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Idaho Hazardous Waste Management Act/ Resource Conservation and Recovery Act Closure Plan for Idaho Nuclear Technology and Engineering Center Tanks WM-103, WM-104, WM-105, WM-106, and WM-181

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Portage Environmental, Inc.

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Idaho Operations Office

ABSTRACT

This document presents the plan for the closure of the Idaho Nuclear Technology and Engineering Center Tank Farm Facility Tanks WM-103, WM-104, WM-105, WM-106, and WM-181 in accordance with Idaho Hazardous Waste Management Act/Resource Conservation and Recovery Act interim status closure requirements. Initial closure activities for Tanks WM-182 and WM-183 served as a proof-of-process demonstration of the waste removal, decontamination, and sampling techniques for the closure of the remaining tanks in the Tank Farm Facility. Such an approach was prudent because of the complexity and uniqueness of the Tank Farm Facility closure. This plan uses the same closure strategy as that used for Tanks WM-182 and WM-183. This document describes the closure units, objectives, and compliance strategy as well as the operational history and current status of the tanks. Decontamination, closure activities, and sampling and analysis will be performed with the goal of achieving clean closure of the tanks. Coordination with other regulatory requirements, such as U.S. Department of Energy closure requirements, also is discussed.

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ACRONYMS

ANOVA	analysis of variance
ASME	American Society of Mechanical Engineers
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
CPP	Idaho Chemical Processing Plant
DOE	U.S. Department of Energy
DVB	diversion valve box
FFA/CO	Federal Facility Agreement and Consent Order
FR	Federal Register
HEPA	high-efficiency particulate air
HLW	high-level waste
HWMA	Hazardous Waste Management Act
HWN	hazardous waste number
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
IDHW	Idaho Department of Health and Welfare
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
M	molar
ND	not detected
OU	operable unit
PC	Performance Category
PE	professional engineer
PEWE	process equipment waste evaporator

PRG	Preliminary Remediation Goal
RCRA	Resource Conservation and Recovery Act
RI/FS	remedial investigation/feasibility study
ROVER	Space Nuclear Propulsion Program
TCLP	toxicity characteristic leaching procedure
TFF	Tank Farm Facility
VCO	Voluntary Consent Order
WAG	waste area group

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1. INTRODUCTION

Under the terms of the 1992 Consent Order (and subsequent modifications) between the Idaho Department of Health and Welfare[a] and the U.S. Department of Energy (DOE) (IDHW 1992), DOE must permanently cease use of the tanks in its Tank Farm Facility (TFF) at the Idaho National Engineering and Environmental Laboratory (INEEL) Site or bring the tanks into compliance with secondary containment requirements as set forth by Idaho Administrative Procedures Act (IDAPA) 58.01.05.009 (2003) (40 Code of Federal Regulations [CFR] 265.193, 2002). The Consent Order further specifies that this compliance cannot be achieved through an equivalency demonstration or by obtaining a variance as provided by IDAPA 58.01.05.009 [40 CFR 265.193(d)(4) and (h)]. DOE plans to close the TFF tanks because high-radiation fields would make compliance with secondary containment requirements difficult, and a need for such storage is not evident after 2012.

In June 2000, the Idaho Department of Environmental Quality (IDEQ) and DOE entered into a consent order (IDEQ 2000) regarding the INEEL Site. The Consent Order, or Voluntary Consent Order (VCO), is a long-term agreement between the State of Idaho and DOE to resolve potential compliance issues with provisions of the Hazardous Waste Management Act (HWMA) (State of Idaho 1983)/ Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et seq., 1976) at the INEEL Site.

The VCO Action Plan documents the actions to be taken and the milestones for covered matters under the VCO (IDEQ 2000). The Action Plan is further separated into detailed action plans that address specific compliance issues. Tanks WM-103, WM-104, WM-105, and WM-106 are included in the SITE-TANK-005 Action Plan of the VCO. The SITE-TANK-005 Action Plan addresses tanks/components that require a hazardous waste determination or need to be verified as empty.

Tanks WM-103, WM-104, and WM-105 were characterized as having managed HWMA/RCRA-hazardous waste; Tank WM-106 was characterized as not having managed HWMA/RCRA-hazardous waste (EDF-2614, 2002). In accordance with the SITE-TANK-005 Action Plan, interim actions and a further milestone were identified for the tanks. In September 2002, the tanks were emptied as an interim action under the VCO to the maximum extent possible to reduce the potential for an inadvertent release since the tanks do not have secondary containment meeting the secondary containment requirements of HWMA/RCRA. An enforceable milestone was established under the SITE-TANK-005 Action Plan for the submittal of a HWMA/RCRA closure plan addressing tanks WM-103, WM-104, and WM-105 to the State of Idaho by September 30, 2007.

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a. On July 1, 2000, the Division of Environmental Quality, a division within the Idaho Department of Health and Welfare, was elevated to the Idaho Department of Environmental Quality (IDEQ). This department now oversees the implementation of the Consent Order.

The waste that was originally stored in Tank WM-106 was removed and the contents of the tank flushed before implementation of RCRA. Tank WM-106 has not received any RCRA waste since the implementation of RCRA and has been determined to be nonhazardous per RCRA regulations (EDF-2614, 2002). This determination was agreed to by the State of Idaho (Gregory 2002). Nonhazardous steam condensate from a leaky valve was received into the tank from 1990 until 2001. Though WM-106 does not fall within the closure requirements of RCRA, it will be sampled and grouted in the same fashion as the other three 30,000-gal tanks to meet DOE Order 435.1 requirements.

The TFF includes 11 belowground 300,000-gal and 318,000-gal tanks (hereinafter referred to as 300,000-gal tanks) and four 30,750-gal tanks (hereinafter referred to as 30,000-gal tanks) (see Figure 1). The 300,000-gal tanks are numbered WM-180 through WM-190. The 30,000-gal tanks are numbered WM-103 through WM-106. The second modification to the Consent Order specifies that DOE must cease use of Tanks WM-182, WM-183, WM-184, WM-185,[b] and WM-186 by June 30, 2003, and the remaining tanks by December 31, 2012. Ceasing use of the tanks, as defined in the Consent Order, means that DOE must empty the tanks down to their heels (that is, the liquid level remaining in each tank must be lowered to the greatest extent possible by the use of existing transfer equipment) (IDHW 1998). According to the Idaho HWMA and RCRA, the TFF is an interim status hazardous waste management unit (State of Idaho 1983; 42 USC 6901 et seq., 1976). Because of this, the requirements of 40 CFR 265 (2002) apply to the TFF closure (rather than 40 CFR 264 [2002]).

The TFF tanks will be closed in phases; the closure of Tanks WM-182 and WM-183 is the first phase and is in progress. The closure of Tanks WM-184, WM-185, and WM-186 is the second phase and is also in progress; closure of Tanks WM-103, WM-104, WM-105, WM-106, and WM-181 is the third phase. The TFF will continue to operate until 2012 while various parts of the facility are being closed. The final closure of any component of the TFF will not be complete until all of the tanks have been closed and the remedial investigation/feasibility study (RI/FS) for Operable Unit (OU) 3-14 (Tank Farm Soils) is completed. The final closure plan will address closure and any required post-closure care of the TFF.

Tank closure plans are written with a goal of clean closure; however, a decision to close the unit as a landfill or as clean closure will not be made until final closure.

Two significant releases from TFF piping systems to surrounding soils have occurred. No releases have occurred from the tanks to environmental media. These releases are subject to investigation and remediation as necessary under the INEEL Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC 9601 et seq., 1980) program as described in the Federal Facility Agreement and Consent Order (FFA/CO) (DOE-ID 1991).

This closure plan addresses closure of Tanks WM-103, WM-104, WM-105, WM-106, and WM-181, including the ancillary equipment, pursuant to the Idaho HWMA and RCRA only. Because the tanks also contain radioactive constituents regulated by DOE, the tanks also must comply with DOE closure requirements; a DOE closure plan will be developed separately. The DOE requirements are found in DOE Order 435.1, "Radioactive Waste Management" (2001), and its associated guidance and manual (DOE G 435.1-1, 1999; DOE M 435.1-1, 2001). DOE orders are discussed further in Section 5.1. All closure activities will be closely coordinated to ensure compliance with Idaho HWMA/RCRA and DOE orders.

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b. The Consent Order allows Tank WM-185 to be used as an emergency spare tank.

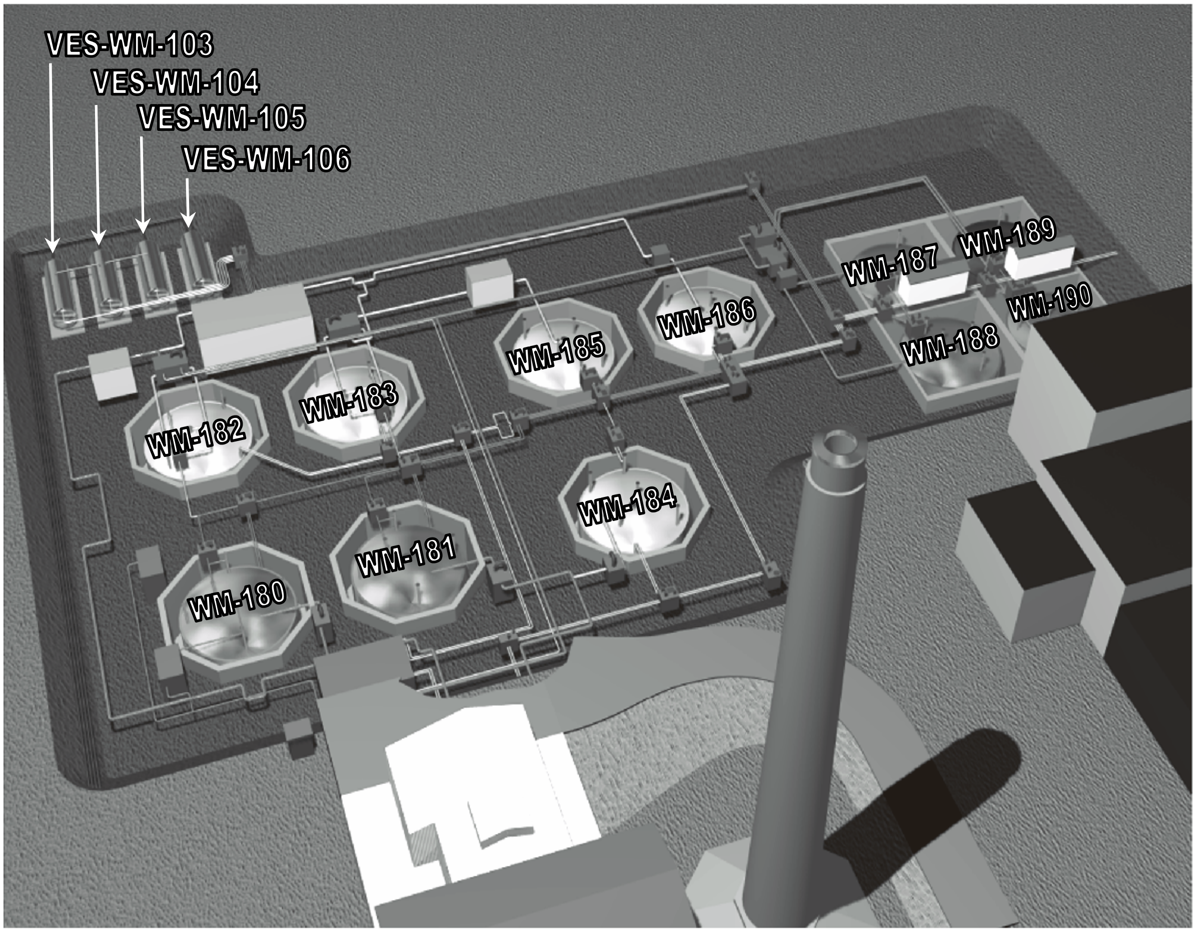

Figure 1. Conceptual overview of the Tank Farm Facility.

This document is a plan for the closure of TFF Tanks WM-103, WM-104, WM-105, and WM-181 as required by IDAPA 58.01.05.009 (2003) and 40 CFR Part 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities" (2002). This plan describes a strategy for clean closure (removal or decontamination of all waste residues) of the tanks to site-specific action levels. In addition, IDAPA 58.01.05.009 [40 CFR 265.197(c)(1), 2002] specifies that both a closure plan for clean closure and a contingent closure plan for closure of the tanks as a landfill must be prepared for tank systems that do not have adequate secondary containment. Because the Notice of Noncompliance Consent Order states that the TFF tanks do not have RCRA-compliant secondary containment (IDHW 1992), the contingent landfill closure plan is presented in *Contingent Landfill Closure and Post-Closure Plan for Idaho Nuclear Technology and Engineering Center Tanks in the Tank Farm Facility* (DOE-ID 2003a).

1.1 Tank Farm Description

The TFF is part of the INEEL Site's Idaho Nuclear Technology and Engineering Center (INTEC), formerly the Idaho Chemical Processing Plant (CPP). The TFF includes 11 belowground 300,000-gal and four belowground 30,000-gal stainless steel tanks. Aboveground structures in the TFF include the TFF Control Houses (Buildings CPP-628 and CPP-619), the Computer Interface Building (CPP-618), valve boxes, and tank and vault sump riser covers. The condenser pits are the TFF belowground structures. The Computer Interface Building is only used to monitor the closure processes and is not otherwise associated with any closure activities. The TFF Control Houses contain piping that is associated with the TFF. Portions of the piping associated with Tanks WM-103, WM-104, WM-105, WM-106, and WM-181 will be decontaminated and capped or otherwise sealed during this closure. The condenser pits and tanks will be closed during closure of WM-103, WM-104, WM-105, WM-106, and WM-181. A perimeter fence encloses the TFF (see Figure 2). Buildings border parts of the east and south sides. Gates are located on the west, north, and south sides of the TFF (PSD-4.2, 1998). A description of the INTEC TFF and a general description of the hydrogeologic conditions are provided in Appendix A.

The TFF was used to store liquid wastes generated by spent nuclear fuel reprocessing operations, ancillary operations, and decontamination wastes from reprocessing facilities at INTEC. Construction of the TFF began in 1951 with Tanks WM-180 and WM-181. Tanks WM-182 through WM-184 were completed in 1955, Tanks WM-185 and WM-186 were completed in 1957, and Tanks WM-187 and WM-188 were completed in 1959. The last tanks, WM-189 and WM-190, were constructed in 1964. Construction of the four 30,000-gal tanks was completed in 1955.

The four 30,000-gal underground storage tanks were connected to the E-Cell in CPP-601 and were designed to hold the first-cycle waste from the Submarine Intermediate Reactor and the Split Table Reactor fuel reprocessing activities (DOE 2002). WM-103 and WM-106 also stored E-Cell decontamination solutions.[c] After fuel reprocessing activities ceased, with the exception of WM-106, the 30,000-gal tanks provided temporary storage for process equipment waste evaporator (PEWE) condensate. This was a one-time occurrence in September/October 1982. The E-Cell feed lines (1” PWA-15, 1” PWA-17, 1” PWA-19, and 1” PWA-21) were cut and capped before Calendar Year 1990 (EDF-2614, 2002). At this time, 12,000 gal of rinse water was added to each tank and then the tanks were emptied to their heels. Between 1990 and September 2001, Tanks WM-103, WM-104, and WM-106 slowly received nonhazardous steam condensate from valve leaks. The steam lines for the steam jets in these tanks were isolated in September 2001 with a blind flange. Data logs of the level indicators show no increase in volumes since that time. The tanks were emptied in September 2002 down to their heels. Prior to emptying the tanks, the transfer piping was evaluated to ensure its integrity. Tanks WM-103, WM-104, WM-105, and WM-106 currently contain estimated volumes of approximately 615, 615, 555, and 558 gal, respectively.[d]

The four 30,000-gal tanks (WM-103, WM-104, WM-105, and WM-106) contain stainless steel cooling coils to minimize tank corrosion. Chromates were likely used in these cooling coils to limit corrosion of the coils themselves.

Risers provide access to each tank. WM-181 has four 12-in. diameter risers. The 30,000-gal tanks have three 6-in. risers and one 3-in. diameter riser. Most risers also have installed equipment, such as radio frequency probes for level measurement, corrosion coupons, or waste transfer equipment (steam jets and airlifts). Two steam jets are located inside WM-181. A single steam jet can transfer waste out of a tank at approximately 50 gpm, and an airlift can transfer waste out of a tank at approximately 35 gpm (INEEL 2000a). Tanks WM-103 and WM-104 are each installed with four steam jets, while Tanks WM-105 and WM-106 contain two steam jets.

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c. Personal Communication from Dave C. Machovec, INEEL, to A. J. Matule, INEEL, “Tank Farm Tank Size,” DCM-08-90, August 29, 1990.

d. Waste Process Computer System, January 8, 2004.

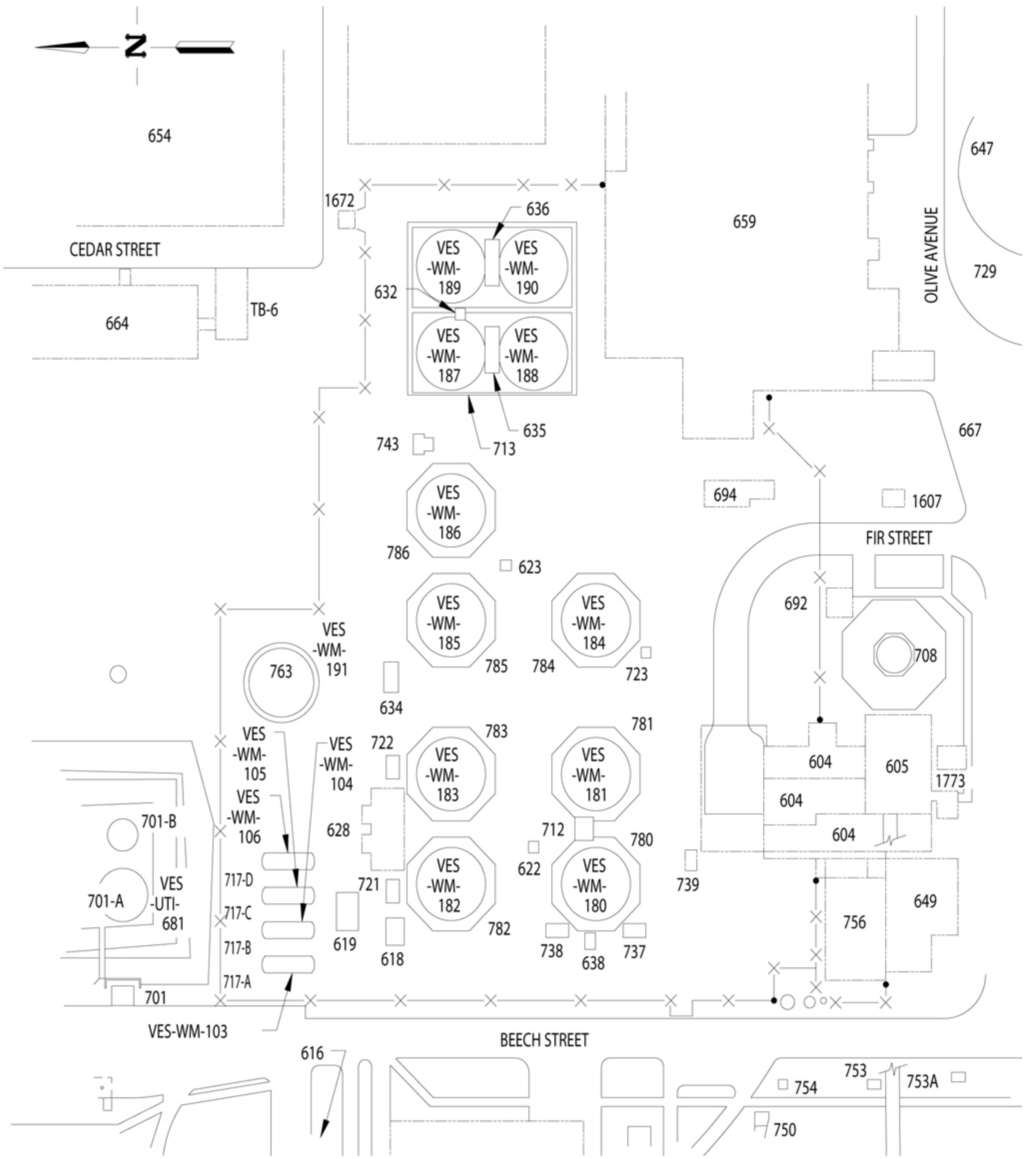

Figure 2. A map of the INTEC Tank Farm Facility. (The numbers shown are building or structure numbers.)

WM-181 is contained in a concrete vault. The bottom of the monolithic octagonal vault is approximately 45 ft belowground and was placed on bedrock with the walls being poured in place. The 6-in.-thick concrete vault roofs are covered with approximately 10 ft of soil to provide radiation shielding.

Tanks WM-103, WM-104, WM-105, and WM-106, and their associated piping systems have no secondary containment, but were buried directly in the ground. Concrete slabs (CPP-717A through CPP-717D, 47.5 by 17 by 1.25 ft thick) were constructed first with a 0.75 by 1-ft-high curb surrounding the slab perimeter to contain any potential leaking waste. A gravel pad was placed inside the curb perimeter. The curb and gravel construction was designed to provide drainage to a sump constructed in each pad.

Liquid waste transfers to, from, and between the tanks are managed through a system of piping, valves, and diversion boxes. The liquid waste is routed through waste transfer valves located in underground, stainless steel-lined concrete boxes, referred to as valve boxes. Liquids resulting from decontamination efforts or leakage of valve boxes and piping encasements (secondary containment for piping) are drained to vaults or diversion boxes (PSD-4.2, 1998).

A centralized vessel off-gas system is designed to maintain negative pressure and balance airflow in each of the 300,000-gal tanks (INEEL 1999). The vessel off-gas piping consists of 10-in.-diameter underground piping from the tanks to condenser pits and then to blowers located in CPP-605; the blowers discharge air to the INTEC main exhaust stack. The components of the vessel off-gas system associated with WM-103, WM-104, WM-105, WM-106, and WM-181 cannot be closed until each of the tanks is grouted because of the safety basis defined in the TFF safety analysis report (SAR-107, 2003), which requires the system to remain operational until final closure of the tanks.

1.2 Waste Description

Wastes stored in the WM-103, WM-104, WM-105, and WM-181 exhibit the hazardous characteristics of corrosivity (hazardous waste number [HWN] D002) (40 CFR 261, Subpart D, 2004). Historical data indicate the TFF waste exhibited the characteristic of toxicity for lead (D008), cadmium (D006), chromium (D007), and mercury (D009) (DOE-ID 2003b). Also associated with the waste are four RCRA-listed HWNs (Gilbert and Venneman 1999):

- F001 (carbon tetrachloride; 1,1,1-trichloroethane; trichloroethylene)
- F002 (carbon tetrachloride; tetrachloroethylene; 1,1,1-trichloroethane; trichloroethylene)
- F005 (benzene, carbon disulfide, pyridine, toluene)
- U134 (hydrofluoric acid).

1.3 Tank Farm Status

The TFF is currently used to (a) store sodium-bearing waste from activities associated with previous reprocessing, ancillary operations, and decontamination activities, and (b) receive newly generated liquid waste from INTEC plant operations and decontamination activities. To meet the Settlement Agreement and subsequent court order with the State of Idaho (State of Idaho, DOE, and Department of the Navy 1995), all non-sodium-bearing, liquid high-level waste (HLW) was converted to calcine by February 1998 (DOE 2002). Table 1 summarizes the volume in the TFF as of December 31, 2003.

Table 1. Tank volumes as of December 31, 2003.

Tank	Volume (gal)	Tank [a]	Volume (gal)[a]
WM-103	615[b]	WM-184	3,100[c]
WM-104	615[b]	WM-185	6,500[c]
WM-105	555[b]	WM-186	6,400[c]
WM-106	558[b]	WM-187	230,900
WM-180	276,000[a]	WM-188	231,200
WM-181	22,800[a]	WM-189	279,800
WM-182	6,400[a,c]	WM-190	500
WM-183	7,100[a,c]	**Total**	**1,073,043**

a. Source: Mascarenas, Carol, INEEL, to Brian R. Monson, IDEQ, January 27, 2004, "Contract No. DE-AC07-99ID13727-Status of Consent Order Activities," CCN 47472.

b. Source: Waste Process Computer System, January 8, 2004.

c. The volumes represent rinse water remaining after the tanks were emptied and cleaned.

1.4 Maximum Inventory of Wastes

The provisions in IDAPA 58.01.05.009 (2003) [40 CFR 265.112(b), 2002] require that a closure plan includes an estimate of the maximum inventory of hazardous wastes ever on-Site over the active life of the facility. This section discusses the reprocessing operations and wastes generated, tank usage, history of operations, and the maximum inventory in each of Tanks WM-103, WM-104, WM-105, WM-106, and WM-181. The maximum inventory of WM-181 was administratively controlled at 285,000 gal. The maximum volume of waste received in WM-103 was 30,200 gal, WM-104 was 30,200 gal, WM-104 was 26,300 gal, and WM-106 was 28,000 gal. Details about waste composition and the historical uses of Tanks WM-103, WM-104, WM-105, WM-106, and WM-181 are located in Section 1.4.4.

1.4.1 Reprocessing Operations and Wastes Generated

Reprocessing operations at INTEC took place from 1952 until they were phased out in 1992. These operations used a three-cycle solvent extraction process to recover enriched uranium from spent nuclear fuel. The spent nuclear fuel was dissolved in hydrofluoric or nitric acid to form a uranyl nitrate solution suitable for solvent extraction. The fuel types included aluminum, zirconium, stainless steel, graphite, and custom. The fuel dissolution process varied depending on the type of fuel to be reprocessed. The enriched uranium was then extracted using a three-step solvent extraction process. The solution remaining after the first extraction cycle was considered HLW and was stored in the TFF. The liquid remaining from the second and third extraction cycles, as well as solutions resulting from decontamination activities, were stored separately in the TFF. This waste is generally referred to as sodium-bearing waste because of its relatively high sodium content (when compared to first-cycle wastes) as a result of decontamination activities. Although reprocessing operations have ceased, the TFF continues to receive waste from INTEC plant operations and decontamination activities.

1.4.2 Fuel Dissolution

Generally, five types of dissolution processes were used during reprocessing because of the varied nature of fuel types: aluminum, zirconium, stainless steel, graphite, and custom. In the aluminum dissolution process, aluminum-based fuels were dissolved in a nitric acid solution in the presence of a mercuric nitrate catalyst. Zirconium-based fuels were dissolved using the fluorinel dissolution process.

This process used hydrofluoric and nitric acids, aluminum nitrate, and the soluble nuclear poisons of cadmium and boron. Stainless steel fuels were dissolved in nitric acid while a direct electrical current passed through the fuel in the electrolytic dissolution process. The Space Nuclear Propulsion Program (ROVER) dissolution process was used to dissolve graphite fuels. The ROVER fuels consisted of either an uncoated or pyrolytic carbon-coated graphite matrix that contained uranium dispersed throughout as uranium dicarbide fuel particles. These fuels were first burned in oxygen to remove the graphite. The uranium materials were then dissolved in hydrofluoric and nitric acids. Custom processing in specially designed, pilot plant-type equipment with material-specific dissolvents was used for nuclear material that was incompatible with established dissolution processes. For example, those fuels with nontraditional cladding materials, material impurities, excessively high radiation levels, or small amounts of recoverable fissile material required custom fuel processing methods (WINCO 1986).

1.4.3 Fuel Extraction

In the first-cycle extraction process, uranium was extracted from the uranyl nitrate solution into a solution of tributyl phosphate in dodecane. The aqueous raffinate stream from this extraction, which included the fission products, was sent to the TFF waste tanks unless the uranium concentration remained high enough for further extraction (WINCO 1986).

The second- and third-cycle extraction processes used the hexone extraction process to purify the uranium product from the first-cycle extraction. The process used the solvent methyl isobutyl ketone (hexone) to separate the uranium from residual fission products and transuranic elements such as neptunium and plutonium. The waste material containing the transuranics and fission products was generally evaporated to reduce its volume before being sent to the TFF for calcination (WINCO 1986).

1.4.4 Waste Types and Composition

The types of radioactive liquid waste generated at INTEC can be separated into eight basic categories, as listed below. Table 2 summarizes the typical chemical compositions of these waste types.

- Aluminum waste from the dissolution of aluminum fuels in nitric acid
- Zirconium fluoride waste from the dissolution of zirconium fuels in hydrofluoric acid
- Coprocessing waste that results when dissolver product from aluminum fuel dissolution is used as the complexing agent for zirconium dissolver product before introduction to the extraction system
- Fluorinel waste from the dissolution of zirconium fuels in hydrofluoric acid and nitric acid
- Stainless steel waste from the electrolytic dissolution of stainless steel fuels in nitric acid
- ROVER waste from the dissolution of graphite-type fuels in hydrofluoric acid and nitric acid
- Custom-processing wastes that are the second- and third-cycle raffinates resulting from processing custom fuels
- Sodium-bearing waste that results from PEWE bottoms and sodium-bearing decontamination solutions.

Table 2. Typical chemical composition of various waste types.[a]

Waste Type	Aluminum (*M*)	Zirconium (*M*)	Fluorinel (*M*)	Stainless Steel (*M*)	Sodium (*M*)
Acid (H+)	1	1.5	1.9	2.5	1.2
Nitrate	4.6	2.6	2.3	3	4.6
Fluoride	0	2.5	2.7	0	0.05
Aluminum	1.3	0.6	0.3	0.65	0.6
Zirconium	0	0.4	0.4	0.01	0.0
Boron	0.01	0.15	0.2	0	0.01
Cadmium	0	0	0.13	0	0.0
Sulfate	0.01	0	0.08	0.06	0.06
Sodium	0.04	0.04	0.03	0.01	1.6
Potassium	0.003	0.007	0.001	0	0.2
Iron	0.01	0.01	0.01	0.06	0.02
Chromium	0	0	0	0.01	0.003
Calcium	0.06	0.02	0.02	0.005	0.04

a. Source: *Idaho Nuclear Technology and Engineering Center Safety Analysis Report* (INEEL 1999).

All first-cycle raffinates were acidic, with a hydrogen-ion concentration between 1 and 3 molar (*M*). Radionuclides in the first-cycle raffinates produced a typical radioactivity level in the stored wastes from 5 to 40 Ci/gal (PSD-4.2, 1998). The raffinates from zirconium dissolution and coprocessed zirconium and aluminum dissolution were fluoride-bearing wastes. The first-cycle raffinates from the dissolution of aluminum and stainless steel fuel were non-fluoride bearing (WINCO 1986).

The chemical and radiochemical composition of the wastes and the amount of heat generated vary with the type of fuel being processed, decay time before processing, and fuel burnup. Chemicals in concentrations up to 4 *M* and large quantities of fission products are present. The major chemicals present are aluminum and nitrate in the non-fluoride waste, and aluminum, zirconium, fluoride, and nitrate in the fluoride waste (PSD-4.2, 1998).

The composition of second- and third-cycle raffinates is essentially the same for all fuel types processed. The fission product activity in these wastes is low enough that little heat is generated, making cooling unnecessary. The principal nuclides present are ^{137}Cs, ^{90}Sr, and ^{238}Pu. The predominant chemicals in the second- and third-cycle combined waste are aluminum and nitrate. The waste is acidic, with a hydrogen ion concentration between 0.1 and 1.6 *M* (PSD-4.2, 1998).

During the late 1950s through December 1965, the four 30,000-gal tanks (WM-103, WM-104, WM-105, and WM-106) received and stored first-cycle extraction waste until it was transferred to other TFF tanks while waiting calcination into a solid waste form. From August 1966 through September 1970, WM-103 and WM-106 also received liquid waste generated during decontamination of the E-Cell. Both the first-cycle extraction waste and E-Cell decontamination solution originated from CPP-601 (EDF-2614, 2002).

The four 30,000-gal tanks were emptied by June 1974. By January 1975, all four tanks had also been flushed with approximately 5,000 gal of water (EDF-2614, 2002). Because both the first-cycle extraction waste and the E-Cell decontamination solutions were received and removed and the contents were flushed from these tanks before the implementation of RCRA regulations (42 USC 6901 et seq., 1976), neither waste stream was subject to RCRA regulations. Consequently, all piping from CPP-601 that was used to convey these waste streams to the 30,000-gal tanks is also not subject to RCRA regulations (EDF-2614, 2002). IDEQ has concurred with this determination (Gregory 2002).

Figures 3 through 7 show the historical volumes in Tanks WM-103, WM-104, WM-105, WM-106, and WM-181, respectively. The sources and quantities of tanks solids are estimated from process history, recent tank-heel sampling, and in-tank video inspections. Since Tanks WM-103, WM-104, WM-105, and WM-106 were considered not in use between 1974 and 2002 (except for the short period in 1983 when they held injection well waste) volume data were not regularly reported. The actual amount of solids varies in each tank observed. However, based on tank filling history and a comparison of inspected tanks, solid quantities and radiological compositions have been conservatively estimated and should be bounded by this estimate (EDF-1920, 2003). Waste quantities used to calculate inventories in the 300,000-gal tanks were based upon 1 in. of sludge (25% solids and 75% liquid) and about 1/4 in. or 400 gal of free liquid remaining in each individual tank. The quantity of solids sludge from all tanks is estimated to be about 45,000 gal, containing about 86,000 kg of solids (Poloski 2000).

1.4.5 1990 Sampling of 30,000-gal Tanks

In 1990, the 30,000-gal tank heels were sampled and analyzed for radionuclides and RCRA metals to satisfy environmental compliance concerns. The testing results indicated contaminant concentrations of metals that were below RCRA limits for hazardous waste and a small amount of radioactivity.[e] At this time, the tanks were each flushed with 12,000 gal of water and emptied to their heels. Table 3 lists analytical results for pH, metals, and gamma scan results from 1990 water samples taken from the 30,000-gal tanks.

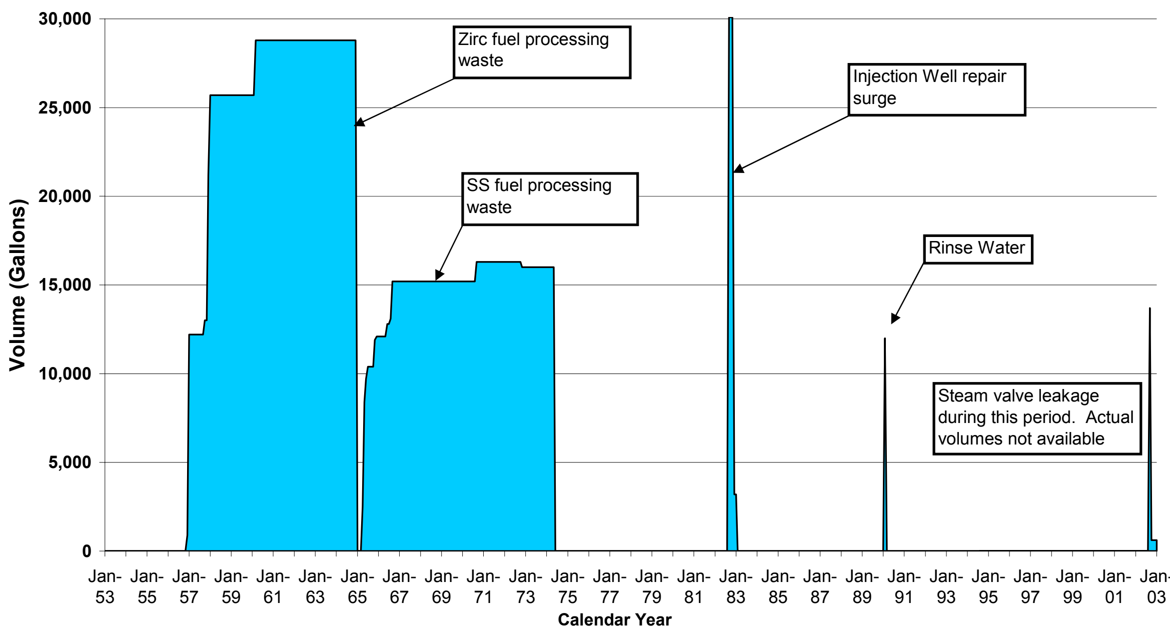

Figure 3. Volumes of waste contained in WM-103.

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e. Personal Communication from A. J. Matule, WINCO, to D. C. Machovec, WINCO, “Solid Sampling of WM-103–106,” AJM-20-90, September 26, 1990.

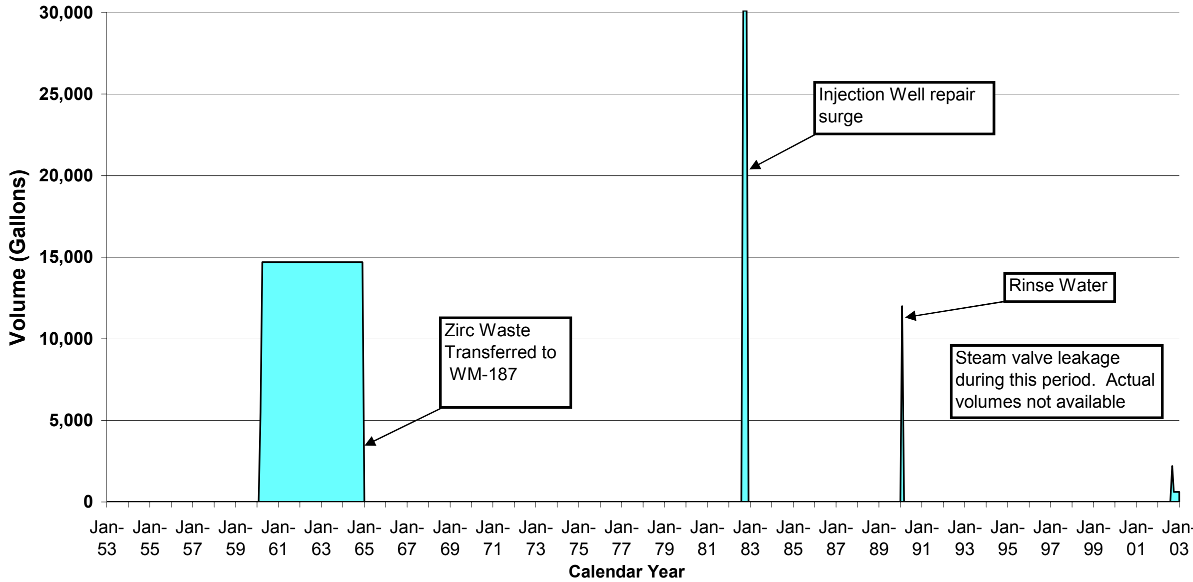


Figure 4. Volumes of waste contained in WM-104.

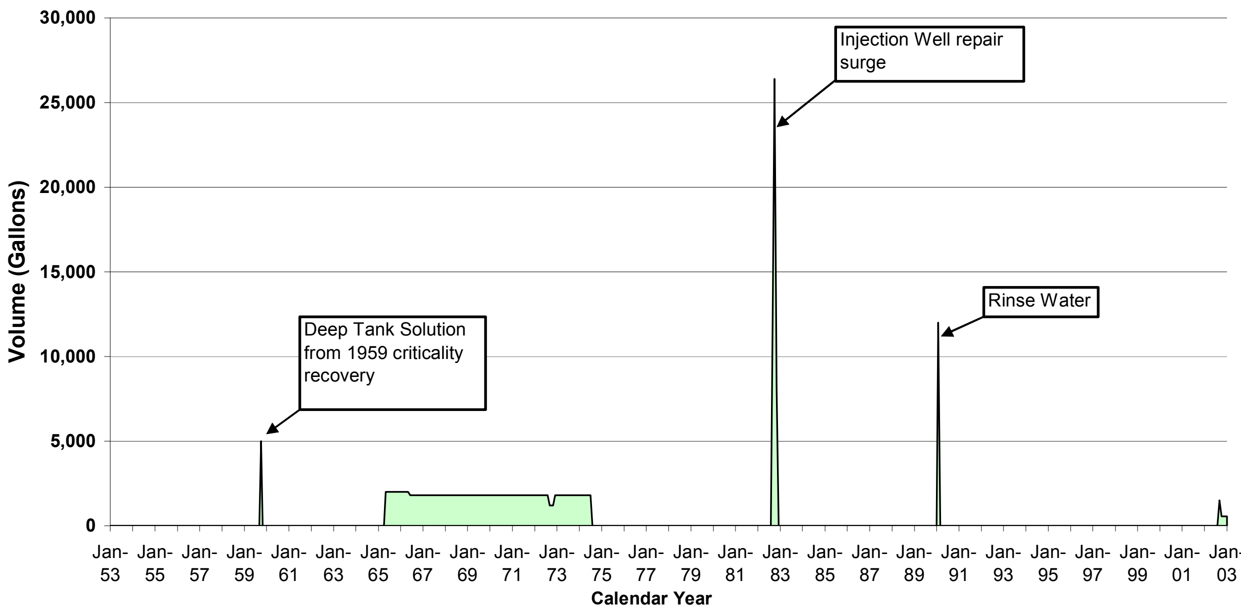


Figure 5. Volumes of waste contained in WM-105.

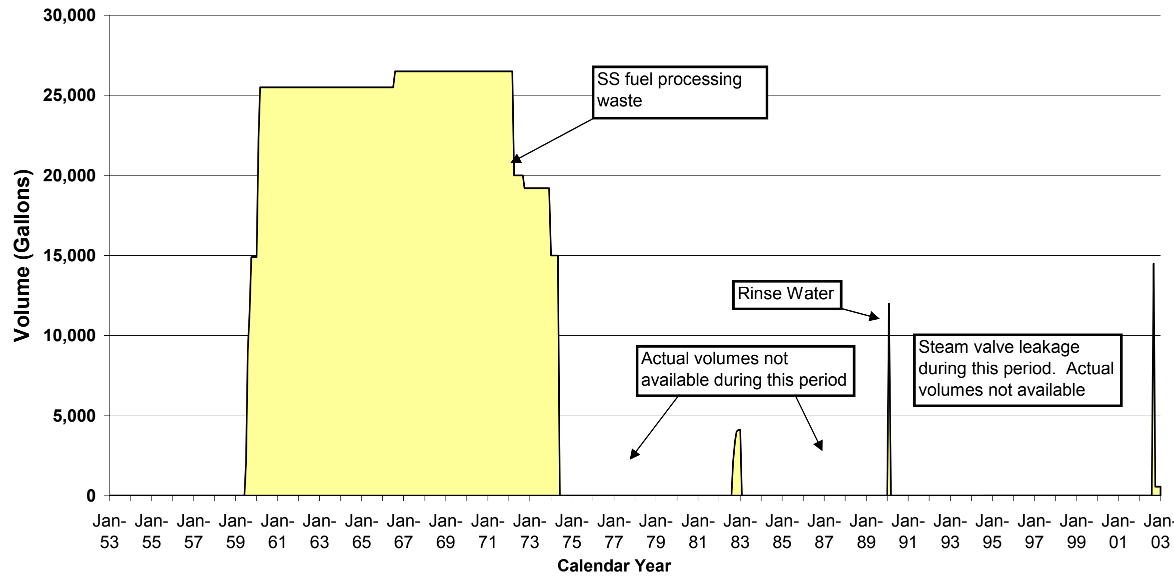


Figure 6. Volumes of waste contained in WM-106.

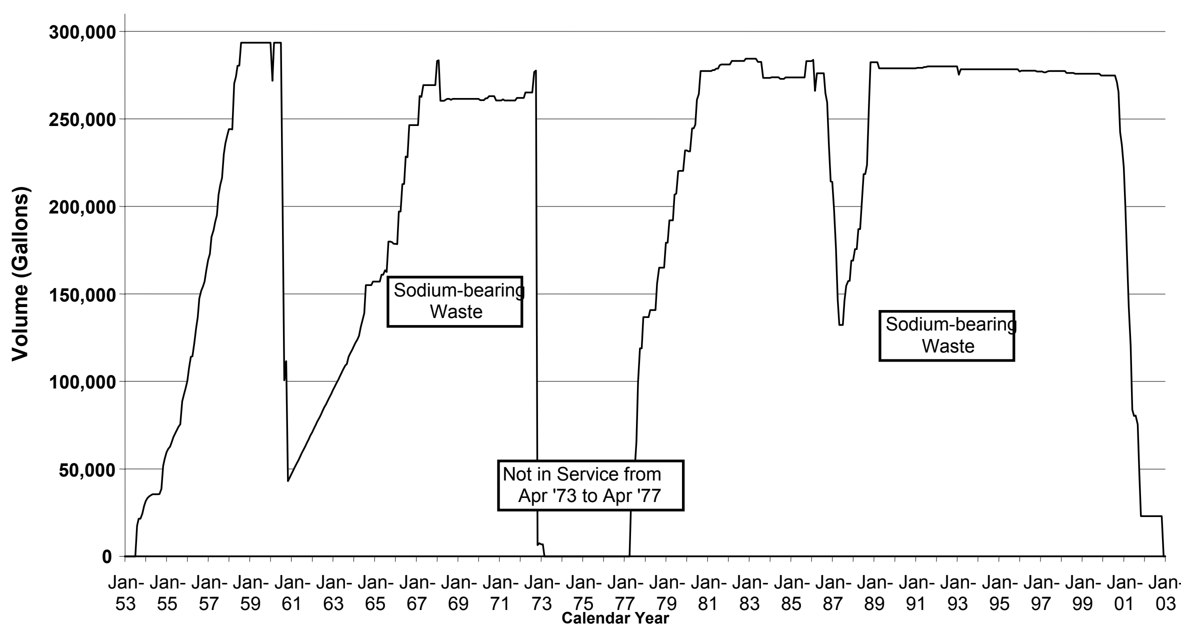


Figure 7. Volumes of waste contained in WM-181.

Table 3. Results of 1990 sampling of the 30,000-gal tanks.

Analyte	Tank WM-103 Concentration (mg/L)	Tank WM-104 Concentration (mg/L)	Tank WM-105 Concentration (mg/L)	Tank WM-106 Concentration (mg/L)
pH (unitless)	3.4	3.4	6.0	7.9
Arsenic	ND[a]	ND	ND	ND
Barium	0.46	0.11	0.11	0.27
Cadmium	ND	ND	ND	ND
Chromium	0.24	0.84	0.04	0.05
Lead	ND	ND	ND	ND
Mercury	0.005	0.004	0.007	0.003
Selenium	ND	ND	ND	ND
Silver	ND	0.005	0.006	ND
Cs-137	1.08E+04 pCi/mL		5.19E+03 pCi/mL	

a. ND = not detected.

2. CLOSURE OBJECTIVES

This closure plan presents the strategy for clean closure of Tanks WM-103, WM-104, WM-105, and WM-181 to meet the HWMA/RCRA requirements for cleanup of hazardous constituents only. As previously noted, WM-106 has been determined to be nonhazardous per RCRA regulations (EDF-2614, 2002). The closure of Tanks WM-103, WM-104, WM-105, WM-106, and WM-181 must also meet the requirements for cleanup of radionuclides to meet the intent of DOE orders for HLW systems, specifically DOE Order 435.1 (2001). The DOE Tier 1 Closure Plan provided the necessary information for removal of radionuclides (DOE-ID 2003c). These objectives are discussed in greater detail below.

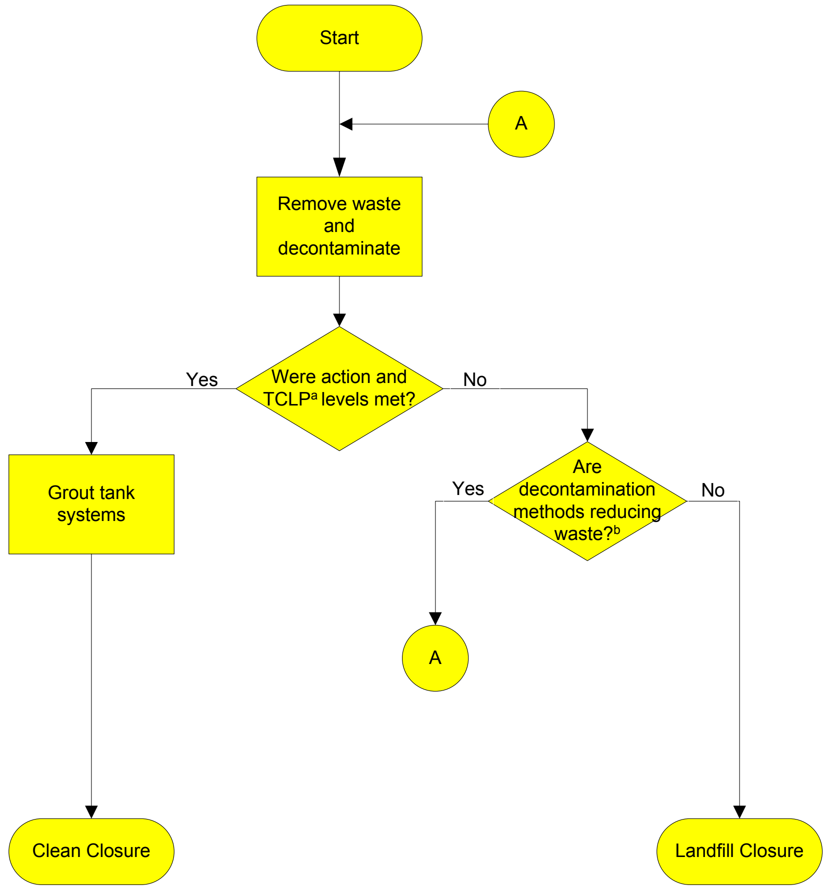
2.1 HWMA/RCRA Clean Closure Objectives

Closure of Tanks WM-103, WM-104, WM-105, and WM-181 will be performed to meet requirements of both HWMA and RCRA, specifically IDAPA 58.01.05.009 (2003) and 40 CFR 265 (2002). Administrative Rule IDAPA 58.01.05.009 incorporates 40 CFR 265 and all subparts (excluding Subpart R, "Underground Injection," 40 CFR 265.149, "State Assumption of Responsibility," and 265.150, "Use of State-Required Mechanisms") by reference. The objective will be to achieve clean closure of the tanks and tank system components in accordance with 40 CFR 265.110, 40 CFR 265.111, 40 CFR 265.112, and 40 CFR 265.197.

Clean closure is the removal or decontamination of all hazardous wastes from the tank system. Except for hazardous waste and liners, the regulations do not require complete removal of all contamination for clean closure. Rather, some limited quantity of hazardous constituents may remain in the tanks after clean closure if the concentrations of hazardous constituents are below site-specific action levels and are not RCRA hazardous. Tanks WM-103, WM-104, WM-105, and WM-181 are intended to be clean closed. Section 3 describes compliance with the performance standards in 40 CFR 265.111 and 40 CFR 265.197 (2002). Figure 8 shows the steps for HWMA/RCRA closure for Tanks WM-103, WM-104, WM-105, and WM-181.

Although RCRA closure of a tank system requires investigation and removal or decontamination of associated contaminated soils, the contaminated soils investigation and remediation associated with the tank closures will be performed in accordance with CERCLA requirements as described by the FFA/CO (DOE-ID 1991). The entire TFF will be investigated as part of OU 3-14. The investigation is described in the OU 3-14 Tank Farm Soil and Groundwater Phase I RI/FS Workplan (DOE-ID 2003d). The objectives of the remedial investigation as described in the work plan are to collect data for preparation of a baseline risk assessment and feasibility study. The TFF area contaminated soils and the Snake River Plain Aquifer (the area of the aquifer that lies within the boundaries of the INTEC fence) are the focus of the remedial investigation. A final remedial action for the TFF area soils will be the result of the RI/FS and subsequent Record of Decision.

To define the clean closure standard, site-specific action levels are developed. The methodology for establishing action levels is found in Appendix B. Clean closure is achieved by performing all of the following steps, as shown in Figure 8:



a. TCLP = toxicity characteristic leaching procedure.
b. This decision will be made after all tanks and ancillary equipment have been closed.

Figure 8. Steps for HWMA/RCRA closure for INTEC Tank Farm Facility tanks, ancillary equipment, and soils.

- Remove or decontaminate hazardous waste. All constituents will be decontaminated to less than the toxicity characteristic threshold concentrations (40 CFR 261.24, Table 1, 2004) and the characteristic of corrosivity (40 CFR 261.22, 2004) and will not exhibit the toxicity characteristic. The pH of the residual will be greater than 2 and less than 12.5, as described in 40 CFR 261.22. Threshold concentrations are not used as action levels but rather to demonstrate that waste does not remain in the tanks.

- Meet the site-specific action levels described in Section 3.2.

- Meet the performance standards of 40 CFR 265.111 (2002). Grouting of the pipes, tanks, vaults, and sumps will meet these performance standards to eliminate need for further maintenance and preclude post-closure escape of any residual contaminants during the post-closure period.

2.2 DOE Closure Objectives

The second objective is to meet the closure criteria of DOE Order 435.1, “Radioactive Waste Management” (2001), for Tanks WM-103, WM-104, WM-105, WM-106, and WM-181. The DOE closure process is designed to close systems in a manner that is safe and protective of human health and the environment. A Tier 1 DOE closure plan has been prepared to address potential exposure pathways associated with the radiological nature of the tank contents (DOE-ID 2003c). Before proceeding with the irreversible actions connected to closure, DOE Headquarters will issue an Authorization to Proceed. DOE closure requirements are discussed further in Section 5.1. The methods used for removing radionuclides from the tank systems are the same as those used to meet the HWMA/RCRA requirements described in Section 4.3.

3. CLOSURE REQUIREMENTS AND PERFORMANCE STANDARDS

Closure requirements are specified by HWMA/RCRA as implemented by IDAPA 58.01.05.009 (2003) and 40 CFR 265 (2002). The matrix in the following section summarizes closure requirements and the strategy for complying with the requirements.

3.1 Compliance Matrix

Table 4 provides a summary of HWMA/RCRA closure requirements for this closure plan, organized by regulatory citation. The table includes a description of how the compliance strategy will meet the requirement and a reference to the section in this closure plan where the strategy is described in more detail. A contingent landfill closure plan has been prepared (DOE-ID 2003a) and will be submitted with this closure plan.

3.2 Action Levels

The action levels established for WM-103, WM-104, WM-105, and WM-181 will be compared to data gathered after final decontamination of the tanks and ancillary equipment. Final sample results collected from residuals of the tanks and WM-181 vault will be used as the concentration term. The concentration term will be established as the 95% upper confidence limit of the mean of samples collected after decontamination. Residuals from the tanks, and WM-181 vault will be sampled. During the course of closure, the data from these samples will be analyzed by statistical methods to determine if the data from the various locations are from the same population. The statistics tests used will be the Student's *t*-test and/or analysis of variance (ANOVA). Potential exposure associated with radionuclide residuals are addressed in the DOE closure plans. The action levels for RCRA/HWMA closure are presented in Table 5. The constituents listed in Table 5 are those that could reasonably be expected to exist in the tanks and associated systems. However, hazardous constituents other than those shown in Table 5 that are detected during confirmation sampling (post-decontamination sampling) will be assigned action levels using methodology consistent with that shown in Appendix B.

The action levels were developed by the methodology described in Appendix B. The concentrations of action levels are shown in mg/L. Based on WM-182 and WM-183 decontamination, it is anticipated that the solid removal will be very effective. Solid sampling and analysis will be in accordance with the sampling and analysis plan (ICP 2004).

3.3 Soils Strategy

Soil contamination is present at the TFF because of historical leaks from tank transfer piping. The tanks have never leaked contents to the environment. The RCRA closure of a tank system requires investigation and removal or decontamination of associated contaminated soils. These soils are not part of this plan, however, but are included as part of a CERCLA project. The contaminated soils will be investigated as part of the OU 3-14 RI/FS. The investigation is described in the *Operable Unit 3-14 Tank Farm Soil and Groundwater Phase I Remedial Investigation/Feasibility Study Work Plan* (DOE-ID 2003d).

The alternate strategy for removal and decontamination of the tank systems, which includes soils investigation and decontamination, is proposed because the FFA/CO has established that investigations of Solid Waste Management Unit releases are the responsibility of the CERCLA program (DOE-ID 1991). The investigation and remediation plans must be final before closure of the entire TFF. The Idaho Completion Project will plan the soil investigation, with input from the INEEL HLW and HWMA/RCRA regulatory programs.

Table 4. HWMA/RCRA closure plan compliance matrix.

40 CFR, Part 265, Subpart G (2002) Interim Status Treatment, Storage, and Disposal Facility Standards—Closure and Post-Closure		
Regulatory Requirement Summary	Compliance Strategy	Section in Plan
§ 265.110 Applicability		
(a) Sections 265.111 through 265.115 (closure) apply to the owners and operators of all hazardous waste management facilities.	These sections are not applicable to this closure.	See citation in matrix below
(b) Sections 265.116 through 265.120 (post-closure care) apply to owners and operators of hazardous waste disposal facilities, waste piles and surface impoundments as required by Sections 265.228 or 265.258, tank systems that are required under Section 265.197 to meet requirements for landfills, and containment buildings as required by Section 265.1102.	Not applicable for clean closure. These sections are addressed in the contingent landfill closure plan (DOE-ID 2003a).	See citation in matrix below
(c) Section 265.121 applies to owners and operators of units that are subject to the requirements of 40 CFR 270.1(c)(7) (2002).	Not applicable for clean closure. This section is addressed in the contingent landfill closure plan (DOE-ID 2003a).	See citation in matrix below
(d) The Regional Administrator may replace all or part of the requirements of this subpart with alternative requirements for closure.	Not applicable.	Not applicable
§ 265.111 Closure Performance Standard		
(a) Facility must be closed in a manner that minimizes the need for further maintenance.	The closure strategy results in waste removal and decontamination of Tanks WM-103, WM-104, WM-105, and WM-181 to action levels to meet clean closure standards, minimizing the need for further maintenance.	2.1, 3.2, Table 5, 4.4
(b) Facility must be closed in a manner that controls, minimizes, or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere.	Waste will be removed and the system decontaminated. Only residue that does not exceed the clean closure criteria (action levels) and is not RCRA hazardous will remain in the tank system. Grouting of the tank system will minimize post-closure escape of hazardous constituents, leachate, or hazardous waste decomposition products to the groundwater or to the atmosphere.	4.4, 4.5
(c) Facility must be closed in a manner that complies with the closure requirements of this subpart, including § 265.197 (tank systems).	The closure performance standard will be met as described above. The requirements of § 265.197 will be met as described later in this matrix.	4.4

Table 4. (continued).

40 CFR, Part 265, Subpart G (2002) Interim Status Treatment, Storage, and Disposal Facility Standards—Closure and Post-Closure		
Regulatory Requirement Summary	Compliance Strategy	Section in Plan
§ 265.112 Closure Plan; Amendment of Plan		
(a) Written plan. This section specifies the conditions under which a written closure plan must be maintained.	This closure plan meets this requirement. DOE was required under the Second Modification to Consent Order (IDHW 1998) to submit a closure plan to IDEQ under the requirements of IDAPA 16(now 58).01.05.009 (40 CFR Part 265, Subpart G) for at least one of the tanks (WM-182 through WM-186) on or before December 31, 2000. The plan will be maintained until closure certification of the facility is provided to the IDEQ Director.	9
(b) Content of plan. This section specifies requirements for the content of the closure plan: (1) A description of how each hazardous waste management unit at the facility will be closed in accordance with § 265.111.	 (1) This closure plan identifies the steps necessary to close Tanks WM-103, WM-104, WM-105, and WM-181, which is a partial closure of the TFF and INTEC. The general strategy is ▪ Isolate Tanks WM-103, WM-104, WM-105, and WM-181 from the rest of the TFF by decontaminating pipe encasements and vault sump, and isolating process lines and the vessel off-gas system ▪ Remove steam jet assemblies and radio frequency probes that will not be used during decontamination and corrosion coupons ▪ For WM-181, wash tank walls and agitate tank heels using high-pressure water from a wash ball or similar high-pressure nozzle or nozzle arrangement, simultaneously removing liquids and solids using remaining or newly installed steam jets ▪ For WM-103, WM-104, and WM-105, rinse water will be added through process lines and removed along with solids using remaining steam jets ▪ Decontaminate the vault floor of WM-181	 4.4, 4.5

Table 4. (continued).

40 CFR, Part 265, Subpart G (2002) Interim Status Treatment, Storage, and Disposal Facility Standards—Closure and Post-Closure		
Regulatory Requirement Summary	Compliance Strategy	Section in Plan
	▪ Sample and analyze tank residuals after decontamination to determine whether decontamination is complete or whether additional decontamination is required and is economical and practical ▪ Sample and analyze tank and vault residuals for comparison to action levels ▪ Isolate non-process waste lines ▪ Perform final heel management and grout tank and components.	
(2) A description of how final closure of the facility will be conducted in accordance with § 265.111, including the maximum extent of the operation, which will be unclosed during the active life of the facility.	Final closure of INTEC will be performed in accordance with approved interim status or HWMA/RCRA closure plans. A discussion of the maximum extent of operation unclosed is provided in Section 7.	7
(3) An estimate of the maximum inventory of hazardous wastes ever on-Site over the active life of the facility and a detailed description of the methods to be used during partial and final closure, including waste removal methods.	The maximum inventory of hazardous waste ever in the tank system is discussed in this closure plan. Liquids and solids, including the tank heels, removed from Tanks WM-103, WM-104, WM-105, and WM-181 will be transferred to another TFF tank for storage before treatment.	1.4
(4) A detailed description of the steps needed to remove or decontaminate all hazardous waste residues and contaminated containment system components, equipment, structures, and soils.	Ancillary equipment will be triple-flushed with decontamination solution. The tanks will be flushed iteratively with decontamination solution, and residuals will be compared to action levels to ensure that clean closure criteria will be met. Soil contamination is present at the TFF because of leaks from tank transfer piping. The contaminated soils will be investigated as part of the OU 3-14 RI/FS (DOE-ID 2003d). The FFA/CO has established that investigations of Solid Waste Management Unit releases are the responsibility of the CERCLA program (DOE-ID 1991).	3.3, 4.4, 5.2
(5) A detailed description of other activities necessary during the partial and final closure period to ensure that all partial closures and final closure satisfy the closure performance standards.	No other closure activities have been identified at this time.	Not applicable

Table 4. (continued).

40 CFR, Part 265, Subpart G (2002) Interim Status Treatment, Storage, and Disposal Facility Standards—Closure and Post-Closure		
Regulatory Requirement Summary	Compliance Strategy	Section in Plan
(6) A schedule for closure of each hazardous waste management unit and for final closure of the facility.	Closure schedule (activities may run concurrently; the specific sequence in which tanks are closed may change, depending on logistics): Activity — Time for Completion Approval of partial closure plan and DOE Authorization to Proceed — Day 0 Remove waste and decontaminate WM-181 — 328 days Evaluate results, grout and close WM-181 — 339 days Remove waste and decontaminate WM-103, WM-104, and WM-105 — 328 days Evaluate results, grout and close WM-103, WM-104, WM-105, and WM-106 — 339 days Submit professional 60-day engineer certification (time is in addition to the 1,334 days for closure) — 60 days **NOTE:** *Waste removal, decontamination, and evaluation will commence on or before approval of the partial closure plan. Grouting will commence after the DOE Authorization to Proceed is received.*	8
(7) An estimate of the expected year of final closure for facilities without approved closure plans.	Use of the remaining tanks at the TFF must cease by December 31, 2012. The INTEC facility is estimated to be closed no sooner than 2035.	4.3
(8) This section applies to facilities where the Regional Administrator has applied alternative requirements at a regulated unit.	Not applicable.	Not applicable

Table 4. (continued).

40 CFR, Part 265, Subpart G (2002) Interim Status Treatment, Storage, and Disposal Facility Standards—Closure and Post-Closure		
Regulatory Requirement Summary	Compliance Strategy	Section in Plan
(c) Amendment of plan. This section specifies requirements for amending the closure plan and includes conditions under which the closure plan must be amended, timeframes for providing the amendment, procedures for submitting the amended plan, and procedures for responding to a request for amendment by the regulatory agency.	The closure plan will be amended as necessary in accordance with the requirements of this section.	9
(d) Notification of partial closure and final closure. This section specifies when the closure plan must be submitted, the date when closure is expected to begin, and how opportunities for public comment on the closure plan will be provided.	Not applicable.	8
(e) Removal of wastes and decontamination or dismantling of equipment. Nothing in this section shall preclude the owner or operator from removing hazardous wastes and decontaminating or dismantling equipment in accordance with the approved partial or final closure plan at any time before or after notification of partial or final closure.	Closure activities will be performed in accordance with this closure plan.	Not applicable

Table 4. (continued).

40 CFR, Part 265, Subpart G (2002) Interim Status Treatment, Storage, and Disposal Facility Standards—Closure and Post-Closure		
Regulatory Requirement Summary	Compliance Strategy	Section in Plan
§ 265.113 Closure; Time Allowed for Closure		
(a) This section specifies when closure activities must begin. The Regional Administrator may approve a longer period under certain conditions, including demonstration that closure activities will, of necessity, take longer than 90 days to complete, and demonstration that all steps have been taken and will continue to be taken to prevent threats to human health and the environment, including compliance with all applicable interim status requirements.	DOE is requesting an extension to the 90-day waste removal period. An extension is required because waste removal activities will, of necessity, require longer than 90 days. Complicating factors include ▪ The highly radioactive wastes stored in the tanks will require that much of the sampling and waste removal work be performed using remote handling technology, which will require significant lead times to set up and conduct ▪ The approach for partial closure of TFF tanks in sequence will require the continued availability of storage space in other tanks and treatment capacity in INTEC waste treatment systems for the wastes generated; operational problems in these systems could result in delays in the closure process ▪ Closure to action levels will involve an iterative process of decontamination, sampling, analysis, data review, and possibly, additional decontamination. Tanks WM-103, WM-104, WM-105, and WM-181 are to be closed because high-radiation fields would make compliance with secondary containment requirements difficult and a need for such storage is not evident after 2012; however, all steps have been taken and will continue to be taken to prevent threats to human health and the environment.	8

Table 4. (continued).

40 CFR, Part 265, Subpart G (2002) Interim Status Treatment, Storage, and Disposal Facility Standards—Closure and Post-Closure		
Regulatory Requirement Summary	Compliance Strategy	Section in Plan
(b) This section specifies when partial and final closure activities must be completed. The Regional Administrator may approve a longer period under certain conditions, including demonstration that partial or final closure activities will, of necessity, take longer than 180 days to complete, and demonstration that all steps have been taken and will continue to be taken to prevent threats to human health and the environment from the unclosed but not operating hazardous waste management unit or facility, including compliance with all applicable interim status requirements.	DOE is requesting an extension to the 180-day closure period to 1,334 days. An extension is required because closure activities will, of necessity, require longer than 180 days. Complicating factors include ▪ The highly radioactive wastes stored in the tanks will require that much of the sampling and waste removal work be performed using remote handling technology, which will require significant lead times to set up and conduct ▪ The approach for partial closure of TFF tanks in sequence will require the continued availability of storage space in other tanks and treatment capacity in INTEC waste treatment systems for the wastes generated; operational problems in these systems could result in delays in the closure process ▪ Closure to action levels will involve an iterative process of decontamination, sampling, analysis, data review, and possibly, additional decontamination. Tanks WM-103, WM-104, WM-105, and WM-181 are to be closed because high-radiation fields would make compliance with secondary containment requirements difficult and a need for such storage is not evident after 2012; however, all steps have been taken and will continue to be taken to prevent threats to human health and the environment.	8
(c) This section specifies when demonstration of conditions requiring an extension must be made.	The demonstrations necessary for extension of the closure periods requested are being submitted in this closure plan.	8
(d) This section specifies when the Regional Administrator may allow an owner or operator to receive nonhazardous wastes in a landfill, land treatment, or surface impoundment.	Not applicable.	Not applicable
(e) This section imposes additional requirements on the owner or operator of a hazardous waste surface impoundment that is not in compliance with the liner and leachate collection system requirements.	Not applicable.	Not applicable

Table 4. (continued).

40 CFR, Part 265, Subpart G (2002) Interim Status Treatment, Storage, and Disposal Facility Standards—Closure and Post-Closure		
Regulatory Requirement Summary	Compliance Strategy	Section in Plan
§ 265.114 Disposal or Decontamination of Equipment, Structures, and Soils		
During the partial and final closure periods, all contaminated equipment, structures, and soil must be properly disposed of or decontaminated unless specified otherwise in 40 CFR 265.197, 265.228, 265.258, 265.280, or 265.310. By removing all hazardous wastes or hazardous constituents during partial and final closure, the owner or operator may become a generator of hazardous waste and must handle that hazardous waste in accordance with all applicable requirements of 40 CFR 262.	All contaminated equipment, structures, and soils generated during closure of the tank system will be characterized, stored, and treated in accordance with applicable IDAPA 58.01.05.006 (2003) (40 CFR 262, 2002) requirements.	6
§ 265.115 Certification of Closure		
This section specifies the schedule and procedure for submitting the closure certification. The certification must be signed by the owner or operator and by an independent registered professional engineer.	Within 60 days of completing closure of the tank system, a certification that the tank system was closed in accordance with the specified activities and closure performance standards of the approved closure plan will be submitted to the IDEQ Director.	10
§ 265.197 Closure and Post-closure Care		
(a) At closure of a tank system, the owner or operator must remove or decontaminate all waste residues, contaminated containment system components (liners, etc.), contaminated soils, and structures and equipment contaminated with waste, and manage them as hazardous waste. In addition, the requirements of 40 CFR Part 265 Subpart G (Closure and Post-Closure) and Subpart H (Financial Requirements) must be met.	The closure strategy developed for the tank system will meet this regulatory requirement. Subpart G requirements are discussed in detail earlier in this matrix. Pursuant to Section 265.140(c), the federal government, as owner of Tanks WM-103, WM-104, WM-105, and WM-181, is exempt from Subpart H requirements. Soil contamination is present at the TFF because of leaks from ancillary equipment, but contents never leaked to the environment from the tanks. The contaminated soils will be investigated as part of the OU 3-14 RI/FS (DOE-ID 2003d). The FFA/CO has established that investigations of Solid Waste Management Unit releases are the responsibility of the CERCLA program (DOE-ID 1991).	4, 11

Table 4. (continued).

40 CFR, Part 265, Subpart G (2002) Interim Status Treatment, Storage, and Disposal Facility Standards—Closure and Post-Closure		
Regulatory Requirement Summary	Compliance Strategy	Section in Plan
(b) This section specifies when closure and post-closure care must be performed in accordance with requirements for landfills. If the owner or operator demonstrates that not all contaminated soils can be practicably removed or decontaminated as required in Section 265.197(a) above, then the owner or operator must close the tank system and perform post-closure care in accordance with the closure and post-closure care requirements that apply to landfills (40 CFR 265.310).	This section applies to the closure of WM-103, WM-104, WM-105, and WM-181. This requirement is addressed in the contingent landfill closure plan (DOE-ID 2003a).	Contingent Landfill Closure Plan
(c) This section imposes additional requirements for a tank system that does not have secondary containment that meets the requirements of 40 CFR 265.193 (“Containment and Detection of Releases”), including the preparation of a contingent plan for complying with 40 CFR 265.197(b) above.	This section applies to the closure of WM-103, WM-104, WM-105, and WM-181. This requirement is addressed in the contingent landfill closure plan (DOE-ID 2003a).	Contingent Landfill Closure Plan

Table 5. Clean closure action levels for Tanks WM-103, WM-104, WM-105, and WM-181.

Constituent of Concern (Inorganic)	Action Level (mg/L)	Constituent of Concern (Organic)	Action Level (mg/L)
Aluminum	3.1E+03	Acetone	9.9E+02
Antimony	6.3E+01	Benzene	3.7E–01
Arsenic	4.2E–01	Bromomethane	1.2E+02
Barium	8.3E+01	Carbon disulfide	9.9E+02
Beryllium	5.3E+00	Carbon tetrachloride	2.9E–01
Cadmium	6.1E–01	Chloroethane	9.6E+00
Chromium	9.0E–01	Chloromethane	4.5E+00
Cobalt	7.7E+02	Cyclohexane	7.5E+03
Copper	6.0E+02	Cyclohexanone	7.0E+03
Fluoride	7.7E+02	2,4-dinitrophenol	1.4E+02
Iron	1.7E+03	Ethyl acetate	3.0E+03
Lead	4.0E+00	Ethyl benzene	9.9E+02
Manganese	4.9E+02	2-hexanone	6.3E+02
Mercury	1.6E–01	Methanol	2.2E+03
Nickel	4.4E+02	Methylene chloride	6.0E+00
Selenium	8.9E–02	Methyl ethyl ketone	1.6E+02
Silver	3.0E+00	Methyl isobutyl ketone	8.9E+02
Thallium	2.6E+01	N-nitrosodimethylamine	7.3E–02
Vanadium	2.6E+02	Phenol	2.4E+03
Zinc	1.7E+03	Polychlorinated biphenyl (Aroclor 1260)	3.7E–01
		Pyridine	4.3E+00
		Tetrachloroethylene	4.5E–01
		Toluene	1.4E+03
		1,1,1-trichloroethane	4.4E+02
		Trichloroethylene	4.1E–01
		Xylene	4.4E+03

4. CLOSURE STRATEGY

The decontamination activities in Tank WM-182 and WM-183 have been completed, including the sample collection and analysis of the verification samples required in the sampling and analysis plan (ICP 2004). Because that cleaning appears to be successful, the same closure strategy will be used for WM-181. However, Tanks WM-103, WM-104, and WM-105 differ in their configuration and history, prompting a modified approach to closure. Since the valve boxes associated with these tanks will be required for future waste transfers from other non-closed tanks, no valve boxes will be closed during this phase. The closure strategies are discussed in the following sections. During closure, an independently registered Idaho professional engineer (PE) will review activities, data, closure methodologies, and waste management practices.

4.1 WM-181 Closure Strategy

The Tank WM-181 closure strategy is designed to meet the clean closure requirements described in Section 3. The waste will be removed from the tank, piping, and WM-181 vault. The tank, vault, and piping will then be decontaminated. Following decontamination, sampling and analysis will be performed, followed by data validation, data evaluation, and comparison to action levels. Grouting of the tank, tank vault, and piping can occur when the data indicate that hazardous waste is not left in place and concentrations of hazardous constituents are below action levels and are not RCRA hazardous.

For WM-181, waste removal under closure will begin when additional water is added (flushing water) and then removed in conjunction with full-scale decontamination. New steam jets are planned to be installed and lowered to within approximately 1 in. of the tank floor to enhance waste removal. This level is much lower than that of the original steam jets. The remaining residual will be decontaminated by spraying high-pressure water to clean the tank walls, agitating the heel, and pumping the resulting liquid and solid (to await further treatment) to another tank. Grout placement, which is not a part of the residual removal process, is being done to stabilize residuals and remove any remaining free liquids. The grouting will minimize the escape of any remaining residual contamination as described above.

As required by 40 CFR 265.111, "Closure Performance Standard" (2002), decontamination of the tanks and ancillary equipment will be followed by grouting of the tank, vault, and piping to minimize post-closure escape of hazardous constituents by stabilizing the residuals in a solid matrix. Furthermore, process piping will be capped (thus sealing any residues in the pipes) to minimize escape of hazardous constituents. The WM-181 vault will be decontaminated during decontamination of the pipe encasement, and samples from the vault sump will be collected. The simplified closure sequence to be used for WM-181 is shown in Figure 9. Following decontamination, sampling and analysis will be performed, followed by data validation, data evaluation, and comparison to action levels. Grouting of the tank, vault, and piping can occur when the data indicate that hazardous waste is not left in place and concentrations of hazardous constituents are below action levels and are not RCRA hazardous.

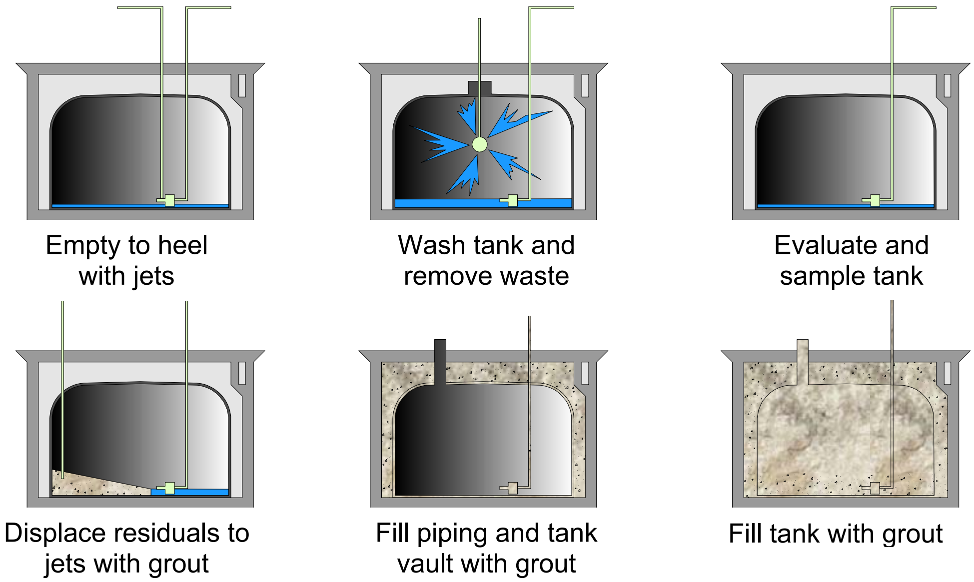


Figure 9. Simplified closure sequence for Tank WM-181.

4.2 WM-103, WM-104, and WM-105 Closure Strategy

Closure activities associated with Tanks WM-103, WM-104, and WM-105 will be performed in a different manner than those for the large tanks. The modified closure strategy is designed to meet the clean closure requirements described in Section 3. The waste was previously removed from the tanks and piping (EDF-2614, 2002). The tanks have previously been flushed with water in 1980 and again in 1990, and sampling indicates that the contents do not contain RCRA-hazardous constituents above regulatory levels (EDF-2614, 2002). The simplified closure sequence to be used for Tanks WM-103, WM-104, and WM-105 is discussed in Section 4.4.1.2.

For Tanks WM-103, WM-104, and WM-105, the closure will begin with the rinsing of process piping, which will drain into the tanks. Existing steam jets will be used to remove this rinse water to another tank to await further treatment. Following removal of the rinse water, sampling and analysis will be performed, followed by data validation, data evaluation, and comparison to action levels. Closure activities for these tanks may run concurrently. Once DOE gives approval, grouting of the tanks and piping can occur when the data indicate that hazardous waste is not left in place and concentrations of hazardous constituents are below action levels and are not RCRA hazardous. Grout placement, which is not a part of the residual removal process, is being done to stabilize residuals and remove any remaining free liquids. The grouting will minimize the escape of any remaining residual contamination as described above.

4.3 Facility Closure

IDAPA 58.01.05.009 (2003) and 40 CFR 265.112(b)(7) (2002) state that an estimate of the expected year of final closure for facilities without approved closure plans should be provided. The HWMA/RCRA facility is the TFF, which must cease use of the remaining tanks by December 31, 2012.

The INTEC facility has a future use projection "…that in 50 years the INTEC would be approaching the end of useful life if no new mission is identified" (DOE-ID 1995). It is estimated that the INTEC facilities will be closed no sooner than 2035. The following paragraphs provide a description of the closure unit boundaries.

Closure of Tanks WM-103, WM-104, WM-105, and WM-181 constitutes a partial closure of the TFF. Tanks WM-182, WM-183, WM-184, WM-185, and WM-186 have been decontaminated and will no longer be in operation. The remainder of the TFF tanks will continue to operate during the closure actions. Because Tanks WM-103, WM-104, WM-105, and WM-181 may share associated piping and ancillary equipment with other tanks in the TFF, the definition of the tanks and related components or, more specifically, the tank systems being closed, is necessary.

For the purposes of this closure, the WM-181 tank system is comprised of Tank WM-181 (VES-WM-181), Vault CPP-781, and ancillary equipment such as piping, and pumps. Piping will be cut and capped upstream of the CPP-781 vault; valves will be isolated. Other ancillary equipment termination points included in the WM-181 tank system closure are pipes to Valve Boxes C7 (DVB-WM-PW-C7), C9 (DVB-WM-PW-C9), and C11 (DVB-WM-PW-C11). Figure 11 shows the WM-181 tank system to be decontaminated for closure. Figure 12 shows ancillary equipment that will be taken out of service during closure but will not require decontamination because it has not contacted hazardous waste. Examples of ancillary equipment that did not contact hazardous waste include equipment installed but never used, the supplied air or steam supply to the tank system, and the equipment used for instrumentation connections.

For the purposes of this closure, the WM-103 tank system is comprised of Tank WM-103 (VES-WM-103) and ancillary equipment such as piping. Figure 13 shows the WM-103 tank system to be decontaminated for closure. Figure 14 shows ancillary equipment that will be taken out of service during closure but will not require decontamination because it has not contacted hazardous waste. Examples of ancillary equipment that did not contact hazardous waste include equipment installed but never used, the supplied air or steam supply to the tank system, and the equipment used for instrumentation connections. Pad CPP-717A will be included as part of the CERCLA program.

For the purposes of this closure, the WM-104 tank system is comprised of Tank WM-104 (VES-WM-104) and ancillary equipment such as piping. Figure 13 shows the WM-104 tank system to be decontaminated for closure. Figure 14 shows ancillary equipment that will be taken out of service during closure but will not require decontamination because it has not contacted hazardous waste. Pad CPP-717B will be included as part of the CERCLA program.

For the purposes of this closure, the WM-105 tank system is comprised of Tank WM-105 (VES-WM-105) and ancillary equipment such as piping. Figure 13 shows the WM-105 tank system to be decontaminated for closure. Figure 14 shows ancillary equipment that will be taken out of service during closure but will not require decontamination because it has not contacted hazardous waste. Pad CPP-717C will be included as part of the CERCLA program.

The piping between the tanks and the diversion valve box (DVB-WM-PW-B8) is included in the WM-103, WM-104, and WM-105 system closure. The cooling supply and return lines to each of the four 30,000-gal tanks will be decontaminated and grouted.

The TFF Control House (CPP-619) contains the steam, water, air, cooling, and instrumentation lines for Tanks WM-103, WM-104, WM-105, and WM-181. This building also contains similar equipment for other TFF tanks, which will not be closed as a part of this closure plan. Piping and valves associated with Tanks WM-103, WM-104, WM-105, and WM-181 will be capped in the TFF Control

House. Table C-1 contains a piping list for closure of the tanks. Table C-2 shows the non-RCRA piping and conduit associated with the tanks.

The following line and equipment designators are used in Figures 11 through 14:

- CA and DCN—decontamination line
- CRA—heat exchanger return lines
- DVB—diversion valve box
- HSA—high-pressure steam
- INST—instrumentation
- LT, HAN, and PT—instrument line
- MAH—manway
- PLA, PUA, PWA, PPA—process waste lines
- PWM—decontamination or transfer line
- SR—sump riser
- SWA—transfer line
- TR—tank riser
- TWN—sensor lines
- VGA—vessel off-gas
- WRA—cooling solution return line
- WSA—cooling solution supply line.

Figure 11. Tank WM-181 systems to be decontaminated during closure.

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Figure 12. Tank WM-181 systems that do not require decontamination.

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Figure 13. Tanks WM-103, WM-104, WM-105, and WM-106 systems to be decontaminated during closure.

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Figure 14. Tanks WM-103, WM-104, WM-105, and WM-106 systems that do not require decontamination.

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4.4 Closure

4.4.1 General Closure Activities

4.4.1.1 WM-181

For Tank WM-181, the high-pressure water from a wash ball (or similar high-pressure nozzle or nozzle arrangement to wash the tank walls and agitate the tank heels) will be used to rinse the tank, remove waste, and decontaminate the tank. The decontamination fluid for WM-181 closure will be demineralized water. Water will be obtained from water sources near the TFF. Liquids and solids will be removed using the steam jets simultaneously with wall decontamination and heel agitation. The liquids and solids removed from Tank WM-181 will be stored in an existing TFF tank to await treatment. A video camera and lighting will be installed to monitor and record removal and decontamination efforts. For activities where hazardous constituent contamination may exist, confinement (e.g., temporary enclosures and high-efficiency particulate air [HEPA] filter structures) will be placed to minimize contamination spread.

The ancillary equipment to the tanks consists of piping, trenches, and condenser pits. Table 6 provides an overview of the ancillary equipment and Appendix C lists the piping associated with the closure of WM-181. Not all of the ancillary equipment in the following description will be closed (decontaminated and grouted) during this phase of closure. Some equipment has never contacted hazardous waste, while other equipment is not scheduled to be closed during this phase of closure. For example, the process line 4” PWM-28107Y shown in Figure 12 has never been used. In addition, some ancillary equipment needed for operating tanks cannot be closed.

Tank WM-181 uses numerous piping routes to transfer waste solutions, vessel off-gas, and high-pressure steam to and from each tank. Valves housed in diversion valve boxes (DVBs) or condenser pits are used to manipulate all piping transfer routes to and from the TFF tanks. Since the DVBs associated with WM-181 will be required for future waste transfer, no DVBs will be closed as part of this phase. Only the piping shown in green in Figure 11 and listed in Appendix C are to be closed during this phase of the TFF closure.

4.4.1.2 WM-103, WM-104, WM-105, and WM-106

As noted previously, Tank WM-106 has been determined to be nonhazardous per RCRA regulations (EDF-2614, 2002). Though WM-106 does not fall under the closure requirements of RCRA, it will be closed in the same fashion as the other 30,000-gal tanks to meet DOE Order 435.1 (2001) requirements.

For Tanks WM-103, WM-104, WM-105, and WM-106, process lines will be rinsed and allowed to drain into their associated tank. The rinse water will then be removed from the tanks along with any solids. Demineralized water for the decontamination will be obtained from water sources near the TFF. Liquids and solids will be removed using the existing steam jets. The liquids and solids removed from Tanks WM-103, WM-104, WM-105, and WM-106 will be stored in an existing TFF tank to await treatment.

The ancillary equipment to the tanks consists of piping. Table 6 provides an overview of the ancillary equipment and Appendix C lists the piping associated with the closure of WM-103, WM-104, WM-105, and WM-106. As noted above, not all of the ancillary equipment in the following description will be closed (decontaminated and grouted) during this phase of closure.

Table 6. Ancillary equipment associated with WM-103, WM-104, WM-105, WM-106, and WM-181.

Equipment Designator	Description	Comments
SR-17	South vault sump riser for WM-181	
TR-18	Tank riser for WM-181	
TR-17	Tank riser for WM-181	
TR-48	Tank riser for WM-181	
TR-49	Tank riser for WM-181	
TR-50	Tank riser for WM-181	
TR-103-1	Tank riser for WM-103	
TR-103-2	Tank riser for WM-103	
TR-103-3	Tank riser for WM-103	
TR-103-4	Tank riser for WM-103	
TR-104-1	Tank riser for WM-104	
TR-104-2	Tank riser for WM-104	
TR-104-3	Tank riser for WM-104	
TR-104-4	Tank riser for WM-104	
TR-105-1	Tank riser for WM-105	
TR-105-2	Tank riser for WM-105	
TR-105-3	Tank riser for WM-105	
TR-106-1	Tank riser for WM-106 (non-RCRA)	
TR-106-2	Tank riser for WM-106 (non-RCRA)	
TR-106-3	Tank riser for WM-106 (non-RCRA)	

TFF tank systems WM-103, WM-104, WM-105, and WM-106 use numerous piping routes to transfer waste solutions, vessel off-gas, and high-pressure steam to and from each tank. Valves housed in DVBs or condenser pits are used to manipulate all piping transfer routes to and from the TFF tanks. No valve boxes directly associated with Tanks WM-103, WM-104, WM-105, or WM-106 will be closed during this phase.

4.4.2 Tank Isolation and Decontamination of Ancillary Systems

The following discussion outlines the sequence of activities required to isolate Tanks WM-103, WM-104, WM-105, WM-106, and WM-181 from the rest of the TFF to allow closure activities to take place. The remainder of this section also describes the decontamination of ancillary systems associated with Tanks WM-103, WM-104, WM-105, WM-106, and WM-181. The decontamination of ancillary systems is generally sequenced based on a logical progression that ensures decontaminated areas will not be recontaminated by subsequent operations. Generally, the sequence of activities is

- Process waste line decontamination and isolation

- Pipe encasement decontamination (WM-181 only; 30,000-gal tank piping is direct buried and is not contained within encasements)
- Vault decontamination (WM-181 only)
- Removal of system components and installation of cleaning equipment
- Non-process waste line isolation
- Tank decontamination.

The activities have been segregated into stages based on construction logic. The decontamination sequence may change based on field conditions. These decontamination sequence changes would not jeopardize the closure performance standards, would be considered minor deviations, and would be noted by the independent PE during certification. Therefore, sequence changes would not require an amendment to the closure plan.

Cleaning operations will begin with process lines and end with the steam jet lines required to remove decontamination fluids displaced during the initial grout placements in the waste tanks. This logical progression through lines and equipment ensures that cleaned areas will not be recontaminated as cleaning operations continue within the closure boundaries. Figures 11 through 14 and Appendix C show the closure equipment and piping.

4.4.2.1 Process Waste Line Decontamination and Isolation. Process waste lines to be closed will be isolated in valve boxes. Split-flow valve cartridges may be installed to replace various valves on process waste lines. This will enable grout to be placed in the lines leading to the tanks while allowing decontamination and subsequent grouting of lines leading to other portions of the TFF. Split-flow valve cartridges were designed to isolate pipelines without having to manually and/or remotely cut and remove pipe sections in contaminated areas. Use of these cartridges limits worker exposure and minimizes pipe cutting and welding in hazardous environments. A split-flow valve cartridge replaces the ball valve components with a separating plate.

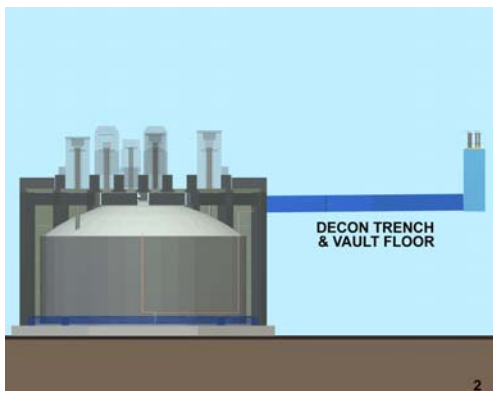
Process waste lines will be triple-rinsed with decontamination fluid, which will be drained to the related tanks. Triple-flushing with water has been successfully used to decontaminate piping in the TFF to remove residual waste from piping, reduce radiation fields, and limit the potential for airborne radioactivity.

Historically, successful decontamination of the lines has been performed during maintenance and repair work on the systems (i.e., valve replacement or repair requiring welding of lines). During the work, lines were decontaminated. The process used water flushing through the lines from a decontamination connection inside the TFF Control House. When the lines were cut in preparation for welding and visually inspected, the lines were observed to be free of liquids and loose solids (Demmer 1996).

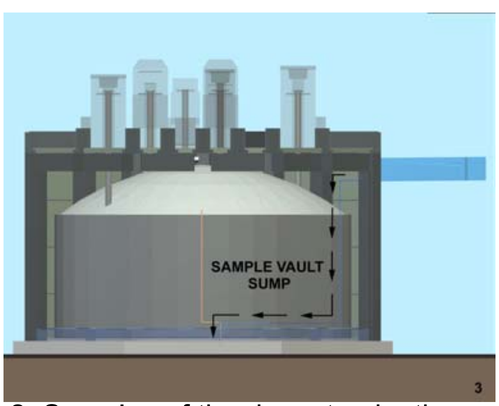
Because the piping systems of Tanks WM-103, WM-104, WM-105, and WM-181 are very similar to Tanks WM-182 and WM-183, the analysis of samples from the piping in Tanks WM-182 and WM-183 is judged to be representative of piping lines in Tanks WM-103, WM-104, WM-105, and WM-181. Therefore, no additional pipe samples will be collected.

4.4.2.2 Pipe Encasement Decontamination. The stainless steel-lined concrete encasements that provide secondary containment for WM-181 process waste lines will be decontaminated. The piping associated with WM-103, WM-104, and WM-105 are direct buried and not contained within pipe encasements. Each encasement will be triple-rinsed with decontamination solution. The decontamination fluids will be allowed to drain through existing 1-in. drain lines to the vault sump of Tank WM-181 to decontaminate the drain lines. Once decontamination is complete, samples will be taken from the vault sump to ensure action levels are met. Decontamination fluids that accumulated in the sump of the vault will be transferred using existing steam jets to the PEWE after samples have been collected.

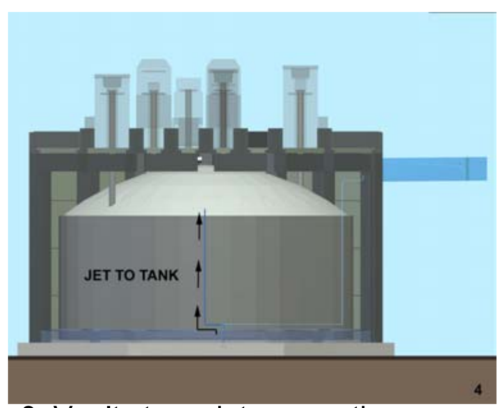
The pipe encasement decontamination also will allow for decontamination of the tank vault floor. Historically, the only way that waste may have entered the WM-181 vault is from valve or pipe leaks, which were collected in the encasements that drain to the vault sump. Infiltration of water into the vault from surrounding soils during spring runoff and significant precipitation events has covered the vault floor at times. This infiltrated water likely has served to help remove any waste discharged to the vaults from the pipe encasements. During closure, decontamination fluid will be introduced into the encasement and will flow onto the vault floor and into the vault sump following the path by which waste may have previously entered the tank vault. The rinsing sequence will be performed three times with a sufficient volume of demineralized water to adequately cover the vault floor. Figure 15 shows the decontamination flow path. In this way, the flushes will decontaminate both the encasements and the vault floor. The decontamination fluid will be pumped out as described above and samples will be collected. Sampling will be indicative of the residual left in the vault, and encasements.



1. The piping trench and vault floor are decontaminated.



2. Samples of the decontamination rinse water are obtained from the vault sumps.



3. Vault steam jets pump the decontamination rinse water into the respective tank.

Figure 15. The piping trench and vault floor decontamination flow path for Tank WM-181.

4.4.2.3 Vault Decontamination. The decontamination fluid used to clean the pipe encasements will be allowed to flow into the vault and to the vault sump. Remaining liquids will be transferred using the steam jets to the PEWE. This process will decontaminate the vault, vault sump, and waste line piping. Sampling of the vault sump will provide sufficient data to characterize the vault (the sump is the lowest point within the vault). Following decontamination, samples will be collected from liquids remaining in the vault sump. These sample results will be used in the evaluation of action levels. After the vault sump is emptied and the vault liquid removal lines have been decontaminated, the steam jets and lines for the sump can be disconnected.

Data from various locations, such as the tank vault sump and tanks, will be evaluated using statistical techniques. Several different statistical methods will be applied to the TFF closure data. There are two primary objectives with regard to the statistical analysis of the data. The first objective is to determine if the constituents of interest are present in levels greater than the specified action level. The second objective is to determine if the contents of the tanks and the vault sump come from the same population. The description of the proposed statistical analysis is presented in Appendix D.

4.4.2.4 Removal of System Components and Installation of Cleaning Equipment. After the covers are removed from the risers using standard INTEC procedures, liquid level indicators and corrosion coupons installed in the tanks will be removed and managed in accordance with applicable regulations as discussed in Section 6.3. Steam jets will be left in the tank for use in the decontamination process.

4.4.2.5 Non-Process Waste Line Isolation. The condition of the cooling coil lines for Tanks WM-103, WM-104, WM-105, and WM-106 has not been determined. It is anticipated that past flushing removed chromium contamination to below actions levels. The coils will be pressure-tested to ensure their integrity. Once the integrity is determined, they will be decontaminated with water flushes. The water from the cooling coils will be sampled and the water will be disposed of in accordance with applicable regulations. Following flushing, the supply headers for each tank will be connected to a compressed air supply and purged with air.

If pressure testing determines that the integrity of the coils is uncertain, flushing will not be performed. In this case, sections of the coils will be removed and sampled in accordance with the sampling and analysis plan (ICP 2004) and the coils will be capped and abandoned in place. However, it is anticipated that the contamination will be below action levels.

Tank instrumentation lines for Tank WM-181 will be isolated from each line in the TFF Control House. Two 2-in. electrical conduits that carry 24 thermowell instrumentation lines to the tank will be cut inside the TFF Control House. The portions of these conduits inside the building will be disposed of appropriately, and the portions leading to the tanks will be permanently capped.

4.4.2.6 Tank Decontamination. For Tank WM-181, the existing steam jets are 12 in. off the bottom of the tank. Therefore, a new steam jet is planned to be installed and lowered to within approximately 1.0 in. of the tank floor to enhance waste removal. Existing jets in Tanks WM-103, WM-104, WM-105, and WM-106 will be used. The steam jets will be used to pump out as much of the tank heels as possible. For Tank WM-181, the washing system described in the *Conceptual Design Report, INTEC Tank Farm Facility Closure* (INEEL 2000a) will agitate the heels to allow more effective waste removal in Tank WM-181. The solids will be suspended in liquid by the agitation as demonstrated by the decontamination of Tanks WM-182 and WM-183. The solids in Tanks WM-103, WM-104, WM-105, and WM-106 are minimal[f] and the addition of water into the tanks is expected to provide the agitation required.

The steam jets will not be removed at the end of decontamination but will be effectively decontaminated by removing thousands of gallons of decontamination fluid from the tank. If the tank liquid meets specified action levels, it will be concluded that the steam jet will also be decontaminated. The tank heel will be sent to another existing tank within the TFF. The steam jets will be operated during washing to remove waste residues. Video systems will be used to evaluate and record the effectiveness of the tank wall decontamination. The sampling and analysis approach is described in detail in the *Sampling and Analysis Plan for the Post-Decontamination Characterization of the WM-103, WM-104, WM-105, WM-106, and WM-181 Tank Residuals* (ICP 2004).

The initial tank washing sequence is designed to remove contaminants and provide incidental pH adjustment of the heels. The final pH in the decontaminated tank residuals will be confirmed to be greater than 2.0 but less than 12.5.

After decontamination, the tank residuals will be sampled to determine their final composition. Samples will be obtained using a pump or other sampling device to be installed in a tank riser. These samples will be compared to action levels. During tank decontamination, a visual inspection using the remote camera will be made to ensure that the tank walls and floor are clean. Radiation detection instruments will be used to measure radiation levels in the waste and decontamination fluid as it is removed from the tanks. As the concentrations of radionuclides are reduced and stabilized, decontamination will cease.

The data collected from sampling the residuals will be used to determine if the decontamination was successful. Successful decontamination is defined as removing hazardous waste and meeting the criteria described in Section 2.1. If the data are conclusive regarding removal of hazardous waste, decontamination efforts will stop and the data will be compared to action levels to determine if clean closure has been achieved. If the concentrations of contaminants exceed the action levels, decontamination will continue until the process is no longer economical or practical. Landfill closure will be determined at final closure of the TFF.

4.4.3 Sampling of Tank Residuals and Ancillary Equipment

At the conclusion of decontamination activities, samples of tank residuals will be collected to determine the concentrations of hazardous constituents remaining in the tanks. During the tank washing, a radiation detection instrument will be used to measure radiation levels of waste removed from the tanks. When the concentrations of radionuclides are reduced and begin to stabilize, the effectiveness of further decontamination will be minimal. At that point, decontamination will cease. The correlation of removal efficiency between radionuclides and metals in the tank will be sufficient to determine when decontamination efficiency has been maximized, indicating that sampling for comparison to action levels may begin. Samples of the residual will be collected to confirm that decontamination has occurred.

The samples will be analyzed for hazardous constituents and radionuclides in accordance with DOE closure plans. The sample data will be used to determine if clean closure objectives have been reached. The sample data for hazardous constituents will be compared to the action levels. If the action levels have not been reached, decontamination may resume if it is determined further efforts are likely to

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f. Personal Communication from A. J. Matule, INEEL, to D. C. Machovec, INEEL, "Solid Sampling of WM-103 through WM-106," AJM-20-90, September 26, 1990.

be successful. The sampling and analysis approach is described in detail in the *Sampling and Analysis Plan for the Post-Decontamination Characterization of the WM-103, WM-104, WM-105, WM-106, and WM-181 Tank Residuals* (ICP 2004).

All sample data from the tanks and ancillary equipment will be examined to determine if they are from the same population. The statistical analysis to determine if the data are from the same population is included in Appendix D. The 95% upper confidence level around the mean of each population will be used to compare to the contaminant-specific action level. Action levels are shown in Table 5; the methodology for calculation is explained in Appendix B.

4.5 Grouting Activities

After tank isolation activities are completed, a determination has been made regarding the effectiveness of decontamination, and decisions for DOE closure and HWMA closure have been made, final heel management and tank grouting will begin. At that time, the WM-181 tank vault will be isolated and final grouting of the tank system, including the vault, will be performed. The decision for landfill closure will be determined based on results from all tanks in the TFF. Physical access to some areas does not allow for piping to be grouted. Figures 11 through 14 show the pipes that will only be decontaminated or capped. As noted previously, though WM-106 does not fall within the closure requirements of RCRA, it will be grouted to meet DOE Order 435.1 (2001) requirements.

4.5.1 Final Heel Management and Initial Tank Grouting

Grout delivery equipment will be installed through tank risers on Tanks WM-103, WM-104, WM-105, WM-106, and WM-181. Video surveillance equipment also will be installed through risers on the tanks. Grout will be placed in each tank in layers following a predetermined sequence. The first grout layer will be placed in a manner that displaces as much of the remaining tank residuals as possible, moving the remaining residual toward the steam jet for removal from the tank. As the grout is placed, the remaining tank residual (liquid and solid) will be pumped using the steam jets remaining in each tank and transferred through process waste piping to storage in another TFF tank to await further treatment. After the initial grout placements to remove residuals, the tank will be filled with grout to approximately 4 ft.

Steam supply lines (1.5 in.) will be cut and permanently capped. Dry grout or another absorbent may be placed in the tanks if free liquids remain. Video inspection will be used to determine if free liquids remain and if additional absorbent is necessary.

4.5.2 Final Grouting

The final grouting will include grouting the pipe encasements. Grout will be pumped through the encasement covers. This process will grout over the 1-in. encasement drain lines. Vault instrumentation lines will be capped in the TFF Control House. The lines will then be permanently capped.

The vault for WM-181 will be filled with grout from the vault risers. The grout will be placed in lifts. After the vault has been filled, the vault risers will be filled to the bottoms of the vault riser lids.

Process piping lines for each tank will be grouted by pumping grout into each line until it comes out of the return end or until the line no longer accepts grout.

The large tank void remaining after the initial grout placements to remove residuals will be filled with grout. The grout will be placed in lifts until the tank is full. Video surveillance equipment and lighting will be installed in the centermost tank risers to observe grout placement. The grouting equipment will be reinstalled on the outermost tank risers.

For Tanks WM-103, WM-104, WM-105, WM-106, and WM-181, the vessel off-gas lines will be grouted. The grouting equipment will be connected to the lines and grout will be pumped through these lines until grout enters the tank risers. This action will also grout the ends of the PEWE lines that connected the two tanks. After the remaining tank voids and the vessel off-gas lines are filled with grout, the lines will be permanently capped.

Any remaining voids in the tank risers will be filled with grout. The tank riser access boxes will be filled with grout and the tank riser access box covers will be reinstalled.

Grouting completion also concludes the closure process for Tanks WM-103, WM-104, WM-105, WM-106, and WM-181. Closure-generated wastes will be disposed of as described in Section 6. The closure process will be documented and certified as described in Section 10.

5. COORDINATION WITH OTHER REGULATORY REQUIREMENTS

As an interim status hazardous waste management unit, the TFF must comply with applicable HWMA/RCRA regulations. However, the TFF is also a HLW facility regulated by DOE and must meet DOE closure requirements. In addition, other ongoing INTEC and TFF actions may also affect the TFF HWMA/RCRA closure activities. These actions include the CERCLA cleanup of the TFF soils and decisions made pursuant to the *Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement* (DOE 2002). Therefore, this HWMA/RCRA closure will be carefully coordinated with each of these other requirements to ensure that the objectives of all activities at the TFF are met efficiently and economically.

5.1 DOE Radioactive Waste Management Requirements

Because the TFF is an HLW facility regulated by DOE, this closure must meet the requirements of DOE Order 435.1 (2001) and its associated guidance and manual (DOE G 435.1-1, 1999; DOE M 435.1-1, 2001). Closure requirements for HLW facilities are specified in DOE Manual 435.1-1 (2001). The TFF will be closed under an approved DOE closure plan, in accordance with DOE Order 435.1.

DOE requires a two-tiered approach to closure plan development, review, and approval. The Tier 1 Closure Plan (DOE-ID 2003c), once approved by DOE Headquarters, is based on preliminary information and is intended to define and bound the parameters of the closure action. The first-tier plan includes

- Closure methodology
- Schedules and assumptions
- Closure standards and performance objectives (for the radioactive constituents)
- Strategy for allocating closure standards and performance objectives to individual facilities and units to be closed at the Site
- Preliminary assessment of the projected performance of each unit to be closed relative to the allocated performance objectives
- Preliminary assessment of the projected composite performance of all units to be closed at the Site
- Alternatives (if any)
- Waste characterization data
- Closure controls plans
- Stakeholder concerns.

The DOE Tier 1 Closure Plan has been prepared and is being reviewed by DOE Headquarters. Once DOE Headquarters approves the plan, they will issue an Authorization to Proceed. Cleaning of the tanks can proceed before DOE Headquarters approval. Once the cleaning of WM-103, WM-104, WM-105, WM-106, and WM-181 is complete, a Tier 2 plan will be prepared and approved to discuss the readiness to proceed with final closure (grouting) activities.

5.2 Comprehensive Environmental Response, Compensation, and Liability Act Requirements

In November 1989, the INEEL was listed on the National Priorities List (54 Federal Register [FR] 223, 1989). In 1991, the FFA/CO was written to establish a framework for fulfilling both CERCLA remedial action and RCRA corrective action requirements (DOE-ID 1991). The FFA/CO divides the INEEL into 10 waste area groups (WAGs), which are further divided into OUs. INTEC is designated as WAG 3 with 14 OUs (DOE-ID 1991).

For closure of tank systems, HWMA/RCRA requires investigation of associated contaminated soils. Past leaks from TFF transfer piping have contaminated areas of the TFF soils. The OU 3-13 Final Record of Decision (DOE-ID 1999) states that investigation of the hazardous constituents in the TFF soils will be addressed during the OU 3-14 RI/FS (DOE-ID 2003d). Therefore, remediation of these soils will be addressed by the CERCLA OU 3-14 Record of Decision and will address the RCRA closure requirements within the regulatory framework and authority of the FFA/CO as a RCRA corrective action. Table 5 identifies constituents of concern that are reasonably expected in the soils. A summary of information regarding TFF soils from investigation/remediation activities available at the time of final TFF closure will be included in the PE certification documentation.

5.3 High-Level Waste and Facilities Disposition Environmental Impact Statement Requirements

Closure of the TFF and Tanks WM-103, WM-104, WM-105, WM-106, and WM-181 also may be affected by the decisions made on the basis of the *Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement* (DOE 2002). This document addresses three primary decision-making goals:

- How to treat sodium-bearing waste
- How to treat HLW calcine into final waste form ready to leave the State of Idaho by December 2035
- How to conduct the disposition of associated HLW program facilities, including the TFF.

The three environmental impact statement general closure alternatives are

- Clean closure
- Closure to landfill standards
- Performance-based closure.

The environmental impact statement was prepared to fulfill commitments DOE made as part of the terms of a 1995 settlement agreement and court order with the State of Idaho (State of Idaho, DOE, and Department of the Navy 1995). Under the agreement and court order, DOE must cease use of the TFF tanks by 2012 and treat all HLW currently at the INEEL so that the waste is ready for removal from the State of Idaho by 2035. To meet this requirement, DOE must issue a record of decision no later than December 31, 2009, based on an environmental impact statement that analyzes alternatives for treating INEEL HLW. On September 19, 1997, DOE issued a “Notice of Intent to Prepare a High-Level Waste and Facilities Disposition Environmental Impact Statement, Idaho Falls, Idaho" (62 FR 182, 1997). The environmental impact statement was issued in September 2002 (DOE 2002).

Both DOE and the State of Idaho have designated a performance-based closure method as the preferred alternative for disposition of HLW facilities at INTEC. These methods encompass three of the six facility disposition alternatives analyzed in the environmental impact statement: clean closure, performance-based closure, and closure to landfill standards. These methods are consistent with the closure approach proposed for the TFF in this closure document. A DOE Record of Decision is expected in 2004 or early 2005.

6. CLOSURE-GENERATED WASTE HANDLING AND DISPOSAL

In accordance with IDAPA 58.01.05.006 (2003) (40 CFR 262.11 [2002]), all solid waste generated during the closure process for Tanks WM-103, WM-104, WM-105, WM-106, and WM-181 is required to be properly characterized to determine if the waste is a hazardous waste. If so, the waste must be managed as a hazardous waste in accordance with all applicable HWMA/RCRA regulations. Circumstances may arise during closure implementation that requires removal of equipment and treatment for reuse or disposal rather than leaving the equipment in place as planned. Conversely, leaving some equipment in place may be necessary or desirable to limit personnel radiation exposure.

As stated in more detail in Section 1.2, wastes stored in Tanks WM-103, WM-104, WM-105, and WM-181 exhibit the hazardous characteristics of corrosivity (HWN D002) and the characteristic of toxicity for lead (D008), mercury (D009), cadmium (D006), and chromium (D007). Also associated with the waste are four RCRA listed waste codes: F001, F002, F005, and U134 (Gilbert and Venneman 1999).

6.1 Decontamination and Treatment of Equipment for Disposal

Contaminated equipment from Tanks WM-103, WM-104, WM-105, WM-106, and WM-181 closure activities will be decontaminated or treated for all hazardous constituents present. The presence of hazardous constituents will be indicated by the baseline sampling results and the historical inventory of wastes managed in the tanks. Treatment will consist of subjecting the equipment to one or more existing treatment technologies identified in IDAPA 58.01.05.011 (2003) (40 CFR 268.45, 2004). The specific technology or technologies will be selected at the time of closure based on the contaminants subject to treatment, the effectiveness of the selected technology, and the ability of equipment to be effective in a highly radioactive environment. Equipment to be disposed of as solid waste will be disposed of in accordance with applicable local, state, and federal requirements. In some cases, the contaminated equipment may be dismantled, packaged, and transported to an on-Site or off-Site treatment, storage, and disposal facility. Section 6.3 describes available storage, treatment, and disposal options. Hazardous waste determinations will be performed on waste in accordance with 40 CFR 262.11 (2002).

6.2 Equipment and Structures to be Reused

The following equipment and structures are designated for potential reuse and will be decontaminated or disposed of if they become contaminated during WM-103, WM-104, WM-105, WM-106, and WM-181 closure activities:

- Tank closure equipment—grout delivery equipment, wash ball, heel sampling equipment, video equipment, and tank lighting
- Trucks—utility, flat-bed, and dump
- Cranes, backhoes, front-end loaders, and excavator
- Temporary vessel off-gas system—blower, filter skids, condensate accumulation receiver tank, and ducting
- Decontamination equipment (line spray and valve box washing systems)
- Grout system—pump and piping

- Radiological protection equipment—shielding and large area containment tents
- Buildings—temporary enclosure and construction trailers
- Miscellaneous—pipe-cutting tools, liquid catches, buckets, brushes, etc.
- Utilities—electrical power (protective devices, conductors, and distribution systems), water (pressure regulators, control valves, and distribution/delivery systems), steam, and/or air distribution systems as deemed appropriate
- Direct heel sampling pump or simple sampler.

All equipment and structures that have documented contamination, visible signs of contamination, or known contact with waste materials will be decontaminated. Also, the contaminated equipment may be dismantled, packaged, and transported to an on-Site storage/treatment facility for decontamination before reuse (see Section 6.3). For example, grout system piping may require decontamination in the INTEC debris treatment facilities before reuse.

6.3 Closure-Generated Waste

The INTEC storage and treatment systems (e.g., PEWE and TFF) may be used to store and treat wastes generated from the following sources:

- Valve box covers, valve boxes, and drain lines
- Vaults, vault sumps, and liquid removal lines to tanks and the PEWE
- Pipe encasements
- Condenser pit covers, pits, vessel off-gas lines, and vessel off-gas drain lines
- Purge liquids and decontamination solutions.

Alternatives for treatment and disposal methods for the liquid sodium-bearing and calcined wastes are addressed in the *Idaho High-Level Waste and Facility Disposition Final Environmental Impact Statement* (DOE 2002). If necessary, decontamination materials and residues (e.g., personal protective equipment, sampling equipment, and HEPA filters) will be placed in containers labeled with the date of accumulation and a barcode identifier, sampled and analyzed, and held within the TFF as mixed, low-level, or transuranic waste. Based on process knowledge and the results of analysis, closure waste will be managed to ensure proper handling, treatment, storage, and disposal. Examples include, but are not limited or restricted to, the following:

- The HEPA filters determined to be waste or debris may be transferred to CPP-659 New Waste Calcining Facility HEPA Filter Storage before treatment in the CPP-659 New Waste Calcining Facility HEPA Filter Leach System. These HEPA filters will be disposed of either on-Site at the Radioactive Waste Management Complex or off-Site. Filter leaching will be necessary before disposal at the Radioactive Waste Management Complex.
- Hazardous or mixed waste may be accumulated within the area of closure and either sent off-Site for treatment and disposal or sent to CPP-1619, the Hazardous Chemical and Radioactive Waste

Storage Facility, before shipment off-Site. If hazardous waste generated from the closure activity is maintained within the boundaries of Tanks WM-103, WM-104, WM-105, WM-106, and WM-181 closure, the 90-day storage limit will not apply; all other handling, packaging, and inspection rules will apply to protect human health and the environment. The HWMA/RCRA facility closure requirements specify that the boundaries applicable to cleanup of closed facilities are the unit boundaries of the unit being closed. The boundaries for DOE HLW facility closures are based on the performance assessment conducted during closure activities (DOE-ID 2003e).

If applicable, fluids from decontamination may be contained within a work/closure area or collected in containers until characterization results are obtained to ensure compliant storage and/or treatment and disposal.

6.4 Management of Excavated Soils

Management of soils excavated during TFF closure activities will be conducted consistent with the approved methods outlined in the INTEC C40 Valve Box Soil Work Plan (INEEL 2000b). Soil excavated during TFF closure activities either will be returned to the excavation or managed in accordance with applicable HWMA requirements within the 24-month timeframe. TFF closure actions, which may include soil excavation, are expected to require a typical construction season, but may be delayed by unexpected circumstances. The project may require excavation of about 20 yd^3 of soil. Soil excavated during TFF closure activities will be used as backfill for this project only.

6.4.1 Excavation

One or more construction piles will be established immediately adjacent to the excavation where excavated soil will be held temporarily before transfer to a staging pile. Transfer will be accomplished using TFF-approved equipment (e.g., backhoe, front-end loader, hand shovels, vacuum, and excavator). These temporary construction piles are separate from the soil staging piles. Soil from the construction piles will be removed (down to approximately the last 6 in.) at the end of each day and then covered to prevent the spread of loose soil.

6.4.2 Staging

Staging piles, as used for this project, will provide for temporary staging of soil (no longer than 24 months) before reuse as a backfill for the TFF closure project or placement into containers for long-term management. Using staging piles will provide a reliable, effective, and protective option for staging soil before use as backfill. Soil contaminated at levels above 50 mrem/hr (on or near contact) will not be put directly into staging piles but will be placed into containers (probably metal boxes or industrial-duty sacks or bags) to prevent possible spread of radiological contamination. Each container will be marked to indicate the location and depth at which the soil originated. This soil also will be placed back into the excavation near the depth and location of origination. Information on the location, depth, and level will be provided to the CERCLA program for resolution at final closure.

The staging piles will be placed on a double layer of an impermeable liner to prevent contamination of underlying soil or asphalt. The piles will be covered with impermeable material to prevent windblown spread of radionuclides and hazardous constituents. The covers also will prevent intrusion and percolation of precipitation through the soil. The covers will be secured to the liner and to each other using standard methods such as timbers and sandbags. Netting will be placed over the covers to aid in preventing wind damage. Precipitation run-off from the covers will be diverted away from the piles and then away from the TFF area through the existing storm water diversion system. The same diversion system will prevent precipitation run-on. The covers will be lifted or removed to allow working access to the staging pile as required. The staging pile will be re-covered and the cover secured at the end of each day.

Soil potentially contaminated with hazardous waste that has been placed into containers will not be staged in a HWMA/RCRA-regulated treatment, storage, or disposal facility such as CPP-1617. The containers will be managed within the area of contamination as if they are in a less-than-90-day storage area until the soil is returned to the excavation as backfill. Excess soil, if any, will be managed in accordance with a formal hazardous waste determination and any applicable no-longer-contained-in determination. For the purpose of the TFF closure project, soil placed into containers for radiological control will be deemed no different than soil placed into staging piles; land disposal restriction requirements will not be violated.

6.4.3 Soil Emplacement as Backfill

Soil will be used as backfill in a way that does not significantly increase potential exposure at the TFF either through direct exposure to radiation or by migration of contaminants. Soil will generally be placed back into the excavation in reverse order of removal (e.g., last out, first in). Soil emplacement in the excavation will be completed such that the site profile/condition before and after the project is consistent.

6.4.4 Soil Tracking

A single one-time-only waste stream will be established for tracking the management of the soil associated with closure of each TFF tank. The INEEL Integrated Waste Tracking System material profile will track excess soil placed into containers for long-term management. For soil used as backfill, only the volume will be tracked via the INEEL Integrated Waste Tracking System under a single-container profile tied back to the waste stream.

Several steps will be used to track soil during excavation, staging, and backfill activities. Radiological control personnel will complete necessary surveys during all soil movement.

Log sheets will be completed during initial excavation and when soil is used as backfill. These forms allow tracking of soil from the excavation to a staging pile; from the staging pile to backfill; into containers for radiological control; and use of containerized soil as backfill. The log sheets also provide a means to initially identify containers used for long-term storage of excess soil. These log sheets will be retained as part of the operating record.

7. MAXIMUM EXTENT OF THE OPERATION UNCLOSED

Closure of Tanks WM-103, WM-104, WM-105, and WM-181, and the final closure of the TFF represent a partial closure of the INEEL facility. Final closure of the remaining HWMA/RCRA-regulated operational units at the INEEL will be conducted in accordance with applicable interim status or approved HWMA/RCRA Part B closure plans. In accordance with the information required under IDAPA 58.01.05.009 (2003) [40 CFR 265.112(b)(2), 2002], “the maximum extent of the operation which will be unclosed during the active life of the facility” must be identified. Therefore, an estimate of the maximum extent of operations that will remain unclosed (open) at the INEEL Site after closure of Tanks WM-103, WM-104, WM-105, and WM-181 is to be determined. An estimate of the maximum extent of operations that will remain unclosed on the entire INEEL Site is available in the *HWMA/RCRA Part A Permit Application for the Idaho National Engineering and Environmental Laboratory* (DOE-ID 2000) and other approved HWMA/RCRA Part B permits for the INEEL.

8. TIME ALLOWED FOR CLOSURE/EXTENSION

IDAPA 58.01.05.009 (2003) (40 CFR 265.113, 2002) requires that closure of the TFF must commence within 90 days after receiving the final volume of hazardous wastes or within 90 days after approval of the closure plan, whichever is later. The regulations allow IDEQ to approve a longer period to commence closure, provided

- "The activities required to comply with this paragraph will, of necessity, take longer than 90 days to complete; and"
- The operator "has taken and will continue to take all steps to prevent threats to human health and the environment, including compliance with all applicable interim status requirements."

The second modification to the Consent Order (IDHW 1998) specifies that DOE must cease use of Tanks WM-182 through WM-186 by June 30, 2003, and the remaining tanks by December 31, 2012.[g] Ceasing use of the tanks means that DOE must empty the tanks to their heels, that is, the liquid level remaining in each tank must be lowered to the greatest extent possible by the use of existing transfer equipment. As described in Section 1, closure of the TFF will be conducted in phases, with partial closures of groups of tanks leading to final closure of the TFF. IDAPA 58.01.05.009 and 40 CFR 265.113 also require that closure activities be completed in accordance with the approved closure plan "within 180 days after receiving the final volume of hazardous wastes" or "within 180 days after approval of the closure plan, if that is later." The director of IDEQ may approve an extension to the closure period provided it is demonstrated that

- "The activities required to comply with this paragraph will, of necessity, take longer than 180 days to complete; and"
- The operator "has taken and will continue to take all steps to prevent threats to human health and the environment from the unclosed but not operating hazardous waste management unit or facility, including compliance with all applicable interim status requirements."

Closure activities for the TFF tanks are anticipated to take longer than 180 days to complete for the following reasons:

- The highly radioactive wastes stored in the tanks will require much of the sampling and waste removal work to be performed using remote handling technology, which will require significant lead times to set up and conduct
- The approach for partial closure of the TFF tanks in sequence will require the continued availability of storage space in other tanks and treatment capacity in the INTEC waste treatment systems for the wastes generated; operational timeframes in these systems do not allow closure within 180 days
- Closure to performance-based standards will involve an iterative process of decontamination, sampling, analysis, data review, and possibly, additional decontamination.

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g. The Consent Order allows Tank WM-185 to be used as an emergency spare tank.

For these reasons, the closure of each set of tanks in the TFF is likely to require much longer than 180 days. Current planning estimates suggest each partial closure phase will require 3 to 5 years. An extension to the 180-day period for Tanks WM-103, WM-104, WM-105, and WM-181 is requested to 1,334 days.

Quarterly reports will be provided for the closure of Tanks WM-103, WM-104, WM-105, and WM-181. These reports will be integrated with the quarterly reports for (a) WM-182 and WM-183, and (b) WM-184, WM-185, and WM-186. The reports will be provided to IDEQ within 30 days of the end of each quarter of the fiscal year. The reports will identify the status of the closure activities, identify the status of the entire closure schedule, and outline any issues or concerns relative to the milestone of completing partial closure. Reporting will begin at the end of the first quarter after approval of the closure plan. The reports will be submitted no later than January 31, April 30, July 31, and October 31 of each year (the same schedule as for WM-182 and WM-183), and will continue until closure is complete. Table 7 lists the durations and descriptions of the planned activities for closure of Tanks WM-103, WM-104, WM-105, and WM-181.

Finally, IDAPA 58.01.05.009 (2003) and 40 CFR 265.112(a) (2002) require that by May 19, 1981, or by six months after the effective date of the rule that first subjects a facility to provisions of this section, the owner or operator of a hazardous waste management facility must have a written closure plan. This closure plan is being submitted in accordance with the Consent Order, which requires submittal of the first closure plan on or before December 31, 2000, as described in the second modification to the Consent Order (IDHW 1998).

The integration of HWMA/RCRA closure and DOE closure is vital to success of the TFF closure. Implementation of the DOE closure plan by DOE must be coordinated with the implementation of the HWMA/RCRA closure plan by IDEQ. Both a DOE Authorization to Proceed and State of Idaho approval must be obtained before any irreversible closure actions may begin. Preliminary tank washing may commence before these closure plans are approved.

Table 7. Durations and descriptions of planned activities scheduled for WM-103, WM-104, WM-105, and WM-181 closure.[a]

Duration	Description
0 day	Receive approval of partial closure plan and receive DOE Authorization to Proceed[b]
328 days	Remove waste and decontaminate Tank WM-181
339 days	Evaluate results, grout, and close Tank WM-181
328 days	Remove waste and decontaminates Tanks WM-103, WM-104, and WM-105
339 days	Evaluate results, grout, and close Tanks WM-103, WM-104, and WM-105
60 days	Submit PE supporting documentation (this time is in addition to the 1,334 days for closure)

a. The sequence of tank closure may change based on timing and logistics.

b. Waste removal, decontamination, and evaluation will commence on or before approval of the partial closure plan. Grouting will commence after the DOE Authorization to Proceed is received.

9. CLOSURE PLAN MAINTENANCE AND AMENDMENTS

In accordance with IDAPA 58.01.05.009 (2003) [40 CFR 265.112(a), 2002], a copy of the most current version of the closure plan will be maintained by the facility until closure is certified. The plan will be furnished to the IDEQ Director, upon request, any time before closure certification. This closure plan will be modified, as necessary, in accordance with IDAPA 58.01.05.009 [40 CFR 265.112(c)] and as follows:

- Whenever changes in operating plans or facility design significantly affect the closure plan
- If there is a change in the expected year of closure
- If, in conducting closure activities, unexpected events require a modification
- If a change in state or federal laws or regulations requires a change in the closure plan
- If the regulatory authority requests modification of the closure plan in accordance with IDAPA 58.01.05.009 [40 CFR 265.112(c)(4)]
- At the time of closure to address the schedule for closure, changes to regulatory standards for cleanup, biased sampling based on the operating record, specific decontamination methods/technologies to be employed, changes to how and where disposal of equipment and structures will take place, and other changes necessary to accomplish the “clean closure” performance standard.

Written notifications or requests for amendment or modification of this closure plan will be submitted, along with a copy of the amended plan, to the appropriate regulating agency

- 60 days before a proposed changed in operating plans or design of the waste management unit or facility
- No later than 60 days after an unexpected event occurs that affects the closure plan
- No later than 30 days after an unexpected event occurs during closure [IDAPA 58.01.05.009 and 40 CFR 265.112(c)].

10. CERTIFICATION OF CLOSURE

Certification of closure will be provided by an independent Idaho-registered PE and the facility contractor and/or the DOE Idaho Operations Office, in accordance with IDAPA 58.01.05.009 (2003) (40 CFR 265.115, 2002), at final closure of the TFF system. Certification of partial closures is not required (EPA 1998). The TFF tanks will not be certified closed until all of the tanks have been decontaminated and the waste removed.

Within 60 days of completion of final closure covered by this plan, the owner or operator must submit to the IDEQ Director, by registered mail, a certification that the hazardous waste management unit has been closed in accordance with the specifications in the approved closure plan. The certification will be signed by the owner or operator and by the PE. Documentation supporting the PE's certification must and will be furnished to the IDEQ Director. These actions will meet the certification of closure requirements stated in 40 CFR 265.115. PE certification information will be submitted to IDEQ 60 days after completion of this closure plan for Tanks WM-103, WM-104, WM-105, and WM-181. Records of each partial closure certification will be stored at the INEEL for certification upon final closure.

As data are collected in the partial closures of the TFF, the data will be combined using the statistical methods shown in Appendix D. Final closure conditions for the TFF will be determined when the data from all of the tanks and ancillary equipment is compared to the TFF action levels. The 95% upper confidence level of the mean of all samples will be compared to the action levels. Tank and ancillary equipment sample populations may be considerably different; therefore, two or more upper confidence level calculations may be performed and compared to action levels.

If closure of the TFF systems to the landfill closure standard is necessary, a "Notice in Deed" and survey plat will be submitted to the Butte County Courthouse in accordance with IDAPA 58.01.05.009 (40 CFR 265.119, 2002), and the tanks will be closed in accordance with the contingent landfill closure plan (DOE-ID 2003a). The survey plat will be prepared and certified by an Idaho professional land surveyor and will indicate the location and dimensions of the tank system that requires closure to the landfill standard. The "Notice in Deed" will state

- That the land has been used to manage hazardous waste
- That land use is restricted under IDAPA 58.01.05.009 (40 CFR 265.119)
- That the facility contractor and/or the DOE Idaho Operations Office have an obligatory commitment to restrict disturbance of the closed landfill unit.

In addition, a record describing the type, location, and quantity of hazardous waste disposed of in any and all WM-103, WM-104, WM-105, and WM-181 tank system components will be submitted to IDEQ and the Butte County Commissioners (IDAPA 58.01.05.009 [40 CFR 265.119]).

The PE certification information will document all closure activities so there is adequate information provided for each phase of closure. Closure activities for Tanks WM-103, WM-104, WM-105, and WM-181 under this closure plan will be considered complete upon submittal of the supporting documentation from the independent PE to IDEQ.

11. COST, FINANCIAL ASSURANCE, AND LIABILITY REQUIREMENTS

The INEEL is owned and operated by the U.S. Government. Therefore, the facility is, in accordance with IDAPA 58.01.05.009 (2003) (40 CFR 265.140(c), 2002), exempt from the financial requirements of IDAPA 58.01.05.009 (40 CFR Part 265, Subpart H, 2002).

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