

8. RI/BRA SUMMARY AND CONCLUSIONS

The following sections summarize the Waste Area Group (WAG) 1 nature and extent of contamination, and the Operable Unit (OU) 1-10 human health and ecological risk assessments (ERAs). See Sections 1 through 7 of the OU 1-10 Remedial Investigation/Baseline Risk Assessment (RI/BRA) (DOE-ID 1996) for further information.

8.1 Contamination Nature and Extent Summary

Potential Test Area North (TAN) release sites identified in the Federal Facility Agreement/Consent Order (FFA/CO) (DOE-ID 1991), and those added under the new site identification process, include injection wells, disposal ponds, leach fields, french drains, valve pits, burn pits, rubble pits, and assorted spills and releases to the environment associated with above and belowground storage tanks. These release sites comprise the 10 WAG 1 OUs. Seventy-one of the WAG 1 release sites were identified in the FFA/CO, and 20 others have been identified since the FFA/CO was issued. All potential release sites, and other sources of contamination at TAN (e.g., co-located facilities), were considered as part of the OU 1-10 RI/BRA (DOE-ID 1996).

The sources of contamination at WAG 1 that have the potential for producing unacceptable future residential risk are past discharges and releases associated with the Technical Support Facility (TSF)-06 soil contamination areas, the TSF-07 disposal pond, TSF-26 (PM-2A tanks), TSF-09/18 (V-Tanks), the Water Reactor Research Test Facility (WRRTF)-01 and TSF-03 burn pits, the WRRTF-13 fuel spill, TSF-08 mercury spill area, and the TSF-05/23 injection well/groundwater contamination. The TSF-06 soil contamination areas include surface ponds, drainage ditches, railroad tracks, and open unpaved areas utilized for open storage of equipment. The TSF-07 disposal pond, which covers an area of approximately 9,790 m² (105,400 ft²), began receiving wastewater from various sources in 1972, after the TSF-05 injection well was taken out of service. The TSF-26 area, contaminated through spills and incidental releases, covers an area of approximately 650 m² (7,000 ft²). The soil contamination present at TSF-09/18 was produced by a spill that occurred during a maintenance action and covers an area of approximately 372 m² (4,000 ft²). The WRRTF-01 and TSF-03 burn pits were contaminated by incomplete combustion of construction materials that were disposed of in the pits. The WRRTF-13 fuel spill site was contaminated by diesel fuel that leaked from two tanks and a transfer line at WRRTF. The soil contaminated with mercury that remains after a removal action at TSF-08 covers an area of approximately 61.3 m² (660 ft²). Finally, the TSF-05 groundwater contamination was produced by organic, inorganic, low-level radioactive, industrial, and sanitary waste waters that were discharged into the Snake River Plain Aquifer through the TSF-05 injection well from 1953 to 1972. These discharges produced trichloroethylene, tetrachloroethylene, 1,2-dichloroethylene, Sr-90, H-3, and Cs-137 contamination of the aquifer. As described in the OU 1-07B Record of Decision (ROD) (DOE-ID 1995), the aquifer is currently undergoing remedial action.

The extent of contamination at all sites retained for evaluation in the BRA is based on the OU 1-10 field investigations and previous WAG 1 investigations. The nature and extent of contamination at the sites evaluated in the BRA are summarized in Section 4 of the OU 1-10 RI/BRA (DOE-ID 1996).

8.2 Human Health Risk Evaluation Summary

The OU 1-10 human health risk assessment described in the OU 1-10 RI/BRA (DOE-ID 1996) consists of two broad phases of analysis; (1) a site and contaminant screening that identified release sites and contaminants of potential concern (COPCs) that could produce adverse human health impacts to workers and potential future residents at WAG 1, and (2) an exposure route analysis that produced estimates of human health risk for each COPC. The exposure route analysis includes an exposure assessment, a toxicity assessment, and a risk characterization discussion. As described in Chapter 6 of the RI/BRA, the BRA includes an evaluation of human health risks associated with exposure to contaminants through soil ingestion, fugitive dust inhalation, volatile inhalation, external radiation exposure, groundwater ingestion, ingestion of homegrown produce, dermal absorption of groundwater, dermal absorption from soil, and inhalation of water vapors due to indoor water use.

Tables 8-1 through 8-3 summarize the results of the human health risk assessment with respect to the evaluated exposure routes. Table 8-1 indicates which release sites have calculated risks in excess of $1E-04$, Table 8-2 indicates which release sites have calculated risks in excess of $1E-06$, and Table 8-3 indicates which release sites have calculated hazard indices in excess of 1. As shown in the tables, the exposure routes that have calculated risks within or above the National Contingency Plan (NCP) target risk range at WAG 1 (i.e., risk = $1E-06$ to $1E-04$ or hazard index = 1) are ingestion of soil, ingestion of homegrown produce, external radiation exposure, groundwater ingestion, dermal absorption from groundwater, and inhalation of vapors from indoor water use.

The contaminants with the greatest potential for causing adverse human health effects at WAG 1 [i.e., risks greater than $1E-06$ or hazard index (HI) greater than 1.0] include nine radionuclides, four metals, four organic contaminants [including total petroleum hydrocarbons (TPH)], and polychlorinated biphenyls (PCBs). The contaminants are shown in Table 8-4 according to the exposure scenario (i.e., occupational or residential exposure) in which they are predicted to produce unacceptable risks. These contaminants are considered to be contaminants of concern (COCs) for WAG 1.

8.3 Ecological Risk Evaluation Summary

The objectives of the OU 1-10 WAG ERA were to define the extent of contamination for each site at the WAG level, determine the potential effects from contaminants on environmental receptors, habitats, or special environments, determine the potential effects from contaminants on other ecological receptors at WAG 1, and identify sites and COPCs to be assessed at the Idaho National Engineering and Environmental Laboratory (INEEL)-wide ERA. The approach used in the WAG ERA is an extension of the screening level ecological risk assessment methodology used at the INEEL (VanHorn, Hampton, and Morris 1995). This methodology uses conservative exposure modeling and input parameters to identify contaminants and sites that may pose a risk to the environment.

The ecological risk assessment is presented in Section 7. All potential release sites identified in the FFA/CO and since the FFA/CO was completed were evaluated for risk to ecological receptors. The retained sites and their associated COPCs of concern were evaluated as discussed in Section 7, using the general approach proposed by EPA (EPA 1994, 1996). As discussed in Section 7.5, the results of this assessment will be utilized as input into the INEEL-wide ERA.

Table 8-1. Summary of sites and exposure routes with calculated risks greater than 1E-04.

Sites Evaluated in RI/BRA	Occupational Scenario				Residential Scenario					
	Soil	External Radiation Exposure	Inhalation of Fugitive Dust	Air	Soil	External Radiation Exposure	Inhalation of Fugitive Dust	Air	Groundwater	
	Ingestion of Soil		Inhalation of Volatiles		Ingestion of Soil	Ingestion of Homegrown Produce	Inhalation of Volatiles	Inhalation of GW	Dermal Absorption of GW	Inhalation of Vapors From Indoor Water Use
LOFT-12: N Transformer Yard										
TSF-06 Area 1: Soil NE of Turntable	○				●					
Area 3: TAN-781 Pond										
Area 5: Radioactive Soil Berm										
Area 7: Soil Box Storage										
Area 8: Cask Storage Pad										
Area 9: NE Corner Soil Contamination										
Area 11: TSF-06 Ditch	⊙									
Area B: Soil South of Turntable	⊙									
TSF-07: TSF Disposal Pond	⊙									
TSF-08: Mercury Spill Site 13B										
TSF-09/18: V-Tanks	⊙									
TSF-10: TSF Drainage Pond										
TSF-11: Clarifier Pits										
TSF-21: Initial Engine Test (IET) Valve Pit										
TSF-22: Railroad Turntable										
TSF-26: PM-2A Tanks	○									
TSF-29: TSF Acid Pond	○									
TSF-36: TAN-603 French Drain										
TSF-37: Contaminated Well Water Spill										
WRRTF-01: WRRTF Burn Pits										

○ = Risk greater than 1E-04 for the current occupational exposure scenario.
 ⊙ = Risk greater than 1E-04 for the current occupational and future occupational exposure scenarios.
 ● = Risk greater than 1E-04 for the future residential exposure scenario.
 Note: WRRTF-13 is not included on this table because none of the site's contaminants have available toxicity information. However, the site is retained for evaluation in the FS.

Table 8-2. Summary of sites and exposure routes with calculated risks greater than 1E-06.

Sites Evaluated in RI/BRA	Occupational Scenario				Residential Scenario							
	Soil		Air		Soil		Air		Groundwater			
	Ingestion of Soil	External Radiation Exposure	Inhalation of Fugitive Dust	Inhalation of Volatiles	Ingestion of Soil	External Radiation Exposure	Ingestion of Homegrown Produce	Inhalation of Fugitive Dust	Inhalation of Volatiles	Ingestion of GW	Dermal Absorption of GW	Inhalation of Vapors From Indoor Water Use
LOFT-12: N Transformer Yard					●		●			●		●
TSF-06 Area 1: Soil NE of Turntable	⊙				●		●			●		●
Area 3: TAN-781 Pond												●
Area 5: Radioactive Soil Berm	⊙					●				●		●
Area 7: Soil Box Storage	⊙					●				●		●
Area 8: Cask Storage Pad	⊙				●		●			●		●
Area 9: NE Corner Soil Contamination	○					●				●		●
Area 11: TSF-06 Ditch	○					●				●		●
Area B: Soil South of Turntable	○					●				●		●
TSF-07: TSF Disposal Pond	⊙				●		●			●		●
TSF-08: Mercury Spill Site 13B	○					●				●		●
TSF-09/18: V-Tanks	○				●					●		●
TSF-10: TSF Drainage Pond	⊙					●				●		●
TSF-11: Clarifier Pits												●
TSF-21: IET Valve Pit												●
TSF-22: Railroad Turntable	⊙					●				●		●
TSF-26: PM-2A Tanks	⊙					●				●		●
TSF-29: TSF Acid Pond	⊙					●				●		●
TSF-36: TAN-603 French Drain												●
TSF-37: Contaminated Well Water Spill												●
WRRTF-01: WRRTF Burn Pits												●

○ = Risk greater than 1E-04 for the current occupational exposure scenario

⊙ = Risk greater than 1E-04 for the current occupational and future occupational exposure scenarios.

● = Risk greater than 1E-04 for the future residential exposure scenario.

Note: WRRTF-13 is not included on this table because none of the site's contaminants have available toxicity information. However, the site is retained for evaluation in the FS.

Table 8-3. Summary of sites and exposure routes with calculated hazard indices greater than 1.

Sites Evaluated in RI/BRA	Occupational Scenario				Residential Scenario							
	Soil	Air	Air	Soil	Air	Air	Groundwater	Groundwater				
	Ingestion of Soil	External Radiation Exposure	Inhalation of Fugitive Dust	Inhalation of Volatiles	Ingestion of Soil	External Radiation Exposure	Ingestion of Homegrown Produce	Inhalation of Fugitive Dust	Inhalation of Volatiles	Ingestion of GW	Dermal Absorption of GW	Inhalation of Vapors From Indoor Water Use
LOFT-12: N Transformer Yard												
TSF-06 Area 1: Soil NE of Turntable												
Area 3: TAN-781 Pond												
Area 5: Radioactive Soil Berm												
Area 7: Soil Box Storage												
Area 8: Cask Storage Pad												
Area 9: NE Corner Soil Contamination												
Area 11: TSF-06 Ditch												
Area B: Soil South of Turntable												
TSF-07: TSF Disposal Pond												
TSF-08: Mercury Spill Site 13B												
TSF-09/18: V-Tanks												
TSF-10: TSF Drainage Pond												
TSF-11: Clarifier Pits												
TSF-21: IET Valve Pit												
TSF-22: Railroad Turntable												
TSF-26: PM-2A Tanks												
TSF-29: TSF Acid Pond												
TSF-36: TAN-603 French Drain												
TSF-37: Contaminated Well Water Spill												
WRRTF-01: WRRTF Burn Pits												

● = Hazard index greater than 1 for the future residential exposure scenario.

Note: WRRTF-13 is not included on this table because none of the site's contaminants have available toxicity information. However, the site is retained for evaluation in the FS.

Table 8-4. WAG-1 contaminants of concern.

Exposure Scenario	Radionuclides	Metals	Organic Contaminants	Other
Occupational	Cs-137, Co-60, Eu-154, Ra-226, Sr-90, U-238	Arsenic	None	None
Residential	Cs-137, Ra-226, Th-232, U-234, U-235	Arsenic, lead, manganese, mercury	Benzo(a)anthracene, benzo(b)fluoranthene, PCE, TPHs	PCBs

Table 8-5 summarizes the results of the ERA evaluation by presenting the range of HQs calculated for functional groups potentially present at each site. For the purposes of this assessment, HQs greater than the target values (1 for nonradiological contaminants, and 0.1 for radionuclides) are indicative of potential adverse effects. Due to the uncertainty in the ERA methods, HQs are used only as an indicator of risk and should not be interpreted as a final indication of actual adverse effects to ecological receptors. Of the sites and COPCs assessed, two sites were eliminated as posing no potential risk to ecological receptors [TSF-06 (Area 7) and TSF-22]. The results of the assessment indicate risk at the remaining 7 sites as follows: from exposure to both metals and organics at TSF-03, TSF-07, WRRTF-01, and WRRTF-13 and from exposure to metals at LOFT-02, TSF-08, and WRRTF-03.

A basic assumption of the ERA is that, under a future use scenario, the contamination is present at an abandoned site which will not be institutionally controlled. In actuality, co-located facilities are currently in use and institutional controls will remain in place until they are decommissioned, at which time

Table 8-5. Summary of the sites with potential for posing risk to ecological receptors.

Site	Nonradionuclides		Radionuclides	
	Metal	Non-Metals	Internal	External
LOFT-02	•			
TSF-03	•	•		
TSF-07	•	•		
TSF-08	•			
WRRTF-01	•	•		
WRRTF-03	•			
WRRTF-13		•		

they will be reassessed. Since these sites are at an industrial facility that is currently in use, they most likely do not contain desirable or valuable habitat. The absence of habitat, facility activities, and institutional controls will minimize the exposure of ecological receptors to levels which could be considered acceptable.

Additionally, due to the conservative nature of the ERA, an evaluation of the exposure of ecological receptors to some inorganics at or near background concentrations would also be indicative of risk. Therefore, these sites would not be considered in the remedial alternative screening process. The apparent risk from naturally occurring metals will be evaluated specifically during the INEEL-wide ERA.

The ERA determined that risks to ecological receptors exist at 7 sites at WAG 1. Human health risks exceeding allowable levels exist at 5 of these sites and some level of remediation ranging from institutional controls to active remediation will be required. Any remedial alternative that reduces human health risks would be expected to also reduce ecological risks.

LOFT-02 has low risk to native metals (HQ<20) and due to the nature of the analysis no actual risks are expected at this time. Since commonly risk from metals at background is common.

Overall, it is important to reiterate that it was anticipated that the conservative nature of the ERA at the WAG level would result in many sites and contaminants being indicative or risk to ecological receptors. This is due to the exposure calculations using a very conservative approach and is also compounded by the methods used to determine extent of contaminations and characterize exposure concentrations at each release site. It was assumed that the total area of the site was contaminated at the 95% UCL or maximum contaminant concentration resulting in an unrealistic exposure scenario. More importantly, risks to individuals (vs. population-level effects) were assessed. It is anticipated that additional modeling performed at the INEEL-wide level will reevaluate this risk at a more ecologically relevant level.

8.4 Release Sites to be Evaluated in the Feasibility Study

Risk from past releases at WAG 1 is primarily associated with the radiological contamination at TSF-06, and TSF-07, the mercury contamination at TSF-08, the metal contamination in the WRRTF-01 and TSF-03 burn pits, and the TPH contamination at WRRTF-13, and the contaminated soils, liquids, and sludges associated with TSF-09/18 (the V-Tanks) and TSF-26 (the PM-2A Tanks). Each of these sites are discussed further in the following sections, and the type of contaminated media at each site is summarized in Table 8-6.

The radiological and organic contamination contained in the TSF-05 groundwater plume is also expected to produce unacceptable future risks under a future residential exposure scenario. This contamination, however, is not evaluated further in the OU 1-10 Feasibility Study (FS), because the groundwater plume is currently being remediated under OU 1-07B. Risks from the groundwater contamination are expected to be reduced to acceptable levels once the OU 1-07B remediation is complete.

Future releases that might one day occur, or past releases that have not been discovered, from several currently operational facilities at WAG 1 also have the potential for producing unacceptable risks. These currently operational, or co-located facilities include the Radioactive Parts Security Storage Area (RPSSA) pads, the TAN Hot Shop Facility, and the two Radioactive Liquid Waste Treatment and Transfer/Storage buildings (Buildings TAN-616 and TAN-666). The WAG 1 co-located facilities are discussed as a group in Section 8.3.11.

Table 8-6. Summary of release sites addressed in the OU 1-10 feasibility study.

Radionuclide Contaminated Soils/Sediments	Nonradionuclide Contaminated Soils/Sediments	Tank Contents	Co-located Facilities
TSF-06: Area 11	TSF-03: TSF Burn Pit	V-Tank Contents	RPSSA Pads
TSF-06: Area B	TSF-07: TAN Disposal Pond	PM-2A Tank Contents	Hot Shop Facility
TSF-07: TAN Disposal Pond	TSF-08: Mercury Site		Hot Waste Storage/Treatment Facilities (Bldg 616 and 666)
TSF-09/18: V-Tank Soils	WRRTF-01: WRRTF Burn Pit		
	WRRTF-13: Fuel Oil Leak		

8.4.1 TSF-06 Ditch, Area 11

Area 11 is defined as the entire ditch in TSF-06 soil contamination area. This ditch originates at the north end of TAN-607 and TAN-603, running east to west, and empties into the TSF-29 pond. The 270 m (900 ft) ditch empties storm-water runoff from the TSF-06 area into the pond. This area was partially remediated during the OU 10-06 removal action.

The exposure route and the associated COCs that produce calculated risks greater than 1E-04 include external radiation exposure of current workers by Cs-137 and external radiation exposure of future workers by Cs-137.

Currently Area 11 is administratively controlled. The site is within TSF-06, which is fenced and posted with signs that identify it as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site. No activities can be performed within the site without contacting the INEEL Environmental Restoration directorate. Per U.S. Department of Energy (DOE) Order 5480.11, entry into the site requires radiological control precautions. The purpose of these controls is to keep worker exposures as low as reasonably achievable (ALARA), and to prevent the spread of contaminated soils. ALARA controls reduce occupational risks at the site to acceptable levels.

Since worker risks will be eliminated by institutional controls, and residential risks are not expected to exceed 1E-04, this site will not be evaluated further in the FS.

8.4.2 TSF-06 Area B

TSF-06 Area B is an open triangular shaped soil area bound by the facility fence on the west and facility roads on the east and south. The site measures approximately 205.8 m (675 ft) wide on the southern base and 129.6 m (425 ft) wide on the western boundary. The surface soils within the site are radioactively contaminated because of windblown deposition of radioactive particles from the PM-2A tank area (TSF-26). Based on sampling results, 3 small areas of contamination remain after previous OU 10-06

removal actions at the site. One of these area is located close to the railroad tracks where further excavation would have resulted in damage to the tracks. The other two areas are located within a 15.2 by 152.4 m (50 by 500 ft) long strip adjacent to Snake Avenue in the eastern portion of the site. Contamination within the area is suspected of extending beneath Snake Avenue.

The exposure route and the associated COCs that produce calculated risks greater than $1\text{E-}04$ at Area B include external radiation exposure of current workers by Cs-137, external radiation exposure of future workers by Cs-137, and external radiation exposure of future residents by Cs-137.

Currently Area B is administratively controlled. The site is within TSF-06, which is fenced and posted with signs that identify it as a CERCLA site. No activities can be performed within the site without contacting the INEEL Environmental Restoration directorate. Per DOE Order 5480.11, entry into the site requires radiological control precautions. The purpose of these controls is to keep worker exposures ALARA, and to prevent the spread of contaminated soils. ALARA controls reduce occupational risks at the site to acceptable levels.

8.4.3 TSF-07, TAN Disposal Pond

TSF-07 is a 35 acre unlined disposal pond located southwest of TSF. Only 5 acres in the northeast corner and on the eastern edge of the pond have been contaminated with radionuclides and metals. The highest levels of contamination are found along the drainage ditch from the inlet basin in the northeast corner of TSF-07 to the main pond along the eastern berm. Based on available screening data, the remaining 30 acres have never been used and are not contaminated. The active portion of the pond consists of a 1.5-acre main pond and a 1-acre overflow pond. Previously, the pond received wastewater from sources including sanitary waste discharge, low-level radioactive waste, cold process waste water, and treated sewage effluent originating from TAN service buildings and processes. Borated water was also transported from the LOFT facility and poured into a manhole leading into the pond when LOFT was operational. The sediment thickness in the pond has been estimated to range from 7.5 m (24.5 ft) to 19.5 m (64 ft) with an average thickness of 13.7 m (45 ft). Contamination appears to have vertically migrated into the sediments. Radionuclides and metals appear to have migrated to a depth of 3.4 m (11 ft) bgs while organics appear to be limited to the top 1.4 m (5 ft) of sediment. The horizontal extent of contamination is limited to the main and overflow ponds.

The exposure route and the associated COCs that produce calculated risks greater than $1\text{E-}04$ at TSF-07 Disposal Pond include external radiation exposure of current workers by Cs-137, external radiation exposure of future workers by Cs-137, and external radiation exposure of future residents by Cs-137.

Currently TSF-07 is administratively controlled. The site is fenced and posted with signs that identify it as a CERCLA site. No activities can be performed within the site without contacting the INEEL Environmental Restoration directorate. Per DOE Order 5480.11, entry into the site requires radiological control precautions. The purpose of these controls is to keep worker exposures ALARA, and to prevent the spread of contaminated soils. ALARA controls reduce occupational risks at the site to acceptable levels. The pond is permitted for Land Application of Waste Water with the State of Idaho. TSF-07 is also considered a co-located facility.

8.4.4 TSF-08 Area 13B, TSF HTRE III Mercury Spill Area

TSF-08 Area 13B is a mercury spill release site located near the southwest corner of TAN-607. The area was contaminated by a large mercury spill that occurred in 1958 during rail car movement of the Heat Transfer Reactor Experiment (HTRE)-III engine. Based on sampling results, contamination at TSF-08 Area 13B is assumed to be present at relatively low levels over an area of 164 by 4.6 m (54 by 15 ft). The vertical extent of mercury contamination is conservatively assumed to occur from 0.76 m (2.5 ft) to a depth of 3.0 m (10 ft). Cs-137 and Co-60 were also detected at the site, but are assumed to be limited to 0.76 m (2.5 ft) to 1.5 m (5 ft) because of relative immobility of radionuclides in the environment.

The exposure route and the associated COC that produce a calculated HQ greater than 1 is ingestion of homegrown produce contaminated with mercury.

Currently TSF-08 is administratively controlled. The area is posted with signs that identify it as a CERCLA site. No activities can be performed within the site without contacting the INEEL Environmental Restoration directorate. Also, all intrusive activities at the site must be cleared with the TAN Facility Manager prior to initiation of activities.

8.4.5 WRRTF-01 Burn Pits

The WRRTF-01 Burn Pits are located approximately 823 m (2,700 ft) north of WRRTF, outside the WRRTF perimeter fence. The four burn pits were used for open burning of combustible waste generated at the TAN facilities from 1958 to 1975. Burn Pit I opened after the TSF-03 Burn Pit was filled, and received both combustible solids and liquids from 1958 to 1964. Burn Pits II and III were opened after Burn Pit I was filled and operated from 1964 to 1970. Burn Pit II also may have received only combustible solids, while Burn Pit III received only combustible liquids. Burn Pit IV was opened after Burn Pit II was filled and received mainly combustible solids and some reportedly noncombustible solids (automobile parts, metal goods, etc.). Minor amounts of combustible liquids may have been disposed in Burn Pit IV. These sites have been backfilled and vegetation has been reestablished, but subsidence control has not been maintained at Pits I, II, and IV.

Burn Pit I surficial boundary dimensions are estimated to be 16 by 22 m (52 by 72 ft), with a depth of the burn pit ranging from 1.5 to 2.7 m (5 to 9 ft) bgs. A 0.6 to 0.9 m (2 to 3 ft) clean soil cover exists above the contaminated area. Burn Pit II surficial dimensions are estimated to be 10 by 62.8 m (33 by 206 ft) with a 0.6 to 1.5 m (2 to 5 ft) soil cover above the contamination. The depth of Burn Pit II ranges from 1.7 to 2.7 m (5.5 to 9 ft) bgs. Burn Pit III surficial dimensions are estimated to be 17.7 by 19.8 m (58 by 65 ft), with a depth of 2.4 to 5.8 m (8 to 19 ft). The contamination of Burn Pit III is covered with a clean soil cover ranging from 0.9 to 1.2 m (3 to 4 ft) thick. Burn Pit IV surficial dimensions are 13.1 by 90.8 (43 by 298 ft), with a depth ranging from 2.0 to 4.0 m (6.5 to 13 ft) bgs. The soil cover above the contamination ranges from 0.1 m to 2.7 m (0.5 ft to 9 ft) thick.

No contaminants have been detected at the burn pits that would produce calculated risks in greater than 1E-04 or calculated HQs greater than 1, but lead has been detected at the pits at concentrations that are greater than the Environmental Protection Agency's (EPA's) 400 mg/kg residential cleanup level.

Currently WRRTF-01 is administratively controlled with signs identifying the area as a CERCLA site. No activities can be performed at the pits without contacting the INEEL Environmental Restoration directorate.

8.4.6 TSF-03 Burn Pits

The TSF-03 Burn Pit is located northwest of the Columbia Street gate access, outside the TSF perimeter fence. TSF-03 was used for open burning of combustible waste from 1953 to 1958. The pit received refuse, construction debris, and combustible liquids from the TAN areas. The use of this pit was discontinued when similar disposal operations started at the WRRTF-01 Burn Pits in 1958. The site has been backfilled, subsidence-control maintained, and vegetation has been naturally reestablished. Based on Track 2 investigation sampling results at the site, the dimensions of the pit are estimated to be 7.9 by 19.5 m (26 by 64 ft) with a depth of 2.7 to 3.7 m (9 to 12 ft) bgs. The clean soil cover above the contamination ranges from 1.2 m to 2.2 m (4 ft to 7.25 ft) thick.

No contaminants have been detected at the burn pit that would produce calculated risks in greater than $1E-04$ or calculated hazard quotients greater than 1, but lead has been detected at the pit at concentrations that are greater than EPA's 400 mg/kg residential cleanup level.

Currently TSF-03 is administratively controlled with signs identifying the area as a CERCLA site. No activities can be performed without contacting the INEEL Environmental Restoration directorate.

8.4.7 WRRTF-13, Diesel Fuel Spill

WRRTF-13 was contaminated by diesel fuel leaks associated with tanks TAN-738 and TAN-787, and a transfer line that ran between the tanks. The tanks and the transfer line have been removed from the site, but the site still contains subsurface soils that are contained with high levels of TPH. The maximum TPH concentration detected at the site is 35,700 mg/kg.

None of the contaminants detected at the site have available human health toxicity information, so risks for the site were not calculated in the BRA. However, TPH concentrations at the site exceed the State of Idaho Underground Storage Tank (UST) Program cleanup criteria of 1,000 mg/kg.

Currently, WRRTF-13 is administratively controlled with signs identifying the area as a CERCLA site. No activities can be performed at the site without contacting the INEEL Environmental Restoration directorate.

8.4.8 TSF-09/18, TSF Intermediate-Level (Radioactive) Waste Disposal Site/TSF Contaminated Tank Southeast of Tank V-3

TSF-09 and TSF-18 are situated in the same area and therefore are included together in this document. The two sites are situated in an open area east of building TAN-616 and north of TAN-607. TSF-09 includes three UST (V-1, -2, -3) each with a capacity of 37,850 L (10,000 gal). TSF-18 includes a 1514 L (400 gal) UST (V-9) and a sand filter. The tanks were installed in the early 1950s as part of the system designed to collect for treatment (1) radioactive liquids effluents generated in the hot cells, laboratories, decontamination facilities at TAN and (2) waste from the Initial Engine Test (IET) facility. V-1, 2, and 3 tanks are buried approximately 3 m (10 ft) bgs, and V-9 tank is buried approximately 2.1 m (7 ft) bgs. On the basis of past sampling and current radiation surveys, TSF-09/18 is assumed to be a rectangular area 19.2 m (50 ft) wide by 24.4 m (80 ft) long. The soil and basalt interface at the site is estimated to be between 11.6 m and 17.4 m (38 ft and 57 ft) bgs based on historic well and boring data. The depth of contaminated soil at the site is conservatively estimated to be 14.5 m (47.5 ft), the estimated midpoint to the basalt interface, although no sample results indicate contamination at that depth.

The exposure route and the associated COCs that produce calculated risks greater than 1E-04 at TSF-09/18 include external radiation exposure of current workers by Cs-137, external radiation exposure of future workers by Cs-137, and external radiation exposure of future residents by Cs-137.

The V-tanks buried at TSF-09/18 contain liquids and sludges that are contaminated with radionuclides and organic materials. Risks from these liquids and sludges were not calculated in the OU 1-10 BRA because there is no evidence to indicate that the tanks have leaked. However, the tank contents are being included in the site's FS evaluation because they are so highly contaminated that they would produce unacceptable human health and ecological risks if they ever were to escape into the environment.

Currently TSF-09/18 is administratively controlled. The site is fenced and posted with signs that identify it as a CERCLA site. No activities can be performed within the site without contacting the INEEL Environmental Restoration directorate. Per DOE Order 5480.11, entry into the site requires radiological control precautions. The purpose of these controls is to keep worker exposures ALARA, and to prevent the spread of contaminated soils. ALARA controls reduce occupational risks at the site to acceptable levels. The tank content levels are also monitored weekly to check for leakage and to prevent additional release of contamination to the area.

8.4.9 TSF-26 and the TSF PM-2A Tanks

The PM-2A Tanks (variously referred as the PM-2A Tanks, TAN-709 and TAN-710, or V-13 and V-14) have been used from when they were installed, in approximately 1955, until 1972 to store concentrated low-level radioactive wastes from the TAN-616 evaporator. Potentially contaminated site components at TSF-26 include:

- Two abandoned 89,250 L (50,000 gal) carbon steel USTs
- Sludge and diatomaceous earth in the abandoned USTs
- Cut and capped piping that leads to and from the abandoned USTs
- Concrete cradles and sand on which the USTs rest
- Other subsurface features including two monitoring tubes and a 0.6 by 1.2 by 2.4 m (2 by 4 by 8 ft) wooden box of soil
- Radionuclide contaminated soils.

The area of contamination at the site extends from the surface to the soil/basalt interface, and includes the area where the tanks and concrete cradles are located. The entire site covers an area of approximately 30.5 by 21.3 m (100 by 70 ft). The assumption that the subsurface soils in the area are contaminated to the soil/basalt interface is very conservative. No sampling and analysis results for the site are available below a depth of 5.2 m (17 ft) bgs.

The exposure route and the associated COCs that produce calculated risks greater than 1E-04 at TSF-26 include external radiation exposure of current workers by Cs-137.

The V-tanks buried at TSF-26 contain sludges that are contaminated with radionuclides. Risks from these sludges were not calculated in the OU 1-10 BRA because there is no evidence to indicate that the tanks have leaked. However, the tank contents are being included in the site's FS evaluation because they are so highly contaminated that they would produce unacceptable human health and ecological risks if they ever were to escape into the environment.

Currently TSF-26 is administratively controlled. The site is fenced and posted with signs that identify it as a CERCLA site. No activities can be performed within the site without contacting the INEEL Environmental Restoration directorate. Per DOE Order 5480.11, entry into the site requires radiological control precautions. The purpose of these controls is to keep worker exposures ALARA, and to prevent the spread of contaminated soils. ALARA controls reduce occupational risks at the site to acceptable levels.

8.4.10 TSF-05, Technical Support Facility Injection Well

The TSF-05 injection well is located just south of TAN-655. The well was drilled in 1953 and completed to a depth of 93 m (305 ft) bgs. The well was used to dispose of liquid effluent generated from the Aircraft Nuclear Propulsion (ANP) Program. It was last used as a primary disposal site in September 1972. Discharges to the TSF-05 injection well included treated sanitary sewage, process wastewaters, and low-level radioactive waste streams. Hazardous wastes disposed of in the well include corrosive and ignitable waste from shop operations and potentially corrosive and toxic condensate from the intermediate-level waste disposal system evaporator. Based on usage rates at the facilities that discharged to the well, as much as 97,161 L (25,670 gal) of trichloroethylene may have been disposed to the well. Extensive drilling, aquifer testing, and sampling have shown that the majority of the groundwater contamination produced by the well is limited to the uppermost groundwater system underlying TAN, at a depth of approximately 134 m (440 ft) bgs.

Routine monitoring of the drinking water at TAN prevents current workers from risks associated with the ingestion of groundwater. Currently the contamination of the TSF-05 injection well is being remediated by the OU 1-07B ROD, therefore no further evaluation of this site will be addressed by this FS.

8.4.11 Co-Located Facilities

In view of the fact that past and present activities associated with TAN facilities and structures are proximal, or "co-located", to WAG 1 sites identified in the FFA/CO, an analysis was performed to address their potential for causing current risk to be underestimated. Based on the analysis, only the RPSSA pads, the TAN Hot Shop Facility, and the two Radioactive Liquid Waste Treatment and Transfer/Storage buildings (Buildings 616 and 666) are identified to have the potential to produce unacceptable future risks at WAG 1.

The RPSSA buildings (TAN-647 and TAN 648) are two large buildings west of TAN-607 used for storage of excess materials and waste. Outside of the buildings, asphalt pads that surround the buildings cover and fix radioactive contaminated soil, causing this site to be considered a possible release site if disturbed. Currently, administrative controls exist for this site. All material stored on these pads are monitored and surveyed prior to movement and removal. The area is also with the fenced area of TSF-06 which is posted as a CERCLA site. No intrusive activities are permitted without authorization from the TAN Facility Manager and the INEEL Environmental Restoration directorate.

The TAN Hot Shop Facility, for the purpose of the analysis, is defined as consisting of the TAN-607 Hot Shop, the Hot Shop Pool and support areas, and parts of building TAN-607. Currently, administrative

controls exists to ensure a water level is maintained in the pool to prevent uncovering of stored radioactive waste. Routine monitoring checks for pool leakage, and water lost to evaporation is replenished on a frequent basis. The Hot Shop is structurally designed to prevent release of surface contamination to the environment.

The Radioactive Liquid Waste Treatment building (TAN-616) and the Radioactive Liquid Waste Transfer and Storage building (TAN-666) are part of the system that treated, stored, and transferred radioactive contaminated liquid waste that was generated from facilities such as the TAN Hot Shop, Hot Cell, and the Hot Cell Annex. These facilities are connected by the TSF Intermediate Waste disposal system. The buildings are administrative controlled. The buildings are posted as being radioactively contaminated as appropriate. No entry and work can be performed at these facilities without authorization from the TAN Facility Manager. Established radiological control procedures prevent release of contamination to the environment from these buildings.

8.5 References

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DOE-ID, 1995, *Record of Decision Declaration for the Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23) and Miscellaneous No Action Sites Final Remedial Action*, State of Idaho Department of Health and Welfare, U.S. Environmental Protection Agency, U.S. Department of Energy, August.

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