**10. Development of Alternatives**

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# TABLES

# 10. DEVELOPMENT OF ALTERNATIVES

The technologies selected in Section 9.5 were combined to develop a range of response actions appropriate for WAG 5 contaminants and site conditions that exceed risk-based criteria for human health or the environment. One set of alternatives was developed to address the contaminated soil sites (i.e., ARA-01, ARA-12, ARA-23, ARA-25, and PBF-16). Additional sets of remedial alternatives were developed for the ARA-02 Sanitary Waste System and the ARA-16 Radionuclide Tank. However, any contaminated soils associated with ARA-02 and ARA-16 will be combined with the soil sites.

## 10.1 Response Actions for Contaminated Soils

Five major remedial alternatives were developed to address contaminated soils: no action; limited action; excavation, consolidation, and containment within WAG 5; removal and disposal; and removal with ex situ treatment and disposal. The major combinations of technology process options associated with each alternative are presented in Table 10-1. Each of the five remedial alternatives is discussed below.

### 10.1.1 Alternative 1: No Action

Formulation of a no action alternative is required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) [40 CFR 300.430(e)(6)] and guidance for conducting feasibility studies under CERCLA (EPA 1988). The no action alternative serves as the baseline for evaluating other remedial action alternatives. The alternative can include environmental monitoring, but does not include any actions to reduce potential exposure pathways, such as fencing or deed restrictions (EPA 1988).

### 10.1.2 Alternative 2: Limited Action

A limited action alternative was developed that involves only institutional controls that would remain in place for a minimum of 100 years following closure. The limited action alternative represents the continuation of current management practices at WAG 5 soil sites and also includes site inspection and monitoring. Air monitoring and groundwater monitoring would be performed under INEEL Site-wide programs. Actions under this alternative focus on restricting access (i.e., fencing and deed restrictions), conducting radiation surveys at sites at which radionuclides remain in place, and performing routine monitoring for potential problems such as animal burrowing or erosion. If necessary, surface water diversions would be implemented to prevent surface water from accumulating at the site.

The effectiveness of the limited action would be evaluated by DOE-ID, EPA, and IDHW during subsequent 5-year reviews. Additional environmental monitoring would be defined if determined necessary.

### 10.1.3 Alternative 3: Excavation, Consolidation, and Containment within WAG 5

Implementation of this alternative would involve the excavation of soils present in concentrations greater than PRGs, consolidation of the soils on a site within the WAG 5 area, and containment with a native soil cap or engineered barrier. A soil consolidation site within WAG 5 has not been identified. One site under consideration is the region within ARA-II around the buried SL-1 Reactor Building foundation within ARA-23. Conventional excavation equipment, soil vacuuming equipment, or a combination of both would be used under this alternative. Verification sampling would be conducted to ensure that all contamination at concentrations exceeding PRGs was removed. Excavated areas more

**Table 10-1.** Remedial alternatives for contaminated soil sites.

| | Remedial Alternatives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Technology Process Options | 1 No Action | 2 Limited Action | 3a Excavation, Consolidation, and on-Site Containment within WAG 5 (Native Soil Cover) | 3b Excavation, Consolidation, and on-Site Containment within WAG 5 (Engineered Barrier) | 4a Removal and Disposal on the INEEL | 4b Removal and Disposal off the INEEL | 5a Removal, Ex Situ Sorting, and Disposal on the INEEL | 5b Removal, Ex Situ Sorting, and Disposal off the INEEL |
| Groundwater sampling | X | X | X | X | | | | |
| Air sampling | X | X | X | X | | | | |
| Soil surveys | X | X | X | X | | | | |
| Fences | | X | X | X | | | | |
| Deed restrictions | | X | X | X | | | | |
| Native soil cover | | | X | | | | | |
| Engineered barrier | | | | X | | | | |
| Cap integrity monitoring and maintenance | | | X | X | | | | |
| Excavation with conventional earth-moving equipment | | | X | X | X | X | X | X |
| Truck-mounted vacuum systems | | | X | X | X | X | X | X |
| Gamma monitor, conveyer, and gate system | | | | | | | X | X |
| RWMC disposal | | | | | X | | X | |
| Soil repository disposal | | | | | X | | X | |
| CFA Landfill disposal | | | | | X | | X | |
| Nevada Test Site disposal | | | | | | X | | X |
| Envirocare disposal | | | | | | X | | X |
| Waste Control Specialists disposal | | | | | | X | | X |

than 1 ft deep would be backfilled with clean soil. Shallow excavations would be recontoured to blend with the existing landscape. Institutional controls would not be required for the remediated areas because all contamination would be removed and exposure pathways would be eliminated. However, the consolidated soil area would require management.

With the soil contamination consolidated into a single area within WAG 5, a containment technology would be used to inhibit contaminant migration and limit exposures to protect human health and the environment. The containment alternatives would be designed to meet the RAOs for protecting human and ecological receptors from exposures to contaminated soils. Human health risks resulting from radionuclides decline to less than 1E-04 within 130 years for Cs-137, 700 years for Ag-108m, and more than 1,000 years for Ra-226. Containment technologies must be designed to maintain integrity for the period of time that unacceptable cumulative exposure risks will be present. However, ecological risks are predominantly posed by inorganics, which are conservatively assumed to remain indefinitely. The functional life of a particular cap design is based on erosion prevention, minimization of subsidence, prevention of slope failure, resistance to infiltration, resistance to biotic and human intrusion, and the materials used for construction.

Two containment alternatives were developed to address the radionuclide and chemical soil contamination at WAG 5 sites:

- Native Soil Cover—A thick layer of native soil with surface vegetation, rock armor, or other surface cover
- Engineered Barrier—Multiple layers of native geologic materials.

***10.1.3.1 Alternative 3a: Excavation, Consolidation, and Containment with a Native Soil Cover.*** The native soil cover would consist of 3.05 m (10 ft) of clean INEEL native soils with a surface covering of vegetation, rock armor, or other suitable material. The contaminated soil would be moved to the centralized location, and the soil cover would be added abovegrade to bring the total thickness over the contaminated soils to 3.05 m (10 ft). Site-specific considerations would be used to design the optimum configuration for application at the consolidation site during the remedial design phase.

Environmental monitoring, cap integrity monitoring and maintenance (e.g., repairing any observable degradation such as cracks, erosion, and biotic intrusion), and access restrictions (e.g., fencing) would be conducted on an annual basis as part of the alternative. Air monitoring and groundwater monitoring would be performed under INEEL Site-wide programs. Site reviews would be conducted every 5 years to evaluate the effectiveness of the native soil cover and the need for additional environmental monitoring requirements.

***10.1.3.2 Alternative 3b: Excavation, Consolidation, and Containment with an Engineered Barrier.*** The engineered barrier would be designed in accordance with specifications developed for the cover constructed at the SL-1 site, which consists of a 0.3-m (12-in.) layer of basalt cobbles underlain and overlain by 0.2-m (8-in.) layers of gravel and covered with a basalt riprap layer. The basalt riprap layer would be a minimum of 0.6 m (24 in.) thick. Implementation of this alternative would require consolidation of the radiologically and chemically contaminated soils into one centralized location before capping.

Environmental monitoring, cap integrity monitoring and maintenance (e.g., repairing any observable degradation such as cracks, erosion, and biotic intrusion), and access restrictions (e.g., fencing) would be conducted on an annual basis. Air monitoring and groundwater monitoring would be performed under INEEL Site-wide programs. To evaluate the effectiveness of the engineered barrier alternative and the need for additional environmental monitoring requirements, 5-year reviews of the site would be conducted.

### 10.1.4 Alternative 4: Removal and Disposal

Removal and disposal alternatives for WAG 5 radiologically and chemically contaminated sites consist of using conventional construction equipment, soil vacuuming equipment, or a combination of both, to excavate contaminated soil, followed by disposal of the contaminated material on the INEEL or at a permitted off-Site facility. Verification sampling would be conducted at the removal sites to ensure that all contamination at concentrations exceeding PRGs was removed. The excavations exceeding 1 ft in depth would be backfilled with clean soil following the excavation. Shallow excavations would be recontoured to blend with the existing landscape. Under Alternative 4a, the excavated soils would be disposed of on-Site at the INEEL, while Alternative 4b excavated soils would be disposed of off-Site. These alternatives are discussed in the following subsections.

***10.1.4.1 Alternative 4a: Removal and On-Site Disposal at the INEEL.*** Implementation of this alternative would require excavation of all soils that are above preliminary remediation goals (PRGs) and the transport of the soils to an INEEL low-level waste disposal facility such as the proposed INEEL soil repository. The INEEL soil repository is currently under review by stakeholders. If the repository is developed, it would open for receipt of soils in the year 2001. Though the repository was selected for evaluation in this FS, other INEEL facilities can be considered, if appropriate, based on factors such as facility waste acceptance criteria, available capacity, and cost.

***10.1.4.2 Alternative 4b: Removal and Disposal Off the INEEL.*** Implementing this alternative would involve excavation of all soils above PRGs and the transport of the soils to a private off-Site disposal facility. The most likely off-Site disposal location would be Envirocare, a RCRA-permitted low-level radioactive waste disposal facility located approximately 480 km (300 mi) south of the INEEL near Clive, Utah. The Envirocare facility was selected for evaluation of this alternative for this FS. However, the Nevada Test Site (NTS) and Waste Control Specialists (WCS) facilities also will be considered for disposal of the soils. Compliance with appropriate waste characterization, transportation, and possible treatment requirements would be required under this alternative.

### 10.1.5 Alternative 5: Removal, Ex Situ Sorting, and Disposal

The removal, ex situ treatment, and disposal alternative was developed for the radiologically contaminated soils with concentrations that exceed human health PRGs (i.e., sites ARA-12, ARA-16, ARA-23, and ARA-25). Conventional construction equipment would be used to excavate the soils radiologically contaminated above the PRGs. The segmented-gate separation technology would be used to sort the soil into two categories: above the PRG criteria and below the PRG criteria. A minimum amount of clean soil would be removed with the radiological contamination, which would significantly reduce the overall amount of material requiring disposal. Under this alternative, the soils from the sites with an ecological risk only, ARA-01 and PBF-16, would be excavated and disposed of with the radiologically contaminated soils.

***10.1.5.1 Alternative 5a: Removal, Ex Situ Sorting, and On-Site Disposal at the INEEL.*** This alternative follows the same guidelines as those outlined in Section 10.1.4.1 for Alternative 4a.

***10.1.5.2 Alternative 5b: Removal, Ex Situ Sorting, and Disposal Off the INEEL.*** This alternative follows the same guidelines as those outlined in Section 10.1.4.2 for Alternative 4b.

## 10.2 Response Actions for the ARA-02 Sanitary Waste System

Alternatives developed to address the ARA-02 Sanitary Waste System are discussed in the following sections. The alternatives presented below focus on the contents of the ARA-02 seepage pit. In addition, the disposition of the Sanitary Waste System structural components (i.e., three septic tanks, pipelines, and pumice blocks) also is discussed. Four major remedial alternatives were developed to address ARA-02: no action, limited action, removal with ex situ treatment and disposal, and in situ stabilization. The major combinations of technology process options associated with each alternative are presented in Table 10-2. Each of the four remedial alternatives is discussed below.

### 10.2.1 Alternative 1: No Action

Formulation of a no action alternative is required by the NCP (40 CFR 300.430(e)(6)) and EPA guidance for conducting feasibility studies under CERCLA (EPA 1988). The no action alternative serves as the baseline for evaluating other remedial action alternatives. This alternative can include environmental monitoring, but it does not include actions to reduce potential exposure pathways, such as fencing or deed restrictions (EPA 1988). The no action alternative developed for the ARA-02 seepage pit sludge involves only environmental monitoring (i.e., groundwater, air, and soil) for at least 100 years after site closure. Based on the BRA, additional groundwater monitoring would not be required for ARA-02 seepage pit waste because the risk assessment results (see Section 6.4) indicate that migration of the current contents of the seepage pit would not affect groundwater. However, the BRA considered only the current contents of the seepage pit and did not quantify risk from historical releases to the environment over the operational lifetime of the seepage pit. The final decision about groundwater monitoring will be established in the WAG 5 ROD.

### 10.2.2 Alternative 2: Limited Action

A limited action alternative was developed that involves only institutional controls that would remain in place for a minimum of 100 years following closure. This alternative would continue current management practices at the ARA-02 seepage pit and also would include site inspection and monitoring. Air monitoring and groundwater monitoring would be performed under INEEL Site-wide programs. Actions under this alternative would focus on restricting access (fencing and deed restrictions), radiation surveys, and routine monitoring for potential problems such as animal burrowing and erosion. If necessary, surface water diversions would be implemented to prevent surface water from accumulating at the site.

These actions would be implemented annually for the first 5 years following site closure. The effectiveness of the limited action would be evaluated by DOE-ID, EPA, and IDHW during subsequent 5-year reviews, and additional environmental monitoring would be defined if determined necessary.

### 10.2.3 Alternative 3: Removal, Ex Situ Treatment, and Disposal

The two following alternatives were developed to address ARA-02 seepage pit sludge through removal, ex situ treatment, and disposal:

- Excavate the seepage pit, remove and thermally treat the contents, and dispose of the treated material off-Site
- Excavate the seepage pit, remove and solidify or stabilize the contents, and dispose of the treated material off-Site.

**Table 10-2.** Remedial alternatives for the ARA-02 seepage pit sludge and the structural components of the ARA-I Sanitary Waste System.

| | Remedial Alternatives | | | |
|---|---|---|---|---|
| Technology Process Option | 1<br>No Action | 2<br>Limited Action | 3<br>Removal, Ex Situ Thermal Treatment and Disposal | 4<br>In Situ Stabilization |
| Groundwater sampling | X | X | | X |
| Vadose zone monitoring | X | X | | X |
| Air sampling | X | X | | X |
| Soil surveys | X | X | | X |
| Fences | | X | | X |
| Deed restrictions | | X | | X |
| Excavation with conventional earth-moving equipment | | | X | |
| Truck-mounted vacuum systems | | | X | |
| Incineration | | | X | |
| Fixation and stabilization | | | | X |
| RWMC storage or disposal | | | Structural components only | |
| Soil repository disposal | | | X | |
| Envirocare disposal | | | X | X |
| Waste Control Specialists disposal | | | X | X |

The ARA-02 seepage pit sludge and pumice blocks are classified as F-listed RCRA waste (42 USC § 9601 et seq.; 40 CFR 261, Subpart D). The proposed on-Site soil repository (the ICDF) would be the only facility that could accept RCRA-listed or characteristic waste. Because this repository is still in conceptual design and funding and approval to construct such a facility are uncertain, only off-Site disposal in a permitted facility was considered for cost-estimation purposes. For this alternative then, the treated sludge and pumice blocks of the seepage pit would be disposed of off-Site at a facility such as Envirocare. If encapsulation of the pumice blocks is required for disposal, it could be performed at Envirocare. In addition, the three empty concrete septic tanks and other piping associated with this system would be excavated and disposed of off-Site. Institutional controls would not be required after site excavation and disposal because all contamination would be removed and all exposure pathways would be eliminated.

Sample results indicate that only a small volume of contaminated soil is associated with ARA-02 and that the concentrations of all contaminants are well below the PRGs. Therefore, the assumption that remediation will not be required for ARA-02 soils was incorporated into the alternative. The ARA-02 site is located within ARA-23, the contaminated soil site that encompasses the ARA-I and ARA-II facilities and surrounding area. If soils contaminated above PRGs are detected during the remediation of the seepage pit, they will be addressed in conjunction with ARA-23.

***10.2.3.1 Alternative 3a: Removal, Ex Situ Thermal Treatment and Disposal.*** Alternative 3a involves excavation of the ARA-02 seepage pit, removal of the sludge, shipment, ex situ thermal treatment outside of WAG 5, and disposal of the treated waste. The seepage pit would be excavated using conventional construction equipment.

The seepage pit sludge can be accepted for incineration at WERF. Under this option, the seepage pit sludge would be blended with other waste or combustible materials such as corn cobs, before incineration to reduce the PCB concentration to less than 5 ppm. Because the sludge is dry, no adsorbents would be necessary. Treated residuals would be stabilized if necessary to meet disposal criteria of an off-Site permitted facility such as Envirocare. The pumice blocks and concrete septic tanks and associated piping would be shipped for disposal at an off-Site permitted facility such as Envirocare.

***10.2.3.2 Alternative 3b: Removal, Ex Situ Stabilization and Off-Site Disposal.*** Alternative 3b involves excavation of the seepage pit, removal of the sludge, ex situ solidification or stabilization of the sludge, and disposal of the treated waste at an off-Site waste disposal facility. The seepage pit would be excavated using conventional construction equipment.

The sludge would be mixed with chemical additives such as phosphates or silicates to stabilize it at WAG 5 or elsewhere on the INEEL to meet the RCRA land disposal restriction criteria (42 USC § 9601 et seq.). The pumice blocks and concrete septic tanks and associated piping would be shipped off-Site for disposal. The most likely disposal location off-Site is the Envirocare RCRA-permitted low-level radioactive waste disposal facility. Compliance with appropriate waste characterization, transportation, and possible treatment requirements would be required under this alternative.

### 10.2.4 Alternative 4: In Situ Stabilization and Encapsulation

Alternative 4 would consist of partially filling the seepage pit with soil and then grouting the seepage pit sludge and pumice blocks in place. In addition, the three empty concrete septic tanks and associated piping would be filled with grout. Jet grouting would be used in the seepage pit to ensure adequate mixing of the sludge with the grout material to stabilize the waste and completely encapsulate the entire seepage pit system. After the seepage pit is stabilized and encapsulated, a gravity feed system would be used to fill the remainder of the septic system with grout.

Institutional controls and environmental monitoring would be implemented to restrict access and confirm that contamination was not migrating from the site. Institutional controls would include deed restrictions and fencing. The environmental monitoring would include groundwater and vadose zone monitoring, radiation surveys, and soil sampling and analysis. Five-year reviews would be conducted to evaluate the effectiveness of the institutional controls and treatment.

## 10.3 Response Actions for the ARA-16 Radionuclide Tank

Alternatives developed to address the ARA-16 Radionuclide Tank are discussed in the following sections. Though the alternatives presented below focus on the contents of the ARA-16 tank waste, the disposition of the tank system structural components (i.e., the tank vault, pipelines, and the stainless steel tank) also is discussed. Five major remedial alternatives were developed to address ARA-16: no action; limited action; in situ vitrification; removal, ex situ thermal treatment, and disposal; and removal, ex situ stabilization, treatment, and disposal. The major combinations of technology process options associated with each alternative are presented in Table 10-3. Each of the five remedial alternatives is discussed below.

### 10.3.1 Alternative 1: No Action

Formulation of a no action alternative is required by the NCP (40 CFR 300.430(e)(6)) and EPA guidance for conducting feasibility studies under CERCLA (EPA 1988). The no action alternative serves as the baseline for evaluating other remedial action alternatives. This alternative can include environmental monitoring, but it does not include actions to reduce potential exposure pathways, such as fencing or deed restrictions (EPA 1988). The no action alternative developed for the ARA-16 tank involves only environmental monitoring (i.e., groundwater, air, and soil) for at least 100 years after site closure. Because RCRA-regulated waste would remain in the ARA-16 tank, tank system integrity monitoring would be implemented and groundwater or vadose zone monitoring would be installed.

### 10.3.2 Alternative 2: Limited Action

A limited action alternative was developed that involves only institutional controls that would remain in place for a minimum of 100 years following closure. Under this alternative, current management practices at ARA-16 would be maintained and site inspection and monitoring would be included. Air monitoring and groundwater monitoring would be performed under INEEL Site-wide programs. Actions under this alternative would focus on restricting access (e.g., fencing and deed restrictions), radiation surveys, and routine monitoring for potential problems such as animal burrowing and erosion. If necessary, surface water diversions would be implemented to prevent surface water from accumulating at the site.

These actions would be implemented annually for the first 5 years following site closure. The effectiveness of the limited action would be evaluated by DOE-ID, EPA, and IDHW during subsequent 5-year reviews, and additional environmental monitoring would be defined if determined necessary.

### 10.3.3 Alternative 3: In Situ Vitrification

Two variations of in situ vitrification are considered for ARA-16: (1) in situ vitrification (ISV) at the current location of the tank at ARA-I and (2) transport of the tank or tank waste to TAN for ISV with the V-tanks.

**Table 10-3.** Remedial alternatives for the ARA-16 radionuclide tank and the structural components of the tank system.

| Technology Process Option | Remedial Alternatives 1 No Action | 2 Limited Action | 3a In Situ Vitrification of the ARA-16 Tank at the Existing Tank Site | 3b1 and 3b2 In Situ Vitrification of the ARA-16 Tank or Tank Waste at TAN | 4 Removal, Ex Situ Thermal Treatment and Disposal | 5 Removal, Ex Situ Stabilization, and Disposal |
|---|---|---|---|---|---|---|
| Groundwater sampling | X | X | X | | | |
| Vadose zone monitoring | X | X | X | | | |
| Air sampling | X | X | X | | | |
| Soil surveys | X | X | X | | | |
| Fences | | X | X | | | |
| Deed restrictions | | X | X | | | |
| Vitrification | | | X | X | | |
| Excavation with conventional earth-moving equipment | | | | X | X | X |
| Truck-mounted vacuum systems | | | | X | X | X |
| Incineration | | | | | X | |
| Fixation and stabilization | | | | | | X |
| RWMC storage or disposal | | | | X | X | X |
| Soil repository disposal | | | | X | X | X |
| Envirocare disposal | | | | | X | X |
| Waste Control Specialists disposal | | | | | X | X |

**10.3.3.1 Alternative 3a: In Situ Vitrification of the ARA-16 Tank at the Existing Tank Site.** For the ISV alternative at ARA-16, a temporary containment structure would be erected and the ARA-16 tank contents, tank system, and surrounding soils would be vitrified. The piping associated with the tank system would be excavated, dismantled, buried in the vicinity of the tank, and treated by ISV. The containment structure would be equipped with shielding, and a negative pressure ventilation system would exhaust through HEPA filters. The containment would be constructed over the tank site before the start of treatment activities. The tank contents would be treated in place via ISV coupled with a vapor-control preconditioning technique.

This site is located within ARA-23, the contaminated soil site that encompasses the ARA-I and ARA-II facilities and surrounding area. The soil immediately adjacent to the tank would be treated along with the tank. Soils outside of the melt zone will be addressed as a component of ARA-23.

The ISV process establishes two planar-shaped ISV melts on opposite sides of the tank. As these two melts grow together, the tank and its contents are processed. The melting technique, combined with the structural disruption of the upper regions of the tank, provides a pathway for vapors generated within the tank to be continuously vented. The venting prevents the entrapment of vapors that could lead to unacceptable operating events such as fires or explosions.

The ISV system employs an array of graphite electrodes that supply electrical energy to the soil and waste to be vitrified. The natural electrical properties of molten soil permit the flow of current between the electrodes. Gases generated during processing escape to the surface where they are contained and collected in an off-gas hood. The hood is maintained at a partial vacuum to ensure that the off gases are transported through the off-gas treatment system before their ultimate release to the environment.

**10.3.3.2 Alternative 3b: Removal and In Situ Vitrification of the ARA-16 Tank or Tank Waste at TAN.** For the ISV alternative at TAN, two variations are considered: (1) Alternative 3b1—the entire tank, intact with its contents, would be transferred to TAN, buried, and treated along with the ISV of the V-tanks and (2) Alternative 3b2—the tank contents would be removed and placed in drums, transported to TAN, and vitrified with the V-tanks.

This site is located within ARA-23, the contaminated soil site that encompasses the ARA-I and ARA-II facilities and surrounding area. The ARA-16 soils will be addressed in combination with the contaminated soil alternatives discussed in the previous section.

Under Alternative 3b1, the ARA-16 tank would be excavated and transported to TAN. The tank would then be buried in the vicinity of the V-tanks and subsequently vitrified in place using the planar ISV method. The concrete vault would be removed and disposed of on-Site as low-level waste.

Under Alternative 3b2, the ARA-16 tank contents would be removed using technologies such as jetting and pumping or vacuum removal, containerized for shipment, transported to TAN, and injected into a V-tank before ISV treatment of the tanks. The ARA-16 tank waste is similar in composition to the V-tank waste, and ISV is presently being considered for these tanks. Because the quantity of waste in the ARA-16 tank is insignificant compared to the total volume of waste in the V-tanks, a tremendous cost savings could be realized compared to ISV of the ARA-16 tank in place. The tank and associated piping would be removed, decontaminated, and disposed of with the concrete vault on-Site as low-level waste. The waste generated from decontamination can be incinerated at WERF and the residual waste disposed of at an off-Site facility such as Envirocare.

For either option, a temporary structure equipped with shielding and a negative pressure ventilation system exhausted through HEPA filters would be constructed over the tank site before the start of excavation and tank or waste removal. The tank would be excavated using conventional construction equipment, and the excavated soils would be treated in the same manner as other radiologically contaminated soil at WAG 5. The site would be backfilled and contoured to match the surrounding terrain. The removal of the waste from the site obviates the need for institutional controls.

### 10.3.4 Alternative 4: Removal, Ex Situ Thermal Treatment, and Disposal

Alternative 4 involves erection of a temporary containment structure, excavation of the ARA-16 tank, removal of the waste, shipment, ex situ thermal treatment outside of WAG 5, and disposal of the treated waste. A temporary structure equipped with shielding and a negative pressure ventilation system exhausted through HEPA filters would be constructed over the site before the start of excavation and waste removal. The tank waste would be removed using technologies such as jetting and pumping or vacuum removal. The structural components of the system would be excavated using conventional construction equipment. This site is located within ARA-23, the contaminated soil site that encompasses the ARA-I and ARA-II facilities and surrounding area. Sample results indicate that contaminated soil is associated with ARA-16. The ARA-16 soils will be addressed in combination with the contaminated soil alternatives discussed in the previous section.

The contents of the tank would be removed and thermally treated on-Site. The ARA-16 tank waste is classified as F-listed RCRA waste (42 USC § 9601 et seq.; 40 CFR 261, Subpart D). The proposed on-Site soil repository (the ICDF) would be the only facility that could accept RCRA-listed or characteristic waste. Because this repository is still in conceptual design and funding and approval to construct such a facility are uncertain, only off-Site disposal in a permitted facility was considered for cost-estimation purposes. The ARA-16 tank waste does not meet the waste acceptance criteria for WERF because of high alpha contamination and high PCB concentrations. However, the waste is a candidate for treatment in the proposed Advanced Mixed Waste Treatment Facility (AMWTF). Temporary storage at the RWMC will be required until the AMWTF becomes operational. Under this option, the ARA-16 tank waste would be packaged in a high-integrity container and stored at the RWMC until the AMWTF becomes operational. The treated waste would be disposed at an off-Site permitted facility such as Envirocare.

The ARA-16 tank and associated piping would be decontaminated and disposed of with the concrete vault on-Site at the proposed INEEL soil repository or the RWMC. Institutional controls would not be required after site excavation and disposal because all contamination would be removed and all exposure pathways would be eliminated.

### 10.3.5 Alternative 5: Removal, Ex Situ Stabilization, and Off-Site Disposal

Alternative 5 involves erection of a temporary containment structure, excavation of the tank, removal of the tank waste, ex situ solidification or stabilization of the tank waste, and disposal of the treated waste at an off-Site waste disposal facility. A temporary structure equipped with shielding and a negative pressure ventilation system exhausted through HEPA filters would be constructed over the tank site before the start of excavation and waste removal. The tank would be excavated using conventional construction equipment. The tank waste would be removed using technologies such as jetting and pumping or vacuum removal.

This site is located within ARA-23, the contaminated soil site that encompasses the ARA-I and ARA-II facilities and surrounding area. Sample results indicate that contaminated soil is associated with

ARA-16. The ARA-16 soils will be addressed in combination with the contaminated soil alternatives discussed in the previous section.

The tank waste would be mixed with chemical additives such as phosphates or silicates to stabilize it at WAG 5 or elsewhere on the INEEL to meet the RCRA land disposal restriction criteria (42 USC § 9601 et seq.). The proposed on-Site soil repository (the ICDF) would be the only facility that could accept RCRA-listed or characteristic waste. Because this repository is only in conceptual design and funding and approval to construct such a facility are uncertain, only off-Site disposal in a permitted facility was considered for cost-estimation purposes. The most likely disposal location off-Site is the Envirocare RCRA-permitted low-level radioactive waste disposal facility. Compliance with appropriate waste characterization, transportation, and possible treatment requirements would be required under this alternative.

The tank and associated piping would be decontaminated and disposed of with the vault at the proposed INEEL soil repository or the RWMC as low-level waste. Institutional controls would not be required after site excavation and disposal because all contamination would be removed and all exposure pathways would be eliminated.

## 10.4 References

42 USC § 9601 et seq., *United States Code*, October 21, 1976, "Resource Conservation and Recovery Act."

40 CFR 261, *Code of Federal Regulations*, Title 40, "Protection of the Environment," Part 261, "Identification and Listing of Hazardous Wastes," Subpart D, "Lists of Hazardous Wastes."

40 CFR 300, *Code of Federal Regulations*, Title 40, "Protection of the Environment," Part 300, "National Oil and Hazardous Substances Pollution Contingency Plan."

EPA, October 1988, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, Interim Final, OSWER Directive 9355.3-01, EPA/540/G-89/004, U.S. Environmental Protection Agency.