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DOE/OR/02-1486&D4

Record of Decision
for the K-1070-C/D Operable Unit,
East Tennessee Technology Park,
Oak Ridge, Tennessee

Date Issue-November 1997

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PREFACE

This Record of Decision for the K-1070-C/D Operable Unit, East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/02-1486&D4) was prepared in accordance with requirements under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) to present the selected remedy for the K-1070-C/D Operable Unit to the public. This work was performed under Work Breakdown Structure 1.4.12.4.1.01.48 (Activity Data Sheet 4300, "K-1070-C/D G Pit and Concrete Pad"). This document provides the Environmental Restoration Program with information about the selected remedy for the K-1070-C/D Operable Unit, which includes excavation of G Pit materials and placement into interim storage, treatment and disposal, and an interim soil cover for the Concrete Pad Area. The CERCLA remedial investigation and risk analysis has shown that no further action is necessary for the Landfarm Area, surface water, and sediment at the K-1070-C/D Burial Ground. This selected remedy is different from and supersedes the remedy presented in the document's D1 version. This document also summarizes information from the remedial investigation/feasibility study (DOE/OR/01-1297&D2) and the proposed plan (DOE/OR/02-1399&D4).

ACRONYMS AND ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CNF	Central Neutralization Facility
DCA	dichloroethane
DCE	dichloroethene
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
ETTP	East Tennessee Technology Park (formerly Oak Ridge K-25 Site)
FFA	Federal Facility Agreement
FFCAct	Federal Facility Compliance Act of 1992
FR	Federal Register
FS	feasibility study
ft	foot
g	gram
gal	gallon
ha	hectare
ISV	in situ vitrification
km	kilometer
L	liter
LDR	land disposal restriction
LLW	low-level (radioactive) waste
m	meter
IR	microroentgen
MCL	maximum contaminant level
mg	milligram
mrem	millirem
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NTS	Nevada Test Site
O&M	operation and maintenance
ORR	Oak Ridge Reservation
OSWER	Office of Solid Waste and Emergency Response
OU	operable unit
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
pCi	picocurie
ppm	parts per million
RCRA	Resource Conservation and Recovery Act of 1976
RI	remedial investigation
ROD	record of decision
S&M	surveillance and maintenance

ACRONYMS AND ABBREVIATIONS (continued)

SARA	Superfund Amendments and Reauthorization Act of 1986
TBC	to be considered
Tc	technetium
TCA	trichloroethane
TCE	trichloroethene
TDEC	Tennessee Department of Environment and Conservation
U	uranium
USC	United States Code
WAC	waste acceptance criteria
yd	yard

PART 1. DECLARATION

SITE NAME AND LOCATION

U.S. Department of Energy
K-1070-C/D Operable Unit
East Tennessee Technology Park, Oak Ridge Reservation
Oak Ridge, Tennessee

STATEMENT OF BASIS AND PURPOSE

This record of decision (ROD) presents the selected remedial action for the G Pit and the Concrete Pad of the K-1070-C/D Operable Unit (OU) at the East Tennessee Technology Park (ETTP) (formerly the Oak Ridge K-25 Site) on the U.S. Department of Energy (DOE) Oak Ridge Reservation (ORR) in Oak Ridge, Tennessee. This ROD also designates no further action for the Landfarm Area and for surface water and sediment at the K-1070-C/D OU. The action was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 United States Code (USC) Section 9601 et seq. and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This decision is based on the Administrative Record for the K-1070-C/D OU, including the remedial investigation (RI)/feasibility study (FS) (DOE 1995), the proposed plan (DOE 1997a), and other documents for this site.

DOE is the lead agency for this action. The U.S. Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC are supportive agencies as parties of the Federal Facility Agreement (FFA) for this response action. They concur with the selected remedy.

ASSESSMENT OF THE SITE

If actual or threatened releases of hazardous substances from this site arc not addressed by implementing the response action selected in this ROD, the hazardous substances present unacceptable risks to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This response action fits into the overall ORR cleanup strategy by addressing wastes and contaminated soils at the K-1070-C/D G Pit, Concrete Pad, and Landfarm Area. The selected remedy mitigates a primary contaminant source to groundwater by:

- excavating the G Pit and backfilling it with suitable material;
- placing G Pit soil and excavated waste into compliant interim storage at ETTP;
- conducting a written evaluation of potential ex situ treatment technologies to determine their applicability to the G Pit wastes;
- conducting a "proof-of-process" evaluation of those treatment technologies identified in the written evaluation to aid in the selection of the most appropriate treatment technology;
- treating G Pit waste using the selected technology to meet applicable waste

acceptance criteria (WAC) [such as Resource Conservation and Recovery Act of 1976 (RCRA) land disposal restrictions (LDRs)] for a permitted disposal facility (it is anticipated that this treatment will also destroy the classified components of the waste); and

- disposing of the treated waste in a disposal facility that can lawfully accept it.

The selected remedy also includes interim measures for areas of the OU other than the G Pit, the Landfarm Area, and surface water and sediment. These interim measures include the following:

- placing a soil cover to prevent direct contact with and provide radiation shielding at the Concrete Pad Area and
- maintaining institutional controls as they currently exist in the surveillance and maintenance (S&M) program.

Areas addressed by these interim actions, including the Trench Area, the North Pits Area, the South Pits Area (exclusive of the G Pit), the K-1414 Area, and the Pits Downgradient Area, will be reevaluated for final remedial action in the ETTP ROD.

No further action will be taken for the Landfarm Area and for surface water and sediment at the K-1070-C/D OU.

STATUTORY DETERMINATIONS

The selected remedy protects human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate, and is cost-effective. The final remedy (G Pit excavation) uses permanent solutions and alternative treatment technologies to the maximum extent practicable for this site and satisfies the statutory preference for treatment to reduce toxicity, mobility, and volume as a principal element of the remedy. For areas subject to interim actions, the use of permanent solutions, alternative treatment technologies, and the preference for treatment will be addressed in the final remedial action pursuant to the ETTP ROD. A CERCLA 5-year review will not be required after the remedial action at the G Pit because the G Pit wastes are removed. The other areas of the K-1070-C/D OU where hazardous substances will remain on site will be reevaluated in the upcoming ETTP RI/FS and ROD.

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PART 2. DECISION SUMMARY

SITE NAME, LOCATION, AND DESCRIPTION

DOE ORR, shown in Figure 2.1, is located within and adjacent to the corporate limits of the city of Oak Ridge in East Tennessee and includes portions of Anderson and Roane Counties. Oak Ridge is located approximately 20 km (12.5 miles) west-northwest of Knoxville, 19 km (12 miles) southwest of Clinton, and 16 km (10 miles) northeast of Kingston. ORR comprises 13,794 ha (34,516 acres) of federally owned land and houses three major installations-Oak Ridge National Laboratory, Oak Ridge Y-12 Plant, and ETTP. ORR is bounded to the east, south, and west by Clinch River (Melton Hill Lake) and by the developed portion of the city of Oak Ridge.

ETTP encompasses approximately 688 ha (1,700 acres) in the northwest corner of ORR in Roane County, Tennessee. The K-1070-C/D OU is an 8.9-ha (22-acre) tract of land located within the security perimeter fence on the eastern side of ETTP (Fig. 2.1). Although portions of ETTP are within the 100- and 500-year floodplains; of Clinch River, the K-1070-C/D OU is not. It is bordered by the East Patrol Road to the north and the Burial Ground Patrol Road to the south. The K-1070-C/D OU is divided into seven source areas: Trench Area, Landfarm Area, Concrete Pad Area, North Pits Area, South Pits Area (which includes G Pit), Pits Downgradient Area (i.e., area downgradient from the North and South Pits), and K-1414 Area. These areas include soil and buried waste, such as drums, gas centrifuge hardware, and other equipment, and numerous hazardous substances. Surface water (wet weather conveyances) and associated sediments are also part of the K-1070-C/D OU.

SITE HISTORY

Activities at the former K-25 Site generated many types of waste, including hazardous, radioactive, and classified wastes that were disposed of at the K-1070-C/D OU from 1975 to 1989.

The Trench Area was used for the disposal of classified materials generated by the Gas Centrifuge Program and other plant operations, including hardware and equipment. Low-level radioactive, nonradioactive, hazardous, and nonhazardous materials were also buried in the Trench Area. Records indicate that these materials included organic and inorganic wastes, asbestos, solvents, uranium, heavy metals, acids, bases, glass, waste oil, capacitors containing polychlorinated biphenyls (PCBs), lead-acid batteries, and machine coolant. When the last trench was closed, a grassy vegetative soil cover was established.

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The Landfarm Area was created by two landfarming operations at the site. In 1982, roads within the fenced boundaries of the K-1070-C/D OU were treated with 16,850 L (4,450 gal) of mineral oil for dust suppression. The mineral oil contained < 1 percent solvent, < 5 ppm PCBs, and no uranium. In 1983, an additional 7,600 L (2,000 gal) of oil was landfarmed. Based on anecdotal evidence, this oil is believed to have contained a relatively high level of uranium. The layer of soil believed to have contained most of the uranium was subsequently excavated and buried in the Trench Area.

The Concrete Pad Area includes the Concrete Pad and associated contaminated soils. The Concrete Pad covers a small portion of the Trench Area and was the site of a compactor used to crush scrap metal, empty drums and boxes, and glass in the early 1980s. The Concrete Pad Area has been identified as a highly contaminated radiological area, and access has been restricted.

The North and South Pits Areas include 10 pits that were used for disposal of segregated liquid and glass waste. The pits typically received laboratory quantities of hazardous wastes. Some pits also received radioactive wastes. After disposal operations ceased, a 0.31-0.93-m (1-3-ft) soil cover was placed over each pit, and the site was revegetated. The G Pit, 1 of the 10 pits, contains classified materials and drums throughout its depth.

The Pits Downgradient Area is a grassy hill west of the North and South Pits Areas. Shallow groundwater underlying this area is contaminated by releases from the upgradient waste areas.

The K-1414 Area west of the Trench Area is the vehicle maintenance garage and fueling facility for ETTP. The facility has been a fuel storage facility since 1949. In 1987, a fuel leak was discovered. A diesel tank and about 2,300 L (600 gal) of diesel fuel and water were removed.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

DOE originally issued a proposed plan for the K-1070-C/D OU in April 1996. Public notices for the project were published in The Knoxville News-Sentinel, The Roane County News, and the Oak Ridger July 15, 1996, which set a public comment period from July 15, 1996, to August 12, 1996. One comment was received during that time; this comment and DOE's response are documented in Part 3 of this ROD. Following the public comment period, DOE prepared and issued a D1 ROD for the K-1070-C/D OU in February 1997. However, information obtained since that time has led DOE to conclude that the remedy detailed in the D1 ROD was unsuitable because of safety concerns. Therefore, in July 1997, DOE, with the concurrence of EPA and TDEC, issued a revised proposed plan that detailed a more appropriate preferred alternative. DOE published a public notice for the revised proposed plan in The Knoxville News-Sentinel on July 11 and 13, 1997, The Oak Ridger and The Roane County News on July 11, 1997, The Clinton Courier-News on July 13 and 14, 1997, and The Rockwood Times on July 15, 1997, and established a new public comment period from July 14, 1997, to August 12, 1997. No public comments were received during this second comment period.

SCOPE AND ROLE OF THE OU

The K-1070-C/D OU is on the eastern side of ETTP and encompasses soil, waste, surface water (wet weather conveyances), and associated sediments at seven areas: Trench Area, Landfarm Area, Concrete Pad Area, North Pits Area, South Pits Area, Pits Downgradient Area(i.e., area downgradient of the North and South Pits), and K-1414 Area. This remedial action for the K-1070-C/D OU fits into the overall cleanup strategy for ORR by addressing a primary contributor to groundwater contamination (soil and waste from the G Pit in the South Pits Area) as well as protecting industrial workers (from exposure to the Concrete Pad). No further action is recommended for surface water and sediment at the K-1070-C/D OU and for the Landfarm Area.

Additional efforts at risk reduction, not included in this ROD, include an early action that will intercept and treat groundwater releases from this OU and an interim action that involves ongoing collection and treatment of water from the SW-31 Spring, located downgradient of the OU. Early action involves installing a system to capture contaminated groundwater in the unconsolidated zone along the southern and western edges of the Trench Area. This early action is described in the engineering evaluation/cost analysis for the Mitchell Branch and the K-1070-C/D Area trenches (DOE 1997b).

Source characterization of the Trench, the North Pits, and the South Pits Areas, as well as secondary sources at the Pits Downgradient and K-1414 Areas, and their impact to groundwater

will be reevaluated in the ETTP RI and addressed in the ETTP FS. Selection of the final remedy addressing these components of the K-1070-C/D OU has been deferred to the ETTP ROD.

SUMMARY OF SITE CHARACTERISTICS

The following summarizes the RI findings (nature and extent of contamination and fate and transport) for the G Pit, the Concrete Pad Area, the Landfarm Area, and surface water and sediments. Documentation supporting the ETTP ROD will present details of the North Pits Area, the other pits in the South Pits Area, the Trench Area, the Pits Downgradient Area, and the K-1414 Area.

G PIT

The G Pit at the South Pits Area appears to be a primary source of contaminant release to K-1070-C/D OU soil and groundwater, based on adjacent soil borings and source-term samples collected from within this pit. Data collected during the RI define the nature and extent (lateral and vertical) of a soil contaminant plume emanating from the G Pit and extending downgradient to the Pits Downgradient Area. Leachate samples from the G Pit include acetone (500 mg/L), 1,1,1-trichloroethane (TCA) (840 mg/L), trichloroethene (TCE) (220 mg/L), 1,1-dichloroethane (DCA) (43 mg/L), and methylene chloride (7.1 mg/L. The concentrations of TCE (20 percent of solubility) and 1,1-DCA (19 percent of solubility) show the presence of free-phase contamination, indicating that the G Pit is a continuing source of soil and groundwater contamination. Fate and transport modeling of releases from the G Pit area shows that several chlorinated hydrocarbon concentrations exceeded or will exceed the groundwater maximum contaminant levels (MCLs) specified by the Safe Drinking Water Act of 1974 [40 Code of Federal Regulations (CFR) 141], and that maximum concentrations for all contaminants detected in the G Pit (including volatile organic compounds, semivolatile organic compounds, and radionuclides) have not yet peaked at the water table and will continue to increase. Because groundwater is not within the scope of this OU, MCLs are not an applicable or relevant and appropriate requirement (ARAR) for this action. However, these exceedances of MCLs (either actual or modeled future) indicate that the G Pit is contributing to groundwater contamination at unacceptable levels.

CONCRETE PAD AREA

Surface soil samples [0-0.3 m (0-1 ft)] indicate significant levels of radiological and organic contamination. The major contaminants are isotopes of uranium (234 U and 238 U) and technetium (99 Tc). Detected levels of 234 U averaged 75.5 pCi/g, 238 U averaged 60.9 pCi/g, and 99 Tc averaged 16.4 pCi/g. Gross alpha levels averaged 360 pCi/g, and gross beta levels averaged 250 pCi/g.

Because the Concrete Pad lies directly over the Trench Area, sampling the soil around the pad was limited to prevent intrusion into the trenches. Therefore, the lateral and vertical extent of contamination has not been fully defined; however, contamination in the Concrete Pad Area appears to be concentrated in a shallow, surface soil interval. Contaminants migrating vertically from the Concrete Pad Area may commingle with contaminants in the underlying Trench Area; therefore, data from groundwater wells cannot discriminate between these two source areas. Based on models of contaminant leaching, several contaminants from the Concrete Pad Area soils could migrate to groundwater in levels above MCLs or residential risk-based levels. These include technetium, 1,2-dichloroethene (DCE), tetrachloroethene (PCE), and TCE.

LANDFARM AREA

Confirmatory soil samples at the Landfarm Area indicate no significant contamination

remains from landfarming activities; however, an anomalous sample concentration of PCE was detected in this area. This isolated occurrence of PCE is within acceptable residential and industrial risk levels for soils; thus no unacceptable risks are associated with soil at the Landfarm Area.

SURFACE WATER AND SEDIMENTS

The surface waters (wet weather conveyances) in the K-1070-C/D OU do not appear to be an off-site transport mechanism for surface soil contaminants detected at the site. Contaminant concentrations in surface water and sediment at the K-1070-C/D area are low and at levels that do not exceed remedial goal options developed in the RI. Metals and radionuclides detected in sediment at the K-1070-C/D OU were near their detection limits or background criteria concentrations and are therefore believed to be naturally occurring.

SUMMARY OF SITE RISKS

Following is a summary of the site risks presented in the K-1070-C/D RI for the Concrete Pad Area, the G Pit, the Landfarm Area, and surface water and sediment. Unacceptable risks are assumed to exist from exposure to buried waste at the Trench Area, the North Pits Area, and the South Pits Area. These risks, as well as risks from exposure to secondary sources and contaminated groundwater at the Trench, North Pits, South Pits, Concrete Pad, Pits Downgradient, and K-1414 Areas, will be reevaluated in the ETTP RI/FS.

CONCRETE PAD AREA

The Concrete Pad Area is the only area that poses an unacceptable health risk from future industrial worker exposure to soil or concrete. Soil/concrete exposure could occur through dermal contact, ingestion, or external exposure to ionizing radiation. Industrial risk is 2 x 10 -4, based on external exposure to 238 U in soil.

G PIT

The G Pit is the primary source of contaminant release to groundwater in the South Pits Area. These contaminants include 1,1-DCE, TCE, 1,1,2-TCA, and PCE.

LANDFARM AREA

No unacceptable risk was found at the Landfarm Area at the K-1070-C/D OU; therefore, remedial action is unnecessary for this area.

SURFACE WATER AND SEDIMENTS

No unacceptable risk was found for surface water and sediment at the K-1070-C/D OU; therefore, remedial action is unnecessary for these media.

The RI ecological risk assessment indicates that ecological risks for direct contact with and ingestion of contaminants in surface water and surface soil at the K-1070-C/D OU are negligible. Therefore, remedial action to address ecological risk is unnecessary.

DESCRIPTION OF ALTERNATIVES

Four alternatives (Alternatives 1, 2, 3, and 4) were developed and carried forward for detailed analysis in the FS. The primary differences among these alternatives relate to the Concrete Pad Area and the G Pit (see Table 2.1).

Table 2.1. Summary of alternatives for the Concrete Pad Area and the G Pit for the K-1070-C/D OU, Oak Ridge, Tennessee

Alternative	Concrete Pad Area	G Pit
1	No action	No action
2	Remove the Concrete Pad and surface soils, dispose of at NTS	Recycle empty drums, ISV, add and maintain soil cover
3	Remove the Concrete Pad and contaminated surface soils, dispose of at NTS	Excavate and dispose of at Envirocare of Utah, Inc.
4	Cover the Concrete Pad with soil	Recycle empty drums, ISV, add and maintain soil cover
Preferred alternative	Cover the Concrete Pad with soil	Excavate, store temporarily, treat, and dispose of

ISV = in situ vitrification
NTS = Nevada Test Site
OU = operable unit

These alternatives were developed and evaluated based on the assumption that drums and other materials in the G Pit were contained just below the surface. The resulting preferred alternative, documented in the April 1, 1996, proposed plan, was Alternative 4, which includes in situ vitrification (ISV) of the G Pit. However, a subsequent review of G Pit information revealed that man-made materials are likely contained throughout the depth of the G Pit, resulting in safety concerns from the use of ISV. Because of this discovery, DOE added another alternative, the preferred alternative delineated in the proposed plan. This alternative is a combination of Alternatives 3 and 4 and does not include ISV. Details and rationale are provided under the preferred alternative discussion in this ROD.

The focus of all action alternatives presented here (and in the proposed plan) is the G Pit and the Concrete Pad. Institutional controls to prevent exposure to waste or contaminated groundwater at other areas of the K-1070-C/D OU (as they currently exist under the S&M program) were components of these alternatives as developed in the FS and are presented here as such for consistency. However, under the selected remedy (detailed later in this ROD), these institutional controls are an interim measure because reevaluation of sources and contaminated groundwater in portions of the K-1070 C/D OU have now been deferred to the ETTP RI/FS.

Specific details on each alternative are discussed in the following paragraphs.

ALTERNATIVE 1: NO ACTION

For all the waste areas, Alternative 1 would involve no remedial actions or restrictions to reduce potential exposure. Current controls and restrictions would no longer apply; therefore, the site would be available for unrestricted land use. This alternative would leave unprotected and unattended classified waste buried in the Trench Area, which would result in unacceptable risk to human health and the environment. DOE is required by CERCLA to include this alternative as a baseline in the RI/FS selection process for comparison with other selected alternatives.

ALTERNATIVE 2: CONCRETE PAD AREA REMOVAL, G PIT ISV, AND INSTITUTIONAL CONTROLS AND MONITORING

This alternative consists of removing the Concrete Pad and associated contaminated soils and off-site disposal of the waste at the Nevada Test Site (NTS); recycling any drums from the G Pit and ISV of G Pit contaminated soils followed by the addition of a soil cover; and maintenance of new and existing soil covers and institutional controls for the North Pits, South Pits, and Trench Areas. This alternative would designate waste areas as access-restricted, inactive disposal areas.

The Concrete Pad would be demolished using standard construction equipment. The waste concrete and excavated soils, approximately 9.9 m 3 (13 yd 3) and 81.8 m 3 (107 yd 3), respectively, would be placed in shipping containers and transported by truck and rail to NTS for final disposal. Excavated areas would be regraded using uncontaminated native soil.

Metal drums buried near the surface of the G Pit would be excavated and sent to a metal recycling facility for recycling. G Pit soils would be treated in place using ISV. ISV would create a glass monolith, destroying the organic contaminants in the G Pit and encapsulating inorganic and radioactive contaminants. ISV would also prevent further migration of contaminants into groundwater and reduce waste volume by approximately 20 percent. The G Pit would be backfilled and covered with uncontaminated native soil to protect treated waste.

New and existing soil covers for the North Pits, South Pits, and Trench Areas would require routine inspections and periodic maintenance. Institutional controls would consist of access and use restrictions such as fencing, deed restrictions, and administrative controls to prevent unearthing the buried waste. Groundwater monitoring and periodic radiological surveys would be performed.

ALTERNATIVE 3: CONCRETE PAD AREA AND G PIT REMOVAL, AND INSTITUTIONAL CONTROLS AND MONITORING

This alternative involves the removal and off-site disposal of the Concrete Pad and its associated contaminated soils and G Pit soils, drums, and wastes. Institutional controls and monitoring would be implemented for the North Pits, South Pits, and Trench Areas. This alternative would designate the waste areas as access-restricted, inactive disposal areas.

Removal of the Concrete Pad and associated soils would occur as described for Alternative 2. Standard construction equipment would be used to remove soil, drums, and waste from the G Pit. Approximately 133 m 3 (174 yd 3) of contaminated material would be loaded onto railcars at ETTP and transported to the Envirocare of Utah, Inc., disposal facility in Clive, Utah, for chemical stabilization and final disposal.

Institutional controls would be implemented as described for Alternative 2.

ALTERNATIVE 4: CONCRETE PAD AREA SOIL COVER, G PIT ISV, AND INSTITUTIONAL CONTROLS AND MONITORING

This alternative involves placing a soil cover over the Concrete Pad and associated contaminated soils; reuse/recycling of any empty G Pit drums and ISV with a soil cover for the G Pit; maintenance of the new G Pit and Concrete Pad Area soil covers and other existing trench/ pit soil covers; and institutional controls and monitoring for the North Pits, South Pits, and Trench Areas. This alternative would designate the waste areas as access-restricted, inactive disposal areas.

A 0.61-m (2-ft) soil cover would be placed over contaminated material at the Concrete Pad

Area. Risk-based modeling of the Concrete Pad Area indicated that 0.5 m (1.64 ft) of native soil would adequately protect the on-site worker. An earthen berm would be built at the Concrete Pad Area to divert storm runoff. Soil would be seeded with grass to prevent the protective cover from eroding.

ISV of G Pit soils, materials reuse of any excavated drums, institutional controls, and monitoring would be implemented as described for Alternative 2.

Institutional controls would be implemented as described for Alternative 2.

PREFERRED ALTERNATIVE: CONCRETE PAD AREA SOIL COVER, G PIT REMOVAL, AND INTERIM INSTITUTIONAL CONTROLS

The DOE original preferred alternative for the K-1070-C/D OU was Alternative 4. However, it has since been discovered that man-made materials, such as drums and other containers, exist throughout the depth of the G Pit, not just at the surface as originally thought it would be prohibitively difficult to segregate and remove these materials, and ISV of the G Pit with these materials present could result in unacceptable pressure and/or temperature excursions, leading to possible contaminant migration and personnel injury. Accordingly, DOE, with the concurrence of TDEC and EPA, developed a new preferred alternative that combines Alternatives 3 and 4 and presented it in the current version of the proposed plan. Specifically, the excavation, treatment, and disposal of material from the G Pit (Alternative 3) and the soil cover of the Concrete Pad (Alternative 4) are combined to form this remedy. Interim storage of excavated G Pit material, an evaluation of ex situ treatment technologies to meet classification requirements and WAC for a permitted disposal facility, and a bench-scale test (proof-of-process evaluation) of those technologies that are not currently components of Alternative 3 have been added to this alternative as presented in the current version of the proposed plan. Existing institutional controls at the K-1070-C/D OU would also be required until ultimate decisions for the K-1070-C/D OU are finalized in the ETTP ROD. No further action would be taken for the Landfarm Area and for surface water and sediment at the K-1070-C/D OU.

The action on G Pit would be carried out in two phases. The first phase would include excavation of G Pit material and placement into compliant interim storage at ETTP and a written evaluation of ex situ treatment technologies for applicability to this material. The G Pit would also be backfilled during this first phase. The second phase would include interim storage, proof-of-process, full-scale treatment, and ultimate disposal of the G Pit wastes.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Alternatives 1, 2, 3, and 4 were evaluated during the detailed analysis in the K-1070-C/D FS. The preferred alternative was partially evaluated in the FS under Alternatives 3 and 4. A detailed analysis of the new preferred alternative is included here.

The alternatives were evaluated against the first seven of nine criteria developed by EPA (EPA 1988a) to measure overall feasibility and acceptability of remedial alternatives. The last two criteria (state and community acceptance) have been evaluated based on a regulatory agency review and public comments. The first two criteria (overall protection of human health and the environment and compliance with ARARs) must be met by any alternative considered for selection in the ROD. The next five criteria (long-term effectiveness; reduction of toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; and cost) are considered together and represent the primary criteria upon which the analysis is based, taking into account technical, cost, institutional, and risk concerns.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative 1 does not protect human health and the environment. If action is not taken, G Pit seepage will continue to contaminate groundwater, and unacceptable risk from exposure to the Concrete Pad Area may result. Alternatives 2, 3, 4, and the preferred alternative would protect human health and the environment by minimizing exposure to the Concrete Pad and by removing or treating the contents of the G Pit, which is a primary contributor to groundwater contamination from the site.

COMPLIANCE WITH ARARs

All the alternatives would comply with ARARs.

LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative 1 would not be effective in the long-term because current site conditions do not protect human health and the environment and these conditions are likely to worsen in the future. If removal of soil/waste is successfully implemented, the non-ISV component of Alternative 2, Alternative 3, and the preferred alternative would be effective in the long term.

For the Concrete Pad Area, Alternatives 2 and 3 would provide a more permanent remedy than Alternative 4 and the preferred alternative because the pad and contaminated soils would be removed.

Because ISV cannot safely process the materials at the G Pit, the ISV components of Alternatives 2 and 4 would not be effective.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

For Alternative 3 and the preferred alternative, treatment of excavated soils from the G Pit would reduce the mobility of contaminants but could increase the volume of waste, depending on the treatment technology selected.

SHORT-TERM EFFECTIVENESS

Alternatives 2, 3, and the preferred alternative are effective but present some short-term risk to workers and the environment because they involve excavation of contaminated soils, increasing the potential for contaminant migration during remediation. Off-site waste transport and disposal of waste material slightly increase risk to surrounding communities. However, operational controls during remediation would minimize the short-term effects of these actions in compliance with regulatory requirements and DOE Orders.

Because man-made materials such as drums are now thought to be dispersed throughout the G Pit, removing them before ISV would be prohibitively difficult. If ISV were implemented at the G Pit with these materials present, possible pressure and temperature excursions could jeopardize personnel safety and increase the likelihood of contaminant migration.

IMPLEMENTABILITY

Alternative 3, the preferred alternative, and the non-ISV components of Alternatives 2 and 4 are technically and administratively feasible to implement. The materials and services required for excavation, treatment, and disposal are readily available. Some additional administrative requirements may arise for the disposal component of Alternatives 2, 3, and the preferred alternative because of specific regulations concerning characterization, packaging,

transportation, and acceptance of waste for off-site disposition.

COST

Following is a comparison of the costs developed in the FS for Alternatives 1, 2, 3, and 4 and the newly developed costs for the preferred alternative. These costs were developed with an intended accuracy range of +50 to -30 percent. Within this range of accuracy, Alternative 4 and the preferred alternative have the lowest costs while the costs for Alternatives 2 and 3 are higher and approximately equal. The present-worth cost of the preferred alternative, which was defined as $5.7 million in the July 1997 proposed plan, has been reestimated at $5.9 million. The difference between the $5.7 million and the $5.9 million presented here is the present value cost of 5 years of operation and maintenance (O&M) for the site. This 5-year interval is used as a temporary period until a final decision is made and action is implemented for the remaining areas of the K-1070-C/D OU as part of the ETTP ROD and remedial action.

Present-worth Cost (based on a 30-year present value)

- Alternative 1 no cost
- Alternative 2 $7.0 million
- Alternative 3 $7.2 million
- Alternative 4 $5.3 million
- Preferred alternative $5.9 million

STATE ACCEPTANCE

This criterion evaluates whether the state agrees with, opposes, or has no comment on the preferred alternative. The state of Tennessee concurs with the selected remedy.

COMMUNITY ACCEPTANCE

Community acceptance addresses the issues and concerns the public may have regarding each of the alternatives. The "Highlights of Community Participation" section summarizes community participation. The selected remedy was not modified based on public comments. Part 3 of this ROD presents the comment submitted during the first public comment period and a response to this comment. No comments were received from the second public comment period.

SELECTED REMEDY

DOE, with the concurrence of EPA and TDEC, determined that the preferred alternative as presented in the July 1997 proposed plan is the most appropriate remedy for protection of human health and the environment at the K-1070-C/D OU. This remedy consists of an interim soil cover over the Concrete Pad to protect the industrial worker, and excavation, proof-of-process examination, full-scale treatment, and disposal of the contents of the G Pit to eliminate a primary source of groundwater contamination at the OU. This portion of the remedy will be implemented in two phases. No further action will be taken for the Landfarm Area and for surface water and sediment at the K-1070-C/D OU.

Selection of this remedy is based on the comparative analysis of the alternatives presented in the FS and on information regarding G Pit materials obtained since publication of the FS. This alternative provides the best balance of trade-offs with respect to the CERCLA criteria used to evaluate remedial alternatives. This alternative is effective in both the short- and long-term. It has implementability advantages over other alternatives because waste transport is not required for the Concrete Pad and because ISV is not implemented at the G Pit. This remedy complies with ARARs, provides overall protection of human health and the

environment, and is cost-effective.

Specific details on the selected remedy follow.

Concrete Pad

- A soil cover, considered an interim measure, will be placed over the Concrete Pad Area with adequate thickness and sufficient areal extent to provide protection from direct exposure to ionizing radiation. A conceptual example of the areal extent of such a cover is shown in Figure 2.2. The soil cover will be seeded and graded to facilitate drainage and maintenance. The soil cover will be placed over areas directly related to the Concrete Pad contamination. The soil will be placed over the existing plastic cover to minimize the possibility of contamination of cover soil. The necessary thickness and areal extent of the soil cover will be confirmed in the field by radiological surveys to verify that the remediated Concrete Pad Area is within acceptable exposure limits of < 10 IR/hour above background (based on a 1 x 10 -4 risk for an industrial worker working exclusively on the Concrete Pad for 9 years). If the survey indicates that the established exposure criteria for the industrial worker have not been met, more soil will be added to the soil cover. The soil cover will be maintained under the existing S&M program to ensure interim protection until a long-term decision for the Concrete Pad Area is finalized in the ETTP ROD.

G Pit

- Phase I: Soil, debris, and other material from the G Pit will be removed, segregated, characterized, and temporarily placed into classified mixed waste storage at ETTP. Standard construction equipment will be used to remove the materials from the G Pit [estimated at 190 m 3 (250 yd 3)]. The basis of this estimate is a visual approximation from aerial photographs of the G Pit boundaries, approximately 6 m by 6 m (20 ft by 20 ft). Depth is assumed to be 4.6 m (15 ft), based on bedrock elevation. Characterization data obtained during the excavation will be used for a written assessment of potential treatment technologies for the G Pit wastes. Following excavation, the G Pit will be backfilled and properly graded.

- Phase II: While the G Pit waste is in compliant classified storage at ETTP, a proof-of-process evaluation will be conducted using the ex situ treatment technologies identified in the first phase of the selected remedy. This proof-of-process evaluation will consist of a bench-scale test of these treatment technologies on samples of the G Pit waste. Results of the proof-of-process evaluation will be analyzed and used to select the most appropriate waste treatment technology. Once a technology is selected, it will be implemented for full-scale treatment of the G Pit waste to satisfy applicable WAC (including RCRA LDRs). Because the G Pit waste is expected to be classified, the treatment process used to satisfy LDRs is anticipated to also destroy the classified components of the waste. Following successful treatment, the waste will be disposed of in a facility that can lawfully accept it.

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Interim Institutional Controls

- Radiological walkover surveys will be conducted on site to confirm the effectiveness of the Concrete Pad soil cover in preventing exposure to ionizing radiation.

- Existing institutional controls in the S&M program will continue until final decisions are made for the K-1070-C/D OU in the ETTP ROD. These controls include access restrictions and maintenance of soil covers.

Groundwater monitoring requirements will be determined in the ETTP RI/FS (which will address protection of groundwater). However, the results of ongoing monitoring for the SW-31 Spring (not included in the K-1070-C/D OU) under a separate action will be reviewed to assess the impact of actions on the G Pit in the K-1070-C/D OU.

The total escalated cost for this project is $6.3 million (Table 2.2). The present-worth capital cost of this project is $5.7 million. The average annual O&M cost, escalated to the year of inception, is $44,700. The present-worth cost of O&M for a 5-year period is $160,000.

Table 2.2. Cost estimate for the selected remedy, K-1070-C/D OU, Oak Ridge, Tennessee

	Capital cost ($ x 1,000)				O&M cost ($ x 1,000)	
Remedial project	Direct a	Indirect a	Total a	Present worth b	Annual a	Present worth b
Base actions						
Construction	1,349	275	1,624	---	---	---
Assessment	400	82	482	---	---	---
Interim storage	103	21	124	---	---	---
Proof-of-process	672	137	809	---	---	---
G Pit full-scale treatment and disposal	2,691	549	3,240	---	---	---
Base action totals	5,215	1,064	6,279	5,700	44.7	160
Contingent actions						
None	NA	NA	NA	NA	NA	NA

a Costs are escalated (average 2.7 percent escalation rate per DOE guidance).
b Present-worth costs for 30-year study based on Building Life-Cycle analysis (version 4.20-95).
c The total unescalated O&M cost is divided by the number of years duration and then escalated to the first full year of implementation.

DOE = U.S. Department of Energy
NA = not applicable
OU = operable unit
O&M = operation and maintenance
$ = dollar

STATUTORY DETERMINATIONS

Under CERCLA Section 121, selected remedies must be protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified and granted), be cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that use treatment that permanently and significantly reduce the toxicity, mobility, or volume of hazardous wastes as their principal element.

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy protects human health and the environment by providing shielding from contaminants at the Concrete Pad Area; by preventing the continued migration of contaminants from the G Pit; and by providing institutional controls to limit site access, regulate land usage, and maintain the soil covers until a final decision is made in the ETTP ROD.

COMPLIANCE WITH ARARS

The selected remedy meets all ARARs, which are discussed here and listed in Table 2.3.

Chemical-specific requirements set health- or risk-based concentration limits or discharge limitations in various environmental media for specific hazardous substances, pollutants, or contaminants for remedial activities [53 Federal Register (FR) 51437, December 21, 1988, and FR 8741, March 8, 1990]. These requirements generally set protective cleanup levels for the chemicals of concern in the designated media or else indicate a safe level of discharge that may be incorporated when considering a specific remedial activity.

Subpart H of 40 CFR 61 addresses atmospheric radionuclide emissions from DOE facilities and may be applicable to airborne emissions during the K-1070-C/D OU remedial activities. EPA has issued a final National Emission Standards for Hazardous Air Pollutants rule (54 FR 51654, December 15, 1989) that limits emissions of radionuclides to the ambient air from DOE facilities to amounts that would not cause any member of the public to receive an effective dose equivalent of 10 mrem/year or more (40 CFR 61.92). Title 40 CFR 61.93(b)(4)(i) requires radiological emission measurements at all release points with a potential to discharge radionuclides into the air in quantities that could cause an effective dose equivalent in excess of I percent of the standard (0.1 mrem/year). All radionuclides that could contribute > 10 percent of the standard (1 mrem/year) for a release point shall be measured. TDEC has codified these regulations verbatim in Rules of the Tennessee Department of Environment and Conservation, Chapter 1200-3-11.08, effective October 15, 1995.

DOE Orders are not promulgated regulations; thus, they are to-be-considered (TBC) guidance and not ARARs by EPA. However, compliance is required at DOE facilities. The radiation exposure limits defined in DOE Order 5400.5, "Radiation Protection of the Public and the Environment," February 8, 1990, are an effective dose equivalent of 100 mrem/year from all exposure pathways and all DOE sources of radiation. The overriding principle of the DOE Order is that all releases of radioactive material shall be as low as reasonably achievable. DOE has proposed these radiation protection standards for the public and the environment for codification at 10 CFR 834 (58 FR 16268, March 15, 1993).

Location-specific, requirements set restrictions on the concentration of hazardous substances or the conduct of activities solely because they are in special locations (55 FR 8741, March 8, 1990). Based on current information for the K-1070-C/D OU, none of the following factors are present: aboveground caves, Holocene faults, wetlands, floodplains, aquatic resources, historic sites, archaeological findings, or rare, threatened, or endangered species. Therefore, there are no location-specific ARARs triggered for the K-1070-C/D OU.

Performance, design, or other action-specific requirements set controls or restrictions on particular kinds of activities related to the management of hazardous waste (55 FR 8741, March 8, 1990). Selection of a particular remedial action at a site will invoke the action-specific ARARs that may specify particular performance standards or technologies as well as environmental levels for discharged or residual chemicals.

Table 2.3. Summary of ARARs for soil cover of the Concrete Pad, excavation of the G Pit, and institutional controls for the North Pits, South Pits, and Trench Areas, K-1070-C/D OU, Oak Ridge, Tennessee

Action	Requirement	Prerequisites	Citation
	Location-specific		
	None	None	None
	Chemical-specific		
Control of radionuclide emissions	Exposures to members of the public from all radiation sources released into the atmosphere shall not cause an EDE to be > 10 mrem (0.1 mSv)/year Radiological emission measurements must be performed at all release points that have a potential to discharge radionuclides into the air in quantities which could cause an EDE in excess of 1 % of the standard (0.1 mrem/year). All radionuclides which could contribute > 10% of the standard (1 mrem/year for the release point shall he measured	Point source discharge of radionuclides into the ambient air from a DOE facility-applicable	40 CFR 61.92; Rules of the TDEC 1200-3-11-.08 40 CFR 61.93; Rules of the TDEC 1200-3-11-.08
Protection of the general public	DOE will carry out all DOE activities to ensure that radiation doses to individuals will be ALARA Exposures to members of the public from all radiation sources shall not cause an EDE to be > 100 mrem (1 mSv)/year	Release of radionuclides info the environment-TBC 5400.5(II.1a); 10 CFR 834 (proposed)	DOE Order 5400.5(I.4): 10 CFR 834 (proposed) DOE Order
	Action-specific		
Surface water control	Implement good site planning and best management practices to control storm water discharges including: ò document best management practices in a stormwater control plan or equivalent document ò minimal clearing for grading ò removal of vegetation cover only within 20 days of construction ò perform weekly erosion control inspections and maintenance ò control measures to detain runoff ò discharges must not cause erosion	Control of stormwater discharges associated with construction activities at industrial sites that result in a disturbance of > 5 acres of total land area. For those sites with < 5 acres affected-relevant and appropriate	40 CFR 122; Rules of the TDEC 1200-4-10-.05

Table 2.3. (continued)

Action	Requirement	Prerequisites	Citation
Fugitive emissions from excavation activities	Take reasonable precautions to prevent particulate matter from becoming airborne; no visible emissions are permitted beyond property boundary lines for more thin 5 minutes/hour or 20 minutes/day. Potential nonpoint sources of fugitive emissions are included in the plantwide fugitive emissions plan	Nonpoint source air emissions-applicable	Rules of the TDEC 1200-3-8-.01
Characterization/management of excavated wastes, PPE and other secondary wastes streams generated during remediation	A person who generates solid waste must determine whether that waste is hazardous using various methods, including application of knowledge or the hazardous characteristics of the waste based on information regarding the materials or processes used	Generation of waste which is potentially RCRA contaminated- applicable	40 CFR 262.11; Rules of the TDEC 1200-1-11-.03(1)(b)
	All RCRA restricted waste generated during remedial activities must be treated to meet the LDR before land disposal	Disposal of wastes potentially contaminated with RCRA constituents-applicable	40 CFR 268.40; Rules of the TDEC 1200-1-11-.10(3)(a)
	LLW generators must characterize and segregate LLW from uncontaminated waste and otherwise minimize the amount of LLW generated. Subsequent management of LLW must be accordance with DOE Order 5820.2A.	Generators of LLW-TBC	DOE Order 5820.2A(III.3)
Characterization/management of debris containing RCRA hazardous waste	Surface contamination or a representative sample, of debris must be characterized to determine whether it is RCRA-listed or RCRA characteristic waste and a determination made as to whether it is waste restricted from land disposal using TCLP or operator knowledge	Debris contaminated with RCRA-listed or characteristic waste-applicable	40 CFR 262.11; 40 CFR 268.7(a); Rules of the TDEC 1200-1-11-.03(1)(b); Rules of the TDEC 1200-1-11-.10(l)(a)
	Hazardous debris must (1) be treated by specified technologies based on the type of debris and type of contaminants before find disposal or (2) be treated to meet existing treatment standards for the specific waste contaminating the debris		40 CFR 268.45; Rules of the TDEC 1200-1-11-.10(3)(a)
	Debris treated by one of the specified extraction or destruction technologies, meets the requirements for a clean debris surface and which no longer exhibits a characteristic meets the LDR treatment standards and is no longer subject to LDR. Such debris may be disposed of at a sanitary landfill, recycled, or reused; debris treated by immobilization must be disposed of in a Subtitle C facility		40 CFR 268.45(c); Rules of the TDEC 1200-1-11-.10(3)(a)

Table 2.3. (continued)

Action	Requirement	Prerequisites	Citation
Collection, transfer to CNF and treatment or any water generated from decontamination activities	On-site wastewater treatment units that are part of a wastewater treatment facility that is subject to regulation under Section 402 or Section 307(b) of CWA (i.e., are NPDES permitted) are exempt from the requirements of RCRA Subtitle C standards.	All tank systems, conveyance systems, and ancillary equipment used to store or transport RCRA contaminated wastewater-applicable	40 CFR 264.1(g)(6); 40 CFR 260.10; 40 CFR 270.1(c)(2); 53 FR 34079, September 2, 1988
	Must meet WAC of receiving facility		DOE Order 5820.2A; K/SS-538, February 1990 (CNF WAC)
Storage of mixed hazardous waste	Allows storage of mixed wastes at ORR pending development of treatment capacity	Storage of mixed waste-applicable	FFCAct Section 105; ORR FFA
Storage of RCRA hazardous waste in containers	Must comply with the container storage requirements of 40 CFR 262.34 and 40 CFR 264.171-174	Storage of RCRA hazardous waste-applicable	40 CFR 264.34; 40 CFR 264.171-178; Rules of the TDEC 1200-1-11-.06(9)
Residual radioactivity left in place at the Concrete Pad and G Pit	Specific guidelines for allowable levels of residual radioactivity left in place	Long-term management of radioactivity left in place-TBC	DOE Order 5400.5 (IV); 10 CFR 834 (proposed)
Institutional controls	Implement institutional controls for all areas where containment is a remedial action; such controls include, at a minimum, deed restrictions for sale and use of the property and securing the area to prevent human contact with hazardous substances	Containment as final remedial action for hazardous substances which pose or may pose an unreasonable threat to the public, health, safety or the environment-relevant and appropriate	Rules of the TDEC 1200-1-13-.08(10)
Transportation of waste/ treatment residuals to off-site disposal facility	The waste must meet packaging, labeling, marking, placarding and pretransport requirements in accordance with DOT regulations	Transportation of hazardous and radioactive materials above exempt quantities-applicable	49 CFR Parts 171, 172, 173, and 177; DOE Order 460.1 (TBC)
	Must meet packaging requirements based on the maximum activity of radioactive material in a package	Packaging of radioactive materials above exempt quantities for public transport-applicable	49 CFR 173.431; 49 CFR 173.433; 49 CFR 173.435; 49 CFR 173.41
	Must be marked with hazardous waste marking, generator's name and address, and the manifest docket number	Transportation of hazardous waste in containers of 110 gal or less-applicable	40 CFR 262.32(b)

Table 2.3. (continued)

Action	Requirement	Prerequisites	Citation
Transportation of waste/ treatment residuals to off-site disposal facility (continued)	Generators must certify before shipment that waste meets WAC of receiving facility	Waste shipped from one field organization to another for disposal-TBC	DOE Order 5820.2A(III)
	LLW must be disposed of on site; if off-site disposal is required because lack of capacity, disposal must be to a DOE facility	Shipments of LLW-TBC	DOE Order 5820.2A
	Off-site disposal of LLW to a commercial facility requires an exemption from the on-site disposal requirements of DOE Order 5920.2A; requests for exemption must be approved by the DOE ORO field office. Must meet DOE Order and implementing procedural requirements for off-site shipments	Shipments of LLW-TBC	DOE Order 5820.2A

ALARA = as low as reasonably achievable
ARAR = applicable or relevant and appropriate requirement
CFR = Code of Federal Regulations
CNF = Central Neutralization Facility
CWA = Clean Water Act of 1972
DOE = U.S. Department of Energy
DOT = U.S. Department of Transportation
EDE = effective dose equivalent
FFA = Federal Facility Agreement
FFCAct = Federal Facility Compliance Act of 1992
FR = Federal Register
> = greater than
gal = gallon
< = less than
LDR = land disposal restrictions
LLW = low-level (radioactive) waste
mrem = millirem
mSv = milliSievert
NPDES = National Pollutant Discharge Elimination System
ORO = Oak Ridge Operations
ORR = Oak Ridge Reservation
OU = operable unit
% = percent
PPE = personal protective equipment
RCRA = Resource Conservation and Recovery Act of 1976
TBC = to be considered
TCLP = Toxic Characteristic Leaching Procedure
TDEC = Tennessee Department of Environment and Conservation
WAC = waste acceptance criteria

Stormwater Runoff

Stormwater discharges from activities at industrial sites involving construction operations that result in the disturbance of 2 ha (5 acres) of total land or more have been included in the final rule for the National Pollutant Discharge Elimination System (NPDES) permits for stormwater discharges and incorporated into the TDEC permitting regulations (40 CFR 122; Rules of the TDEC 1200-4-10-.05). Consultation with TDEC is required to ensure compliance with the substantive requirements of the NPDES permitting process for stormwater discharges during construction activities (Rules of the TDEC 1200-4-10-.05). In particular, implementation of good site planning and best management practices to control stormwater discharges is required. Stormwater discharge requirements are applicable if 2 ha (5 acres) or more are disturbed; otherwise they are relevant and appropriate requirements. Stormwater flow controls such as berms, silt fences, hay bales, and other best management practices will be followed during implementation of the selected remedy to comply with stormwater runoff ARARs.

Fugitive Emissions

Elevation of airborne particulate concentrations could result from remediation activities. The TDEC Air Pollution Commission has promulgated applicable requirements in Rules of the TDEC 1200-3-8.010 for the control of fugitive dust. An operator must take reasonable precautions to prevent particulate matter from becoming airborne. In addition, fugitive dust may not be emitted as a visible emission beyond property boundary lines for more than 5 minute/hour or 20 minute/day. To ensure compliance with ETTP air permits and to meet the substantive requirements of fugitive dust emissions, dust suppression measures (such as water, organic agents, or foams sprayed over the area of concern to prevent dust generation) combined with ambient air monitoring stations are to be recommended as a best management approach for activities during the K-1070-C/D OU remediation.

Characterization and Management of Excavated Pit Material and Secondary Waste Streams

During remediation, excavated pit material, personal protective equipment, and other secondary wastes will be generated that may be contaminated with RCRA-listed or RCRA-characteristic waste and/or low-level (radioactive) waste (LLW). When a solid waste is generated, it must be classified as hazardous or nonhazardous and managed accordingly (see Table 2.3). DOE Order 5820.2A, "Radioactive Waste Management," requires generators of LLW to characterize and segregate LLW to minimize the amount of LLW generated.

Any empty containers contaminated with RCRA-listed waste that are removed from the G Pit would be exempt from RCRA (including the LDRs) if they meet the definition of an intact container as specified in 40 CFR 268.2 and meet the requirements specified in 40 CFR 261.7 for empty containers. If the container cannot qualify as an empty intact container, any container contaminated with RCRA-hazardous waste must be handled and managed as hazardous debris. Treatment standards for hazardous debris are codified at 40 CFR 268.45. All hazardous debris and any incidental soil associated with the debris must be treated by the specified immobilization, extraction, or destruction technologies or meet the waste-specific LDR treatment standard for the waste contaminating the debris [40 CFR 268.45(a)]. If the debris is treated by an extraction or destruction technology, it will no longer be considered hazardous and need not be managed in a RCRA Subtitle C facility provided the debris no longer exhibits a hazardous characteristic. To meet the LDR treatment standards for contaminated soil, a treatability variance can be obtained under 40 CFR 268.44. EPA has developed guidance for obtaining and complying with a treatability variance for soil that is contaminated with RCRA hazardous wastes for which treatment standards have already been set [EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9347.3-06FS, July 1989].

Wastewater from Decontamination Activities

Any wastewater from decontamination activities at the G Pit and groundwater collected during excavation will be transferred to the Central Neutralization Facility (CNF). The wastewater will be evaluated to ensure that it will meet WAC. The wastewater may contain RCRA-listed waste. However, any on-site wastewater treatment units that are part of a wastewater treatment facility subject to regulation under Clean Water Act of 1972 Sections 402 or 307(b)(i.e., are NPDES-permitted) are exempt from the requirements of RCRA Subtitle C standards for all tank systems, conveyance systems (whether piped or trucked), and ancillary equipment [40 CFR 264.1(g)(6); 40 CFR 260.10; 40 CFR 270.1(c)(2); 53 FR 34079, September 2, 1988]. If the wastewater does not meet CNF WAC, it will be stored on site in compliance with 40 CFR 262.34, 40 CFR 264.171-178, and pursuant to Section 105 of the Federal Facility Compliance Act of 1992 (FFCAct) and the FFA.

Storage of Waste Pending Transfer to Existing Permitted Storage

Some of the excavated wastes are expected to contain RCRA-listed and/or RCRA-characteristic waste in addition to LLW and will thus be considered mixed waste. In accordance with FFCAct Section 105, the FFA among Tennessee, DOE, and EPA, and approved RODs (and implementing plans) issued pursuant to the FFA govern the development of treatment technologies and capacities, storage pending treatment, and ultimate treatment of LDR mixed waste generated by ORR environmental restoration activities. Accordingly, mixed wastes generated under this ROD may be stored at ORR pending the development of treatment capacity for the mixed waste in accordance with schedules set forth in the implementation plans for this ROD.

Closure of G Pit

After removal of the waste from the G Pit, some residual contamination will be present in the surrounding subsurface soils. Pursuant to RCRA, 40 CFR 264.114, at closure all contaminated soils must be removed or the closure must comply with the closure provisions of 40 CFR 264.310, which would be considered potentially relevant and appropriate. This closure provision would require the placement of a cap designed and constructed to have a permeability less than or equal to any bottom liner or subsoils present. However, EPA OSWER Directive 9234.2-04FS discusses a hybrid clean closure that may be used when leachate from the residual contamination will not impact groundwater above health-based levels, even though levels in the leachate and residual contamination are above health-based levels if contamination does not pose a direct-contact threat. In such cases, the guidance indicates no cover would be required. Using the hybrid closure approach, the capping requirements, while considered relevant, are not appropriate for the closure of the G Pit.

For the residual radioactivity left in place, the requirements of DOE Order 5400.5 (IV) will be TBC guidance.

Treatment, Packaging, and Trasportation of Waste Off Site for Disposal

Removal of RCRA waste from an area of contamination at a CERCLA site and subsequent disposal will subject the wastes to the RCRA LDRs (53 FR 51444). To meet the LDR treatment requirements, the waste will be incinerated at the Toxic Substances Control Act of 1976 Incinerator or otherwise treated at another approved, permitted facility to meet LDRs. Because either option involves the use of an approved facility, there are no ARARs for this activity. After treatment, the waste or waste residuals will be transferred to an off-site permitted disposal facility.

Once wastes generated from a CERCLA response action are transferred off site, all administrative as well as substantive provisions of all applicable requirements must be met.

The U.S. Department of Transportation (DOT) Regulations for Hazardous Materials list general requirements for shipping and packaging in 49 CFR 172 and 173 (see Table 2.3).

EPA and TDEC regulations governing generators and transporters of hazardous waste are found in 40 CFR 262-263 and Rules of the TDEC 1200-1-11-.03 to .04, respectively. Rules of the TDEC 1200-1-11-.03 (40 CFR 262) requires generators to ensure and document that the hazardous waste they generate is properly identified and transported to a treatment, storage, and disposal facility. Specific requirements are given for manifesting [Rules of the TDEC 1200-1-11-.03(3); 40 CFR 262.20-23], packaging, labeling, marking, and placarding [Rules of the TDEC 1200-1-11-.03(4); 40 CFR 262.30-33]. Pretransport requirements reference the DOT regulations under 49 CFR 172, 173, 178, and 179.

In accordance with DOE Order 5820.2A, mixed waste is to be disposed of on the site where it is generated, if possible, or if off-site disposal is necessary because there is no on-site capacity, disposal must be at another DOE facility. An off-site disposal facility holding both a RCRA permit and a Nuclear Regulatory Commission Agreement-state permit can be used for disposal if an exemption to DOE Order 5820.2A requirements is approved by EM-50, in consultation with EH-1, and the waste meets the off-site disposal facility WAC (see Table 2.3).

CERCLA Section 121(d)(3) provides certain requirements for the off-site transfer of any hazardous substance, pollutant, or contaminant generated during CERCLA response actions; such substances must be transferred to a facility that is in compliance with RCRA and applicable state laws. EPA has codified this statutory requirement at 40 CFR 300.440, which establishes the procedures and criteria for determining whether facilities are acceptable for the off-site receipt of waste.

Soil Cover of the Concrete Pad

The soil covering placed over the Concrete Pad will leave residual radioactive contamination and waste in place. The requirements of DOE Order 5400.5 (IV) will be considered TBC guidance for the residual radioactivity left in place.

Institutional Controls for the North Pits, South Pits, and Trench Areas

Institutional controls would remain in place for the North Pits, South Pits, and Trench Areas as an interim measure until these sources are reevaluated in the ETTP RI/FS. The institutional control requirements in Rules of the TDEC 1200-1-13-.08(10) will be relevant and hazardous substances that pose or may pose a threat to human health and safety (see Table 2.3). Corresponding requirements found in DOE Order 5400.5 are contractually binding for DOE subcontractors.

COST EFFECTIVENESS

Actions taken under CERCLA must consider the estimated total present-worth cost of alternatives. The selected remedy costs less than Alternatives 2 and 3 and is approximately the same cost as Alternative 4. The selected remedy is, therefore, considered cost-effective for the protection of human health and the environment.

USE OF PERMANENT SOLUTIONS TO THE MAXIMUM EXTENT PRACTICABLE

DOE believes the selected remedy represents the maximum extent to which permanent solutions and alternative treatment technologies or resource recovery technologies can be used in a cost-effective manner for the K-1070-C/D OU sources at this time. Of the remediation alternatives, DOE believes the selected remedy provides the best balance of trade-offs in terms

of long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. Some wastes will remain at the site untreated. The remaining waste's impact on future groundwater contamination will be assessed during the ETTP RI/FS and, potentially, additional action may be taken at that time.

PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The statutory preference for treatment to reduce the toxicity, mobility, or volume of waste as a principal element of the selected remedy is satisfied with the action at the G Pit because the waste will be treated subsequent to excavation. The soil cover at the Concrete Pad does not satisfy this preference; however, this soil cover is considered a temporary measure and will be reevaluated in the ETTP RI/FS along with the other source areas not addressed in this ROD.

DOCUMENTATION OF SIGNIFICANT CHANGES

The proposed plan for the K-1070-C/D OU was released for public comment in July 1997. No comments were submitted during the public comment period. Therefore, no significant changes to the remedy, as originally identified in the proposed plan, are necessary as a result of public comments. However, since the public comment period, the soil cover of the Concrete Pad and the institutional controls, previously designated as final actions in the proposed plan, have been redesignated as interim actions because of the reevaluation of waste, secondary sources, and contaminated groundwater in the upcoming ETTP ROD.

REFERENCES

DOE (U.S. Department of Energy). 1997a. Proposed Plan for the K-25 Site K-1070-C/D Operable Unit, Oak Ridge, Tennessee, DOE/OR/02-1399&D4. Oak Ridge, TN.

DOE. 1997b. Engineering Evaluation/Cost Analysis for the Mitchell Branch and K-1070-C/D Area Trenches, DOE/OR/02-1585&D1. Oak Ridge, TN.

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EPA (U.S. Environmental Protection Agency). 1988a. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, EPA/540/G-89/004. Washington, DC.

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PART 3. RESPONSIVENESS SUMMARY

This responsiveness summary documents public comments to both proposed plans (D2 and D4 versions) for the K-1070-C/D OU (DOE 1996; DOE 1997a). These two proposed plans were issued in April 1996 and July 1997, respectively. The first public comment period began July 15, 1996, and ended August 12, 1996; the second comment period began July 14, 1997, and ended August 12, 1997. In both cases, DOE announced the availability of the proposed plan in local newspapers, including The Knoxville News-Sentinel, The Roane County News, The Oak Ridger, The Rockwood Times, and the Clinton Courier-News. The public notices advised that a public meeting would be arranged if requested. This document addresses all public comments received on the proposed plan.

This responsiveness summary serves three major purposes. First, it informs DOE, EPA, and TDEC of community concerns about the site and the community preferences regarding the proposed remedial alternative. Second, it demonstrates how public comments were integrated into the decision-making process. Finally, it allows DOE to formally respond to public comments.

This summary is prepared pursuant to the terms of the FFA among DOE, EPA, and TDEC, as well as other requirements, including:

- CERCLA as amended by SARA, 42 USC, Section 9601, et seq.;
- NCP, 40 CFR 300.430; and
- Community Relations in Superfund, A Handbook (EPA 1988b).

COMMENTS AND RESPONSES

No public meeting was requested after posting of each public notice. Only one member of the public commented on the K-1070-C/D OU proposed plan during the first public comment period. No comments were received during the second public comment period. This public comment and the DOE response follows.

Comment: Max Trisel wrote that Alteniative 4 appears to be the most appropriate and cost-effective measure and that the proposed plan addresses the concerns for human health and the environment for the short-term and long-term effects upon implementation.

Response: DOE originally agreed that Alternative 4 was the most appropriate alternative. However, recently obtained information indicates man-made materials may be contained throughout the G Pit, not just below the surface as previously thought. ISV of the G Pit with these materials present could result in unacceptable pressure and/or temperature excursions, possibly spreading contamination and leading to worker injury. Therefore, DOE has proposed, and subsequently selected, an alternative that combines part of Alternative 3 (excavation of the G Pit) and part of Alternative 4 (soil cover for the Concrete Pad).

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Attachment One

Record of Decision
K-1070-C/D Operable Unit
East Tennessee Technology Park
Oak Ridge Reservation, Oak Ridge, Tennessee

Site Description - As shown in Attachment Two, the K-1070-C/D Operable Unit (OU) is an 22 acre tract of land located on the eastern side of the East Tennessee Technology Park (ETTP). This OU is divided into seven source areas: Trench Area, Landfarm Area, Concrete Pad Area, North Pits Area, South Pits Area (which includes G-Pit), Pits Downgradient Area (i.e., area down gradient from the North and South Pits), and the K-1414 Area. These areas include soil and buried waste, such as drums, gas centrifuge hardware, and other equipment, and numerous hazardous substances. Surface water and associated sediments are also part of the K-1070-C/D OU. The primary contaminants of concern addressed in this Record of Decision (ROD) include organic compounds in soil and groundwater, and uranium isotopes (U-234 and U-238) and technetium-99 in surface soils.

Selected Remedy: The estimated present worth cost of implementing the selected remedy for 30 years is $5.9M. The remedy includes:

- no action decisions for the Landfarm Area, and surface water and associated sediments within the K-1070-C/D OU;
- existing institutional O&M (including access restrictions and maintenance of existing soil covers) to control exposure concerns associated with waste left in place within the Trench Area, and the North and South Pits Areas;
- a soil cover, considered an interim measure, placed over the Concrete Pad Area with adequate thickness and sufficient areal extent to provide protection from direct exposure to ionizing radiation; and
- removal, interim storage, treatment and disposal of G-Pit source materials (addressing 1 of 10 pits within the South Pits Area). After waste removal (~ 250 cubic yards of classified mixed waste consisting of contaminated soil and debris, including metal drums), G-Pit will be backfilled and properly graded.

Contaminants of Concern: G-Pit leachate contaminants include acetone (500 mg/l), 1,1,1-trichloroethane (840 mg/l), trichloroethene (220 mg/l), 1, I-dichloroethane (43 mg/l), and methylene chloride (7.1 mg/l). Concrete Pad Area contaminants include isotopes of uranium (U-234 and U-238), and technetium-99. No ecological risks were identified for OU surface water.

Risk Issues: The greatest G-Pit risks were identified through the groundwater pathway (i.e., future receptor using groundwater for drinking purposes). Extreme levels of organics composing G-Pit leachate indicate presence of free phase contamination. Fate and transport modeling indicate that several chlorinated hydrocarbon concentrations exceeded or will exceed MCLs for groundwater, and that maximum conceptrations for all contaminants detected in G-Pit leachate (including volatile organic compounds, semivolatile organic compounds and radionuclides) have not yet peaked at the water table and will continue to increase.

The risks from the Concrete Pad Area are due to exposure to ionizing radiation under an industrial scenario. Detected levels of U-234 averaged 75.5 pCi/g, U-238 averaged 60.9 pCi/g, and Tc-99 averaged 16.4 pCi/g. Also, gross alpha levels averaged 360 pCi/g, and gross beta levels averaged 25O pCi/g. The calculated industrial risk is 2 X 10 -4, based on external exposure to U-238 in soil.

Implementation Issues: Due to the classified nature of G-Pit waste, removed source materials will have to undergo treatment to render it un-classified before final disposal. Until a treatment process is developed to accomplish this, G-Pit source materials will have to be placed into classified mixed waste storage. Treatability studies will have to be conducted to evaluate and select a treatment process.

Additional efforts at risk reduction, not included in this ROD include an early action that will intercept and treat groundwater releases from the K-1070-C/D OU and an interim action that involves ongoing collection and treatment of water from the SW-31 Spring, located down gradient of the OU. The early action, described in a previously approved EE/CA, involves installing a system to capture and treat contaminated groundwater in the unconsolidated zone along the southern and western edges of the Trench Area.

Final actions for the K-1070-C/D OU (excluding G-Pit source materials) will be evaluated in the ETTP RI/FS. It is anticipated that DOE will prefer to leave the remainder of K-1070-C/D OU wastes in place under existing institutional controls.

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