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Engineering Evaluation/Cost Analysis for the Accelerated Retrieval Project II

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DOE Idaho Operations Office

ABSTRACT

This engineering evaluation and cost analysis report is prepared for public comment and evaluates proposed activities to remove transuranic and other targeted waste from a portion of Pit 4 and Pit 6 within the Subsurface Disposal Area as a non-time-critical removal action. This document specifies the focused removal action objectives of the Accelerated Retrieval Project II and describes and evaluates two options. The recommended option focuses on retrieval of targeted waste originating from the Rocky Flats Plant that is contaminated with volatile organic compounds, various isotopes of uranium, and transuranic radionuclides.

The Accelerated Retrieval Project II is a continuation of the Accelerated Retrieval Project, which is currently conducting waste retrieval activities in Pit 4 of the Subsurface Disposal Area within the Radioactive Waste Management Complex at the Idaho National Laboratory. The designated retrieval area evaluated in this engineering evaluation and cost analysis lies immediately to the east of the Accelerated Retrieval Project area and includes the eastern-most portion of Pit 4 and a portion of the west end of Pit 6. Waste in this area originated primarily from the Rocky Flats Plant in Colorado. The designated area was selected by the U.S. Department of Energy, the Idaho Department of Environmental Quality, and the U.S. Environmental Protection Agency based on inventory evaluations identifying significant quantities of transuranic and other contaminated waste buried in the area.

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ACRONYMS

ABRA	Ancillary Basis for Risk Analysis
ARP I	Accelerated Retrieval Project for a Described Area within Pit 4
ARP II	Accelerated Retrieval Project II
ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
DOE	U.S. Department of Energy
EE/CA	engineering evaluation and cost analysis
EPA	U.S. Environmental Protection Agency
DEQ	(Idaho) Department of Environmental Quality
FY	fiscal year
HEPA	high-efficiency particulate air
INL	Idaho National Laboratory
NCP	National Contingency Plan
NTCRA	non-time-critical removal action
OU	operable unit
PCB	polychlorinated biphenyl
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
RFP	Rocky Flats Plant
RI/FS	remedial investigation and feasibility study
ROD	Record of Decision
RWMC	Radioactive Waste Management Complex
SDA	Subsurface Disposal Area
TBC	to be considered
TRU	transuranic
VOC	volatile organic compound
WAG	waste area group
WIPP	Waste Isolation Pilot Plant

Engineering Evaluation/Cost Analysis for the Accelerated Retrieval Project II

1. INTRODUCTION

This engineering evaluation and cost analysis (EE/CA) report, prepared for public comment, evaluates a proposed non-time-critical removal action (NTCRA) to remove transuranic (TRU) and other targeted waste from the Radioactive Waste Management Complex, Subsurface Disposal Area (SDA) within the Idaho National Laboratory (INL) (see Figure 1). The action continues accelerated retrieval activities within Pit 4 and Pit 6 and is referred to as the Accelerated Retrieval Project II (ARP II). The ARP II area lies immediately east of where the first phase of the Accelerated Retrieval Project (ARP I) is being performed, and includes the eastern-most portion of Pit 4 and a portion of the west end of Pit 6 (see Figure 2). Consistent with ARP I, this proposed action would perform limited excavation and retrieval of selected targeted waste streams from a designated portion of the SDA. Once retrieved, the waste would be repackaged in new containers, placed in interim storage, and characterized for disposal at the Waste Isolation Pilot Plant (WIPP) in New Mexico.

Waste in the ARP II area originated primarily from the Rocky Flats Plant (RFP)[a] in Colorado. The area was selected by the U.S. Department of Energy (DOE), the State of Idaho Department of Environmental Quality (DEQ), and the U.S. Environmental Protection Agency (EPA) based on inventory evaluations that identified significant quantities of TRU and other contaminated waste buried in the area.

This document specifies the focused removal action objective and describes and evaluates two options. The recommended option is retrieval of waste originating from RFP that is contaminated with TRU radionuclides, volatile organic compounds (VOCs), and various isotopes of uranium.

The recommended retrieval alternative, described further in subsequent sections, is based in part on lessons learned through successful completion of the Operable Unit (OU) 7-10 Glovebox Excavator Method Project and progress to date on ARP I.

1.1 Purpose and Scope

Under the "National Oil and Hazardous Substances Pollution Contingency Plan" (40 CFR Part 300) and "Comprehensive Environmental Response, Compensation and Liability Act" (CERCLA) (42 USC § 9601 et seq., 1980), an EE/CA must be prepared for all NTCRAs. This report fulfills that requirement.

The scope of the proposed NTCRA in this EE/CA is limited to addressing the designated portions of Pit 4 and Pit 6 of the SDA. Implementation of the proposed action is one element of the response to the buried waste at the SDA under the OU 7-13/14 cleanup program. Additional response work at the RWMC will be conducted as defined by future CERCLA removal action documentation or the OU 7-13/14 comprehensive Record of Decision (ROD).

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a. The Rocky Flats Plant is located 26 km (16 mi) northwest of Denver. In the mid-1990s, it was renamed the Rocky Flats Environmental Technology Site. In the late 1990s, it was again renamed, to its present name, the Rocky Flats Plant Closure Project.

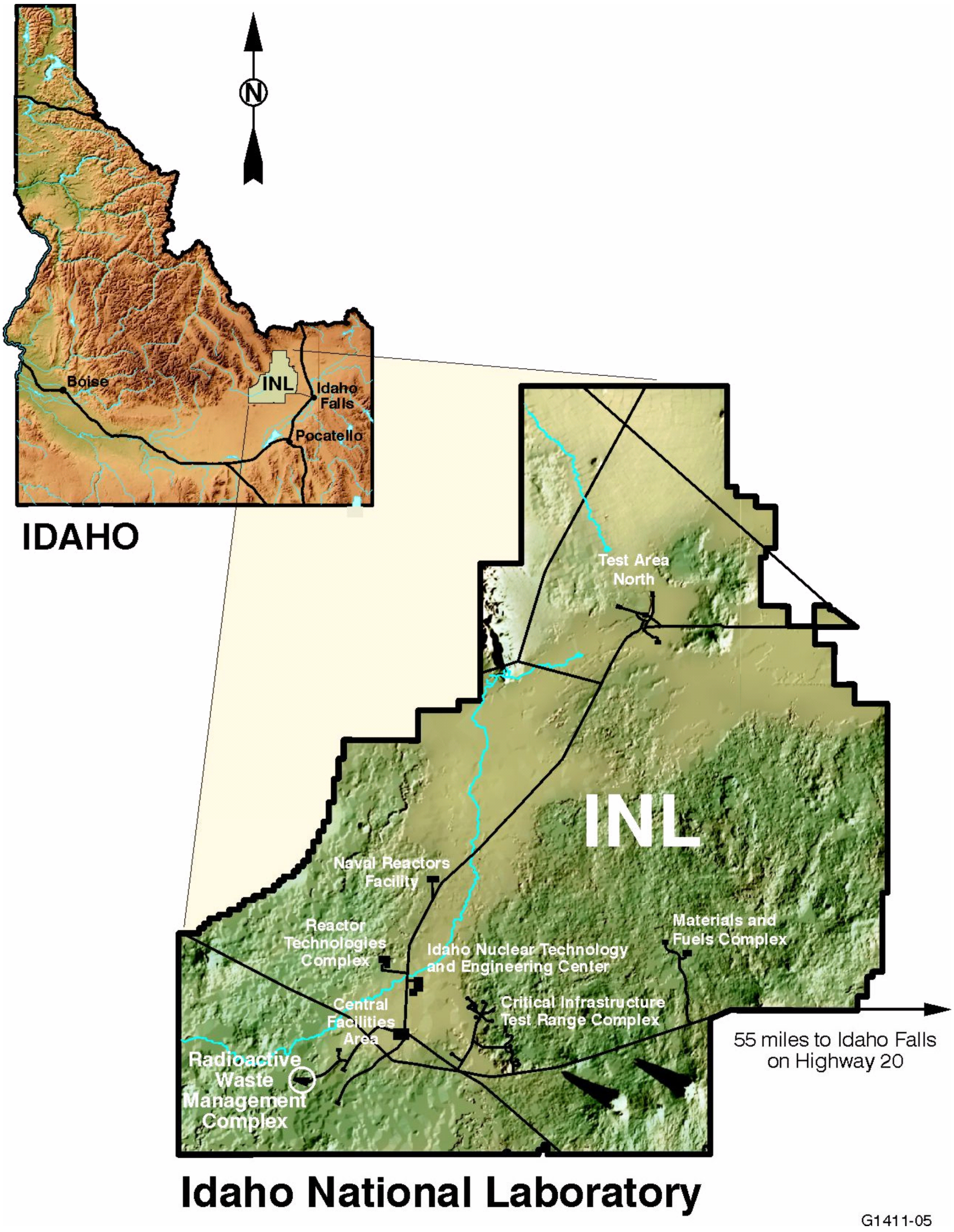

Figure 1. Map of the Idaho National Laboratory showing locations of the Radioactive Waste Management Complex and other major Site facilities.

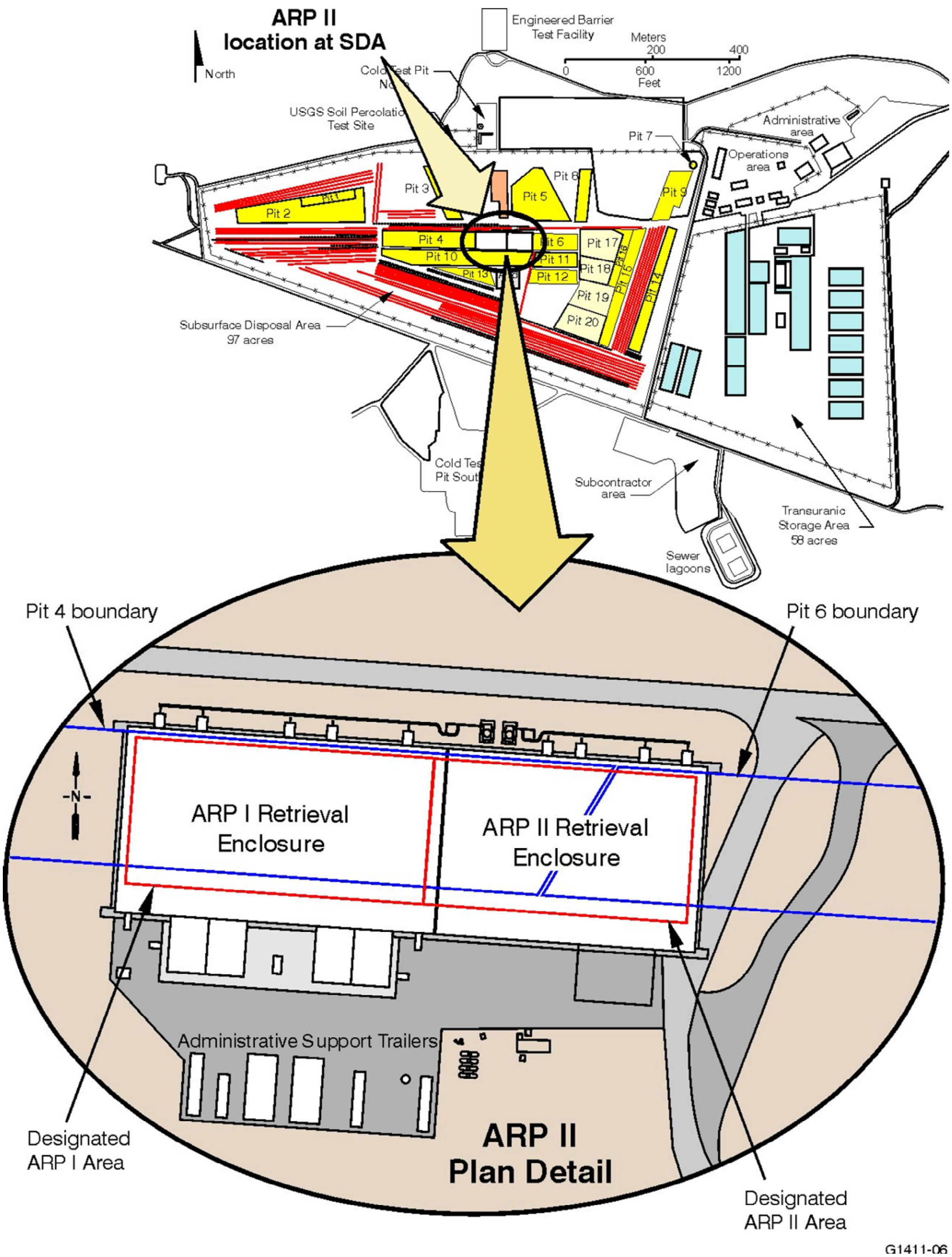

Figure 2. Conceptual drawing showing the location and layout of the Accelerated Retrieval Project II within the Subsurface Disposal Area.

1.2 Document Organization

This section provides general background information for the INL and the RWMC, including a brief discussion of the operations history and regulatory background for performing CERCLA cleanup actions (42 USC § 9601 et seq., 1980). Information also is provided about the nature of contamination and disposal history associated with Pit 4 and Pit 6 within the SDA. Sections 2 and 3 provide details about the proposed removal action objective, alternatives, and associated costs. Sections 4 and 5 provide analyses of the alternatives and a comparative analysis of alternatives, respectively. Section 6 discusses the recommended alternative, and Section 7 provides complete references for information cited in the report text.

1.3 Site History

1.3.1 Description of the Idaho National Laboratory

The INL is located in southeastern Idaho and occupies 2,305 km^2 (890 mi^2) in the northeastern region of the Snake River Plain. Regionally, the INL is nearest to the major cities of Idaho Falls and Pocatello and to U.S. Interstate Highways I-15 and I-86. The INL site extends nearly 63 km (39 mi) from north to south, is about 58 km (36 mi) wide in its broadest southern portion, and occupies parts of five southeastern Idaho counties. Public highways (i.e., U.S. highways 20 and 26 and Idaho highways 22, 28, and 33) within the INL boundary and the Experimental Breeder Reactor I, which is a national historic landmark, are accessible without restriction. Otherwise, access to the INL is controlled. Neighboring lands are primarily in the public domain (e.g., national forests and state-owned land), with some used for farming or grazing.

1.3.2 Background of the Idaho National Laboratory

The INL pursues a variety of programs and support services related to nuclear reactor design and development, nonnuclear energy development, materials testing and evaluation, radioactive waste management, and environmental restoration. Challenges addressed by current INL environmental management activities include hazardous and mixed waste management and minimization; cultural resources preservation; environmental engineering, protection, and remediation; and long-term stewardship. After environmental cleanup is completed, the INL site is expected to have a long-term future mission in nuclear energy research and development. In July 2002, Secretary of Energy Spencer Abraham announced a major mission realignment for the lab, establishing the Site as the nation's lead laboratory for nuclear energy, research, and development. At that time, management of the laboratory was reassigned to the Nuclear Energy, Science, and Technology Office of DOE.

1.3.3 Background of the Subsurface Disposal Area and Operations

The RWMC covers 71.6 ha (177 acres) in the southwestern quadrant of the INL. This includes the administration area of approximately 8.9 ha (22 acres), the SDA (39.3 ha [97.1 acres]), and the Transuranic Storage Area (23.3 ha [57.5 acres]). Figure 2 provides a map of the RWMC showing the location of pits, trenches, and soil vaults in the SDA. Pit 4 and Pit 6 are located in the approximate center of the SDA.

In 1952, the SDA was established at 5.26 ha (13 acres) for disposal of solid radioactive waste. Burial of defense waste with TRU elements from the RFP began in 1954; by 1957, the original SDA was nearly full. In 1958, the SDA was expanded to 35.6 ha (88 acres), which remained the same until 1988 when the security fence was relocated outside the dike surrounding the SDA, and the current size of

39.3 ha (97.1 acres) was established. Roughly 14.6 ha (36 acres) are waste disposal areas and 25 ha (61 acres) comprise space between the pits, trenches, and dikes surrounding the overall area.

From 1952 to 1970, radioactive waste was buried in pits, trenches, and soil vault rows excavated into a veneer of surficial sediment. This sediment is underlain by a series of basaltic lava and sedimentary deposits. In 1970, the shallow burial of TRU waste ended. Since 1970, burial of low-level and other radioactive waste has continued, and TRU waste has been stored on aboveground asphalt pads in retrievable containers. Between 1952 and 1997, approximately 215,000 m^3 (7,592,653 ft^3) of radioactive waste containing about 12.6 million Ci of radioactivity was buried at the SDA (French and Taylor 1998).

Between 1960 and 1963, the RWMC accepted radioactive waste from private sources (e.g., universities, hospitals, and research institutes). This service stopped in September 1963 when commercial burial sites became available for contaminated waste from private industry. The Transuranic Storage Area began operations in 1970. Transuranic waste was stacked on asphalt pads and then covered with plywood, plastic sheeting, and 1 m (3 ft) of soil. From 1975 to 1996, air-support buildings were used to protect recently received waste containers during stacking operations. These support structures were emptied in 1996 and decommissioned in 1998.

In the fall of 1988, the RWMC stopped receiving shipments of TRU waste from out-of-state sources.

Contaminants in the SDA radioactive waste landfill include elements resulting from weapons-component manufacturing at the RFP, fission and activation products resulting from reactor operations on and off the INL, and hazardous chemicals associated with all waste sources.

1.4 Progress to Date on Phase I of the Accelerated Retrieval Project

The proposed action is a continuation of ARP I, where retrieval activities were initiated January 13, 2005, in Pit 4 of the SDA (see Figure 2). The ARP I was approved as a CERCLA NTCRA in August of 2004. The ARP I area of focus includes approximately 1/2 acre of the eastern section of Pit 4 and lies directly to the west of the ARP II area.

The ARP I involves a relatively simple, cost-effective retrieval approach based on lessons learned through the implementation of the OU 7-10 Glovebox Excavator Method Project. Although ARP I is still in the early stages, the following observations are significant:

- Identification of targeted waste streams from nontargeted waste streams through the visual examination and segregation process has proven workable and effective based on retrieval experience to date.

- The visual waste segregation process has resulted in a very high percentage of retrieved targeted waste drums that are TRU waste (i.e., the majority of the drums retrieved to date are greater than 100 nCi/g TRU).

- The simplified Retrieval Enclosure and drum packaging systems are functioning as designed to provide effective control of the radiological materials being retrieved and repackaged.

- Waste containers in the ARP I area, although buried longer, are generally in better condition than those encountered in Pit 9 during OU 7-10 Glovebox Excavator Method Project activities. This observation may be due to historical flooding in Pit 9.

1.5 Source, Nature, and Extent of Contamination

Buried waste in Pit 4 and Pit 6 contains TRU and low-level waste. Transuranic radionuclides in the ARP II area are believed to be primarily contained in the drummed sludge and other RFP waste (e.g., filters). Waste definitions are provided below for purposes of clarification:

- **Transuranic radionuclides**—radionuclides with an atomic number greater than 92 (DOE Order 435.1).

- **TRU waste**—without regard to source or form, waste that is contaminated with alpha-emitting TRU radionuclides (atomic number greater than 92) with half-lives greater than 20 years and concentrations greater than 100 nCi/g at the time of assay. The primary radionuclides associated with SDA RFP TRU waste are Pu-238, Pu-239, Pu-240, and Pu-242, and Am-241.

1.5.1 Background of Pit 4 and Pit 6 within the Subsurface Disposal Area

The SDA is a radioactive waste landfill with shallow subsurface disposal units consisting of pits, trenches, and soil vault rows. The more highly concentrated areas of buried RFP TRU waste include Pits 1, 2, 4–6, 9, and 10. Contaminants in the SDA, including chemicals, contact- and remote-handled fission and activation products, and TRU radionuclides, are discussed in greater detail in Subsection 1.5.1.1.

Pit 4 was open to receive waste from January 1963 through September 1967. Pit 6 was opened later, receiving waste from May 1967 through October 1968. The ARP II retrieval area contains waste shipments from the RFP dated from August 1966 to April 1968. Based on INL disposal practices at that time, containerized waste (primarily from RFP) was initially stacked in Pit 4. In November 1963, this practice was changed, and containers were dumped into the pits, rather than stacked, to reduce labor costs and personnel exposures. Based on this operational change and the time frame of disposal, it is concluded that RFP waste within the designated retrieval area was dumped rather than stacked. Additional waste from INL waste generators and some waste from off-Site generators also were buried in the ARP II area.

The disposal process in the 1960s involved excavating an area in the SDA down to outcroppings of the underlying basalt using tractor-drawn scrapers, followed by backfilling and leveling the newly constructed pit floor with a layer of native soil approximately 0.6 m (2 ft) thick. Drums; cardboard, wood, and metal boxes; and other containers of waste were then placed on the pit floor. After a large area was full of waste, the pits were backfilled and initially covered with about 1 m (3 ft) of soil, commonly referred to as overburden soil. Additional overburden was added over time to repair subsidence and promote surface drainage. The estimated overburden thickness in Pit 4 and Pit 6 ranges from 1.2 to 2.1 m (4 to 7 ft). After approximately 40 years of burial, the original disposal containers, including the carbon steel drums, are expected to be significantly corroded and degraded, similar to the drums removed from Pit 9 in early 2004 as part of the OU 7-10 Glovebox Excavator Method Project activities, and those currently being removed from Pit 4 as part of ARP I. As noted in Section 1.4 above, the drums encountered to date in the ARP I area have been in relatively better condition than those in Pit 9.

The pits were excavated to various sizes. Pit 4 is located in the approximate center of the SDA and shares a common eastern boundary with Pit 6 (see Figure 2). Pit 4 has a surface area of 9,948.2 m^2 (107,082 ft^2). The total volume of Pit 4 is estimated at 45,307 m^3 (1,600,000 ft^3) including the overburden soil. Pit 6 is approximately half the size of Pit 4 with an estimated surface area of 5,108 m^2 (54,984 ft^2). The total volume of Pit 6 is estimated at 22,087 m^3 (780,000 ft^3) (Holdren et al. 2002). The retrieval area of focus has approximate dimensions of 75.6 × 38.4 m (248 × 126 ft) (EDF-5447). As discussed in

Section 1, the designated retrieval area was selected because it contains high concentrations of TRU waste and significant volumes of other targeted waste forms including VOCs and uranium.

1.5.1.1 Estimated Waste Inventory in the Designated Retrieval Area of Pit 4 and Pit 6.

The OU 7-13/14 cleanup program has developed extensive information defining waste inventories buried in SDA pits, trenches, and soil vault rows. Disposal records and corresponding trailer-load-list information from RFP are the ultimate sources of available information for disposal locations and waste-type designations. The OU 7-13/14 cleanup program has developed a number of databases and supporting geographical information system applications to document waste inventory type, quantity, and location information. Based on this information, EDF-5447, "Waste Inventory for Phase II of the Accelerated Retrieval Project," was developed. This EDF summarizes information on the volumes and types of waste buried in the designated retrieval area within Pit 4 and Pit 6. Table 1 provides a summary of information contained in EDF-5447. As noted in EDF-5447, the data are approximations of the best available volume and location information. In some cases, this information is associated with significant limitations (e.g., uncertain disposal coordinates and disposal footprint).

Table 1. Rocky Flats Plant waste content in the retrieval area designated for the Accelerated Retrieval Project II.

Waste Stream	Summary Characteristics	Drum Equivalents[a]
Series 741 first-stage sludge	Salt precipitate containing plutonium and americium oxides, depleted uranium, metal oxides, and organic constituents.	646
Series 742 second-stage sludge	Salt precipitate containing plutonium and americium oxides, metal oxides, and organic constituents.	1,344
Series 743 sludge organic setups	Organic liquid waste solidified using calcium silicate (pastelike or greaselike).	3,750
Series 744 sludge special setups	Complexing chemicals (liquids) including Versenes, organic acids, and alcohols solidified with cement.	374
Series 745 sludge evaporator salts	Nitrate salt residues from solar evaporation ponds at RFP.	1,530
Combustible, noncombustible, and mixed debris	Solid radioactively contaminated combustible debris items such as paper, rags, cardboard, and wood. Noncombustible debris varies widely including pipe, empty drums, glass, and sand. Some waste is contaminated with beryllium metal.	12,129
Graphite	Graphite mold pieces after excess plutonium removal. Molds are broken into large pieces before packaging. Graphite fines (e.g., scarfings) packaged in small bottles.	4
Roaster oxide waste	Incinerated depleted uranium. Primary chemical form is uranium oxide with some metal possible.	210
Line-generated waste	Various waste removed from RFP plutonium-processing gloveboxes including glovebox gloves, combustible waste, graphite, and filters.	178
Filters	Discarded HEPA filters.	867

a. Drum equivalents are derived from the original disposal volume divided by the volume of a 55-gal drum. It is noted that the majority of waste streams were disposed in drums; however, boxes also were used for some waste streams (e.g., filters).

HEPA = high-efficiency particulate air
RFP = Rocky Flats Plant

The RFP waste forms contain various radiological and nonradiological contaminants. Material shipped from RFP included plutonium and uranium isotopes. Plutonium isotopes included Pu-238, Pu-239, Pu-240, Pu-241, and Pu-242. Uranium isotopes (i.e., U-234, U-235, U-236, and U-238) were shipped to the RWMC in the form of depleted uranium oxides. Also included in the waste shipments were Am-241 and trace quantities of Np-237. Isotopes Am-241 and Np-237 are daughter products resulting from the radioactive decay of Pu-241. In addition to the Am-241 produced by the decay of Pu-241, Am-241 removed from plutonium during processing at the RFP was also buried in Pit 4. This extra Am-241 is a significant contributor to the total radioactivity located in Pit 4 and Pit 6, and is primarily contained within the Series 741 sludge targeted for retrieval. Other radionuclides (e.g., Co-60, Cs-137, Sr-90, Y-90, and Ba-137), primarily from INL waste generators, are expected in the project area. The non-RFP waste streams include radioactively contaminated combustible and noncombustible debris (e.g., contaminated equipment, metal, and a large cask) and a limited volume of sludge (e.g., evaporator bottoms).

The primary organic chemicals known to be in Pit 4 and Pit 6 include carbon tetrachloride, trichloroethene, 1,1,1-trichloroethane, tetrachloroethene, lubricating oils, Freon-113, alcohols, organic acids, and Versenes (ethylenediaminetetraacetic acid). Examples of inorganic materials known to be in the waste include hydrated iron, zirconium, beryllium, lead, sodium nitrate, potassium nitrate, cadmium, dichromates, potassium phosphate, potassium sulfate, silver, asbestos, and calcium silicate. Table 1 describes and summarizes the major waste streams from RFP located in the designated retrieval area. The major waste streams, as originally buried, consisted of containerized (e.g., boxes and drums) sludge, combustible and noncombustible debris, and discarded filter media.

Waste management activities will be based on information from the various inventory documents identified in the preceding paragraphs and additional acceptable knowledge documentation being prepared to support the NTCRA. In addition, analytical data collected during project activities would be used to determine appropriate management of primary waste streams.

1.6 Regulatory Background for Response Actions at the Subsurface Disposal Area

The responsibility to perform response actions—under CERCLA, Section 104—on DOE facilities was delegated to DOE by Executive Order 12580 (DOE 1987). The CERCLA response actions include the following:

- Remedial actions, which involve extensive analysis, documentation, planning, and execution, with the goal of complete and final response to all releases of hazardous substances into the environment at the Site
- Removal actions, which are discrete, positive steps—not necessarily physical removal—addressing the release or threat of release of a hazardous substance, that can be undertaken without the extensive analysis involved in remedial actions, and therefore, can be initiated more expeditiously.

Remedial actions at federal facilities, such as the INL, must be conducted in a manner consistent with CERCLA, Section 120. Section 120 requires that remedial actions at federal facilities placed on the CERCLA National Priorities List must have concurrence from the EPA. A federal facility agreement must be established for each DOE facility on the National Priorities List. This federal facility agreement establishes a process for implementing the respective authorities and duties of each federal agency. The Resource Conservation and Recovery Act (Solid Waste Disposal Act)" (RCRA) (42 USC § 6901 et seq., 1976) requires a corrective action plan to address all solid waste management units within a facility containing hazardous waste treatment, storage, or disposal units permitted under RCRA. The *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (DOE-ID 1991a) was written in 1991 and has been designated a consent order for purposes of the "Hazardous Waste

Management Act of 1983" (Idaho Code § 39-4401 et seq., 1983) to fulfill CERCLA and RCRA requirements.

The *Action Plan for Implementation of the Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (DOE-ID 1991b) designated the SDA as Waste Area Group (WAG) 7.[b] The overall remediation of WAG 7 is being evaluated through a CERCLA remedial investigation and feasibility study (RI/FS) under OU 7-13/14 (see Footnote b). Ultimately the RI/FS will lead to risk management decisions and selection of a final comprehensive remedial approach through development of a CERCLA ROD and follow-on remedial design and activities.

To the extent practicable, removal actions should be consistent with foreseeable future remedial actions for the same release and seek to attain applicable or relevant and appropriate requirements (ARARs) identified for the release in accordance with CERCLA, Section 121. The EPA and Idaho DEQ will be provided full and timely information on the preparation and performance of this removal action, and their comments and concurrence will be obtained. The DOE will also seek the comments of the public in accordance with the public participation requirements of the National Contingency Plan (NCP) (40 CFR Part 300) for NTCRAs.

The DOE has determined that the removal action proposed in this EE/CA shall, to the extent practicable, contribute to the efficient performance of any anticipated long-term remedial action with respect to the release concerned. Specifically, the proposed removal action, in addition to addressing a material portion of the hazardous substances in the SDA, will provide characterization and technical and cost information from full-scale waste retrieval activities that will support the RI/FS for OU 7-13/14. It also will establish process details for certification and transfer of formerly buried TRU waste to WIPP.

1.7 Summarized Risk Evaluation

The *Ancillary Basis for Risk Analysis* (ABRA) (Holdren et al. 2002) presents an estimate of cumulative human health and ecological risks associated with the SDA. The ABRA assesses potential risks associated with OU 7-13/14. The ABRA was prepared in accordance with *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (EPA 1988). The ABRA represents the latest information available about the baseline risks presented by waste within the SDA. The final risk assessment work is currently being conducted as part of the OU 7-13/14 cleanup program. Primary elements of the ABRA include the following:

- Description of the nature and extent of contamination associated with WAG 7.
- Evaluation of current and future cumulative and comprehensive risks to human health posed by waste buried in the SDA.
- Performance of a limited, screening-level ecological risk assessment to validate the assumption that the SDA poses unacceptable risk to ecological receptors (DOE-ID 1998).
- Identification of contaminants of concern (COCs) within WAG 7. Contaminants of concern are defined as those contaminants likely to require a risk management decision to address potential threats to human health and the environment.
- Limited analysis of sensitivity and uncertainty.

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b. The FFA/CO (DOE-ID 1991a) lists 10 WAGs for the Idaho National Engineering and Environmental Laboratory (now the INL). Each WAG is subdivided into OUs. The RWMC was identified as WAG 7 and originally contained 14 OUs. Operable Unit 7-13 (TRU pits and trenches RI/FS) and OU 7-14 (WAG 7 comprehensive RI/FS) were ultimately combined to become OU 7-13/14.

Risk evaluation specific to the designated ARP II retrieval area, or the waste inventory located in the designated retrieval area, has not been calculated. Existing risk information for the SDA pits and trenches as documented in the ABRA, which includes Pit 4 and Pit 6 as part of the overall assessment, is summarized in the following paragraphs. Final risk characterization for the SDA will be evaluated as part of the OU 7-13/14 comprehensive RI/FS process, and will accommodate changes to risk assessment process details (e.g., possible exposure scenario changes) as well as changes introduced because of any intermediate activities (e.g., proposed NTCRA described in this EE/CA).

Twenty COCs have been identified for the SDA. Seventeen were identified through risk assessment. Three plutonium isotopes were identified as special-case COCs to acknowledge uncertainties about plutonium mobility in the environment and to reassure stakeholders that risk management decisions for the SDA will be fully protective. The remaining contaminants were eliminated from further quantitative analysis in the future OU 7-13/14 remedial investigation and baseline risk assessment.

The RFP waste located in the designated retrieval area within Pit 4 and Pit 6 is contaminated with Am-241, Np-237, Pu-238, Pu-239, Pu-240, uranium isotopes, and VOCs. As discussed in Section 2, the focused scope of the proposed NTCRA evaluated in this EE/CA involves removal of a targeted group of RFP waste streams located in the designated area. Removal of the targeted waste streams will mitigate future potential risk by removing from the retrieval area the RFP waste streams that contain significant concentrations of the COCs identified in the OU 7-13/14 risk assessment work completed to date. Potential risk associated with the COCs not addressed through the proposed NTCRA (i.e., in other locations within the SDA) ultimately will be addressed through the selected remedial alternative to be documented in the OU 7-13/14 comprehensive ROD.

2. REMOVAL ACTION OBJECTIVES AND SCOPE

The focused objective of the proposed NTCRA is to perform a targeted retrieval of certain RFP waste streams that are highly contaminated with TRU radionuclides, VOCs, and various isotopes of uranium. To achieve this objective, the NTCRA would primarily focus on removal of the following RFP waste streams (see Table 1): Series 741 and 743 sludge, graphite and filters, and roaster oxide waste. Details supporting implementation of the NTCRA retrieval alternative are presented in the following subsections.

During excavation, other types of waste will be encountered that are not within these targeted waste streams. This nontargeted waste also will be removed if the DOE, EPA, and Idaho DEQ WAG 7 remedial project managers agree that retrieval is warranted because information from visual inspection (e.g., package labeling or distinctive packaging) identifies the nontargeted waste as being of such a nature that the:

- Waste poses a potential risk of contamination to the underlying aquifer, if left in place
- Potential risk is sufficient to warrant removal at that time rather than leaving it to be addressed by the OU 7-13/14 final remedial action for WAG 7
- Waste can safely be managed by retrieval using the personnel, facilities, and equipment readily available onsite for retrieval of the targeted waste streams.

Based on review of the NCP factors (40 CFR Part 300) for determining whether it is appropriate to perform a removal action, it has been concluded that performing the proposed activity as a NTCRA is appropriate and consistent with the relevant NCP criteria, considering that the area of focus contains ". . .hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release. . ." (40 CFR Part 300.415[b][2][iii]).

Selecting the specific retrieval area required evaluating the shipping and burial records for containerized radioactive materials and sludge from RFP and low-level radioactive waste generated at the INL. The DOE Idaho Operations Office, with agreement from the EPA and Idaho DEQ, has selected the designated portion of Pit 4 and Pit 6 (see Figure 2) as the targeted retrieval area based on its high content of TRU radionuclides, VOCs, and uranium.

2.1 Determination of Schedule for the Non-Time-Critical Removal Action

The NTCRA schedule for Alternative Two (see Section 3.1.2) involves performance of design and facility construction in Fiscal Year (FY) 2005 to support commencement of retrieval operations before FY 2006. The planned retrieval operation period for the project is approximately 12 months long, followed by a 6-month deactivation, decontamination, and decommissioning phase. Performance of WIPP-related processing and certification activities will be a fundamental element of proposed NTCRA activities and is expected to require several years to complete, although a final schedule is not currently available.

3. IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

Because of the focused objective of the proposed NTCRA, a decision was made to limit removal action alternatives considered in this EE/CA to the No Action alternative and the Targeted Waste Retrieval alternative. Evaluation of alternatives that rely on means other than retrieval to remediate the waste (e.g., in-situ treatment options) is not consistent with the general objective of the NTCRA to remove highly contaminated waste from a portion of the SDA. Evaluation of a full range of remedial alternatives for application to the SDA will be included within the OU 7-13/14 RI/FS and is beyond the scope of this proposed NTCRA.

3.1 Development of Alternatives

The following subsections briefly describe the proposed NTCRA alternatives—No Action and Targeted Waste Retrieval.

3.1.1 Alternative One—No Action

The No Action alternative provides a baseline against which impacts of the proposed action can be compared. Under the No Action alternative, no removal action would be taken at the SDA beyond the current monitoring of environmental media. Buried waste, institutional controls, and monitoring at the SDA would remain as they currently are until an appropriate remedy is selected through the OU 7-13/14 comprehensive ROD. The key element of the No Action alternative evaluated in this EE/CA is implementation of the existing monitoring system from FY 2005 to 2020. This monitoring system would occur until the final long-term monitoring program is implemented after 2020. The Year 2020 was identified as the approximate time when a long-term monitoring action would be implemented through the OU 7-13/14 comprehensive ROD process. Given the current milestones for the OU 7-13/14 ROD, it is recognized that the final long-term monitoring activities that stem from the ROD may occur sooner than 2020; however, the 2020 date is assumed in order to have a basis for calculating a total cost for the No Action alternative. The No Action alternative includes only monitoring and requires no direct action to treat, stabilize, or remove contaminants. Costs for this alternative include monitoring of air, vadose zone soil moisture, and the aquifer for 14 years. The existing monitoring system for the SDA will proceed regardless of either action.

This comparatively inexpensive alternative is easily implemented, incurring only costs associated with monitoring. However, the No Action alternative offers no reduction in toxicity, mobility, or volume of contaminants within the SDA and does not mitigate the release of COCs from the buried waste that will be addressed through the selected action.

3.1.2 Alternative Two—Targeted Waste Retrieval

Alternative Two provides an efficient method of retrieving and managing waste material, while maintaining protection of the workers, public health, and the environment. The basic concept comprises waste retrieval in a Retrieval Enclosure, transfer of waste into containers at clean drum-packaging stations, assay of the waste containers after release from the Retrieval Enclosure, and interim storage. For ARP II, the Retrieval Enclosure constructed for ARP I would be expanded with an additional five retrieval bays to encompass the ARP II area as shown in Figure 3. Other processes necessary for safe handling and processing of waste and waste containers will be performed as determined necessary by the project.

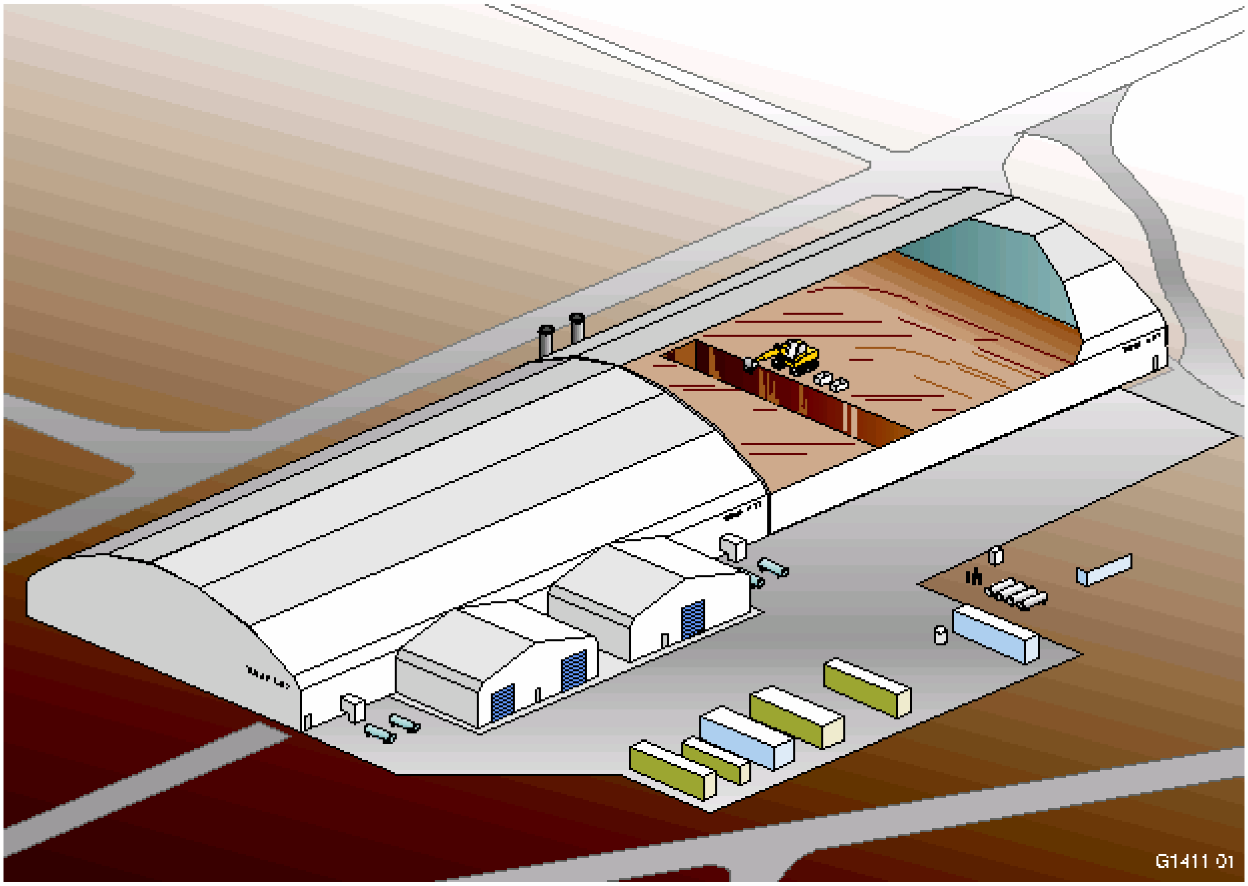

Figure 3. Graphic portrayal of the Retrieval Enclosure encompassing the area for the Accelerated Retrieval Project II.

Performance of the alternative will, to the extent practical, result in the removal of the targeted RFP waste streams from the retrieval area. Removal of these waste streams will result in a significant reduction of the curies of TRU radionuclides and uranium isotopes within the retrieval area. In addition, removal of the Series 743 sludge will deplete the source of VOCs that remain in waste containers located in the retrieval area. Based on observations made during OU 7-10 Glovebox Excavator Method Project operations, the Series 743 sludge drums have degraded significantly over the years. However, the inner plastic bags in which the sludge was packaged remained in fairly good condition. Consequently, it is anticipated that a significant percentage of the original VOC inventory remains in the original packaging and therefore is available for retrieval. The following subsections describe the proposed alternative in greater detail.

3.1.2.1 Site Location. The ARP II retrieval site is located at the approximate center of the SDA within Pit 4 and Pit 6 (see Figure 2). The paved area (i.e., 0.2-ft-thick asphalt) installed during ARP I will be expanded to the east to provide an approach for the expanded retrieval area and to provide parking for project support trailers and systems, as needed. Based on probing data, the depth to basalt in the area is anticipated to range from 4.9 to 8.5 m (16 to 28 ft). An existing treatment unit and associated wells belonging to the Organic Contamination in the Vadose Zone Project require relocation to accommodate the Retrieval Enclosure expansion.

3.1.2.2 Retrieval and Storage Facilities. To provide protection from the weather and control the spread of contamination, a Retrieval Enclosure (see Figure 3) will cover the retrieval area during all retrieval operations.

The ARP I Retrieval Enclosure is a temporary, relocatable structure that houses excavation, packaging, and sampling, and personnel and equipment ingress and egress activities. The Retrieval Enclosure provides weather protection and supports year-round operations for these activities. The Retrieval Enclosure is a commercially available, standard, fabric-tensioned structure, approximately 51.8 m (170 ft) wide by 87.8 m (288 ft) long with a 6.1-m (20-ft) minimum interior clearance at the eaves. Two attached structures, 21.3 × 15.2 m (70 × 50 ft) in size, house airlock operations (e.g., waste examination and drum repackaging). The ARP II operations involve construction of an extension of the existing Retrieval Enclosure to the east as shown in Figure 3. The extended building will completely enclose the designated ARP II retrieval area in Pit 4 and Pit 6 and will be approximately 51.8 m (170 ft) wide by 73.8 m (242 ft) long. The common wall between the ARP I Retrieval Enclosure and the ARP II Retrieval Enclosure will be removed to support ARP II operations. The ARP I airlock structures will be used for repackaging of ARP II waste (i.e., additional airlock enclosures are not planned at this time). As Figure 2 illustrates, approximately 4.3 m (14 ft) of the west end of the 75.6-m (248-ft) long ARP II area is actually located within the east end of the ARP I Retrieval Enclosure.

Ventilation is provided by high-efficiency-particulate-air (HEPA) -filtered exhaust systems. An additional exhaust stack will be installed to support the expanded ARP II facility. The system design minimizes local worker exposure and permits proper configuration of radiological emissions monitoring, and is equipped with an emissions monitoring system to sample and record possible releases of radioactive substances.

Storage of retrieved waste streams (i.e., repackaged waste drums) will primarily occur within the RCRA-permitted storage module, WMF-628, located within the RWMC Transuranic Storage Area. The RCRA permit was previously modified to allow storage of CERCLA waste in association with performing the storage of ARP waste. Storage of CERCLA waste within WMF-628 will require compliance with the requirements of the INL Hazardous Waste Management Act/RCRA Permit, for RWMC (DEQ 2004). Alternate storage also would occur at other permitted storage facilities at INL, if needed, to supplement available WMF-628 storage capacity. For example, storage of containers at RCRA-permitted facilities located at the Idaho Nuclear Technology Engineering Center is under evaluation. Containers may also be temporarily staged within the SDA area while awaiting transfer to the permitted facilities. The staging areas would be in the immediate vicinity of the Retrieval Enclosure in the SDA.

Onsite CERCLA storage areas would be used to store containerized secondary waste. These areas would use large containers (e.g., cargo-type containers) for the temporary accumulation of secondary waste. The cargo containers would be registered as CERCLA waste storage areas under INL management control procedures and managed in accordance with the ARARs for CERCLA waste storage identified in Appendix A. Cargo containers would not store waste that is removed from the pit. The containers would be used to store solid waste streams that are eligible for short-turnaround disposal (e.g., personal protective equipment [PPE], decontamination equipment, and waste from routine radiological surveys) and would be located in the SDA near the Retrieval Enclosure.

3.1.2.3 Waste Retrieval and Handling Operations. Initially, 0.6–1.5 m (2–5 ft) of clean overburden soil will be removed before starting operational activities. The remaining 0.6 m (2 ft) of overburden will be removed as the first phase of operations and will be piled or returned directly to the pit. This layer of soil is expected to be non-TRU and will provide a stable working surface for retrieval operations.

Waste zone material will be retrieved using an excavator and will be moved around the enclosure by a forklift. For the ARP I, operators in PPE operate a Gradall XL-5200 excavator to retrieve and place targeted material from Pit 4 into trays for subsequent examination in the airlock enclosures. The excavator and forklift cabs are provided with a blower HEPA-filtered, forced-air system to provide additional protection for the operator. In addition to the original manned excavator, design planning for ARP II involves the use of a remotely operated excavator to minimize personnel entry into the retrieval area. Personnel access to the Retrieval Enclosure will be limited during excavation activities although limited entry by individuals in PPE (e.g., radiological control technicians) may be required. The excavator will operate primarily above grade. The pit is expected to be approximately 5.2–6.1 m (17–20 ft) deep, and the walls will generally be sloped to maintain an angle of repose of approximately one to one.

At the digface, excavators will retrieve targeted waste (e.g., filters, graphite, Series 741 and 743 sludge, and uranium roaster oxides) and place the waste in a tray that has been lined with a bulk storage bag. The determination as to whether waste is targeted and nontargeted will be made by a retrieval specialist assisting the excavator operator using closed-circuit television cameras at the digface and mounted on the excavator. Nontargeted waste (e.g., debris and soil) will be placed in the open pit. The trays of targeted waste will be transported to a Drum Packaging Station. At the Drum Packaging Station, operators will visually examine the waste, perform other functions supporting transfer of the waste to WIPP (e.g., removal of prohibited items if observed), and collect waste samples. The tray liner will be hoisted and loaded into a drum. The drum will then be removed from the drum port, closed, and transferred from the area. This area also may be designed to accommodate boxes, if necessary.

Sampling activities similar to those implemented during ARP I, would be continued to characterize selected radionuclides within nontargeted waste and underburden that is not removed as part of the action. The resulting data would be used by the Agencies (i.e., DOE, EPA, and Idaho DEQ) to assess residual risk considerations and evaluate the effectiveness of the planned visual waste segregation approach. The newly packaged waste materials will be evaluated for potential disposal at WIPP. Payload containers (e.g., individual drums, standard waste boxes, and 10-drum overpacks) will be assembled for transfer to WIPP in TRUPACT II containers. Payload containers that are certified to meet the WIPP waste acceptance criteria will be transported to WIPP for final disposition. The WIPP-related support functions are part of the NTCRA and will be performed in a mobile WIPP Central Characterization Project, or comparable facility. The Central Characterization Project facility was located at the RWMC WMF-628 and -610 facilities in support of ARP I and consists of mobile units that supported required WIPP certification functions (e.g., radiological assay, gas generation testing, and headspace gas sampling). The same facilities would be used to support the proposed ARP II actions.

Retrieved waste materials that do not satisfy the WIPP waste acceptance criteria (e.g., non-TRU waste streams) will be characterized and evaluated for alternate disposal. Depending on waste stream characteristics, treatment of these materials may be required to support achieving appropriate disposal standards required by ARARs and other health-based or facility-specific waste acceptance criteria. Other waste streams, which are not TRU waste (e.g., uranium roaster oxides), may require further analysis and treatment before disposal. In particular, it is expected that some portion of the materials will require treatment to reduce VOC concentrations in the materials before final disposal. These materials will be placed in interim storage pending final evaluation for treatment and disposal. In summary, DOE will give preference to disposal options that do not involve return to pit (e.g., offsite treatment and disposal) and will only consider returning waste to the pit that does not present unacceptable risk to the aquifer, subject to agreement with Idaho DEQ and EPA.

3.1.2.4 Treatment. The TRU material that does not pass WIPP-related waste acceptance criteria (e.g., gas-generation testing) may require treatment for constituents such as VOCs. Thermal desorption processes for treatment of VOCs are being evaluated to support this function. In general, thermal desorption processes entail heating the waste materials to desorb organic materials from the waste. The resulting organic vapor stream typically then would be condensed, collected in tanks, and transferred offsite for further treatment or disposal. Any resulting noncondensible fraction typically would be removed using activated carbon. Details of the potential VOC or other treatment processes would not be fully developed until a reliable estimate of the drum population that does not meet the WIPP waste acceptance criteria can be developed based on retrieval and characterization experience gained during ARP I. If needed, system design and operational parameters would be developed and coordinated with the regulatory agencies in support of system implementation as part of the NTCRA.

3.1.2.5 Interim Closure. Final closure of the excavated area will not occur as part of the NTCRA but will occur for the overall SDA area as specified in the OU 7-13/14 comprehensive ROD. Final closure of the SDA is assumed to include an engineered, multilayer cover that will encompass Pit 4 and Pit 6. Interim closure steps will be implemented as part of Alternative Two, including covering the pit with a layer of soil from the remaining overburden material or other native soil from an approved borrow location. The cover layer will be compacted and graded consistent with an overall SDA grading and drainage plan.

4. ANALYSIS OF ALTERNATIVES

This section presents the analysis of two alternatives: No Action and Targeted Waste Retrieval. As is appropriate for a NTCRA, the alternatives are evaluated against the required CERCLA criteria of effectiveness, implementability, and cost (EPA 1993). Effectiveness is evaluated in terms of protectiveness of the environment, protectiveness of workers during NTCRA implementation, and the ability of the alternative to achieve removal action objectives. Implementability evaluates the technical and administrative feasibility of the alternative and the availability of necessary resources to support implementation. A cost analysis is presented based on defined project work scope.

4.1 Alternative One—No Action

The No Action alternative serves as the baseline for comparison against the Targeted Waste Retrieval alternative. This alternative would include only monitoring and require no direct action to treat, stabilize, or remove contaminants. It is assumed for this alternative that monitoring would be conducted on groundwater, vadose zone moisture, and air for a period of 15 years until a modified monitoring program is implemented through the OU 7-13/14 comprehensive ROD.

4.1.1 Effectiveness

The No Action alternative offers no reduction in contaminated waste inventory. The No Action alternative does not fulfill the stated NTCRA objective for removal of contaminant source term from the SDA. Selection of No Action for the proposed NTCRA does not provide information for retrieval of TRU waste in support of the overall SDA remedial decision process, nor does it provide an increased level of protection of human health and the environment. The No Action alternative does limit worker health and safety risks and minimizes the potential for worker exposure to radionuclides.

4.1.2 Implementability

The No Action alternative is implementable because it requires no immediate expenditure of time or resources, and technically, no engineering or development is necessary. However, in the interim, maintenance and implementation of a temporary monitoring system will require an expenditure of resources.

4.1.3 Cost

Activities for the No Action alternative (e.g., engineering implementation) would incur no cost. The primary part of the No Action alternative costed in this analysis comprises monitoring operations. Management and oversight costs also are included. Although monitoring is a continual activity at the INL, a long-term monitoring program (greater than 100 years) will not be in place until after implementation of the recommended actions in the OU 7-13/14 comprehensive ROD. The No Action alternative would involve monitoring at the SDA from 2005 until implementation of the final remedy, around 2020. For these reasons, a 15-year monitoring duration is used. The estimated cost for the No Action alternative is $3 million, as presented in Table 2.

4.2 Alternative Two—Targeted Waste Retrieval

Alternative Two is assessed in the following subsections against the CERCLA criteria of effectiveness, implementability, and cost as is required by EPA guidance.

Table 2. Total estimated costs for No Action and Targeted Waste Retrieval alternatives.

Cost Element	No Action Alternative[a] ($M)	Targeted Waste Retrieval Alternative[b] ($M)
Engineering	—	2.8
Procurement	—	12.1
Management and oversight	—	4.2
Construction	—	6.9
Operation and maintenance support	—	45.5
WIPP certification and support	—	107.0
Surveillance and monitoring installation	3.0	3.0
Total	3.0	181.5

a. Lopez and Schultz (2004).
b. Scott N. Wasley E-mail to Brent N. Burton, ICP, February 23, 2005, "ARP-2 EE/CA cost estimate data."

WIPP = Waste Isolation Pilot Plant

4.2.1 Effectiveness

Based on the focused nature of the proposed NTCRA, Alternative Two is designed to satisfy the removal action objective identified in Section 2. The selected retrieval location contains TRU waste (primarily plutonium isotopes, Am-241, and associated radioactive decay products), VOCs, and uranium that would be subject to removal through the action. As discussed in Section 3, performance of the alternative will, to the extent practical, result in the removal of the targeted RFP waste streams from the retrieval area. Removal of these waste streams will result in a significant reduction of the curies of TRU radionuclides and uranium isotopes within the retrieval area. In addition, removal of the Series 743 series sludge will deplete the source of VOCs that remain in waste containers located in the retrieval area, reducing the source term and migration of this contaminant.

The ARARs identified for Alternative Two are included in Appendix A. A number of substantive hazardous waste management ARARs will require implementation including requirements for performance of hazardous waste determinations and container storage requirements. Other significant ARARs involve required implementation of "National Emission Standards for Emissions of Radionuclides" (40 CFR Part 61) that limits radionuclide emissions for the project and leads to implementation of required stack monitoring systems. Details of ARARs identification and implementation are presented in Appendix A. It is concluded that the project will include design and operational features necessary to support appropriate implementation and compliance with ARARs.

Evaluation of effectiveness also involves assessment of short-term effectiveness (i.e., the extent to which the alternative is protective of human health and the environment during actual implementation of the NTCRA). Alternative Two is associated with short-term risk of exposures to facility radiation workers during retrieval operations and subsequent waste management and characterization activities. In addition, hazardous chemical exposure risks and other industrial safety risks are inherent hazards associated with the TRU waste retrieval activities that require careful management during design and project implementation phases.

The project design approach includes engineering and administrative features that will effectively minimize the potential for worker and public exposures to radiological and chemical substances. Major design features that contribute to minimizing the potential for radiological contaminant releases will include the Retrieval Enclosure, dust suppressant application at the digface during retrieval, and prompt containerization of materials after retrieval. The project design involves minimal material handling to limit the air suspension of source radionuclide contamination. Personnel involved in the project will perform all work activities in accordance with specific operational procedures and are required to wear properly selected PPE. Facility air emissions will be HEPA-filtered before release to the environment. Treatment of air emissions for chemical releases (e.g., through activated carbon treatment) will be implemented if determined to be necessary during the detailed design phase of the project, but has not been necessary for ongoing ARP activities.

4.2.2 Implementability

A review of information regarding retrieval of TRU waste led to the conclusion that Alternative Two is implementable. Retrieval operations recently have been completed within the SDA at the OU 7-10 Glovebox Excavator Method Project facility and are currently ongoing at the ARP I location. These retrieval operations are demonstrating the technical and administrative feasibility of the proposed retrieval, packaging, and waste certification processes. Retrieval of TRU-contaminated soil also is occurring at RFP in Colorado. Lessons-learned information from these and other projects are part of the evaluation and design process associated with Alternative Two. Simplification of the OU 7-10 Glovebox Excavator Method Project retrieval approaches, including the approaches to facility confinement structure design and material handling, was fundamental to the design approach implemented for ARP I. A similar approach is being proposed for ARP II activities. The most significant modification to the original approach is the introduction of remotely operated retrieval equipment that will be used in addition to equipment currently being used for ARP I.

4.2.3 Cost

This section provides an analysis of costs for the two alternatives. As stated in Section 4.1.3, the No Action alternative primarily involves costs for monitoring and associated management and oversight. A 15-year monitoring duration is assumed.

Costs for the Targeted Waste Retrieval option are presented in Table 2 for the entire project life cycle (FY 2005 through 2007) including management and oversight, engineering, construction, procurement, retrieval operations, and transfer of waste materials to WIPP. Costs for deactivation, decontamination, and decommissioning, or any potential onsite treatment systems, are not included. Table 2 summarizes the initial cost estimate for the No Action and the Targeted Waste Retrieval alternatives. The existing monitoring system for the SDA will proceed regardless of either action. Consequently, the $3 million in monitoring costs is included as a cost element for each alternative in Table 2.

5. COMPARATIVE ANALYSIS OF ALTERNATIVES

Table 3 shows the results of analyzing the Targeted Waste Retrieval and No Action alternatives for effectiveness, implementability, and cost. Because of the limited range of alternatives included for the NTCRA, the comparative analysis simply summarizes the comparison of the Targeted Waste Retrieval alternative against the No Action baseline option. Based on the comparison, the No Action alternative is not the recommended alternative because it does not satisfy the objective of the removal action.

Table 3. Summary of the comparative analysis of alternatives.

Criteria	No Action Alternative	Targeted Waste Retrieval
Effectiveness	Does not address the proposed NTCRA objective	Addresses objective to perform targeted retrieval of waste
	Does not increase protectiveness of human health and the environment	Compliant with ARARs
		Significantly reduces COC inventory associated with targeted waste streams
	Poses less risk to workers and the public in the short term.	Engineered and operational features provide protection of workers and the public in the short term.
Implementability	Easily implemented.	ARP I and OU 7-10 Glovebox Excavator Method Project experience indicates the alternative is both technically and administratively feasible
		The WIPP certification process for buried waste is considered implementable but administratively complex.
Cost	Total cost = $3 million over the course of 15 years.	Total life-cycle cost of approximately $181.5 million dollars for design; construction; operations; WIPP certification; and disposal.

ARP I = Accelerated Retrieval Project for a Described Area within Pit 4
ARARs = applicable or relevant and appropriate requirements
COC = contaminant of concern
NTCRA = non-time-critical-removal-action
WIPP = Waste Isolation Pilot Plant

6. RECOMMENDED ALTERNATIVE

Based on the present state of knowledge, the Agencies have determined that the implementation of Alternative Two, Targeted Waste Retrieval, as described in this EE/CA, represents an appropriate step forward in the process to achieve a comprehensive remedial solution for the SDA.

The proposed approach for use in Alternative Two would provide an effective method for retrieving and managing the targeted waste while maintaining protection of workers, public health, and the environment. Alternative Two would be designed to provide a cradle-to-grave disposal solution for the excavated TRU waste through transfer of materials to the WIPP facility.

Performance of the action will:

- Satisfy the removal action objective for removal of targeted waste streams and associated contaminants from a portion of the SDA
- Reduce the overall TRU, VOC, and uranium inventory buried within the SDA
- Establish the administrative process for certifying and transferring the resulting retrieved TRU waste streams to WIPP
- Provide information to support remedial work at the RWMC as defined by future CERCLA removal action documentation or the OU 7-13/14 comprehensive ROD.

7. REFERENCES

40 CFR Part 61, 2004, "National Emission Standards for Hazardous Air Pollutants," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR Part 300, 2004, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*, Office of the Federal Register.

42 USC § 6901 et seq., 1976, "Resource Conservation and Recovery Act of 1976 (Solid Waste Disposal Act)," *United States Code*.

42 USC § 9601 et seq., 1980, "Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA/Superfund)," *United States Code*.

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Appendix A

Applicable or Relevant and Appropriate Requirements for Alternative Two—Targeted Waste Retrieval

Appendix A

Applicable or Relevant and Appropriate Requirements for Alternative Two—Targeted Waste Retrieval

This appendix provides identification of applicable or relevant and appropriate requirements (ARARs) for the Accelerated Retrieval Project II (ARP II) non-time-critical removal action (NTCRA), Alternative Two—Targeted Waste Retrieval, described in the engineering evaluation and cost analysis (EE/CA). As is appropriate for a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC § 9601 et seq., 1980) action, only the substantive provisions of the cited ARARs require implementation for the project. Specific ARAR citations and implementation information are provided in Table A-1.

Implementation of the ARARs for a CERCLA removal action is prescribed by the "National Oil and Hazardous Substances Pollution Contingency Plan" (40 CFR Part 300). Removal actions must ". . .to the extent practicable considering the exigencies of the situation, attain ARARs under federal environmental or state environmental or facility siting laws. . ." (40 CFR Part 300.415[j]). The same subsection of the National Contingency Plan (NCP) (40 CFR Part 300) further states, "In determining whether compliance with ARARs is practicable, the lead agency may consider appropriate factors, including (1) The urgency of the situation; and (2) The scope of the removal action to be conducted." Consideration of these factors is discussed in the following sections relative to the identification of appropriate ARARs for this NTCRA.

A-1. CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The chemical-specific ARARs for this NTCRA identified in Table A-1 are primarily limited to ARARs controlling air emissions from the site. Examples of chemical-specific ARARs that will be attained through the NTCRA include the requirements of Idaho's toxic air pollutant standards for releases of carcinogenic and other hazardous chemicals to the ambient air. For radionuclide emissions, the requirements of "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities" (40 CFR Part 61, Subpart H) will apply. The provisions of Subpart H limit the effective dose equivalent from all Idaho National Laboratory (INL) facilities to 10 mrem/year.

It is noted that the chemical-specific ARARs of the Idaho groundwater quality rules and associated maximum contaminant levels (IDAPA 58.01.11) are anticipated to be ARARs for the comprehensive Operable Unit (OU) 7-13/14 remedy, but are not relevant and appropriate to the limited scope of this NTCRA. This conclusion is based on the limited scope of the proposed NTCRA in the context of the overall OU 7-13/14 cleanup program. As stated in the *CERCLA Compliance with Other Laws Manual: Interim Final* (EPA 1988):

> . . .a removal action may be conducted to remove a large number of leaking drums and associated contaminated soil. In this situation, because the removal focuses only on partial control, chemical-specific ARARs for groundwater restoration would not be considered. . .

Table A-1. Evaluation summary of the applicable or relevant and appropriate requirements for the Targeted Waste Retrieval alternative.

Applicable or Relevant and Appropriate Requirements or To-Be-Considered Requirements	Type	Relevancy[a]	Implementation Comments
Idaho toxic air pollutants (IDAPA 58.01.01.585; IDAPA 58.01.01.586)	Chemical	A	The standards for Idaho's toxic air pollutants have been determined to be applicable because carcinogenic and noncarcinogenic air contaminants may be present. The release of carcinogenic and noncarcinogenic contaminants into the air must be estimated and controlled, if necessary, based on estimated emissions. If emission control equipment or operational limits are implemented to limit emissions, a practical means of monitoring, recordkeeping, or testing also will be implemented to show conformance with these limits.
Idaho toxic air pollutants – Demonstration of Preconstruction Compliance with Toxic Standards (IDAPA 58.01.01.210)	Chemical	A	Substantive provisions of the "Demonstration of Preconstruction Compliance with Toxic Standards" will be implemented to appropriately quantify emission rates resulting from the NTCRA activities and in performing modeling to assess compliance with the toxic standards.
Idaho ambient air quality standards for specific air pollutants (IDAPA 58.01.01.577)	Chemical	A	These standards establish ambient air quality standards for particulate matter, sulfur oxides, ozone, nitrogen dioxide, fluorides, and lead. Project air emissions estimates must provide a basis for assessing compliance with the standards.
National emission standards for emissions of radionuclides other than radon from DOE facilities, Subpart H (40 CFR Part 61.92–.94)	Chemical	A	Emission of radionuclides to the ambient air from DOE facilities will not exceed those amounts that would cause any member of the public to receive, in any year, an effective dose equivalent of 10 mrem/year (40 CFR Part 61.92). Project air emissions estimates and monitoring must provide a basis for assessing compliance with the substantive standards. Required monitoring, testing, and calibration of monitoring equipment would be performed in conformance with ANSI/HPS N13.1-1999, "Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities."

Table A-1. (continued).

Applicable or Relevant and Appropriate Requirements or To-Be-Considered Requirements	Type	Relevancy[a]	Implementation Comments
"National Historic Preservation Act of 1966" (16 USC 470 et seq., 2002)	Location	RA	The National Historic Preservation Act covers a variety of historic properties (e.g., buildings, structures, archaeological sites, Native American resources, and significant artifacts). The law requires that properties of this type be identified before disturbance by any federal undertaking, including cleanup activities under CERCLA. Implementation of associated substantive requirements will be coordinated with the INL cultural resources office personnel in the event that archaeological remains or other artifacts are encountered during overburden removal activities.
Idaho control of fugitive dust emissions (IDAPA 58.01.01.650; IDAPA 58.01.01.651)	Action	A	Fugitive dust requirements are applicable if fugitive dust is generated during remediation or construction activities.
Idaho visible emissions (IDAPA 58.01.01.625)	Action	A	Discharge of any air pollutant into the atmosphere from any point of emission for a period or periods aggregating more than 3 minutes in any 60-minute period, which is greater than 20% opacity, is prohibited.
Hazardous waste determination (IDAPA 58.01.05.006 [40 CFR Part 262.11])	Action	A	Performance of an appropriate hazardous waste determination is required for waste that is newly generated.
Standards for owners and operators of treatment, storage, and disposal facilities—use and management of containers (IDAPA 58.01.05 [40 CFR Part 264, Subpart I])	Action	A	CERCLA storage areas for containers of hazardous waste will be managed in compliance with Subpart I requirements.
Subpart X—Miscellaneous units (40 CFR 264.600–.603)	Action	A	Subpart X is identified as an ARAR for the thermal treatment system. As part of Subpart X implementation, additional substantive ARAR provisions deemed necessary to protect human health and the environment will be identified through consultation among DOE, Idaho Department of Environmental Quality, and U.S. Environmental Protection Agency representatives as part of the removal action treatment design process. Additional ARARs for consideration include provisions of Subparts I through O and Subparts AA through CC of this part, Part 270, Part 63 Subpart EEE, and Part 146 of this chapter that are appropriate for the miscellaneous unit (i.e., thermal treatment unit) and the site-specific circumstances of the CERCLA action.
Land disposal restrictions (40 CFR Parts 268.40, 268.44, 268.45, 268.48, and 268.49)	Action	A	These requirements are applicable to the treatment and disposal of RCRA hazardous waste if placement of restricted waste occurs.

Table A-1. (continued).

Applicable or Relevant and Appropriate Requirements or To-Be-Considered Requirements	Type	Relevancy[a]	Implementation Comments
Polychlorinated biphenyls storage and disposal (40 CFR Part 761)	Action	A	The Toxic Substances Control Act regulations governing management, characterization, storage, treatment, and disposal requirements for PCB remediation waste are applicable. Inventory information indicates a potential for PCB contamination in the Pit 4 and Pit 6 waste inventories at concentrations above the Toxic Substances Control Act regulatory threshold for PCBs (i.e., 50 ppm or greater).
Radioactive waste management (DOE Order 435.1)	Action	TBC	The objective of "Radioactive Waste Management" (DOE Order 435.1) is to ensure that all DOE radioactive waste is managed in a manner that is protective of the worker, public health and safety, and the environment. The "Radioactive Waste Management Manual" (DOE Manual 435.1-1) establishes specific responsibilities for implementing radioactive waste management practices for DOE's high-level waste, TRU waste, low-level waste, and the radioactive component of mixed waste. Pit 4 and Pit 6 are historical disposal sites rather than new radioactive waste disposal facilities. Therefore, the substantive low-level waste disposal requirements contained in the "Radioactive Waste Management Manual" do not apply. The substantive requirements in the DOE order, other than the disposal requirements (e.g., storage requirements), will apply and require implementation to relevant radioactive waste management activities.
Radiation protection of the public and the environment (DOE Order 5400.5)	Action and chemical	TBC	This DOE order establishes standards for DOE operations with respect to protection of the public and the environment against undue risk to radiation. This order sets limits for the annual effective dose equivalent for relevant pathways of exposure.

a. Relevancy refers to the type of requirement: A = applicable, RA = relevant and appropriate, or TBC = to-be-considered guidance

ARAR = applicable or relevant and appropriate requirement
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
DOE = U.S. Department of Energy
INL = Idaho National Laboratory
PCB = polychlorinated biphenyl
RCRA = Resource Conservation and Recovery Act
TBC = to be considered
TRU = transuranic

A-2. LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Location-specific ARARs that may apply to the action relate to cultural resource requirements such as those from the National Historic Preservation Act. Although the SDA is a disturbed area with prior clearance, the associated regulations are considered ARARs, and substantive provisions must be addressed in the event that archaeological remains are encountered during excavation of overburden soil.

A-3. ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Substantive Resource Conservation and Recovery Act (RCRA) (42 USC § 6901 et seq., 1976) generator requirements for hazardous waste identification and management would be applicable to waste retrieved and generated as part of the action. Available acceptable knowledge documentation combined with data collected during retrieval operations, will provide sufficient information to safely store the waste. Waste forms from RFP will be associated with various listed and characteristic hazardous waste numbers (ICP 2004). The requirements for storage (40 CFR Part 264, Subpart I) are identified as ARARs to address CERCLA waste storage areas within the ARP II area of contamination.

Storage of retrieved waste streams (i.e., repackaged waste drums) would primarily occur within the RCRA-permitted storage module (i.e., WMF-628) located within the RWMC Transuranic Storage Area. The RCRA permit was previously modified to allow storage of CERCLA waste in association with performing the storage of ARP I waste. Storage of CERCLA waste within WMF-628 will require compliance with requirements of the INL Hazardous Waste Management Act/RCRA Permit for RWMC (DEQ 2004); consequently, ARARs are not relevant to storage in the permitted facilities. Alternate storage would also occur at other permitted storage facilities at the INL as needed and will be subject to the permit requirements of the individual permitted area. The storage duration may exceed 1 year.

The RCRA land disposal restrictions prohibit placement of restricted RCRA hazardous waste in land-based units (e.g., landfills, surface impoundments, and waste piles) until treated to standards considered protective for disposal. Specific treatment standards are included in requirements. These requirements are applicable to the treatment and disposal of RCRA hazardous waste if placement of restricted waste occurs. The land disposal restrictions do not apply to materials disposed of at WIPP, based on WIPP Land Withdrawal Act (PL 102-579, 1992) exemption. The land disposal restrictions generally will apply to treated waste, secondary waste streams, other waste that is RCRA-listed, or characteristic waste that is disposed of at off-RWMC treatment, storage, or disposal facilities.

The RCRA closure requirements for landfills are not considered ARARs for the limited scope of the ARP II removal action. As referenced above, the limited scope of the removal action can be considered in determining whether an ARAR is practicable for implementation in a removal action context. In the case of the proposed Alternative Two—Targeted Waste Retrieval, the U.S. Department of Energy (DOE) has determined that implementation of closure ARARs is not practicable. Implementation of closure requirements and associated monitoring provisions is not meaningful considering the limited portion of the SDA being retrieved, and considering that final closure ARARs for the facility will be satisfied through the OU 7-13/14 comprehensive Record of Decision. It is not possible to construct a meaningful closure scenario for the retrieved area considering the scope of the retrieval being proposed and the magnitude of surrounding existing waste forms not addressed by the action.

The thermal treatment process to be potentially employed for treatment of volatile organic compounds would be subject to substantive ARARs as a miscellaneous unit under RCRA. As part of

Subpart X implementation, additional substantive ARAR provisions deemed necessary to protect human health and the environment will be identified through consultation among representatives from DOE, the Idaho Department of Environmental Quality, and the U.S. Environmental Protection Agency as part of the removal action treatment design process. Additional ARARs for consideration include provisions of Subparts I through O and Subparts AA through CC (40 CFR Part 270), Subpart EEE (40 CFR Part 63), and 40 CFR Part 146 of this chapter that are appropriate for the thermal treatment unit and the site-specific circumstances of the CERCLA action.

The Toxic Substances Control Act (TSCA) (15 USC § 2601 et seq., 1976) regulations of "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions" (40 CFR Part 761) governing management, characterization, storage, treatment, and disposal requirements for PCB remediation waste are applicable. Inventory information indicates a potential for PCB contamination in the ARP II waste inventory at concentrations above the TSCA regulatory threshold for PCBs (i.e., 50 ppm or greater). The TSCA storage ARARs will need to be satisfied for any portion of the waste population identified to contain PCBs at 50 ppm or greater. As in the ARP I case, this may be accomplished through a risk-based storage approval process as is allowed by "PCB Remediation Waste" (40 CFR Part 761.61[c]). If excavated waste-zone materials are identified to contain PCBs greater than or equal to 50 ppm, the materials will not be eligible for return to pit without supporting risk-based disposal approval. Disposal of these potential materials will be addressed in future documentation.

The State of Idaho regulations for fugitive dust emissions (IDAPA 58.01.01, 1994) are applicable to fugitive dust generated during remediation or construction activities. In addition, State of Idaho visible emission standards are identified as ARARs. The requirements prohibit discharge of any air pollutant into the atmosphere from any point of emission for a period or periods aggregating more than 3 minutes in any 60-minute period that is greater than 20% opacity.

Relevant substantive requirements of "Radiation Protection of the Public and the Environment" (DOE Order 5400.5) and "Radioactive Waste Management" (DOE Order 435.1), which specify DOE radiation protection and management requirements, would be met as to-be-considered (TBC) requirements.

A-4. REFERENCES

40 CFR Part 61, 2004, "National Emission Standards for Hazardous Air Pollutants," *Code of Federal Regulations,* Office of the Federal Register.

40 CFR Part 63, 2005, "National Emission Standards for Hazardous Air Pollutants for Source Categories," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR Part 146, 2002, "Underground Injection Control Program: Criteria and Standards," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR Part 262, 2004, "Standards Applicable to Generators of Hazardous Waste," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR Part 264, 2002, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR Part 268, 2003, "Land Disposal Restrictions," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR Part 270, 2002, "EPA Administered Permit Programs: The Hazardous Waste Permit Program," *Code of Federal Regulations,* Office of the Federal Register.

40 CFR Part 300, 2004, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR Part 761, 2003, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions," *Code of Federal Regulations*, Office of the Federal Register.

15 USC § 2601 et seq., 1976, "The Toxic Substances Control Act (TSCA) of 1976," *United States Code.*

16 USC § 470 et seq., 2002, "National Historic Preservation Act," *United States Code*.

42 USC § 6901 et seq., 1976, "Resource Conservation and Recovery Act of 1976 (Solid Waste Disposal Act)," *United States Code*.

42 USC § 9601 et seq., 1980, "Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA/Superfund)," *United States Code*.

ANSI/HPS N13.1, 1999, "Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities," American National Standards Institute.

DEQ, 2004, *Final HWMA Storage Permit for the Radioactive Waste Management Complex (RWMC) on the Idaho National Engineering and Environmental Laboratory,* EPA ID NO. ID4890008952, Rev. 1, Idaho Department of Environmental Quality.

DOE M 435.1, 2001, "Radioactive Waste Management Manual," Change 1, U.S. Department of Energy.

DOE O 435.1, 2001, "Radioactive Waste Management," Change 1, U.S. Department of Energy.

DOE O 5400.5, 1993, "Radiation Protection of the Public and the Environment," Change 2, U.S. Department of Energy.

EPA, 1988, *CERCLA Compliance with Other Laws Manual: Interim Final*, EPA/540/G-89/006, U.S. Environmental Protection Agency.

ICP, 2004, *Central Characterization Project Acceptable Knowledge Summary Report for A Described Area in Pit 4 at the Idaho National Engineering and Environmental Laboratory*, CCP-AK-INEEL-001, Rev. 0, Idaho Completion Project.

IDAPA 58.01.01, 1994, "Rules for the Control of Air Pollution in Idaho," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality.

IDAPA 58.01.05, 2004, "Rules and Standards for Hazardous Waste," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality.

IDAPA 58.01.11, 1997, "Ground Water Quality Rule," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality.

PL 102-579, 1992, "The Waste Isolation Pilot Plant Land Withdrawal Act," *Public Law*.