid Waste Storage Area
TBC	to be considered
TSCA	Toxic Substances Control Act
TDEC	Tennessee Department of Environment and Conservation
TRU	transuranic
USC	United States Code
WAC	waste acceptance criteria
WIPP	Waste Isolation Pilot Plant

EXECUTIVE SUMMARY

The Corehole 8 plume source in the Bethel Valley Watershed of Oak Ridge National Laboratory consists of Tank W1-A, its contents, and surrounding soil contaminated with low-level radioactive waste. The tank is in the North Tank Farm in Central Bethel Valley. The purpose of the project is to reduce risk to human health and the environment through remediation of this source of radiological contamination to First Creek and White Oak Creek. The focus of this action is to remove the most highly contaminated source area, but the extent of excavation is limited by infrastructure (e.g., overhead lines, buried process waste piping). Residual contamination in groundwater and soils beyond the boundaries of the project will be addressed separately in the Bethel Valley Watershed decision-making process or other response actions under the Comprehensive Environmental Response, Compensation, and Liability Act.

The removal action was initiated in March 2001 resulting in the removal of most of the contaminated soil (approximately 90%) identified in the Removal Action Work Plan. However, during removal of soil adjacent to and west of Tank W-1A, unexpected high concentrations of transuranic isotopes (primarily ^{241}Am and $^{239/240}\text{Pu}$) and beta-gamma emitting isotopes (primarily ^{137}Cs) were encountered. The concentration of these isotopes significantly exceeded the waste acceptance criteria of Envirocare and Nevada Test Site and would require disposition at the Waste Isolation Pilot Plant. As a result, the removal of the remaining soil and tank was deferred to a later date. The *Removal Action Report for the Core Hole 8 Plume Source (Tank W-1A) at Oak Ridge National Laboratory, Oak Ridge, Tennessee* (DOE/OR/01-1969&D2) describing the work performed and condition of the site was submitted.

This amended Removal Action Work Plan identifies the removal action design requirements for the remaining soil and tank removal, illustrates to regulators how those requirements meet applicable or relevant and appropriate requirements, updates the proposed schedule, and specifies goal attainment. Submittals required herein will be transmitted to the regulators for information after U.S. Department of Energy (or designated representative) approval.

1. INTRODUCTION

This Removal Action Work Plan (RmAWP) amendment addresses completion of the non-time-critical removal action approved in the *Action Memorandum for the Core Hole 8 Plume Source (Tank W-1A) Removal Action at Oak Ridge National Laboratory, Oak Ridge, Tennessee* (DOE 1998a). Tank W-1A is in the North Tank Farm in the Central Bethel Valley area (main plant area) of Oak Ridge National Laboratory (ORNL). This action addresses excavation of Tank W-1A and remaining contaminated soils surrounding the tank. The action will address the remaining source of ^{90}Sr , uranium, and other radionuclide contaminants being released to groundwater and migrating to First Creek and White Oak Creek. Additionally, the removal action will leave the site in a stable condition and will not preclude any future actions at the site that may be implemented as part of the Bethel Valley watershed project or other response actions under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).

This action will be performed under the auspices of the Federal Facility Agreement (FFA) for the Oak Ridge Reservation (DOE 1992). This action will be implemented in accordance with CERCLA requirements. Bechtel Jacobs Company LLC (BJC) is the U.S. Department of Energy's (DOE's) contractor for environmental restoration. The contractor's method of accomplishment for implementing this removal action will be to execute a fixed price, performance-based removal and disposal contract with another subcontractor.

Implementation of the original RmAWP (DOE/OR/01-1800&D1) was initiated in March 2001 and removed most of the contaminated soil (approximately 90%). The soil was removed and disposed at Envirocare and the Environmental Management Waste Management Facility (EMWMF). However, during removal of soil adjacent to and west of Tank W-1A, unexpected high concentrations of transuranic (TRU) isotopes (primarily ^{241}Am and $^{239/240}\text{Pu}$) and beta-gamma emitting isotopes (primarily ^{137}Cs) were encountered. The concentration of these isotopes significantly exceeded the Waste Acceptance Criteria (WAC) of Envirocare and Nevada Test Site (NTS) and would require disposition at the Waste Isolation Pilot Plant (WIPP). Additionally, the high concentration of beta-gamma isotopes would require remote handling of the containers. As a result, approximately 100 yd³ in an area of 20 by 25 ft could not be removed, and the removal was deferred to a later date.

The soil was removed from around the tank to a depth of approximately 8 ft below ground surface prior to encountering the high concentrations of TRU isotopes. The majority of the TRU contaminated soil was encountered on the west side of Tank W-1A approximately 9 to 10 ft below grade. Eight grab samples showed ^{241}Am concentrations ranging from approximately 50 nCi/g to 300 nCi/g and $^{239/240}\text{Pu}$ concentrations ranging from 10 to 1,240 nCi/g. In addition to TRU isotopes, the soil contained high levels of gamma emitting isotopes, mainly ^{137}Cs . When the TRU soil was encountered, dose rates ranged from 1 to 6 rem/h when measured in the excavator bucket. The eight grab samples showed ^{137}Cs ranging from 1,200 nCi/g to 9,000 nCi/g. The area was covered with approximately 3 to 4 ft of gravel.

1.1 PURPOSE OF THE REMOVAL ACTION WORK PLAN

The design process began with approval of the Action Memorandum (DOE 1998a) on September 15, 1998, for the initial action and will continue as described in this Work Plan amendment. This amendment provides a schedule for design and completion of the removal action, describes how the action will meet applicable or relevant and appropriate requirements (ARARs), and specifies how attainment of the removal action's objectives will be verified.

The following activities were completed in the initial removal action:

- removed and transferred liquid accumulated in Tank W-1A to the ORNL liquid low-level (radioactive) waste (LLLW) system;
- excavated to top of bedrock and disposed of contaminated soil surrounding the tank;
- cut and capped all lines that tie into the tank (and removed abandoned lines that passed through the area of excavation);
- removed the aboveground valve box; and
- backfilled the resulting pit (included grading and establishing a vegetative cover).

The following activities are addressed in this RmAWP amendment:

- prepare Sampling and Analysis Plan for chemical, radiological, and physical characterization of remaining soil;
- perform radiological and chemical characterization of the remaining soil;
- determine lateral and vertical extent of the remaining remote-handled (RH) TRU soil;
- determine the lateral and vertical extent of the remaining low-level soil;
- prepare Waste Handling Plan for disposition of low-level soil;
- construct storage facility for the TRU soil;
- prepare Excavation Plan for removal of TRU and low-level soil;
- excavate and dispose low-level soil at the EMWMF;
- excavate RH TRU soil and place into storage;
- remove and dispose of the tank and concrete saddles; and
- backfill excavation with soil and cover with gravel.

1.2 SCOPE OF THE REMOVAL ACTION WORK PLAN

The following items are included in the scope of this amended RmAWP:

- proposed schedule for submittal of FFA documents to regulators and implementing the removal action;
- requirements for the removal action subcontractors;

- crosswalk of each ARAR identified in the Engineering Evaluation/Cost Analysis (EE/CA) to the subcontractor requirements that implement that ARAR; and
- summary-level description of how attainment of removal action objectives will be demonstrated.

2. SITE DESCRIPTION

Tank W-1A is in the North Tank Farm in the main plant area of ORNL near the corner of Third Street and Hillside Avenue (see Figs. 1 and 2). The site is in a highly developed area of the laboratory. Buildings in this vicinity include offices, research laboratories, process buildings, support facilities such as change houses, and emergency and security buildings. Underlying the ORNL facility is a complex array of underground utilities, drain pipes, process pipes, building foundation excavations, and sumps. The underground utilities within the area of excavation were removed during the initial removal action. There are no sensitive ecological receptors near the work area.

Tank W-1A was commissioned in 1951 as a storage tank to collect wastes from the high radiation level analytical facilities: Buildings 2026, 3019-B, and the Radiochemical Processing Pilot Plant (3019). The transfer line from Buildings 2026 and 3019 was strongly suspected of leaking, and the tank was taken out of service in 1986. Prior to the initial 2001 removal action, the water and residual solids were removed from the tank and discharged to the ORNL LLLW treatment system.

The EE/CA (DOE 1998b) indicates that gross alpha activity levels in the soil surrounding the tank range from 13,000 to 84,000 pCi/g; the highest levels were detected nearest the tank. Gross beta activity levels range from 40,000 to over 500,000 pCi/g. Strontium-90 levels range from 9 to 33,500 pCi/g, again, with the highest concentrations close to the tank. Higher levels of radionuclide contamination were detected from 1.5 m (5 ft) below ground surface to refusal. Levels were significantly lower in the surface soil up to 1.5 m (5 ft) deep. Because the inlet LLLW line connects to the top of the tank at approximately 1.5 m (5 ft) deep, these trends are expected. Soils around the tank consist of silty clay similar to natural clay soils found around the tank farm, although with small voids visible. Hydraulic conductivity ranged from 3.6×10^{-7} to 4.7×10^{-6} cm/s, indicating a relatively tight clay. Groundwater was encountered at roughly 2.1 m (7 ft) below ground surface (after a period of heavy rain). After sitting overnight, groundwater was detected at a depth of 1.2 m (4 ft).

Additional soil sampling was performed by the subcontractor prior to the start of the 2001 initial removal action. This additional characterization revealed higher-than-expected contaminant levels immediately west of the tank. The Safety Authorization Basis (SAB) document for the facility was revised to require additional safety rigor to prevent the inadvertent release of contaminants. In addition, the characterization data revealed that the soil would not meet the WAC of Envirocare of Utah and would require shipment to NTS for disposal.

The original excavation boundary was approximately 12×15 m (40×50 ft). This amendment addresses the removal of the remaining area of approximately 6×7.5 m (20×25 ft) and is shown in Fig. 3. Areas remain available to the removal subcontractor for equipment and materials staging; office and decontamination facilities are also shown.

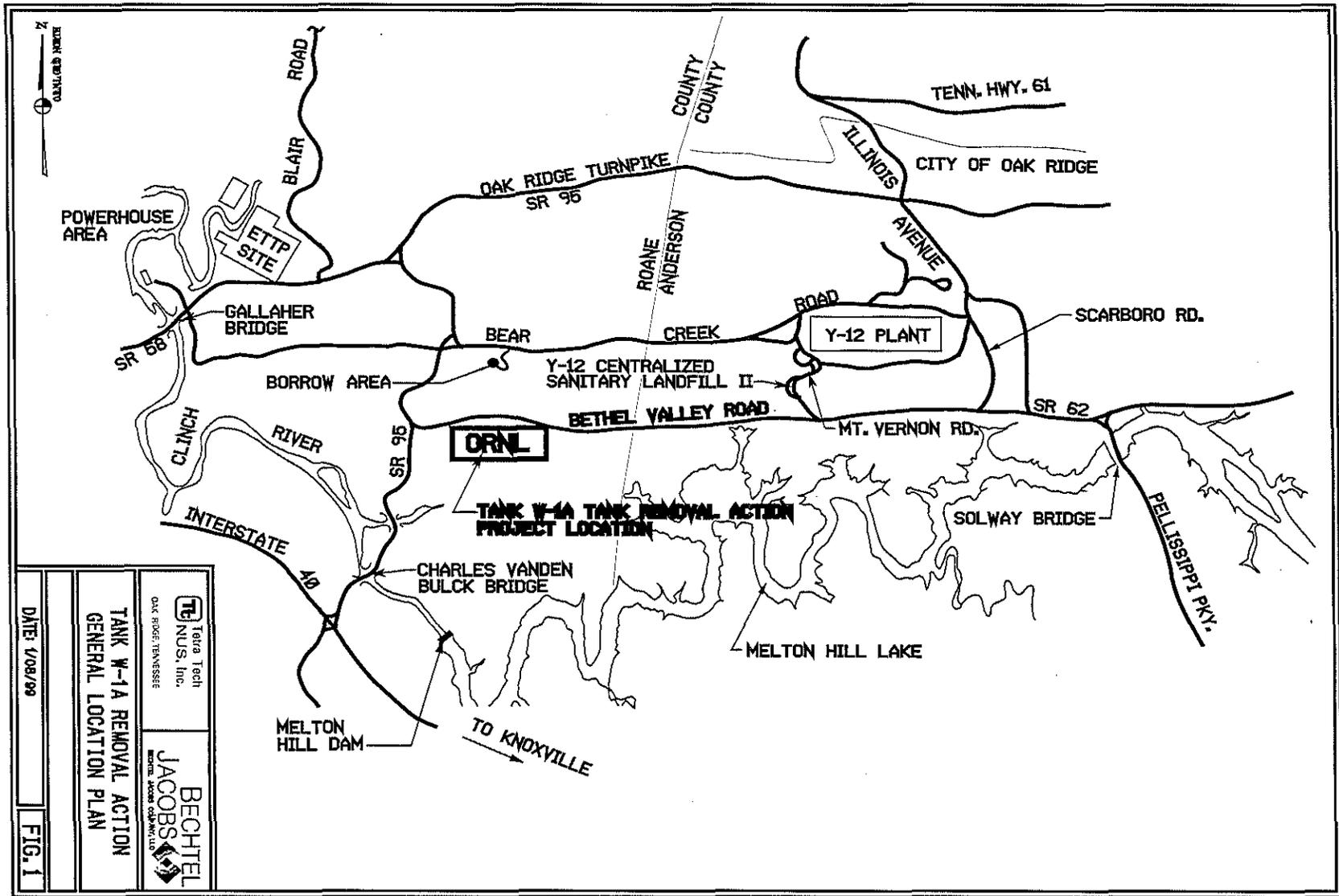


Fig. 1. Tank W-1A removal action general location plan.

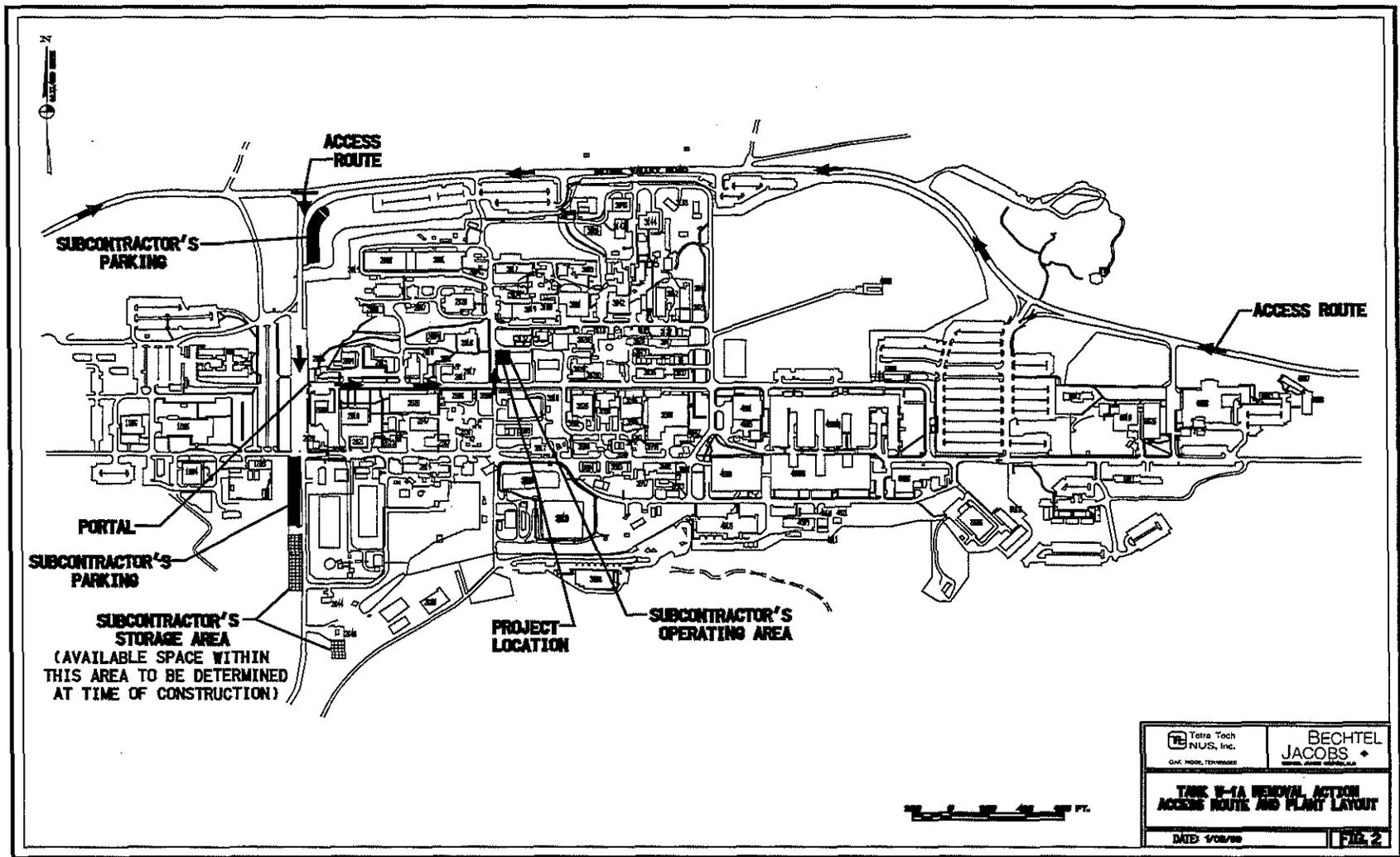
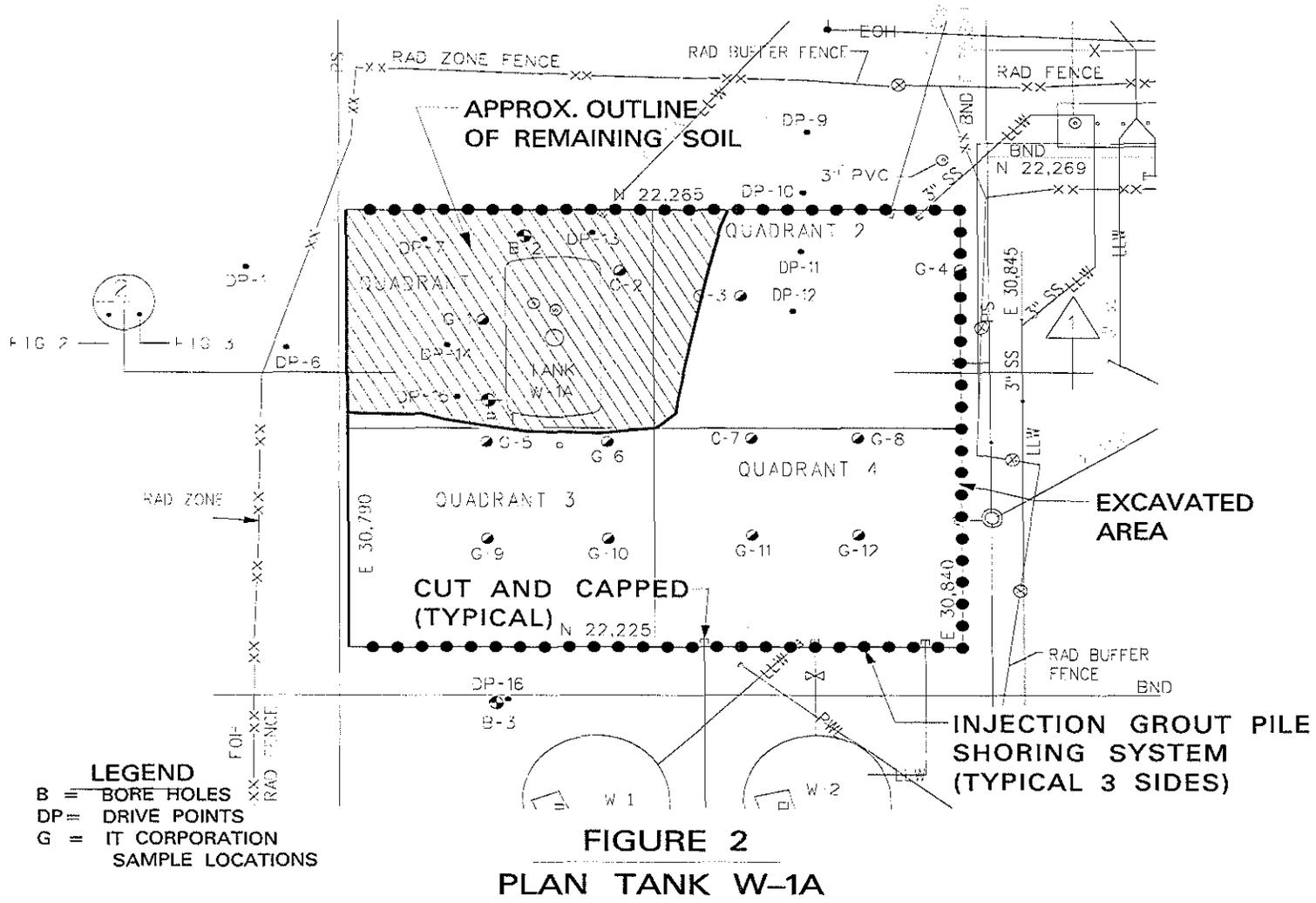


Fig. 2. Tank W-1A removal action access route and plant layout.



530-10\FIG 1.DGN

Fig. 3. Approximate area of soil remaining to be excavated.

There are no security classification concerns associated with the removal action. DOE, the DOE contractor, and UT-Battelle will restrict access to the work areas by unauthorized personnel and help the removal and disposal subcontractor arrange for access to the site.

3. REMOVAL ACTION APPROACH

The DOE contractor will execute a subcontract to perform an Engineering Study of the remaining soil. This study will provide the chemical, radiological, and geotechnical characterization data needed for the safe removal of the tank and soil. It will be followed by a separate subcontract for the removal and disposal of the low-level soil and tank. The low-level soil is anticipated to be disposed at the EMWMF and the tank sent for smelting/recycling. Since the removal action will be performed prior to WIPP being able to receive RH TRU soil, the containerized soil will be placed into storage. It is planned that a separate temporary storage area will be constructed at Solid Waste Storage Area (SWSA) 3. Once WIPP can receive RH TRU soil, it is anticipated that additional characterization and disposal will be performed by the existing DOE TRU Waste Processing Facility. The removal and disposal subcontractor will be selected based on evaluation of proposals submitted by prequalified contractors in response to a request for proposals. These subcontractors will be responsible for complying with the requirements specified. The technical approach for implementing the removal action includes site preparation work to prepare for mobilization by the removal and disposal subcontractor, design preparation by the subcontractor and review by DOE and its contractor, and implementation of removal action activities.

3.1 MAJOR TASKS

Following are major tasks to be completed.

- **Engineering Study.** The Engineering Study will provide sufficient characterization data to perform the safe and efficient removal of the soil and tank. The data from this Study will be used by the BJC project team (nuclear safety, safety, environmental compliance, radiological protection, transportation, waste management, engineering, etc.) to complete the objectives of the initial removal action. This includes radiological characterization of TRU and surrounding low-level soil; development of a three-dimensional map showing soil meeting the definition of TRU waste; development of a three-dimensional map showing low-level (non-TRU) soil; and obtaining geotechnical data about the soil. A Sampling and Analysis Plan will be developed for the Engineering Study.
- **Design preparation.** The removal and disposal subcontractor will submit a project work plan, including safety and health, waste management, and environmental compliance plans. The DOE contractor will review plans and submit them to the U.S. Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC) for information. The Waste Handling Plan will be submitted to EPA and TDEC for review and comment.
- **Site preparation.** Based on the removal and disposal subcontractor's needs, utilities, a staging area, and relocation of any interfering active utilities (e.g., overhead power lines routed through the excavation area) will be completed before mobilization. The storage area will be designed to allow for the temporary storage of the RH TRU soil at SWSA 3.

- **Mobilization.** The removal and disposal subcontractor will mobilize equipment, tools, materials, and a trained work force; prepare the site and staging areas (e.g., install fencing, surface water controls, containment structures); and, with DOE and the DOE contractor, perform a readiness assessment.
- **Tank Isolation.** The removal and disposal subcontractor will, if necessary, remove and transfer any liquid accumulated in Tank W-1A to the ORNL LLLW system.
- **Soil removal.** The removal and disposal subcontractor will excavate the top 1.5 m (5 ft) of uncontaminated soil in the excavation area and stockpile the soil for use as backfill. The subcontractor will then excavate the contaminated soil surrounding the tank, up to the maximum lateral extent in the excavation area and down to 18 ft or to bedrock, whichever is shallower.
- **Tank removal.** The removal and disposal subcontractor will remove the tank, concrete saddles and associated hardware, and concrete foundation(s).
- **Treatment, transportation, storage, and disposal.** The removal and disposal subcontractor will select one or more disposal facilities with the licenses, approvals, capacity, and WAC necessary to accept all solid waste forms generated except for the TRU soils. If the facility is not a DOE facility, an exemption per DOE Order 5820.2A from the DOE- Oak Ridge Operations (ORO) field office will be obtained. The subcontractor will treat, blend, or homogenize the soil as needed to meet the selected disposal facility WAC. The empty tank will be sectioned as needed to fit in containers for smelting. All soil, concrete rubble, gravel (if any), tank and piping sections and hardware, and secondary solid waste (e.g., personal protective equipment) will be packaged, handled, and shipped in a manner that meets disposal facility WAC and all U.S. Department of Transportation (DOT) requirements. The subcontractor will transport the wastes to the selected disposal facility using a licensed transporter with all documents required by DOT. All liquid wastes from emptying the tank, groundwater removed from the excavation area, and decontamination water will be sent to the ORNL LLLW treatment system.
- **Restoration.** The removal and disposal subcontractor will backfill the excavation with clean soil and revegetate the site. The subcontractor will demobilize, decontaminate, decommission, and remove all equipment and material.
- **Removal Action Report.** A Removal Action Report will be developed that describes the actions taken to meet the Action Memorandum. It will summarize any major deviations made during the project. The start and completion dates for the project and any changes will be included.

3.2 CONSTRUCTION MONITORING AND INDEPENDENT VERIFICATION

The DOE contractor will review and comment on all submittals and plans by the removal and disposal subcontractor. Upon acceptance of these submittals, the DOE contractor will issue a notice to proceed. The DOE contractor will have a subcontract administrator overseeing the contractor during active remediation work. The DOE contractor will have engineering, health and safety, environmental compliance, and other resources available for oversight. The DOE contractor will provide independent radiation protection oversight personnel during all hours when a contractor is working in a contaminated area.

3.3 SAFETY AND ENVIRONMENTAL PROTECTION REQUIREMENTS

3.3.1 Control of Releases of Contamination

All contaminated solid materials (soil, piping, tank, and appurtenances) shall either (1) be maintained in a moist condition, (2) have contamination fixed in place with a chemical or physical bonding agent (e.g., MAECTITE™ or paint), or (3) have contamination contained by wrapping in an impermeable membrane or placement in a container while moist to prevent any releases to the atmosphere. Alternately, an appropriately designed containment structure [e.g., a tent with a high-efficiency particulate air- (HEPA-) filtered ventilation system] could be erected around the excavation area. This applies to all materials within the excavation area prior to backfilling.

The removal and disposal subcontractor shall develop and implement a spill prevention, control, containment, and cleanup plan for any contaminated material being transferred through pipelines or transported in vehicles.

The site shall have control boundaries between the exclusion zone (contaminated work area), the contamination reduction zone (decontamination and monitoring area), and the support zone. No personnel, equipment, or materials may pass from the contamination reduction zone to the support zone prior to monitoring by appropriately trained personnel and confirmation that no uncontrolled or uncontained contamination leaves the site.

3.3.2 As Low As Reasonably Achievable Plan

The removal and disposal subcontractor shall develop and implement a radiation safety plan to ensure that exposures to all employees and to the public are maintained as low as reasonably achievable (ALARA). The plan shall address, as appropriate, training, radiation monitoring, supervision by radiation protection personnel, site access restrictions, preventing access of unnecessary personnel to exclusion areas, time limitations for employee access to radiation areas, shielding provisions, prevention of releases to the environment, and other provisions needed to meet the intent of 10 *Code of Federal Regulations (CFR)* 835 and DOE Order 5400.5, "Radiation Protection of the Public and the Environment" [Sect. (I.4)].

3.3.3 Control of Storm Water Discharges

The removal and disposal subcontractor shall develop and implement a plan to control stormwater discharges including the following:

- minimal clearing for grading,
- removal of vegetation cover only within 20 days of construction,
- weekly erosion control inspections and maintenance,
- control measures to detain runoff, and
- discharges that do not cause erosion.

3.3.4 Control of Non-Point-Source Air Emissions

The removal and disposal subcontractor shall develop and implement procedures to prevent particulate matter from becoming airborne to the extent necessary to comply with regulatory requirements and ALARA. No visible emissions of fugitive dust (e.g., from construction traffic on uncontaminated dirt roads) are permitted beyond ORNL boundary lines for more than 5 min/h or 20 min/day.

Compliance with National Emission Standards for Hazardous Air Pollutants (40 *CFR* 61.92 and 40 *CFR* 61.93) and with DOE ALARA requirements will be verified by monitoring ambient air near the boundary of the work area or at the exhaust of the containment structure, if any, for radionuclide emissions.

3.3.5 Waste Management

The removal and disposal subcontractor shall develop and implement a plan to characterize, remove, blend (as necessary), transport, and dispose of all low-level solid waste forms at the approved disposal facility. It is anticipated that the low-level soil will be disposed at the EMWMF. The subcontractor shall also remove, containerize, and transport the RH TRU soil to a pre-designated storage location. The storage location will be constructed at SWSA 3 and meet applicable DOE requirements and ARARS. If other storage space (i.e., TRU bunker) becomes available, it will be utilized instead of SWSA 3.

3.3.5.1 Waste characterization

The removal and disposal subcontractor shall perform any additional characterization of the waste as needed to certify that (1) the waste is not Resource Conservation and Recovery Act- (RCRA-) characteristic hazardous waste per 40 *CFR* 262.11 and Rules of TDEC, Chap. 1200-1-11-.03(1)(b); (2) the final waste form going to EMWMF does not contain TRU constituents in excess of 100 nCi/g; and (3) the final waste form meets the WAC of the EMWMF. The subcontractor may blend, homogenize, or otherwise treat it as needed to meet DOT requirements and disposal facility WAC.

3.3.5.2 Management of low-level (radioactive) waste

The removal and disposal subcontractor shall segregate low-level (radioactive) waste (LLW) from uncontaminated waste and, except as needed for blending, minimize the amount of LLW generated. The subcontractor shall decontaminate equipment and materials to the extent practical. Any items that cannot be decontaminated will remain onsite or will be packaged and disposed of appropriately. Subsequent management of LLW must also be in accordance with DOE Order 5820.2A(III.3).

TRU waste storage shall meet the requirements outlined in DOE Order 5820.2A(II) for the packaging, management, and temporary storage of TRU waste. TRU waste shall be managed to provide reasonable assurance that the combined annual dose equivalent to any member of the public in the general environment resulting from discharges of radioactive material and direct radiation from such management shall not exceed 25 mrem/year to the whole body and 75 mrem/year to any critical organ per 40 *CFR* 191.03(b).

3.3.5.3 Waste Transport

Transport of radioactive and hazardous materials above exempt quantities must meet (1) packaging, labeling, marking, placarding, and pretransport requirements in accordance with DOT regulations 49 *CFR* 171-174 and 177-179, and DOE Order 460.1A; (2) DOT packaging requirements based on the maximum activity of radioactive material in a package in 49 *CFR* 173.431, 49 *CFR* 173.433, 49 *CFR* 173.435, and 49 *CFR* 173.411; and (3) DOE Order 5820.2A implementing procedural requirements for off-site shipments.

All liquid wastes from emptying the tank, groundwater removed from the excavation area, and decontamination water will be collected in a tank and sent to the ORNL LLLW treatment system.

3.4 VERIFICATION OF ATTAINMENT OF REMOVAL ACTION OBJECTIVES

The action memorandum (DOE 1998a) and EE/CA (DOE 1998b) specified removal of the Tank W-1A and appurtenances and surrounding soils within an area limited by infrastructure. The EE/CA states that soil screening criteria will be developed in conjunction with TDEC and EPA and documented in the RmAWP to delineate the actual boundaries of the removal action. Soils not remediated as part of this removal action will be addressed in the Bethel Valley Watershed Record of Decision (ROD) or other response actions under CERCLA.

Instead of developing concentration-based soil screening criteria to minimize the excavated soil volume, DOE will ensure removal of all soil within the infrastructure-limited maximum extent of this removal action as shown in Fig. 3. Soil will be removed down to bedrock, or to approximately 5.5 m (18 ft) below the ground surface, whichever is shallower. This removal of soil will accelerate implementation of the removal action, reduce characterization costs, and prevent delays in completing site restoration while waiting for characterization results. This is expected to remove the most contaminated soil and significantly reduce the contribution of contamination from this source to groundwater and surface water. A physical survey of the remediation boundary and depth of excavation and a visual inspection of the excavation will be used to verify that removal action goals have been attained. Generated wastes will be characterized only as needed to verify compliance with disposal facility WAC.

4. PLANS

This section lists the plans that will be submitted by the removal and disposal subcontractor for review and comment by the project team.

- Environment, Safety, and Health Standard Operating Program, including matrices linking procedure to Integrated Safety Management System;
- site Safety and Health Plan with Radiation Safety Plan;
- Environmental Compliance Plan;
- layout and utility requirements;
- storage area design;
- Safety Authorization Basis document;
- project Work Plans and instructions;
- waste form certification from disposal facility;

- post-restoration As-Built Drawings; and
- Removal Action Report.

5. PROJECT SCHEDULE

Following is the revised project schedule reflecting previously completed actions and upcoming FFA Appendix E milestones, providing dates for submittals to FFA Reviewers, and the expected removal action completion schedule.

Action Memorandum Approved	September 14, 1998
Removal Action Work Plan Approved	February 28, 1999
Initial Removal Action	March 2001 – October 2001
Removal Action Work Plan Amendment D1 submittal	March 26, 2005
Removal Action Work Plan Amendment D2 submittal	May 20, 2005
Waste Handling Plan submittal	January 6, 2006
Removal Action	June 2006 – March 2007
Removal Action Report D1 submittal	June 6, 2007

6. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS CROSSWALK

This section lists each ARAR identified in the EE/CA; specifies whether the requirement was determined to be applicable, relevant and appropriate, or to be considered (TBC); and, if appropriate, discusses determination, states the citation that drives the requirement, and identifies the subcontractor requirements that will ensure that the ARAR will be met.

ARAR 1: Point-source discharge of radionuclides into the ambient air from a DOE facility (applicable): Exposures to members of the public from all radiation sources released into the atmosphere shall not cause an effective dose equivalent (EDE) to be > 10 mrem (0.1 mSv)/year.

Citation: 40 *CFR* 61.92 and Rules of TDEC, Chap. 1200-3-11-.08.

Addressed in: Sect. 3.3.1. Requirement to keep material moist, fixed, contained, or within a containment structure that will prevent airborne releases.

ARAR 2: Point-source discharge of radionuclides into the ambient air from a DOE facility (applicable): Radiological emission measurements must be performed at all release points that have a potential to discharge radionuclides into the air in quantities that could cause an EDE in excess of 1% of the standard (0.1 mrem/year). All radionuclides which could contribute > 10% of the standard (1 mrem/year) for the release point shall be measured.

Citation: 40 *CFR* 61.93 and Rules of TDEC, Chap. 1200-3-11-.08.

Addressed in: Sect. 3.3.4. If a containment structure is used, air inside the structure will be monitored to estimate emissions, which are not likely to contribute greater than 10% of the standard.

ARAR 3: Release of radionuclides into the environment (TBC): DOE will carry out all DOE activities to ensure that radiation doses to individuals will be ALARA.

Citation: DOE Order 5400.5(1.4); 10 *CFR* 834 (proposed).

Addressed in: Sects. 3.3.2 and 3.3.4.

ARAR 4: Release of radionuclides into the environment (TBC): Exposures to members of the public from all radiation sources shall not cause an EDE to be > 100 mrem (1 mSv)/year.

Citation: DOE Order 5400.5(IL.1a), 10 *CFR* 834 (proposed).

Addressed in: Sect. 3.3.1. Requirement to keep material moist, fixed, contained, or within a containment structure will prevent exposure resulting from airborne releases. Requirements for spill prevention and control address potential releases to the ground.

ARAR 5: Any action which will impact historic or archaeological resources (applicable): Action(s) that will affect such resources must adhere to the DOE-ORO Programmatic Agreement (May 6, 1994). When alteration or destruction of the resource is unavoidable, steps must be taken to minimize or mitigate the impacts and to preserve data and records of the resource.

Citation: National Historic Preservation Act (16 USC 470a–w) Sects. 106 and 110; Executive Order 11593; 36 *CFR* 800.

Requirement Met: *Memorandum of Agreement, Remediation of Gunite and Associated Tanks, and Demolition of Buildings 3506 and 3515-Oak Ridge National Laboratory*, February 13, 1995. No further consultation with the Tennessee State Historic Preservation Officer is required.

ARAR 6: Control of storm water discharges associated with construction activities at industrial sites that result in a disturbance of > 5 acres of total land area. For those sites with < 5 acres affected (relevant and appropriate): Implement good site planning and best management practices to control storm water discharges including:

- minimal clearing for grading,
- removal of vegetation cover only within 20 days of construction,
- weekly erosion control inspections and maintenance,
- control measures to detain runoff, and
- discharges that do not cause erosion.

Citation: 40 *CFR* 122 and Rules of TDEC, Chap. 1200-4-10-.05.

Addressed in: Sect. 3.3.3.

ARAR 7: Non-point-source air emissions (applicable): Take reasonable precautions to prevent particulate matter from becoming airborne; no visible emissions are permitted beyond property boundary lines for more than 5 min/h or 20 min/day. Potential non-point sources of fugitive emissions are included in the plant-wide fugitive emissions plan.

Citation: Rules of TDEC, Chap. 1200-3-8-.01.

Addressed in: Sect. 3.3.4.

ARAR 8: Discharge of groundwater to appropriate ORNL treatment facility (TBC): Must meet WAC of treatment facility.

Citation: WM-WMCO-201 July 1991.

Addressed in: Sect. 3.3.5.

ARAR 9: Wastewater exemption for RCRA waste, transport of water to onsite National Pollutant Discharge Elimination System- (NPDES-) permitted facility (applicable): Wastewater accepted by an NPDES-permitted facility need not meet separate RCRA requirements.

Citation: WM-WMCO-201 July 1991.

Addressed in: Sect. 3.1.

ARAR 10: Characterization/management of waste streams generated during action that are potentially contaminated with RCRA-characteristic waste (applicable): A person who generates solid waste must determine whether that waste is hazardous using various methods, including application of knowledge of the hazardous characteristics of the waste based on information regarding the materials or processes used.

Citation: 40 *CFR* 262.11 and Rules of TDEC, Chap. 1200-1-11-.03(1)(b).

Addressed in: Sect. 3.3.5.1.

ARAR 11: Generators of LLW (TBC): LLW generators must characterize and segregate LLW from uncontaminated waste and otherwise minimize the amount of LLW generated. Subsequent management of LLW must be in accordance with DOE Order 5820.2A.

Citation: DOE Order 5820.2A(III.3).

Addressed in: Sects. 3.3.5.1 and 3.3.5.2.

ARAR 12: Transportation of hazardous and radioactive materials above exempt quantities (applicable): The waste must meet packaging, labeling, marking, placarding, and pretransport requirements in accordance with DOT regulations.

Citation: 49 *CFR* 171-174 and 177-179; DOE Order 460.1A (TBC).

Addressed in: Sect. 3.3.5.3.

ARAR 13: Packaging of radioactive materials above exempt quantities for public transport (applicable): Must meet packaging requirements based on the maximum activity of radioactive material in a package.

Citation: 49 *CFR* 173.431; 49 *CFR* 173.433; 49 *CFR* 173.435; 49 *CFR* 173.411.

Addressed in: Sect. 3.3.5.3.

ARAR 14: Waste shipped from one field organization to another for disposal (TBC for all waste LLW streams shipped off site): Generators must certify before the shipment that the waste meets the WAC of the receiving facility.

Citation: DOE Order 5820.2A(III).

Addressed in: Sect. 3.3.5.1.

ARAR 15: Shipments of LLW (TBC): LLW must be disposed of onsite; if offsite disposal is required due to lack of capacity, disposal must be to a DOE facility.

Citation: DOE Order 5820.2A.

Addressed in: Sect. 3.1.

ARAR 16: Shipments of LLW (TBC): Offsite disposal of LLW to a commercial facility requires an exemption from the onsite disposal requirements of DOE Order 5820.2A; requests for exemption must be approved by the DOE-ORO Field Office. DOE Order and implementing procedural requirements for offsite shipments must be met.

Citation: DOE Order 5820.2A.

Addressed in: Sects. 3.1 and 3.3.5.3.

ARAR 17: Treatment of LLW (TBC): Treatment techniques to reduce volume of contaminated soil shall be implemented as necessary to meet performance requirements.

Citation: DOE Order 5820.2A(III).

Addressed in: Sect. 3.3.5.2.

ARAR 18: Temporary and interim storage of TRU waste at generating site (TBC for material, if any, meeting definition of TRU waste): For storage of soil contaminated with TRU waste in drums temporarily onsite and the transfer of such waste to a interim storage site, meet requirements, as outlined in DOE Order 5820.2A(II) for the packaging, management, and temporary storage of TRU waste. Major requirements of Chapter II include the following:

- place in noncombustible packaging that meets DOT requirements;
- monitor periodically to ensure that wastes are not releasing radioactive and/or hazardous constituents;
- protect from unauthorized access;
- store in such a way so as to maintain radiation exposures ALARA; and

- construct and maintain area in such a way as to minimize the adverse impacts of fire, explosion, or accidental release of hazardous components.

Citation: DOE Order 5820.2A(II).

Addressed in: Sect. 3.3.5.2.

ARAR 19: Handling/management of TRU waste (relevant and appropriate for material, if any, meeting definition of TRU waste): TRU waste shall be managed to provide reasonable assurance that the combined annual dose equivalent to any member of the public in the general environment resulting from discharges of radioactive material and direct radiation from such management shall not exceed 25 mrem/year to the whole body and 75 mrem/year to any critical organ.

Citation: 40 *CFR* 191.03(b).

Addressed in: Sect. 3.3.5.2.

7. REFERENCES

DOE (U.S. Department of Energy) 1992. *Federal Facility Agreement for the Oak Ridge Reservation*, DOE/OR-1014, U.S. Environmental Protection Agency Region IV, U.S. Department of Energy, Tennessee Department of Environment and Conservation. (Effective Date—January 1, 1992, as amended)

DOE 1998a. *Action Memorandum for the Core Hole 8 Plume Source (Tank W-1A) Removal Action at Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1749&D1.

DOE 1998b. *Engineering Evaluation/Cost Analysis for the Core Hole 8 Plume Source (Tank W-1A) Removal Action at Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/02-1714&D2.

42 U.S.C. 9610 *et seq.*, Comprehensive Environmental Response, Compensation, and Liability Act.

40 *CFR* Part 300 *et seq.*, National Oil and Hazardous Substances Pollution Contingency Plan.

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