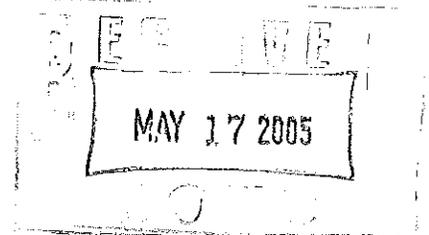


**Addendum to the
Removal Action Report
for the Bethel Valley Main Plant
Inactive Liquid Low-Level Radioactive Waste Tanks
at Oak Ridge National Laboratory
Oak Ridge, Tennessee**



This document is approved for public release per review by:

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7/16/04

ORNL Technical Information Officer

Date

**Addendum to the
Remedial Design Report
for the Bethel Valley Main Plant
Inactive Liquid Low-Level Radioactive Waste Tanks
at Oak Ridge National Laboratory,
Oak Ridge, Tennessee**

Date Issued—September 2004

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

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managing the
Environmental Management Activities at the
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Paducah Gaseous Diffusion Plant Portsmouth Gaseous Diffusion Plant
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PREFACE

This *Addendum to the Removal Action Report for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks at Oak Ridge National Laboratory, Oak Ridge, Tennessee* (DOE/OR/01-1953&D2/A3), was prepared in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. This document provides information applicable to the remediation of the remaining 13 inactive low-level waste tanks at Oak Ridge National Laboratory. A total of 11 tanks—WC-1, WC-10, WC-11, WC-12, WC-13, WC-15, WC-17, 3003-A, T-14, W-1, and W-2—were discussed under the original removal action report issued in February 2001.

The remediation of the remaining 13 tanks was completed in accordance with the following documents: *Engineering Evaluation/Cost Analysis for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks, Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1721&D3 (DOE 1999a); *Action Memorandum for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks, Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1813&D1 (DOE 1999b); *Action Memorandum Addendum for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks, Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1833&D2 (DOE 1999c); *Removal Action Work Plan for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks, Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1821&D1 (DOE 1999d); and *Addendum to the Removal Action Work Plan for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks, Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1842&D1 (DOE 1999e).

The work described herein was accomplished by The Providence Group, Inc., under subcontract number 23900-SC-OR-072F. The tanks remediated and discussed by this removal action report addendum are W-11, WC-4, W-19, W-20, TH-4, W1-I, WC-20, WC-9, F-501, W-18, W-17, WC-3 and 2026-A.

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ACRONYMS

ALARA	as low as reasonably achievable
ARARs	applicable or relevant and appropriate requirements
CA	Contamination Area
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DUST	disposal unit source term
ELCR	excess lifetime cancer risk
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
HEPA	high-efficiency particulate air
HIC	high-integrity container
HFIR	High Flux Isotope Reactor
HOG	Hot Off-Gas (system)
LEL	lower exposure limit
LLLW	liquid low-level radioactive waste
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
PCB	Polychlorinated Biphenyls
PPE	personal protective equipment
QA	Quality Assurance
RCT	radiation control technician
REDC	Radiochemical Engineering Development Center
RmAWP	Removal Action Work Plan
TDEC	Tennessee Department of Environment and Conservation
TRU	Transuranic
WAC	waste acceptance criteria
WIPP	Waste Isolation Pilot Plant

EXECUTIVE SUMMARY

The liquid low-level radioactive waste (LLLW) system at Oak Ridge National Laboratory (ORNL) has been used to collect, store, and treat wastes from laboratories and processes since the mid-1940s when ORNL was constructed as part of the Manhattan Project. As the plant expanded, LLLW storage tanks were added to the system, and other tanks were taken out of service. The LLLW tanks are underground or in vaults to protect workers from radiation that may be associated with the tank contents.

This removal action included the remediation of 24 LLLW tanks at ORNL. The remediation of LLLW tanks WC-1, WC-10, WC-11, WC-12, WC-13, WC-15, WC-17, 3003-A, T-14, W-1, and W-2 has already been described in the *Removal Action Report for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks, Oak Ridge National Laboratory, Oak Ridge, Tennessee* (DOE 2001). The remaining tanks—W-11, WC-4, W-19, W-20, TH-4, W1-I, WC-20, WC-9, F-501, W-18, W-17, WC-3, and 2026-A—are covered under this Removal Action Report Addendum to the original report. All of the tanks are listed as Category D tanks in the Federal Facility Agreement (FFA).

The purpose of this removal action was to reduce potential risks associated with the 24 LLLW tanks and, as a result, remove these tanks from the FFA list of tanks requiring remediation. The alternative developed for the 13 remaining LLLW tanks included contents removal and tank shell stabilization. This alternative was developed and evaluated in the Engineering Evaluation/Cost Analysis (DOE 1999a) to satisfy the purpose of this removal action. The recommended alternative was presented for public comment in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. An Action Memorandum (DOE 1999b) and an Action Memorandum Addendum (DOE 1999c) were prepared, which selected this alternative to be used to remove the contents and to either stabilize or remove the tanks.

The Addendum to the Removal Action Work Plan (DOE 1999e) included a description of specific actions to be taken at the 13 remaining tanks. Specific actions carried out for the implementation of the selected alternative included the following:

- dissolve solid waste in tanks, if necessary;
- mechanically remove the sludge;
- dewater tanks containing significant levels of polychlorinated biphenyls;
- transfer suspended solids that met the LLLW treatment system waste acceptance criteria to the LLLW system via either Tank W-22 or W-23; and
- grout the tanks, when the remaining sludge volume and contaminant concentrations pose a residential excess lifetime cancer risk $< 1 \times 10^{-6}$.

Sludges were successfully removed from these tanks and either pumped into a shielded, trailer-mounted high-integrity container and transported to Tank W-23 or transferred directly into the LLLW active system. Following removal of sludges, the tanks were video inspected to verify that removal action objectives were met, and the tanks were stabilized by filling with grout. Work associated with this Removal Action Report Addendum was accomplished between January 17, 2001, and September 30, 2001.

1. INTRODUCTION AND PURPOSE

This *Addendum to the Removal Action Report for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks at Oak Ridge National Laboratory, Oak Ridge, Tennessee* (DOE/OR/01-1953&D2/A1) provides information applicable to the remediation of 13 inactive liquid low-level waste (LLLW) tanks at Oak Ridge National Laboratory (ORNL). This removal action included the remediation of a total of 24 LLLW tanks. The remediation of LLLW tanks WC-1, WC-10, WC-11, WC-12, WC-13, WC-15, WC-17, 3003-A, T-14, W-1, and W-2 has already been described in the *Removal Action Report for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks, Oak Ridge National Laboratory, Oak Ridge, Tennessee* (DOE 2001). The remaining 13 tanks—W-11, WC-4, W-19, W-20, TH-4, W1-I, WC-20, WC-9, F-501, W-18, W-17, WC-3, and 2026-A—are covered under this Removal Action Report Addendum to the original report. All of the tanks are listed as Category D tanks in the Federal Facility Agreement (FFA).

The purpose of this removal action was to reduce potential risks associated with the 24 LLLW tanks and, as a result, remove these tanks from the FFA list of tanks requiring remediation.

2. PROJECT DESCRIPTION

Since the early days at Oak Ridge National Laboratory (ORNL), research and development activities have involved the generation of radioactive materials and products. For years, ORNL was one of the world's leading producers of radioactive isotopes for medicine and research. Solid and liquid radioactive wastes resulted from most of ORNL's operations. These activities introduced the need for a waste management program to isolate and contain the individual waste streams. Radioactive liquid wastes from these activities were discharged into drains and piping systems that flowed into liquid low-level radioactive waste (LLLW) tanks in the main plant area of Bethel Valley. When tanks no longer receive waste from ORNL facilities, they are formally removed from service and declared inactive. Most of the inactive tanks and those that soon will be removed from service were installed more than 40 years ago. Most have no secondary containment, cathodic protection, or leak detection capabilities, although many were made of stainless steel, a material resistant to corrosion. Liquid levels in some inactive tanks fluctuate because of groundwater infiltration. Over the years, these tanks have been monitored continuously, and from time-to-time, they were pumped to remove excess contaminated water.

When the Oak Ridge Reservation (ORR) was placed on the National Priorities List in 1989, the U.S. Department of Energy (DOE), the state of Tennessee, and the U.S. Environmental Protection Agency (EPA) entered negotiations that resulted in a Federal Facility Agreement (FFA) in 1992. As the lead agency, DOE was responsible for developing an environmental restoration plan for facilities and areas discussed in the FFA (DOE 1992). Appendix F of the FFA identifies the ORNL LLLW tanks requiring remediation. In 1997, DOE, EPA, and the Tennessee Department of Environment and Conservation (TDEC) initiated a non-time-critical removal action to reduce the risk of a release of or exposure to radioactively contaminated waste in certain FFA Appendix F tanks.

The 13 LLLW tanks are a subset of those included in the Removal Action Work Plan (RmAWP) (DOE 1999d) and the Addendum to the Removal Action Work Plan (DOE 1999e). Physical and chemical characterization data were obtained from historical records, construction drawings, the *Waste Characterization Data Manual for the Inactive Liquid Low-Level Waste Tanks System at Oak Ridge National Laboratory, Oak Ridge, Tennessee* (DOE 1997), and field surveys.

The alternative developed for the 13 remaining LLLW tanks included contents removal and tank shell stabilization. This alternative was developed and evaluated in the Engineering Evaluation/Cost Analysis (DOE 1999a) to satisfy the purpose of this removal action. The recommended alternative was presented for public comment in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. An Action Memorandum (DOE 1999b) and an Action Memorandum Addendum (DOE 1999c) were prepared, which selected this alternative to be used to remove the contents and to either stabilize or remove the tanks.

The Addendum to the Removal Action Work Plan (DOE 1999e) included a description of specific actions to be taken at the 13 remaining tanks. Specific actions carried out for the implementation of the selected alternative included the following:

- dissolve solid waste in tanks, if necessary;
- mechanically remove the sludge;
- dewater tanks containing significant levels of polychlorinated biphenyls;
- transfer suspended solids that met the LLLW treatment system waste acceptance criteria (WAC) to the LLLW system via either Tank W-22 or W-23; and
- grout the tanks, when the remaining sludge volume and contaminant concentrations pose a residential excess lifetime cancer risk $< 1 \times 10^{-6}$. Figures 1 and 2 show the geographic location of the 13 tanks.

3. PROJECT REQUIREMENTS

Proposed work described in an Action Memorandum (DOE 1999b) for this project called for the removal, treatment (if necessary), and storage or disposal of tank contents. In the decision documentation prepared by DOE, it was stated that the proposed action “. . . will achieve and maintain risks at acceptable levels from the release of or exposure to residual contamination associated with the tanks for on- and off-site human and ecological receptors.” The work plan for this removal action was developed following guidance contained in the recommended alternative described in the Action Memorandum (DOE 1999b).

3.1 SUMMARY OF REMOVAL ACTION OBJECTIVES

The overall principal objective of the removal action was to reduce risks associated with the tank contents to a level that minimized potential threats to human and environmental receptors until a decision would be made regarding permanent closure. The principal objective was further broken down to the following removal action objectives: (1) remove the waste in the tanks to the extent practicable, (2) provide regulatory compliant disposition of the waste, (3) document that the remaining residuals in the tanks do not pose a risk above acceptable levels, and (4) stabilize the tank shells. An additional objective of the project was to use a removal method that maximized the sludge removal efficiency and minimized the quantity of clean water introduced to the tanks in the process.

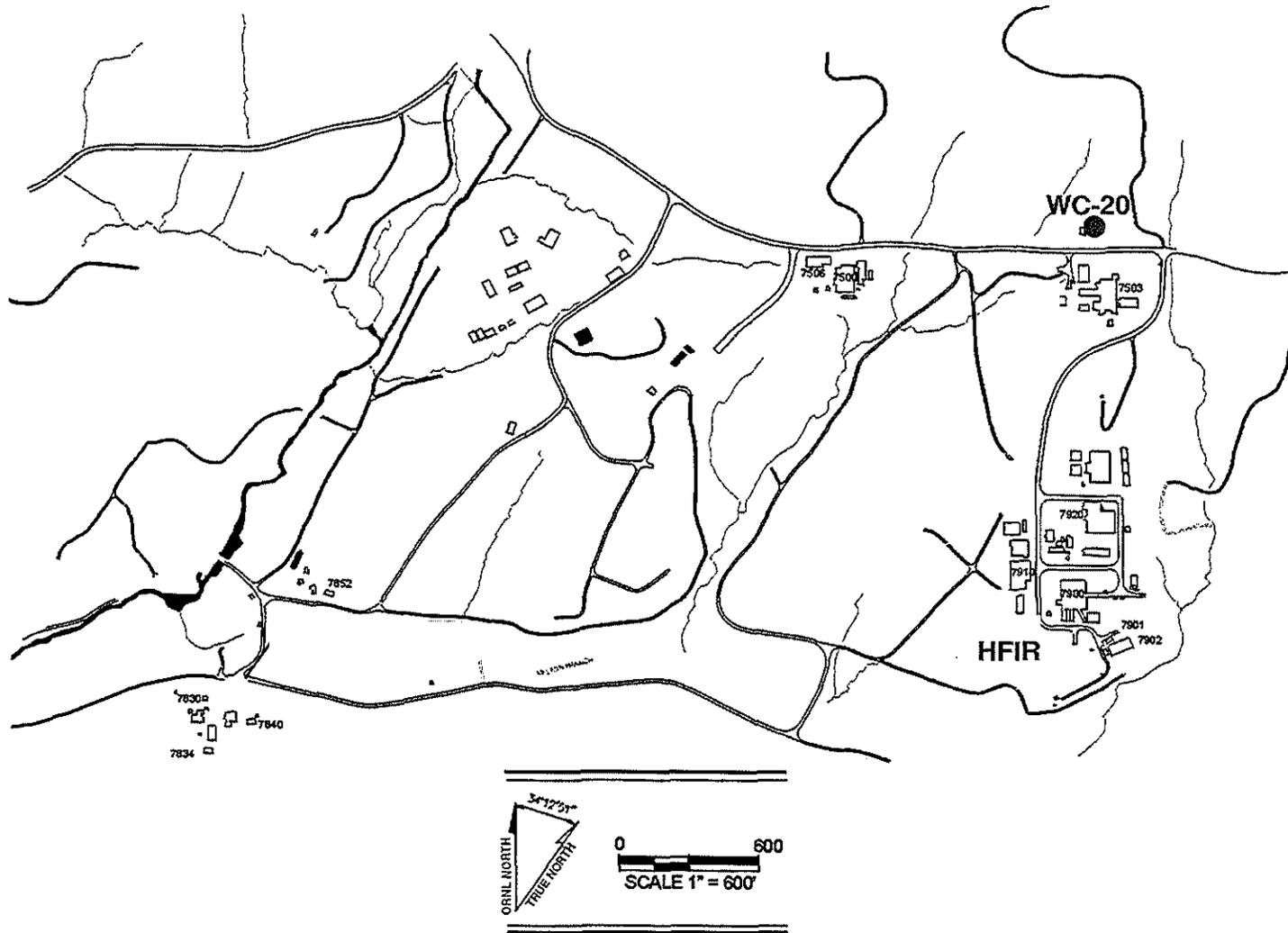


Fig. 2. Removal action Tank WC-20 located in the Melton Valley Complex of Oak Ridge National Laboratory.

3.2 SUMMARY OF PREFERRED REMEDY

The RmAWP (DOE 1999d) and the Addendum to the RmAWP (DOE 1999e) describe the methods to be used for completing the selected alternative and meeting the objectives of the removal action. Prior to initiating operations on a given tank, a Disposal Unit Source Term (DUST) model, based on previous sample information, was completed to estimate the maximum amount of undiluted sludge that could be left in the tank without exceeding an Excess Lifetime Cancer Risk (ELCR) of 1×10^{-6} . The analytical data that the DUST model calculations were based on were collected during a sampling campaign conducted from 1991 to 2000. Each FFA LLLW tank was sampled after the tank became inactive and listed as an FFA Category D tank. The analytical data are compiled in the *Waste Characterization Data Manual for the Inactive Liquid Low-Level Waste Tank Systems at Oak Ridge National Laboratory, Oak Ridge, Tennessee* (DOE/OR/01-1159&D2). Also during the sampling campaign, an estimate of the volume of sludge in each tank was made. These tank-specific data, in combination with the volume of waste presented in Table 4.1, were used to calculate final curies and risk based on the DUST model.

For all tanks except Tank TH-4, WC-4, W-19, W-20 and W1-I, the use of a high-pressure water spray was planned to dislodge and mix the settled solids (sludge) in the tank and then the tank contents were to be pumped to a high-integrity container (HIC) for transport to the active ORNL LLLW System. However, once the DUST models were examined and the initial camera inspections completed, it became apparent that no waste removal was required to fall below the ELCR for tanks WC-9, W-17, W-18, 2026-A, and F501. Only stabilization was required. For Tank TH-4, a Russian mixing system had been used in a previous EM-50 project to mix the settled solids before they were transferred to the active LLLW System; therefore, only stabilization of the tank was required under the this RmAWP. In WC-4, W-19, W-20, W1-I, and WC-20, nitric acid was added to the tanks to loosen up the waste heel before the material was mixed with a low-pressure water wash and pumped from the tanks. Once sludges were removed for the required tanks, the quantity of sludge remaining in each tank was estimated based on a final camera inspection and process knowledge of the level of dilution achieved during sluicing and pumping operations. This estimated quantity was then compared to the quantity of material that would yield an acceptable ELCR. Once the amount of waste material remaining met the ELCR guideline, the tanks were stabilized with a flowable fill (grout) to prevent in-leakage to the tanks in the future.

3.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Compliance with applicable or relevant and appropriate requirements (ARARs) was a key objective of this removal action. The (DOE 1999d) and the Addendum to the RmAWP (DOE 1999e) include a comprehensive listing of ARARs for this removal action. The ARARs that impact this removal action most predominantly include:

- Waste Acceptance Criteria for the ORNL LLLW System
- Control of Radionuclide Emissions – 40 *Code of Federal Regulations* (CFR) 61.92 and Rules of the TDEC 1200-3-11-.08
- ALARA procedures and controls – 10 CFR 20.1301(a)
- Characterization/management of wastes – 40 CFR 262.11, Rules of the TDEC 1200-1-11-.03(1)(b), 40 CFR 264.13(a)(1), Rules of the TDEC 1200-1-11-.06(2)(d), DOE Order 5820.2A, 40 CFR 268.40, Rules of the TDEC 1200-1-11-.10(3)(a).

4. REMEDIATION ACTIVITIES

This chapter describes the remediation activities completed for each of the remaining 13 LLLW tanks. The principal remediation activities are described in general in Sect. 3.1 and then the specific activities for each tank or group of similar tanks is described in Sect. 3.2. The initial and remaining sludge volumes in each tank and the success relating to the DUST model objective, sludge transfer dates, and grouting dates are shown on Table 4.1.

4.1 DESCRIPTION OF REMEDIAL ACTIVITIES

4.1.1 Mobilization

Mobilization for this project included preparation of project documentation and planning including environment, safety and health plans, tank-specific work plans, quality assurance (QA) plans, facility safety authorization basis documentation, and radiation control plans. A radiological survey was completed at each site to identify and quantify pre-existing areas of contamination. Establishment of project operations and staging areas at each tank site were then completed in accordance with the tank-specific work plans. Work areas were zoned and barricaded in accordance with requirements of the site-specific Environment, Safety and Health Plan. Because this project involved the removal, handling, packaging, and transportation of a variety of radioactive isotopes, radiation safety protocols were established to maintain worker radiation exposures as low as reasonably achievable (ALARA). The removal action QA Plan provides operational requirements, responsibility, and lines of authority to ensure that items and services adhered to quality criteria expressed in 10 CFR 830.120.

4.1.2 Initial Tank Inspection and Final Verification

The waste level was measured with a dipstick and videotaped before remediation to determine the amount of aqueous liquid and sludge present. Generally, a high-resolution camera was used to make the initial inspection through an access opening in each tank. A slim-line remote video camera with a variable zoom, integral lights, and a two-axis positioning system was used to obtain the images. The camera system was supported with a color monitor and recording unit. The camera unit was designed to traverse in piping as small as 3 in. in diameter. All video images of tank interiors were recorded on magnetic tape and identified as a project QA document.

During the residual sludge verification process, the volume of sludge remaining in each tank was determined such that comparison to an ELCR of less than 1×10^{-6} , as calculated by the DUST model, could be made. A series of measurements and observations were made to estimate the actual quantity of sludge remaining in each tank. Table 4.1 presents the initial and final sludge volumes and the initial and final estimated curie content of each tank. In cases where the volume of sludge remaining in the tank corresponded to an ELCR of less than 1×10^{-6} , permission was sought from the EPA to fill the tank with grout without first removing the waste material.

Table 4.1. Tank removal action summary

Tank No.	Tank capacity (gal)	Initial sludge volume (gal)	Waste characteristics of concern	Aqueous liquid (yes/no)	Residual sludge (gal)	Residual meets ELCR10^{-6} (from DUST model)	Initial curies in tank	Curies left in tank	Slurry transfer dates	Date grouted
W-11	1,500	94	TRU	No	41	Yes	0.75	0.328	1/25/01 – 1/29/01	1/31/01
WC-4	1,700	335	TRU	Yes	36	Yes	22.60	2.43	2/26/01 – 3/1/01	3/6/01
W-19	2,250	50	TRU	No	5	Yes	3,650.00	379	4/6/01	4/18/01 – 4/19/01
W-20	2,250	50	TRU	No	14	Yes	780.72	219	4/12/01	4/18/01 – 4/19/01
TH-4	14,000	6,400	-	Yes	1,098	Yes	3.44	0.59	1/13/01 – 1/15/01	4/24/01 – 4/27/01
W1-I	500	6	TRU	Yes	0.9	Yes	283.53	34.4	5/14/01	5/24/01
WC-20	10,000	100	TRU	Yes	3.7	Yes	1,001.72	38.9	6/20/01	6/22/01 – 6/25/01
WC-9	2,150	200	TRU	Yes	12	Yes	9.22	0.58	N/A	7/10/01
W-17	1,000	50	TRU/ PCB	No	15	Yes	0.32	0.10	N/A	7/16/01
W-18	1,000	50	PCB	Yes	15	Yes	0.11	0.03	N/A	7/16/01
WC-3	1,000	50	PCB	Yes	15	Yes	0.41	0.15	N/A	7/24/01
2026-A	500	40	TRU/ PCB	No	13	Yes	0.21	0.06	N/A	8/17/01
F-501	400	50	TRU/ PCB	Yes	< 25	Yes	12.21	6.1	N/A	9/5/01

4.1.3 Liquid Removal

Several of the tanks receive in-leakage from groundwater and/or rainwater. This aqueous liquid layer was removed as necessary to allow for inspection of the tank and effective sludge sluicing. The liquid was transferred to the active LLLW System using existing pumps and pipelines when available. In tanks not connected to the active LLLW System, an auxiliary pump and hoses were used to connect to the active LLLW System.

In Tank F-501, a layer of oil was present on top of the supernate in the tank. The oil was removed using a skimmer attached to the suction leg and transferred to two overpack drums filled with absorbent using a peristaltic pump.

4.1.4 Sludge Mixing and Removal

When historical data or initial tank inspections identified a hard heel in the tank, nitric acid was added a day or two prior to sluicing to aid in dissolving the heel. Tank contents removal began with the use of a remote water-washing device to mix any settled solids. Special nozzles and lances were used to cut/break/suspend the sludge solids and, where necessary, a high-pressure jet could be implemented in addition to the standard low-pressure wash. Pressure available for this purpose ranged from line pressure to 3500 psi and ensured the delivery of sufficient energy to clean residue and suspend the solids.

4.1.5 Sludge Transfer

In most cases, the sludge transfer was accomplished by pumping the suspended material to a shielded, trailer-mounted HIC. The capacity of the HIC was approximately 900 gal. The material was then transported by truck to Tank W-23. It was pumped to Tank W-23 through a double-walled hose between the HIC and Tank W-23. Some tanks, such as W-19 and W-20, were located close enough to active valve boxes to allow the slurry to be transferred directly into the LLLW System without the use of a HIC.

4.1.6 Tank Shell Stabilization (Grouting)

Grout filling was performed once regulatory approval of waste removal efforts had been approved for a given tank. Flow rate, field timing, visual observation, and "dip stick" or "float" gauging was used to monitor and measure the elevation of grout fill as it was being placed. Where practical, a plastic grout plate was used to cover the riser so that operators could easily monitor the fill level without leaning directly over the riser. The maximum fill level was within 6 in. of the top of the access riser. In some cases, most notably on Tank W-20, the dose-rate readings over the tank riser rose shortly after the final lift was added to the tank. This rise in dose-rate has been attributed to residual contamination that was liberated from the tank floor and floated up to the surface with the water that separated from the flowable fill. A thick concrete cap was added to the tank riser before a steel plate was installed over the opening. These two measures brought the dose-rate level down to background level.

4.2 TANK-SPECIFIC ACTIVITIES

4.2.1 Tank W-11

Tank W-11 is a 1500-gal Gunitite tank located in the Bethel Valley South Tank Farm. The underground tank was constructed in 1943 to serve as a waste collection and monitoring tank for research laboratories in Building 3550. Although the tank contained less than 50 gal of a fairly low-activity (<1 Ci)

sludge, in-leakage from rainwater was a problem. A level-indicating float and support brackets had been added to the tank to allow monitoring of the in-leakage. Approximately 1 ft of material had to be excavated to reveal the vitreous clay riser with a poured concrete base that provided access to the tank. The riser was partially obstructed by the float and support hardware and was loosely covered by a lead lid split into two pieces for easy removal. The tank was not connected to the plant Hot Off-Gas (HOG) System; thus, a portable high-efficiency particulate air (HEPA) unit was required during sludge removal and grouting activities.

Prior to remediation activities, the float system was cut free of the riser and dropped into the tank. A camera was deployed into the tank for an initial inspection on January 23, 2001, at which time it became apparent that the float rod and cross bracing would interfere with deployment and operation of the existing sluicing arm. A shorter sluice arm that could accommodate the obstruction was used, and sluicing operations began on January 25. A combination of high- and low-pressure spray was used to mobilize the sludge in the tank.

Sluicing and transfer operations between the HIC and Tank W-23 were completed on January 29. A final video inspection revealed 2–3 in. of water remaining from the flush operations. Approximately 40 gal of sludge remained and the TDEC/DOE inspection team approved the completion of tank cleaning operations the next day.

On January 31, the sluicing system was demobilized and approximately 8.5 yards³ of flowable fill was pumped into Tank W-11. All storage and radiation materials were relocated from the Tank W-11 site to the Tank WC-4 site, as weather permitted between February 1 and February 8, 2001. An additional 30 gal of flowable fill was added to the tank on March 6 to top off the riser and to set the final riser cover in place. This activity was arranged to coincide with the grouting of Tank WC-4.

4.2.2 Tank WC-4

Tank WC-4 is a vertically oriented 1700-gal stainless steel tank located west of Building 3036. The underground tank was installed in 1944 to collect wastes generated from the Roll Up Process, which involved dissolving uranium targets and extracting isotopes. Tank WC-4 received waste until the late 1950s, when it was removed from the active LLLW System. In May 1990, the tank was emptied, leaving a waste heel, estimated at less than 200 gal, in the bottom.

Personnel returned to the site on February 19 to replace the existing riser cover with a modified cover that allowed installation of the suction leg, camera, and a droplight into the tank. Tank WC-4 was not connected to the plant HOG system; thus, a portable HEPA unit was required during sludge removal and grouting activities. The tank interior was inspected and videotaped. The inspection revealed approximately 14 in. of liquid accumulated on the south side of WC-4 and a hard heel approximately 2 ft deep within 2–3 ft of the tank wall. On February 20, approximately 240 gal of nitric acid was pumped into the tank using a nitric acid tanker, a Randolph pump, and Tygon™ tubing. Full-face shields, chemically resistant suits, and butyl gloves were part of the special personal protective equipment (PPE) required for acid operations. A charcoal filter stage was added between the tank and HEPA inlet to absorb any nitric acid fumes. The exhaust from the HEPA system was monitored continuously with a 4-gas monitor, calibrated for the hydrogen lower exposure limit (LEL), and every 30 min for breakthrough nitric levels using a Draeger tube. Subcontractor personnel continued to monitor the HEPA exhaust for 4 h after completion of the nitrogen addition activities. No trigger levels were exceeded at any point.

The sluicing and pump system setup was completed on February 23 and 310 gal of water was added to Tank WC-4. The tank was washed several times over the next three days, resulting in a total of

2210 gal of slurry being transferred from the tank to the HIC. The final tank inspection was completed on March 1 and regulatory approval of sludge removal efforts was received on March 2.

Approximately 8 yards³ of flowable fill was added to tank WC-4 on March 6. Prior to pumping, the interface box had been replaced with a Plexiglas riser cover. This allowed the operators to visually monitor the grout level in the tank as fill operations progressed. The Tank WC-4 site was demobilized and the equipment trailers were moved to the worksite for Tanks W-19 and W-20.

4.2.3 Tank W-19

Tank W-19 is a vertically oriented 2250-gal stainless steel tank located north of Building 3517. The underground tank was installed to collect wastes generated from the recovery and reprocessing of uranium and other nuclear materials from the Metal Recovery Facility in Building 3505 and LLLW from Building 3517.

Sluicing and pumping equipment was delivered to the site and set up, and a cold-test demonstration was completed for a Readiness Review team on March 29.

A valve was installed in the valve box to control transfers from W-19 to Tank W-22 in the LLLW System. On March 4, the existing riser cover was replaced with an interface box and the HEPA unit was moved into place as a backup system in the event the plant HOG system failed to draw on the tank. A shielding enclosure was installed over the interface box that allowed 6-ft lead blankets to be hung vertically entirely around the tank riser. The blankets could be pulled apart temporarily for camera installations and riser inspections. The pumps and valves located in the contamination zone were placed in drip pans. Angle iron frames were mounted over the pumps and valves and lead blankets were secured to these frames. The length of the transfer line from the diaphragm pump to the valve box was also covered with lead blankets.

The initial tank inspection was performed on April 4 with the color camera. A cooling coil mounted in the bottom of the tank made camera deployments and in-tank equipment placements more difficult than expected. The inspection showed the presence of some water, as well as some chunks of hard white and brown sludge. The area directly below the riser was free of sludge, making a precise depth measurement difficult to achieve using the dipstick. Once the inspection was complete, 150 gal of 5.5 M nitric acid was added to aid in dissolving the waste material. After allowing the acid to sit for two days, approximately 600 gal of water was added to the tank through a water injection arm. This slurry was then removed using the diaphragm pump. Clean water was added to the transfer hose to dilute the slurry before it entered the LLLW System through the valve box. This dilution was required to reduce operational dose rates. An extended corridor also was added to the Contamination Area (CA) so that personnel could exit the tank area and walk behind a block wall for shielding during pumping operations. Radiation control technicians (RCTs) used long-handled probes to take readings near the transfer equipment and a preliminary flush was completed before personnel entered the area around the tank riser to make valve adjustments. Approximately 4,400 gal of diluted slurry was transferred to Tank W-22. Because the bottom of the tank was convex and the riser was located close to the tank wall, a portion of the diluted waste could not be pumped. A final camera inspection was performed on April 6 after clean water had been backflushed through the suction leg. This inspection indicated that approximately 50 gal of water remained in the tank. An estimate was performed to determine that the material remaining on the tank bottom had been diluted by approximately 90%; therefore, the 50 gal contained approximately 5 gal of sludge. The ELCR for the tank was only 7.7 gal of undiluted material, thus regulatory approval was given for the cleanup effort on April 9. On April 10, the interface box was moved to Tank W-20 and a grout cover was installed on Tank W-19.

Grout operations did not take place until after the waste material had also been removed from Tank W-20 so that both tanks could be filled on the same day(s). On April 18, 8 yards³ of flowable fill was added to the tank. Additional grout was added to the tank the next day. As the grout level rose in the tank, so did the radiation levels measured over the riser. This appeared to be the result of radiological contaminants floating up on the shallow layer of water that separated from the grout. Personnel were removed from the area and a method to seal and shield the riser was devised and sent through the administrative system for approval. On April 23, absorbent was added to the tank to absorb the layer of water, and Quickcrete was mixed and poured into the riser over the absorbent to seal the riser and to provide some radiological shielding from the contaminants. The grout cover was replaced with a final riser cover.

4.2.4 Tank W-20

Tank W-20 is a vertically oriented 2250-gal stainless steel tank located north of Building 3517 and south of Tank W-19. This underground tank was installed to collect wastes generated from the recovery and reprocessing of uranium and other nuclear materials from the Metal Recovery Facility in Building 3505 and LLLW from Building 3517.

On April 10, the interface box and tank riser shielding frame were moved from Tank W-19 onto Tank W-20, and the HEPA unit was repositioned and reconnected as a backup system in the event the plant HOG system failed to draw on the tank. The shielded water injection and waste transfer equipment used on Tank W-19 was essentially left in place for Tank W-20. Only the hose connections to the interface box were moved to Tank W-20. The color camera was deployed for the initial inspection and then 100 gal of nitric acid was added to the tank on April 10. Tank W-20 contained some water in addition to a hard sludge heel. An infrared camera mounted on a pole was installed in the tank the next day and left in place for the waste removal operations. The water injection leg was also installed at this time. A cooling coil was mounted in the bottom of this tank making the camera and injection arms somewhat difficult to deploy and position.

After allowing the acid to sit for two days, approximately 600 gal of water was added to the tank through the water injection arm. This slurry was then removed using the diaphragm pump. Clean water was added to the transfer hose to dilute the slurry before it entered the LLLW System through the valve box. This dilution was required to reduce operational dose rates. Approximately 4,100 gal of diluted slurry was transferred to Tank W-22 on April 12. Because the bottom of the tank was convex and the riser was located close to the tank wall, a portion of the diluted waste could not be pumped. The infrared camera was removed and the color camera was installed for the final camera inspection. This inspection indicated that most, but not all, of the hard sludge had dissolved in the nitric acid. Approximately 14 gal of residual sludge was estimated to remain in the tank after the effects of dilution were taken into account. The DUST model for Tank W-20 indicated that up to 78 gal of undiluted sludge could have been left in the tank; therefore, regulatory approval was given for the cleanup effort. On April 18, approximately 8 yards³ of flowable fill was pumped into the tank. Additional grout was added to the tank the next day. As the grout level rose in the tank, the contact radiation level measured on the grout cover rose from 1.2 mR/h to 320 mR/h. This appeared to be the result of radiological contaminants floating up on the shallow layer of water that separated from the grout. Personnel were removed from the area and a method to seal and shield the riser was devised and sent through the administrative system for approval. On April 23, absorbent was added to the tank to absorb the layer of water, and Quickcrete was mixed and poured into the riser over the absorbent to seal the riser and to provide some radiological shielding from the contaminants. The grout cover was replaced with a final riser cover.

4.2.5 Tank TH-4

Tank TH-4 is a vertically oriented 14,000-gal stainless steel tank located to the southwest of Building 3500. This underground tank was installed in 1952 and received waste from the thorium and uranium pilot plant development projects in Building 3550.

The bulk of the waste material had already been pumped from this tank under the scope of a previous EM-50 project using a Russian mixer. The supernate was removed on April 23 and equipment was mobilized to the site the next day. On April 25, the work area was established, construction and radiological/contamination boundaries were set up, and four of the existing risers were replaced with Plexiglas grout covers. Approximately 80 yards³ of flowable was added to the tank that day. The next day, a layer of water was noted in each riser. Portland cement was added to the various risers to absorb the water.

On April 27, each riser in the tank was topped off individually with flowable fill. About 10 yards³ more of grout was used. A small amount of water remaining in one riser required the addition of one last bag of Portland cement. The grout covers were replaced with the original covers, equipment was demobilized, the work area was cleaned, and the area was downposted.

4.2.6 Tank W1-I

Tank W1-I is a 500-gal stainless steel tank located approximately 20 ft east of Building 3028. The tank was installed in 1950 as an intermediate holding tank for radioactive waste from hot cells in Building 3028. An east wing was added to the building to house the alpha powder handling operations. The floor slab of the east wing was constructed over the tank, which is now situated under the east wing air lock. An approximate 3-ft-vertical airspace exists between the top of the tank and the top of the floor slab. Dirt was backfilled around the tank. The tank sits on a concrete pad designed to collect leakage and channel it to an adjacent detection well. A 6- by 8-ft plate covered the void space over the tank.

Approval to proceed with W1-I operations was received on May 2. Due to the potential for alpha contamination once the tank area was breached, the work area floor was lined with plastic and an opening was cut out around the cover plate; a containment tent was erected over the immediate tank area. The portable HEPA unit was set in place outside the containment tent. A tee was installed on the inlet of the HEPA unit so that one leg could be used to maintain negative pressure on the tent. The second leg of the tee was to be attached to a nozzle on the tank interface plate (once installed) so that the portable HEPA unit could be used as a backup system to the plant HOG system. A manometer was installed on the tent to verify that the appropriate pressure was maintained. The portable HEPA system ran over the weekend to check and to verify the integrity of the containment.

On May 8, the seal around the cover plate was broken loose and pried up a few inches. An aerosol encapsulant was sprayed through the narrow gap to coat the underside of the cover plate and the general void space area. A smoke test verified that the plant HOG system was operational. The cover plate was removed, wrapped in polyethylene, and secured out of the way. Polyethylene sheeting was draped over the top of the tank and small openings were cut and taped around the tank's two 6-in. risers. Each of the riser openings contained expandable pipe plugs. Once the plugs were removed, a smoke test indicated that the HOG system was functioning very well.

On May 11, the demarcated suction leg was installed in the tank, revealing that very little liquid was present in the tank. The color camera was deployed in the tank as well to verify that minimal supernate was present. Nitric acid was added and allowed to sit over the weekend. On May 14, water was added to the tank and approximately 290 gal of liquid was pumped from Tank W1-I.

The final camera inspection was performed on May 14, 2001. The residual sludge volume was calculated to be less than 0.9 gal and met the risk modeling to be within the established 1×10^{-6} risk goal. The tank was approved as "ready to be grouted" by TDEC and DOE. The tank was grouted on May 24, 2001, after which the plate cover was reinstalled and the site was demobilized.

4.2.7 Tank WC-20

Tank WC-20 is a horizontally oriented 10,000-gal, 304L stainless steel tank set in a stainless-steel-lined vault and located north of Building 7567 in the Melton Valley Complex. The tank was used to store LLLW generated from radiochemical operations designed to recover isotopes produced from irradiated HFIR targets and other sources. Some of the tank waste was produced at the Radiochemical Engineering Development Center (REDC), primarily by the disposal of spent off-gas scrubber solutions. Other sources of Tank WC-20 waste material were from routine and non-routine washdowns of hot cells and other contaminated equipment.

The material storage trailers were moved to the Tank WC-20 site on June 14. The next day, rainwater was removed from the concrete pad over the tank and the boundaries were roped off and posted. Then the floor of the contamination area and the sides of the riser that extended above the concrete pad were lined with Herculite. The portable HEPA unit was set in place as a backup system, although the HOG system was verified as operational when the existing tank cover was removed and replaced with a new interface cover. The suction leg and sluicing arm were installed and a tank inspection was performed. No water was present in the tank. The sludge was dark in color and crusty. The bottom of the tank was visible through numerous cracks in the waste material and the overall depth appeared to vary between $\frac{1}{2}$ to $1\frac{1}{2}$ in.

Approximately 250 gal of nitric acid was added to the tank on June 18, allowing the sludge to dissolve over the next two days. On June 20, the tank contents were mixed by adding 700 gal of water to the sludge/acid mixture. About 960 gal of slurry was then transferred to the Evaporator Storage Tanks using the active LLLW System. The dose rate at the riser had been reduced from 380 mR/h (prior to addition of acid) to 40 mR/h. A final camera inspection conducted on the same day revealed that a minimal amount of liquid remained in the tank following the slurry transfer. Although the nitric acid did not dissolve the sludge to the extent seen on previous tanks, the crust and some of the bulk deposits had been removed. Large areas of the tank floor were visible and the remaining liquid appeared moderately diluted. TDEC and DOE approved the tank as ready for grouting on June 21. The next day, approximately 40 yards³ of grout was pumped into the tank. The grout filling was completed on June 25 when an additional 16 yards³ of flowable fill was added to the tank. Demobilization of the site was completed on June 26.

4.2.8 Tank WC-9

Tank WC-9 is a 2150-gal, 347 stainless steel, direct-buried, vertically oriented tank. The tank, which is located south of Building 3503 in the ORNL Bethel Valley Complex, was used to collect LLLW from Building 3503, a high-level radiation-engineering laboratory used for pilot plant studies. The tank also received condensate from the plant HOG system and liquid from the pump pit sump.

The material storage trailers were moved to the Tank WC-9 site on June 27, the boundaries were roped off and posted, and the ground in the contamination area was lined with Herculite. The portable HEPA unit was set in place, the existing cover was replaced with a modified cover, and an initial camera inspection was completed of the tank interior. Very little water was present in the tank and considerably less sludge than expected was visible. The sludge depth varied from $\frac{1}{4}$ to $\frac{1}{2}$ in. along the entire tank bottom. Although the tank bottom is dome shaped, the sludge depth was relatively uniform over the entire

surface. Because a sludge depth of ½ in. corresponded to a volume of 12 gal, the tank met the risk modeling to within the established 10^{-6} goal and was approved on July 3 as “ready to be grouted” by TDEC and DOE. The tank was grouted on July 10, after which the original riser cover was reinstalled and the site was demobilized.

4.2.9 Tank W-17

Tank W-17 is a 1000-gal, 304L stainless steel, direct-buried, vertically oriented tank. The tank is located in the South Tank Farm just west of Building 3525 in the ORNL Bethel Valley Complex. The tank was installed in 1951 and served as a waste tank for isotope production in Building 3026C.

The material storage trailers were mobilized to the Tank W-17 site on July 11. Because Tanks W-17 and W-18 are adjacent to one another in the South Tank Farm, the boundaries and postings were arranged to include both tanks in the same area so they could be grouted on the same day. On July 12, Tanks W-17 and W-18 were isolated and the existing riser covers were removed. These were replaced with Plexiglas cover interface plates. A camera inspection was performed on both tanks, switching the camera and portable HEPA unit between tanks as necessary. Very little water was present in Tank W-17. The sludge depth was approximately 1 in. along the entire tank bottom. This depth corresponded to a volume of approximately 15 gal, which was well below the established 10^{-6} risk goal. Approval was received to grout the tank without further remediation. Grouting was completed on July 16 and the site was demobilized on July 17.

4.2.10 Tank W-18

Tank W-18 is a 1000-gal, 304L stainless steel, direct-buried, vertically oriented tank located in the South Tank Farm just west of Building 3525 in the ORNL Bethel Valley Complex. The tank was installed in 1951 and served as a waste tank for isotope production in Building 3026C. Multigram quantities of radioisotopes were separated, purified, stored, and distributed in the processing in Building 3026C during this time. Most of the waste received in the tank was the result of routine and non-routine hot cell and equipment decontamination. The tank waste was frequently jetted to the Evaporator Facility.

The material storage trailers were mobilized to the Tank W-18 site on July 11. Because Tanks W-17 and W-18 are adjacent to one another in the South Tank Farm, the boundaries and postings were arranged to include both tanks in the same area so that they could be grouted on the same day. Overgrown bushes and brush were cut back from the Tank W-18 area on July 12 to provide easier access to the tank. Also this day, subcontractor personnel isolated Tanks W-17 and W-18 and removed the existing riser covers. These were replaced with Plexiglas cover interface plates. A camera inspection was performed on both tanks, switching the camera and portable HEPA unit between tanks as necessary. Very little water was present in Tank W-18. The sludge depth was approximately 1 in. along the entire tank bottom. This depth corresponded to a volume of approximately 15 gal, which was well below the established 10^{-6} risk goal. Approval was received to grout the tank without further remediation. Grouting was completed on July 16 and the site was demobilized on July 17.

4.2.11 Tank WC-3

Tank WC-3 is a 1000-gal, 347 stainless steel, direct-buried, vertically oriented tank. It is located south of Building 3025 in the ORNL Bethel Valley Complex. Tank WC-3 was used primarily to collect residuals from metallurgical sampling and analysis. The waste solutions came from etching, dissolution, and decontamination of particulate residue from physical property analysis of irradiated metals.

Equipment was mobilized to the Tank WC-3 site on July 17. The next day the work area was set up, and the riser cover was removed and replaced with a modified interface cover. A camera inspection was performed showing approximately 50 gal of water in the tank. The sludge depth was approximately 1 in. across the entire tank bottom, corresponding to a volume of 15 gal and a source term of 0.15 Ci. This was well below the established 10^{-6} risk goal. Approval was received to grout the tank without further remediation. On July 24, approximately 5 yards³ of grout was pumped into the tank, thus completing the grouting process. The original riser cover was replaced and the site was demobilized on July 25.

4.2.12 Tank 2026-A

Tank 2026-A is a 700-gal vertical tank located inside an in-ground concrete vault to the southeast of Building 2026. The tank is constructed of Hastelloy C and has a stainless steel top and piping. A concrete plug was installed over the tank to seal the vault. Installed in 1962, Tank 2026-A received radioactive and chemical wastes from processes involving radioactive sample analysis in Building 2026. The tank was removed from service in 1996.

Tank remedial operations were initiated on July 31 when fall protection railing was installed around the concrete plug over the vault. The concrete vault plug was removed using a crane on August 7. After removal, the plug was wrapped in plastic and set aside in the designated lay-down area. The portable HEPA unit was set up with a tee and one leg of the inlet duct was fed down into the vault. The other leg was blanked off until the tank could be opened. Work platforms were installed over the vault opening and the CA and construction boundaries were put into place. The next day, an aerosol encapsulant was sprayed onto the vault walls to trap the removable contamination. A camera inspection of the vault was also completed at this time.

On August 9, an expandable plug was removed from the top of Tank 2026-A using long-handled tools. A riser extension was installed on the tank so that the other leg of the HEPA inlet could be fed down into the extension to draw tank contaminants away from the opening. The camera was also deployed through the riser extension to perform an initial inspection of the tank. Material estimated at approximately 26 gal remained on the floor of Tank 2026-A. Because the majority of the material appeared to be liquid, approximately 15 gal of absorbent were added to the tank to absorb the moisture. On August 13, the camera was used to verify that most of the liquid had been absorbed in the tank. Not only was the residual moisture gone, but a small pile of absorbent also remained.

Approximately 3 yards³ of grout was added to Tank 2026-A on August 17. The final few inches of fill were added manually on August 20 before initiation of site demobilization activities. The riser extension had been fabricated in two sections, coupled together with a slip-fit joint. Once the fill operations had been completed, the top half of the riser extension was removed and the remaining section of the extension was capped to seal off the tank access. Once the CA had been cleared, the work platforms were removed and the concrete plug was reinstalled over the vault opening. Demobilization activities were completed on August 22.

4.2.13 Tank F-501

Tank F-501 is a 400-gal, 304L stainless steel, vertically-oriented tank located in an underground concrete vault near Building 3525 in the ORNL Bethel Valley Complex. The tank was used to collect LLLW generated from Building 3525. Building 3525 LLLW was produced from the disassembly and decontamination of reactor components. The liquid waste was jetted from the tank to the Evaporator Facility either when the tank was filled or at a preset time interval. The waste was continuously collected and discharged. In December 1998, a sample was collected from the tank. The sample analyses indicated that a brownish-black layer of organic material floating on the surface of the supernate contained

polychlorinated biphenyls (PCBs). This layer of material had to be separated from the remaining tank waste and disposed of as PCB waste before the tank could be grouted in place.

Equipment was mobilized to the Tank F-501 site on August 24. On August 27, the radiological and construction boundaries were posted and the CA was lined with reinforced plastic in preparation for operations. On that same day, a crane was used to remove the concrete-filled pipe that had been used to plug the vault opening. A smoke test verified that the plant off-gas system was drawing air from the vault.

Once the plug had been lifted and set aside, long-handled tools were used to remove the existing riser cover and replace it with a modified riser interface flange. A riser extension was installed using a slip-fit coupling between the interface flange and the top of the vault. After completing a camera inspection on August 29, the suction leg and skimmer for the oil transfer system were installed in the tank in preparation for removal of the organic layer containing PCBs. Once this layer was successfully skimmed off and transferred to two drums containing an absorbent material, the remaining supernate was pumped off and transferred to the active LLLW System. After a final camera inspection to verify that the remaining tank waste (less than 25 gal) met the acceptance criteria, the tank was grouted using approximately 2 yards³ of grout and the vault cover was replaced.

5. DEVIATIONS FROM THE REMOVAL ACTION WORK PLAN

No significant differences were found between the selected remedy as defined in the Action Memorandum (DOE 1999b) and the Action Memorandum Addendum (DOE 1999c) and the remedial activities completed for each of the 13 LLLW tanks. However, there was a deviation from the scope of the RmAWP (DOE 1999d) concerning the tanks addressed by this action. The Action Memorandum and the RmAWP addressed the following 11 LLLW tanks: WC-1, WC-4, WC-10, WC-11, WC-12, WC-13, WC-15, WC-17, W-19, W-20, and 2026-A. The Action Memorandum Addendum (DOE 1999c) and the Addendum to the RmAWP (DOE 1999e) were written to address the following 13 remaining inactive LLLW tanks at ORNL: 3003-A, T-14, W-1, W-2, W-11, WC-3, WC-9, W-17, W-18, W1-I, F-501, TH-4, and WC-20. [Note: T-1, T-2, and the High Flux Isotope Reactor (HFIR) tank were temporarily added but later removed from the scope of the addendum.] The selected remedy for these remaining tanks was the same as the selected remedy for the first set of 11 tanks.

During performance of the removal action, it became necessary to change subcontractor resources due to safety and health concerns. With input from EPA and TDEC, the order in which tanks were scheduled for remediation was altered such that four of the tanks (i.e., WC-4, W-19, W-20, and 2026-A) were not completed until the current phase of the removal action rather than in the first phase as originally scheduled. Four other tanks scheduled for the later phase of the removal action (i.e., W-1, W-2, T-14, and 3003-A) were completed during the first phase. This rescheduling allowed tanks of similar chemical and radiological characteristics to be remediated together.

Five tanks containing PCB-contaminated sludge (i.e., 2026-A, WC-3, W-17, W-18, and F-501) were scheduled to be the final tanks to undergo remediation. The PCB levels exceeded the acceptance criteria for the ORNL LLLW System, which would have necessitated the dewatering of all sludges removed from each of the tanks and storage of the sludges until an approved disposition pathway became available. The only pathway for disposal of transuranic (TRU) sludge is the Waste Isolation Pilot Plant (WIPP), however, the WIPP WAC does not currently allow WIPP to accept regulated PCBs. A factor considered in recommending a final action for these tanks was that the DUST Risk Model calculations for these tanks indicated that the existing sludge volume met the 10E-6 ELCR. A recommendation was made to TDEC

and EPA to remove the supernate from these tanks and confirm the residual sludge volume was within the risk limits. This approach reduced the overall project cost, secondary waste volumes, operations risk of sludge-handling operations, and storage burden for a waste with no pathway. The EPA concurred with the recommended approach. In addition, the oil removed from Tank F-501 was found to meet the criteria for PCB and TRU waste and required packaging for storage at the TRU bunker at ORNL because no disposal path is currently available.

6. COSTS

The baseline costs estimated and actual costs incurred for each tank are shown in Table 6.1. The total actual cost was approximately 6% less than the projected total cost. This is due in large part to the elimination of sludge removal from the five tanks containing PCB-contaminated sludges.

Table 6.1. Baseline tank remediation costs vs actual costs

Tank No.	Baseline costs (\$ in thousands)	Actual costs (\$ in thousands)
W-17	120,934	113,497
W-18	120,934	113,497
WC-3	136,746	128,337
F-501	216,202	202,906
WC-20	488,577	458,532
W1-I	444,392	417,064
TH-4	72,992	68,503
WC-9	160,284	150,427
W-11	298,047	279,719
W-19	345,503	324,257
W-20	315,768	296,350
WC-4	366,573	344,031
2026-A	239,617	224,880
Total cost	3,326,569	3,122,000

7. WASTE MANAGEMENT AND TRANSPORTATION ACTIVITIES

7.1 PRIMARY WASTE STREAMS

The remediation of the 13 LLLW tanks completed during this removal action generated two primary waste streams: the aqueous liquid phase (primarily groundwater and rainwater infiltration, except where nitric acid was used to dissolve solids) and the sludge (settled solids) layer. Both waste streams meet the WAC for the ORNL LLLW system. The aqueous phase was pumped via existing piping or trucked via the LLLW tanker to Evaporator Complex Feed Tank W-22 where the waste will be treated and eventually pumped to the Melton Valley Storage Tanks for storage. The sludge phase was either pumped into an HIC and trucked to the Evaporator Complex Storage Tank W-23 or was transferred directly to the LLLW System via valve boxes located near the tank sites. The waste in Tank W-23 will be pumped directly to the Melton Valley Storage Tanks for storage. All waste in the Melton Valley Storage Tanks will eventually be disposed of at the Waste Isolation Pilot Plant in Carlsbad, New Mexico. As noted in Sect. 5, the oil removed from Tank F-501 was placed in two 55-gal stainless steel drums with absorbent and is stored at the ORNL TRU bunker pending final disposal under the TRU waste program.

7.2 SECONDARY WASTE STREAMS

The secondary solid waste generated during the remediation of the 13 LLLW tanks reported herein was staged at ORNL prior to final packaging and disposal. The secondary solid waste was staged along with secondary solid waste generated during the remediation of Tanks WC-1, WC-10, WC-11, WC-12, WC-13, WC-15, WC-17, 3003-A, T-14, W-1, and W-2. This second group of 11 LLLW tanks was remediated during the first phase of this project and was reported in the *Removal Action Report for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks at Oak Ridge National Laboratory, Oak Ridge, Tennessee, DOE/OR/01-1953&D2*.

The secondary solid waste generated during the two phases of the remediation project was similar in characteristics, consisting of primarily PPE, but also included hoses, pumps, plastic sheeting, and miscellaneous wood and debris. Due to the similar nature of the waste, the waste containers were stored together, and one project for the disposal of all of the waste containers was undertaken. In total there were 69 B-25 boxes, 21 drums, two 20-ft Sealand containers, 1 B-12 box, and 1 concrete plug. During March and April of 2004, the waste containers were filled with sand to fill void spaces and then shipped to the ORR Environmental Management Waste Management Facility (EMWMF) for final disposal. The waste was disposed in accordance with the *Waste Handling Plan for the Inactive Liquid Low-Level Radioactive Waste Tanks Removal Action Waste Under the Melton Valley Closure Project at Oak Ridge National Laboratory, Oak Ridge, Tennessee, DOE/OR/01-2103&D0*, under EMWMF Waste Lot 84.2, *Environmental Management Waste Management Facility Waste Lot Profile for the Oak Ridge National Laboratory Inactive Tanks Removal Action Waste, EMWMF Waste Lot 84.2, BJC/OR-1567*, and Waste Lot 84.5, *Environmental Management Waste Management Facility Waste Lot Profile for the Oak Ridge National Laboratory Inactive Tanks Waste Debris, EMWMF Waste Lot 84.5, BJC/OR-1781*. Included within Appendix A are the shipping manifests for the waste containers. Included within Appendix B are the disposal records for each of the shipments under these Waste Lots.

In addition to the waste containers disposed of at EMWMF, there was one B-25 box, which contained lead blankets, a pump, and a section of hose. EMWMF cannot accept the lead blankets for

disposal. Therefore, the B-25 box with the lead blankets, hose, and pump has been disposed at Envirocare of Utah under existing waste profile 9314-01.

8. OPERATION AND MAINTENANCE PLANS

There are no prescribed operation and maintenance plans for the closed tanks.

9. MONITORING SCHEDULE

There is no monitoring program or schedule specifically planned for these 13 stabilized tanks. The entire ORNL facility is part of an Integrated Water Quality Program that will continue to provide groundwater well monitoring.

10. REFERENCES

- DOE 2001. *Removal Action Report for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks at Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1953&D2, August.
- DOE 1999a. *Engineering Evaluation/Cost Analysis for the Bethel Valley Plan Main Plant Inactive Liquid Low-Level Waste Tanks, Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1721&D3, April.
- DOE 1999b. *Action Memorandum for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks, Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR-01-1813 & D3, April.
- DOE 1999c. *Action Memorandum Addendum for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks, Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1833&D2, September.
- DOE 1999d. *Removal Action Work Plan for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks, Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1821 & D1, June.
- DOE 1999e. *Addendum to the Removal Action Work Plan for the Bethel Valley Main Plant Inactive Liquid Low-Level Radioactive Waste Tanks, Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1842&D1, November.
- DOE 1997. *Waste Characterization Data Manual for the Inactive Liquid Low-Level Waste Tank Systems at Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1159&D1, date reissued December 1997, latest data date April 2000.
- DOE 1992. *Federal Facility Agreement for the Oak Ridge Reservation, U.S. Environmental Protection Agency Region IV, U.S. Department of Energy, Tennessee Department of Environment and Conservation*, DOE/OR-1014, Effective Date: January 1, 1992, Oak Ridge, Tennessee.

APPENDIX A
SHIPPING MANIFESTS

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-001
 Date: 03/01/04

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Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site
 Bear Creek Road.
 Oak Ridge, TN. 37830

Shipper: US DOE c/o AMC Demolition
 2010 HWY 58 Building 1035 Office 132
 Oak Ridge TN. 37830

Site: ORNL

Route: *High 75 to Bear Creek Rd*

Vehicle Initial and Number: *TAG T-9917* Trailer No.: *114806*

No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
5	X	Radioactive Material, LSA. NOS, 7, UN2912, Fissile Excepted, LSA-I, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 2.484e-04 TBq	14122.8 kg. (31135 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. <u>N/A</u> Signature of the Consignor

Remarks: This is an exclusive use shipment made in accordance with 49 CFR 173.427.
 Driver instructions are attached.

Total Volume: 480 Cu. Ft.

Additional information:

In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282
 Emergency Response Guide Number: 162

Container numbers: X10C0100276, X10C0100277, X10C0100282, X10C0100283, X10C0100284

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:

\$ N/A per unit

SS741 Reference

Label(s) applied:

NA

Placard(s) required:
 Class 7

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:

Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.
 YES () NO (X)

Shipper: Michael Wiskerchen for AMC DEMOLITION
 Contract:
 Per: *[Signature]*

The additions on the face hereof and to the terms and conditions are hereby noted:
 Carrier: TAG Transport Inc.

on behalf U.S. Department of Energy
 Date: 03/01/04

Per: *[Signature]* Date: *3-1-04*
 For: *[Signature]*

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-002
 Date: 03/01/04

Page 1 of 7

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site Bear Creek Road. Oak Ridge, TN. 37830	Shipper: US DOE c/o AMC Demolition 2010 HWY 58 Building 1035 Office 132 Oak Ridge TN. 37830
--	---

Site: ORNL

Route: <i> Hwy 95 to Bear Creek Rd </i>	Vehicle Initial and Number: Trailer No.: <i> T-9717 / 84820 </i>
---	---

No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
4	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-I, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 1.387e-04 TBq	11462.5 kg. (25270 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A _____ Signature of the Consignor

Remarks: This is an exclusive use shipment made in accordance with 49 CFR 173.427.
 Driver instructions are attached.

Total Volume: 384 Cu. Ft.

Additional information:
 In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282
 Emergency Response Guide Number: 162

Container numbers: X10C0100279, X10C0100281, X10C0100285, X10C0100286

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:

N/A
 \$ _____ per _____ (unit)

SS741 Reference

Label(s) applied:

NA

Placard(s) required:
 Class 7

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:

Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.
 YES () NO (X)

Shipper: Michael Wiskerchen for AMC DEMOLITION

Contract
 Per:

Michael Wiskerchen
 on behalf U.S. Department of Energy
 Date: 03/01/04

The additions on the face hereof and to the terms and conditions are hereby noted:
 Carrier: TAG Transport Inc.

For: *C. J. ...* Date: *3-1-04*
 For: *JAC*

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-003
 Date: 03/03/04

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site
 Bear Creek Road.
 Oak Ridge, TN. 37830

Shipper: US DOE c/o AMC Demolition
 2010 HWY 58 Building 1035 Office 132
 Oak Ridge TN. 37830

Site: ORNL

Route: Highway 95 to Bear Creek Rd.

Vehicle Initial and Number: Trailer No.:

F-982 / LF 993

No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
4	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-I, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 3.85e-3 TBq	15447.3 kg. (34055 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A Signature of the Consignor

Remarks: This is an exclusive use shipment made in accordance with 49 CFR 173.427.
 Driver instructions are attached.

Total Volume: 384 Cu. Ft.

Additional information:

In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282
 Emergency Response Guide Number: 162

Container numbers: X10C9700421, X10C9700424, X10C9700438, X10C0000141

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:

\$ _____ N/A per _____ (unit)

SS741 Reference

Label(s) applied:

NA

Placard(s) required:
 Class 7

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:

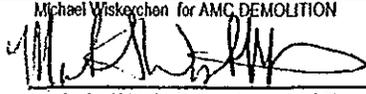
Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.
 YES () NO (X)

Shipper: Michael Wiskerchen for AMC DEMOLITION
 Contract:
 Per:



on behalf U.S. Department of Energy
 Date: 03/03/04

The additions on the face hereof and to the terms and conditions are hereby noted:
 Carrier: TAG Transport Inc.

Per: Eugene Rose Date: 3/2/04
 For: TAG

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-004
 Date: ~~03/04/04~~ 3/5/04

Page 1 of 9

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site Bear Creek Road. Oak Ridge, TN. 37830	Shipper: US DOE c/o AMC Demolition 2010 HWY 58 Building 1035 Office 132 Oak Ridge TN. 37830
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Site: ORNL

Route: Highway 95 to Bear Creek Rd.	Vehicle Initial and Number: Trailer No.:
-------------------------------------	--

T-9117 LP993

No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
6	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-I, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 1.35e-3 TBq	18368.5 kg. (40495 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A Signature of the Consignor

Remarks: This is an exclusive use shipment made in accordance with 49 CFR 173.427. Driver instructions are attached.

Total Volume: 576 Cu. Ft.

Additional information:

In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282
 Emergency Response Guide Number: 162

Container numbers: X10C9502296, X10C9802084, X10C0000140, X10C0010445, X10C9700327, X10C0000120

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:

\$ _____ per _____ (unit)

SS741 Reference

Label(s) applied:

NA

Placard(s) required:
Class 7

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

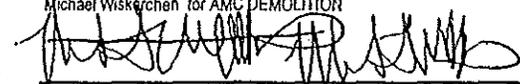
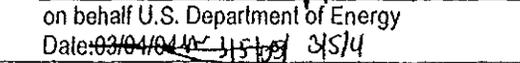
IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:

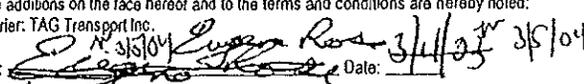
Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges. YES () NO (X)

Shipper: Michael Wiskerchen for AMC DEMOLITION
 Contract: 
 Per: 
 on behalf U.S. Department of Energy
 Date: ~~03/04/04~~ 3/5/04

The additions on the face hereof and to the terms and conditions are hereby noted:
 Carrier: TAG Transport Inc.
 Per:  Date: 3/4/04
 For: TAG

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-005
 Date: 03/04/04

Page 1 of 9

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site
 Bear Creek Road.
 Oak Ridge, TN. 37830

Shipper: US DOE c/o AMC Demolition
 2010 HWY 58 Building 1035 Office 132
 Oak Ridge TN. 37830

Site: ORNL

Route: Highway 95 to Bear Creek Rd.

Vehicle Initial and Number: Trailer No.:

1-9917 / 84810

No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
6	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-II, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 3.69e-4 TBq	17935.3 kg. (39540 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A Signature of the Consignor

Remarks: This is an exclusive use shipment made in accordance with 49 CFR 173.427.
 Driver instructions are attached.

Total Volume: 576 Cu. Ft.

Additional information:

In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282
 Emergency Response Guide Number: 162

Container numbers: X10C9700227, X10C9802280, X10C0000119, X10C0010048, X10C0010462, X10C0010463

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property; The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:

\$ _____ N/A per _____ (unit)

SS741 Reference

Label(s) applied:

NA

Placard(s) required:
 Class 7

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

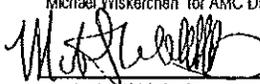
IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:

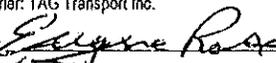
Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.
 YES () NO (X)

Shipper: Michael Wiskerchen for AMC DEMOLITION
 Contract:
 Per: 
 on behalf U.S. Department of Energy
 Date: 03/04/04

The additions on the face hereof and to the terms and conditions are hereby noted:
 Carrier: TAG Transport Inc.
 Per:  Date: 3/4/04
 For: TAG Transport

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-006
 Date: 03/05/04

Page 1 of 10

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site
 Bear Creek Road.
 Oak Ridge, TN. 37830

Shipper: US DOE c/o AMC Demolition
 2010 HWY 58 Building 1035 Office 132
 Oak Ridge TN. 37830

Site: ORNL

Route: Highway 95 to Bear Creek Rd.

Vehicle Initial and Number: Trailer No.:

T-7917 / 84820

No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
7	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-II, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 3.933e-4 TBq	18178.0 kg. (40075 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A Signature of the Consignor

Remarks: This is an exclusive use shipment made in accordance with 49 CFR 173.427.
 Driver instructions are attached.

Total Volume: 672 Cu. Ft.

Additional information:

In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282
 Emergency Response Guide Number: 162

Container numbers: X10C0000121, X10C0010493, X10C9800755, X10C9601867, X10C0100287, X10C9701721, X10C9701708

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:

\$ _____ N/A per _____ (unit)

SS741 Reference

Label(s) applied:

NA

Placard(s) required:
 Class 7

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

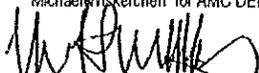
IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:

Emergency Response # (865) 574-3282
 ERG: 162

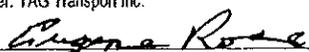
If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.
 YES () NO (X)

Shipper: Michael Wiskerchen for AMC DEMOLITION
 Contract:
 Per: 
 on behalf U.S. Department of Energy
 Date: 03/05/04

The additions on the face hereof and to the terms and conditions are hereby noted:
 Carrier: TAG Transport Inc.

Per:  Date: 3/5/04
 For: TAG

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-007
 Date: 03/05/04

Page 1 of 9

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site Bear Creek Road. Oak Ridge, TN. 37830	Shipper: US DOE c/o AMC Demolition 2010 HWY 58 Building 1035 Office 132 Oak Ridge TN. 37830 Site: ORNL
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Route: Highway 95 to Bear Creek Rd.	Vehicle Initial and Number: Trailer No.: 7-9977 LL-P983
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No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
6	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-II, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 3.644e-4 TBq	18391.2 kg. (40545 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A _____ Signature of the Consignor

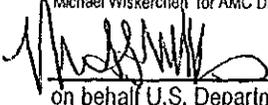
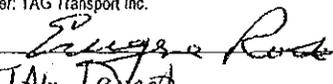
Remarks: This is an <u>exclusive use</u> shipment made in accordance with 49 CFR 173.427. Driver instructions are attached. Total Volume: 576 Cu. Ft. Additional information: In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282 Emergency Response Guide Number: 162 Container numbers: X10C9801994, X10C9701581, X10C9701582, X10C0000145, X10C0010504, X10C0100278	NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property: The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding: \$ _____ per _____ (unit) N/A SS741 Reference Label(s) applied: NA Placard(s) required: Class 7
--	--

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:
 Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.	This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges. YES () NO (X)
---	--

Shipper: Michael Wiskerchen for AMC DEMOLITION Contract: Per:  on behalf U.S. Department of Energy Date: 03/05/04	The additions on the face hereof and to the terms and conditions are hereby noted: Carrier: TAG Transport Inc. Per:  For: TAG Transport Date: 3/5/04
--	--

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-008
 Date: 03/08/04

Page 1 of 8

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site Bear Creek Road. Oak Ridge, TN. 37830	Shipper: US DOE c/o AMC Demolition 2010 HWY 58 Building 1035 Office 132 Oak Ridge TN. 37830 Site: ORNL
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Route: Highway 95 to Bear Creek Rd.	Vehicle Initial and Number: Trailer No.: 1-9917 / 84820
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No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
5	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-II, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 7.74e-3 TBq	18416.2 kg. (40600 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A _____ Signature of the Consignor

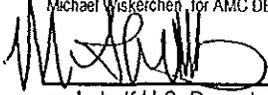
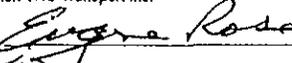
Remarks: This is an <u>exclusive use</u> shipment made in accordance with 49 CFR 173.427. Driver instructions are attached. Total Volume: 480 Cu. Ft. Additional information: In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282 Emergency Response Guide Number: 162 Container numbers: X10C9700414, X10C0000116, X10C9700420, X10C9802067, X10C9801808	NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding: \$ _____ N/A per _____ (unit) SS741 Reference Label(s) applied: NA Placard(s) required: Class 7
---	---

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:
 Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.	This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges. YES () NO (X)
---	--

Shipper: Michael Wiskerchen for AMC DEMOLITION Contract: _____ Per:  on behalf U.S. Department of Energy Date: 03/08/04	The additions on the face hereof and to the terms and conditions are hereby noted: Carrier: TAG Transport Inc. Per:  Date: 3/8/04 For: 
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STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-009
 Date: 03/09/04

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site Bear Creek Road. Oak Ridge, TN. 37830	Shipper: US DOE c/o AMC Demolition 2010 HWY 58 Building 1035 Office 132 Oak Ridge TN. 37830 Site: ORNL
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Route: Highway 95 to Bear Creek Rd.	Vehicle Initial and Number: Trailer No.: T-9917 / LF993
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No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
5	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-II, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 3.08e-3 TBq	16844.4 kg. (37135 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A _____ Signature of the Consignor

Remarks: This is an exclusive use shipment made in accordance with 49 CFR 173.427.
 Driver instructions are attached.

Total Volume: 480 Cu. Ft.

Additional information:
 In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282
 Emergency Response Guide Number: 162

Container numbers: X10C9701308, X10C0100280, X10C0010022, X10C0200571, X10C0000112

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property: The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:

N/A
 \$ _____ per _____ (unit)

SS741 Reference

Label(s) applied:

N/A

Placard(s) required:
 Class 7

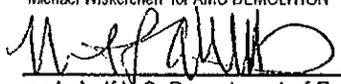
Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

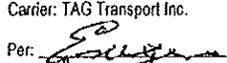
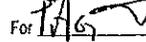
IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:
 Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.
 YES () NO (X)

Shipper: Michael Wiskerchen for AMC DEMOLITION
 Contract:
 Per: 
 on behalf U.S. Department of Energy
 Date: 03/09/04

The additions on the face hereof and to the terms and conditions are hereby noted:
 Carrier: TAG Transport Inc.
 Per:  Date: 3/9/04
 For: 

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-010
 Date: 03/09/04

Page 1 of 8

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site Bear Creek Road. Oak Ridge, TN. 37830	Shipper: US DOE c/o AMC Demolition 2010 HWY 58 Building 1035 Office 132 Oak Ridge TN. 37830
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Site: ORNL

Route: Highway 95 to Bear Creek Rd.	Vehicle Initial and Number: Trailer No.:
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T-9917 / 8440

No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
5	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-II, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 7.05e-3TBq	18622.5 kg. (41055 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A Signature of the Consignor

Remarks: This is an exclusive use shipment made in accordance with 49 CFR 173.427.
 Driver instructions are attached.

Total Volume: 480 Cu. Ft.

Additional information:

In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282
 Emergency Response Guide Number: 162

Container numbers: X10C9402282, X10C9601982, X10C0100289, X10C0100290, X10C9601323

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:

N/A
 \$ _____ per _____ (unit)

SS741 Reference

Label(s) applied:

NA

Placard(s) required:
 Class 7

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

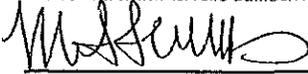
IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:

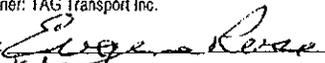
Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.
 YES () NO (X)

Shipper: Michael Wiskerchen for AMC DEMOLITION
 Contract:
 Per: 
 on behalf U.S. Department of Energy
 Date: 03/09/04

The additions on the face hereof and to the terms and conditions are hereby noted:
 Carrier: TAG Transport Inc.
 Per:  Date: 3/9/04
 For: TAG

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-011
 Date: 03/10/04

Page 1 of 9

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site Bear Creek Road. Oak Ridge, TN. 37830	Shipper: US DOE c/o AMC Demolition 2010 HWY 58 Building 1035 Office 132 Oak Ridge TN. 37830 Site: ORNL
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Route: Highway 95 to Bear Creek Rd.	Vehicle Initial and Number: Trailer No.: T-9912 / LC 993
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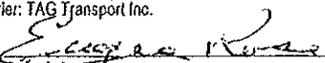
No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
6	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-II, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 5.35e-3 TBq	16712.9 kg. (36845 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A _____ Signature of the Consignor

Remarks: This is an <u>exclusive use</u> shipment made in accordance with 49 CFR 173.427. Driver instructions are attached. Total Volume: 576 Cu. Ft. Additional information: In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282 Emergency Response Guide Number: 162 Container numbers: X10C9700147, X10C9700425, X10C0010464, X10C0010046, X10C9601876, X10C9601946	NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding: \$ _____ N/A per _____ (unit) SS741 Reference Label(s) applied: NA Placard(s) required: Class 7
--	---

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS: Emergency Response # (865) 574-3282 ERG: 162	If delayed in Transit Notify: Michael Wiskerchen (865) 384-3837
--	--

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.	This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges. YES () NO (X)
---	--

Shipper: Michael Wiskerchen for AMC DEMOLITION Contract: _____ Per:  on behalf U.S. Department of Energy Date: 03/10/04	The additions on the face hereof and to the terms and conditions are hereby noted: Carrier: TAG Transport Inc. Per:  Date: 3/10/04 For: 
--	--

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-012
 Date: 03/10/04

Page 1 of 10

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site Bear Creek Road. Oak Ridge, TN. 37830	Shipper: US DOE c/o AMC Demolition 2010 HWY 58 Building 1035 Office 132 Oak Ridge TN. 37830 Site: ORNL
--	---

Route: Highway 95 to Bear Creek Rd.	Vehicle Initial and Number: Trailer No.: T-9917 / 84Y20
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No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
7	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-II, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 1.13e-2 TBq	20393.9 kg. (44960 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A _____ Signature of the Consignor

Remarks: This is an exclusive use shipment made in accordance with 49 CFR 173.427.
 Driver instructions are attached.

Total Volume: 672 Cu. Ft.

Additional information:

In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282
 Emergency Response Guide Number: 162

Container numbers: X10C0010021, X10C0010024, X10C9601997, X10C9800828, X10C9600456, X10C9600171, X10C0000108

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:

N/A
 \$ _____ per _____ (unit)

SS741 Reference

Label(s) applied:

NA

Placard(s) required:
 Class 7

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

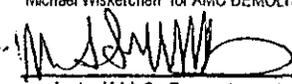
IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:

Emergency Response # (865) 574-3282
 ERG: 162

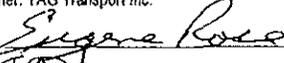
If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.
 YES () NO (X)

Shipper: Michael Wiskerchen for AMC DEMOLITION
 Contract:
 Per: 

The additions on the face hereof and to the terms and conditions are hereby noted:
 Carrier: TAG Transport Inc.

Per:  Date: 3/10/04

on behalf U.S. Department of Energy
 Date: 03/10/04

For: 

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-013
 Date: 03/12/04

Page 1 of 4

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site Bear Creek Road. Oak Ridge, TN. 37830	Shipper: US DOE c/o AMC Demolition 2010 HWY 58 Building 1035 Office 132 Oak Ridge TN. 37830 Site: ORNL
--	---

Route: Highway 95 to Bear Creek Rd.	Vehicle Initial and Number: Trailer No.: T-9917 (84820)
-------------------------------------	--

No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
1	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-II, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 2.37e-3 TBq	9072.0 kg. (20000 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A _____ Signature of the Consignor

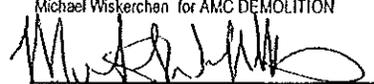
Remarks: This is an <u>exclusive use</u> shipment made in accordance with 49 CFR 173.427. Driver instructions are attached. Total Volume: 1280 Cu. Ft. Additional information: In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282 Emergency Response Guide Number: 162 Container numbers: SL-0230	NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding: \$ _____ N/A per _____ (unit) SS741 Reference Label(s) applied: NA Placard(s) required: Class 7
---	---

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:
 Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.	This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges. YES () NO (X)
---	--

Shipper: Michael Wiskerchen for AMC DEMOLITION Contract: _____ Per:  on behalf U.S. Department of Energy Date: 03/12/04	The additions on the face hereof and to the terms and conditions are hereby noted: Carrier: TAG Transport Inc. Per:  Date: 3/12/04 For: TAG
--	--

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-014
 Date: 03/12/04

Page 1 of 4

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site
 Bear Creek Road.
 Oak Ridge, TN. 37830

Shipper: US DOE c/o AMC Demolition
 2010 HWY 58 Building 1035 Office 132
 Oak Ridge TN. 37830

 Site: ORNL

Route: Highway 95 to Bear Creek Rd.

Vehicle Initial and Number: Trailer No.:
 T-983 / LF993

No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
1	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-II, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 6.35e-3 TBq	14061.6 kg. (31000 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A _____ Signature of the Consignor

Remarks: This is an exclusive use shipment made in accordance with 49 CFR 173.427.
 Driver instructions are attached.

 Total Volume: 1280 Cu. Ft.

 Additional information:
 In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282
 Emergency Response Guide Number: 162

 Container numbers: X10C0013434

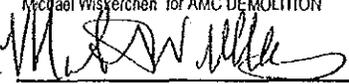
NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:
 \$ _____ per _____ (unit)
 N/A
 SS741 Reference
 Label(s) applied:
 NA
 Placard(s) required:
 Class 7

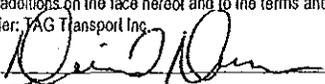
Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:
 Emergency Response # (865) 574-3282
 ERG: 162
 If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.
 YES () NO (X)

Shipper: Michael Wiskerchen for AMC DEMOLITION
 Contract: 
 Per: _____
 on behalf U.S. Department of Energy
 Date: 03/12/04

The additions on the face hereof and to the terms and conditions are hereby noted:
 Carrier: TAG Transport Inc.
 Per:  Date: 3/12/04
 For: TAG

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-016
 Date: 03/22/04

Page 1 of 14

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site Bear Creek Road. Oak Ridge, TN. 37830	Shipper: US DOE c/o AMC Demolition 2010 HWY 58 Building 1035 Office 132 Oak Ridge TN. 37830 Site: ORNL
--	---

Route: Highway 95 to Bear Creek Rd.	Vehicle Initial and Number: Trailer No.: T-99A / 84820
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No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
11 drums	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-II, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 9.493e-5 TBq	3492.7 kg. (7700 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A _____ Signature of the Consignor

Remarks: This is an <u>exclusive use</u> shipment made in accordance with 49 CFR 173.427. Driver instructions are attached. Total Volume: 82.5 Cu. Ft. Additional information: In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282 Emergency Response Guide Number: 162 Container numbers: X10C0102172, X10C0102173, X10C0102174, X10C0102175, X10C0102176, X10C0102177, X10C0102178, X10C0102179, X10C0102180, X10C0102181, X10C0102182	NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding: \$ _____ N/A per _____ (unit) SS741 Reference Label(s) applied: NA Placard(s) required: Class 7
--	---

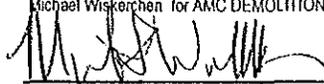
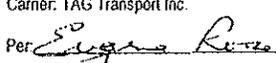
Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:
 Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.
 YES () NO (X)

Shipper: Michael Wiskerchen for AMC DEMOLITION Contract: Per:  on behalf U.S. Department of Energy Date: 03/22/04	The additions on the face hereof and to the terms and conditions are hereby noted: Carrier: TAG Transport Inc. Per:  Date: 3-22-04 For: TAG
--	--

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-017
 Date: 03/25/04

Page 1 of 15

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site
 Bear Creek Road.
 Oak Ridge, TN. 37830

Shipper: US DOE c/o AMC Demolition
 2010 HWY 58 Building 1035 Office 132
 Oak Ridge TN. 37830

Site: ORNL

Route: Highway 95 to Bear Creek Rd.

Vehicle Initial and Number: Trailer No.:

T9917 / 84800

No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
2 B-25 * 10 drums	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-II, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 8.25e-3 TBq	7946.2 kg. (17518 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A Signature of the Consignor

Remarks: This is an exclusive use shipment made in accordance with 49 CFR 173.427.
 Driver instructions are attached.

Total Volume: 267 Cu. Ft.

Additional information:

In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282
 Emergency Response Guide Number: 162

Container numbers: ~~X10C0701722~~ * X10C0010023, X10C0013436, X10C0102183, X10C0400004, X10C0400001, X10C0400002, X10C0400003, X10C0400005, X10C0400007, X10C0400009, X10C0400008

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property; The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:

\$ _____ N/A per _____ (unit)

SS741 Reference

Label(s) applied:

NA

Placard(s) required:
 Class 7

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:

Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 David Pressnell (865) 406-5728

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.
 YES () NO (X)

Shipper: David Pressnell for AMC DEMOLITION

Contract:
 Per:

[Signature] 3/25/04
 on behalf U.S. Department of Energy
 Date: 03/25/04

The additions on the face hereof and to the terms and conditions are hereby noted.
 Carrier: TAG Transport Inc.

Per: *[Signature]* Date: 3-25-04
 For: TAG

* LINED THROUGH CONTAINERS IDENTIFIED WITH * ARE GAAT WASTE LOT 84.1
 WASTE TRANSPORTED ON SAME SHIPMENT.

TTS Docu+

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-018
 Date: 04/08/04

Page 1 of 4

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site Bear Creek Road. Oak Ridge, TN. 37830	Shipper: US DOE c/o AMC Demolition 2010 HWY 58 Building 1035 Office 132 Oak Ridge TN. 37830
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Site: ORNL

Route: Highway 95 to Bear Creek Rd.	Vehicle Initial and Number: Trailer No.:
-------------------------------------	--

T-983 (84812)

No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
1 Wrapped package	X	Radioactive Material, SCO, 7, UN2913, Fissile Excepted, SCO-II, Solid/Oxide See attached sheets for isotopic and activities Total Activity: 4.21e-5 TBq	1524.1 kg. (3360 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. N/A _____ Signature of the Consignor

Remarks: This is an exclusive use shipment made in accordance with 49 CFR 173.427. Driver instructions are attached.

Total Volume: 15 Cu. Ft.

Additional information:
 In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282
 Emergency Response Guide Number: 162

Container numbers: X10C0400010

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:

N/A
\$ _____ per _____ (unit)

SS741 Reference

Label(s) applied:

N/A

Placard(s) required:
Class 7

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

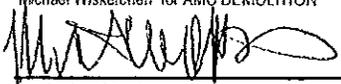
IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:

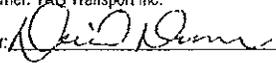
Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 Michael Wiskerchen (865) 384-3837

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.
 YES () NO (X)

Shipper: Michael Wiskerchen for AMC DEMOLITION
 Contract: _____
 Per: 
 on behalf U.S. Department of Energy
 Date: 04/8/04

The additions on the face hereof and to the terms and conditions are hereby noted:
 Carrier: TAG Transport Inc.
 Per:  Date: 4-8-04
 For: TAG TRANSPORT

STRAIGHT BILL OF LADING SHORT FORM NOT NEGOTIABLE

CARRIER: TAG transport
 Carrier No: 642202 SCAC No:
 Purchase / Customer Order No

Shipper No: AMC 04-019
 Date: 04/8/04

Page 1 of 6

Received, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier agrees to carry to its usual place of delivery, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said route to destination and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment. The shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consignee: EMWMF Disposal Site
 Bear Creek Road.
 Oak Ridge, TN. 37830

Shipper: US DOE c/o AMC Demolition
 2010 HWY 58 Building 1035 Office 132
 Oak Ridge TN. 37830

 Site: ORNL

Route: Highway 95 to Bear Creek Rd.

Vehicle Initial and Number: Trailer No.:
 T-983 184812

No. Pkgs.	HM	Description of Material	Weight	Class	Charges	Subject to section 7 of conditions of applicable Bill of Lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
2 B-25 * 1 B-12	X	Radioactive Material, LSA, NOS, 7, UN2912, Fissile Excepted, LSA-II, Solid/Oxide, (Am-241, Am-243, C-14, Cm-243, Cm-244, Cm-245, Cm-246, Cm-247, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, H-3, I-129, Np-237, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-244, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238) Total Activity: 2.7400154 e-2 TBq	11743.7 kg. (25890 lbs.)	7		The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. <div style="text-align: center;">N/A Signature of the Consignor</div>

Remarks: This is an exclusive use shipment made in accordance with 49 CFR 173.427.
 Driver instructions are attached.

Total Volume: 237 Cu. Ft.

Additional information:
 In case of an emergency, call: Park Shift Superintendent @ (865) 574-3282
 Emergency Response Guide Number: 162

Container numbers: ~~X10C000290~~ X10C0013505, X10C9501877

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:
 \$ _____ N/A per _____ (unit)

SS741 Reference

Label(s) applied:
 NA

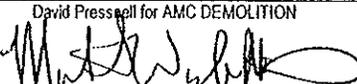
Placard(s) required:
 Class 7

Transportation hereunder is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are to be reimbursed by the U.S. Government, pursuant to cost reimbursable contract. This may be confirmed by contacting

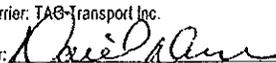
IF THIS BILL OF LADING LISTS HAZARDOUS MATERIALS - NOTE AS FOLLOWS:
 Emergency Response # (865) 574-3282
 ERG: 162

If delayed in Transit Notify:
 David Pressnell (865) 406-5728

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.

Shipper: David Pressnell for AMC DEMOLITION
 Contract:
 Per: 
 on behalf U.S. Department of Energy
 Date: 04/8/04

This shipment is for the U.S. Department of Energy and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by the U.S. Government and is subject to the terms and conditions set forth in the standard form of the U.S. Government Bill of Lading and to any available special rates or charges.
 YES () NO (X)

The additions on the face hereof and to the terms and conditions are hereby noted:
 Carrier: TAG transport Inc.
 Per:  Date: 4/8/04
 For: TAG

* Lined Through Containers Identified with * ARE GAAT WASTE LOT 84. 1 WASTE TRANSPORTED ON SAME SHIPMENT.

APPENDIX B
EMWMF LANDFILL REPORTS

Received Shipments/Landfill Report

Shipments received from 03/01/2004 to 04/08/2004

Profile/ Waste Lot	Shipment #	Received Dt	Truck Nbr	Customer	Gross/Scale Weight (lbs)	(tons)	Waste Weight (lbs)	(tons)	Volume (yd3)	Burial Coordinates x / y / z	Tracking Code (1)
84.2	IB04-EMWM-16652	03/01/2004 09:02 AM	T-99171	Inactive Tanks	62,280	31	30,410	15	10.94	B / 6 / L-2	
	IB04-EMWM-16653	03/01/2004 01:21 PM	T-99171	Inactive Tanks	56,380	28	24,510	12	8.82	B / 5 / L-2	
	IB04-EMWM-16678	03/03/2004 09:55 AM	T-99171	Inactive Tanks	63,260	32	31,390	16	11.29	B / 6 / L-2	
	IB04-EMWM-16712	03/04/2004 12:22 PM	T-99171	Inactive Tanks	70,420	35	38,550	19	13.87	B / 6 / L-2	
	IB04-EMWM-16722	03/05/2004 07:54 AM	T-99171	Inactive Tanks	71,480	36	39,610	20	14.25	B / 6 / L-2	
	IB04-EMWM-1673C	03/05/2004 11:03 AM	T-99171	Inactive Tanks	70,780	35	38,910	19	14.00	C / 6 / L-2	
	IB04-EMWM-16735	03/05/2004 01:37 PM	T-99171	Inactive Tanks	71,440	36	39,570	20	14.23	C / 6 / L-2	
	IB04-EMWM-1681C	03/08/2004 02:03 PM	T-99171	Inactive Tanks	71,120	36	39,250	20	14.12	A / 6 / L-2	
	IB04-EMWM-16751	03/09/2004 10:31 AM	T-99171	Inactive Tanks	68,340	34	36,470	18	13.12	D / 6 / L-2	
	IB04-EMWM-16757	03/09/2004 12:54 PM	T-99171	Inactive Tanks	73,440	37	41,570	21	14.95	D / 5 / L-2	
	IB04-EMWM-16774	03/10/2004 09:51 AM	T-99171	Inactive Tanks	70,360	35	38,490	19	13.85	B / 6 / L-2	
	IB04-EMWM-1679C	03/10/2004 02:21 PM	T-99171	Inactive Tanks	76,140	38	44,270	22	15.92	B / 6 / L-2	
	IB04-EMWM-1685E	03/12/2004 01:38 PM	T-9831	Inactive Tanks	37,180	19	7,120	4	2.56	D / 5 / L-2	
	IB04-EMWM-16857	03/12/2004 01:40 PM	T-99171	Inactive Tanks	47,160	24	15,290	8	5.50	D / 5 / L-2	
	IB04-EMWM-1699E	03/22/2004 11:28 AM	T-99171	Inactive Tanks	39,040	20	7,170	4	2.58	D / 7 / L-2	
	IB04-EMWM-1708E	03/25/2004 11:30 AM	T-99171	Inactive Tanks	43,280	22	11,410	6	4.10	E / 6 / L-2	
	IB04-EMWM-17153	03/29/2004 11:11 AM	842-1	Inactive Tanks	58,920	29	31,340	16	11.27	D / 5 / L-2	
	IB04-EMWM-17157	03/29/2004 12:29 PM	842-4	Inactive Tanks	58,400	29	31,120	16	11.19	D / 5 / L-2	
	IB04-EMWM-17163	03/29/2004 01:20 PM	842-1	Inactive Tanks	57,820	29	30,240	15	10.88	D / 5 / L-2	
	IB04-EMWM-1717C	03/29/2004 02:45 PM	842-3	Inactive Tanks	58,540	29	30,660	15	11.03	D / 5 / L-2	
	IB04-EMWM-1717E	03/29/2004 03:38 PM	842-1	Inactive Tanks	59,040	30	31,460	16	11.32	D / 5 / L-2	
	IB04-EMWM-1717E	03/29/2004 04:29 PM	842-2	Inactive Tanks	57,860	29	30,510	15	10.97	D / 5 / L-2	
	IB04-EMWM-17402	04/08/2004 01:33 PM	T-9831	Inactive Tanks	54,220	27	24,160	12	8.69	G / 11 / L-2	
Total # of Shipments (84.2): 23					Profile/Waste_Lot Summary		1,396,900	698	693,480	347	249.45
Total # of Shipments: 23					Shipments/Landfill Report Summary		1,396,900	698	693,480	347	249.45

DFS: *Darryl Pope*

Date: 6-23-04

BJC STR: *[Signature]*

Date: 6/23/04

(1) ACM-Asbestos Containing Material, STAGED-Temporarily Placed for Subsequent Disposal

Received Shipments/Landfill Report

Shipments received from 04/08/2004 to 04/08/2004

Profile/ Waste Lot	Shipment #	Received Dt	Truck Nbr	Customer	Gross/Scale Weight (lbs)	Weight (tons)	Waste Weight (lbs)	Weight (tons)	Volume (yd3)	Burial Coordinates x / y / z	Tracking Code (1)
84.5	IB04-EMWM-17406	04/08/2004 01:33 PM	T-983J	Inactive Tanks Waste Debris	34,060	17	4,000	2	1.44	G / 11 / L-2	
Total # of Shipments (84.5): 1					Profile/Waste_Lot Summary		34,060	17	4,000	2	1.44
Total # of Shipments: 1					Shipments/Landfill Report Summary		34,060	17	4,000	2	1.44

DFS: *Dred Pope*

Date: 6-23-04

BJC STR: *[Signature]*

Date: 6/23/04

(1) ACM-Asbestos Containing Material, STAGED-Temporarily Placed for Subsequent Disposal