CLOSURE PLAN
FOR THE
RADIOACTIVE MATERIALS
HANDLING FACILITY
(RMHF)

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For

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Oakland Environmental Programs
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EXECUTIVE SUMMARY

This document presents the revised Resource Conservation and Recovery Act (RCRA) Closure Plan for the Radioactive Materials Handling Facility (RMHF). The RMHF is owned by the U.S. Department of Energy (DOE) and co-operated by Boeing. The land on which the RMHF is located is owned by Boeing. The facility is located within the former Energy Technology Engineering Center (ETEC) of Area IV of the Santa Susana Field Laboratory (Santa Susana) in Ventura County, California.

Constructed in 1958 to manage radioactive waste, the RMHF was operational for nearly fifty years. In 1989 the EPA authorized RMHF for the management of "mixed" wastes under the Resource Conservation and Recovery Act (RCRA). Mixed waste contains both radioactive and chemical constituents. As such, mixed wastes are subject to separate regulatory requirements for their respective radioactive and chemical components. The DOE is authorized by the Atomic Energy Act to regulate the radioactive component of mixed waste and the California EPA Department of Toxic Substance Control (DTSC) is authorized by RCRA to regulate the chemical component.

The general purpose of this closure plan is to meet DTSC's closure standards for the chemical component of the mixed wastes managed at the RMHF through the performance of closure activities in a manner that keeps exposure to ionizing radiation As Low As Reasonably Achievable (ALARA) pursuant to DOE requirements.

The RMHF occupies 1.5 acres and consists of ten buildings and structures and one paved area. The specific units subject to RCRA closure requirements are three buildings (Building 4621, Building 4021 and Building 4022) and one outside mixed waste storage area.

This Closure Plan applies to the formal closure of specific Interim Status Storage and Treatment Units identified in the Part A Permit Application for the RMHF dated October 24, 1997. This Part A application was authorized by the Department of Toxic Substances Control (DTSC) in the Interim Status Authorization Letter received by Boeing in December 1997.

This Closure Plan has been prepared in accordance with the closure requirements for Interim Status Facilities found at 22 CCR, Division 4.5, Chapter 15, and is consistent with the Department of Toxic Substances Control's *Permit Writer Instructions for Closure of Treatment and Storage Facilities – Revision 1, January 1994.*
Ten buildings and structures comprise the RMHF; however, the specific units subject to the RCRA Closure requirements described in this plan consist of: 1) an outdoor, asphalt-paved mixed waste storage yard; 2) three storage buildings (Building numbers 4021, 4022 and 4621 and, 3) small apparati (e.g., cement mixer, fume hoods, bench-scale laboratory equipment) used to carry out small scale treatment activities as described in Section 3.3 of this Closure Plan. These specific units were operated under a RCRA

Interim Status authorization for the storage and treatment of mixed waste and are therefore subject to the RCRA closure requirements.

The specific objective of the closure plan is to meet the Closure Performance Standards prescribed in 22 CCR, Section 66265.111 and to achieve closure of the RMHF pursuant to facility closure requirements for Interim Status Facilities identified in 22 CCR, Division 4.5, Chapter 15 by demonstrating that hazardous waste and hazardous constituent residues have been removed or are left in place at levels that are protective of public health and the environment.

The remaining portions of the RMHF that are not specifically addressed under the RCRA closure process are subject to the RCRA corrective action process. These areas will be addressed under the site-wide Corrective Action program for SSFL and is being overseen by DTSC. The regulatory authorities and requirements for ISD units and Solid Waste Management Units are different and thus, are being addresses and implemented separately.

In addition to mixed waste activities, DOE has also used some of the mixed waste storage and treatment units to be closed and nearby areas within the RMHF to store or treat DOE-regulated, low-level radioactive wastes. In parallel with DOE removing the RMHF from service as a hazardous waste facility through this DTSC-approved closure plan, DOE will remove the RMHF from all radiological service (i.e., mixed waste, low-level radioactive waste service) through its decontamination and decommissioning (D&D) program. These DOE activities are being independently undertaken by DOE under its exclusive Atomic Energy jurisdiction. Compliance with DOE’s D&D requirement that residual radioactivity be reduced to a level that permits release of the RMHF site for unrestricted use is not a requirement for facility closure pursuant to this Closure Plan.

All activities required to meet Interim Status closure requirements for hazardous waste facilities are subject to DTSC’s jurisdiction. Some closure activities may be sequenced to D&D activities subject only to DOE jurisdiction. Specifically, in any area subject to the closure requirements, the chemical cleanup under the Closure Plan may take place following pre-demolition radiological release under the D&D program. Similarly, subsequent to building demolition some cleanup of chemical releases to soils may take place following D&D radiological release by DOE and confirmation by DHS that the chemical investigation may proceed without the need for radiological controls.

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LIST OF ABBREVIATIONS, ACRONYMS AND DEFINITIONS

^{o}F	Degrees Fahrenheit
ACM	Asbestos-containing material
ALs	Action Levels
ALARA	As Low As Reasonably Achievable
BGS	Below ground surface
CCR	California Code of Regulations
CM/S	Centimeters per second
CLOSURE	Cleaning and Closing a Hazardous Waste Facility Pursuant to Federal and State Hazardous Waste Requirements
COC	Chain-of-Custody
D&D	Radiological Decontamination and Subsequent Decommissioning Pursuant to DOE Requirements
DHS	California Department of Health Services
DOE	U.S. Department of Energy
DQO	Data Quality Objectives
DTSC	Department of Toxic Substances Control
ETEC	Energy Technology Engineering Center
FT.	Foot or feet
HASP	Health and Safety Plan
LDR	Land Disposal Restrictions
LUFT	Leaking underground fuel tank
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MCLs	Maximum Contaminant Levels
MIXED WASTE	A waste which contains both radioactive and (chemically) hazardous waste.
ORISE	Oak Ridge Institute for Science and Education
QA/QC	Quality Assurance/Quality Control
PPE	Personal Protective Equipment
RCRA	Federal Resource Conservation and Recovery Act
RMHF	Radioactive Materials Handling Facility
SDWA	Safe Drinking Water Act
SRAM	Standardized Risk Assessment Methodology
SRC	Site Related Chemical
SRE	Sodium Reactor Experiment
SSFL	Santa Susana Field Laboratory
SVOCs	Semi-volatile organic compounds
TPH	Total petroleum hydrocarbons
VOCs	Volatile organic compounds

1.0 FACILITY IDENTIFICATION

1.1 FACILITY NAME

Radioactive Materials Handling Facility (RMHF)

1.2 EPA IDENTIFICATION NUMBER

CA3 890 090 001

1.3 PHYSICAL ADDRESS

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1.5 CONTACT PERSON

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1.9 DESCRIPTION OF BUSINESS ACTIVITIES

The RMHF was a mixed waste storage and treatment facility that operated under RCRA interim status located at the former Energy Technology Engineering Center (ETEC). The RMHF was also used to store low-level radioactive wastes that are regulated by the U.S. Department of Energy (DOE). The facility is no longer needed and is being decommissioned.

ETEC is a government-owned complex of buildings, owned by the DOE and co-operated by DOE and Boeing, located within Area IV of the Santa Susana Field Laboratory (refer to Section 2.0 of this Closure Plan for a detailed description of the location).

Shortly after the passage of the Atomic Energy Act in 1946, North American Aviation, Inc. (NAA; a predecessor to The Boeing Company) set up an organization to investigate and pursue business opportunities in nuclear power development. The NAA nuclear group became the Atomics International Division (AI) of NAA in 1955. When AI needed a remote site for nuclear reactor development, it took over part of the SSFL (Area IV) for this work.

At one time, AI research and development facilities included 10 nuclear research reactors, 7 critical facilities, a "Hot Laboratory," the Nuclear Materials Development Facility, the Radioactive Materials Handling Facility (RMHF), and various ancillary test and storage areas. As a result of AI activities, several AI and facilities contain radioactive and chemical contamination.

In 1984, Atomics International was merged into the Rocketdyne Division. Rocketdyne operated all parts of the SSFL, including the Former AI and Energy Technology Engineering Center facilities until 1996 when Rocketdyne was acquired by The Boeing Company. In 2005, The Rocketdyne Division, excluding SSFL was sold to United Technologies Company. The Boeing Company retained ownership of the SSFL.

Research involving radioactive materials was completed in 1988. Since that time DOE-sponsored activities have focused on the decontamination and decommissioning[1] (D&D) of the AI facilities and the offsite disposal of the wastes. The RMHF was dedicated to the exclusive support of the D&D activities at SSFL and only mixed and radioactive wastes are managed at the RMHF.

Specific activities conducted at the RMHF consisted of the interim storage and small scale treatment of radiological wastes and mixed wastes. Treatment activities included elementary neutralization, stabilization, and size reduction. All waste received at the RMHF were subsequently shipped offsite for proper disposal.

The former AI facilities are now in the final stages of D&D and the focus is now on the closure and D&D of the RMHF itself, which is anticipated to be completed by December 2009[2].

1.10 ENVIRONMENTAL PERMITS

The RMHF operated under a Part A (Interim Status) Resource Conservation and Recovery Act (RCRA) permit for the storage and treatment of mixed waste. A copy of the Part A Permit Application dated October 24, 1997 as authorized by the Department of Toxic Substances Control in the Interim Status Authorization Letter received by Boeing in December 1997 is provided in Appendix A. No other environmental permits licenses, registrations, or authorizations have been specifically issued or assigned to the RMHF.

[1] The term "decommission" means to remove a facility, site or structures safely from radiological service and reduce residual radioactivity to a level that permits release of the property for unrestricted use.

[2] Planning for accelerated closure is being contemplated.

1.11 OWNER/OPERATOR CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate information submitted. Based on my inquiry of the person or persons who mange the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

FACILITY OPERATOR	FACILITY OWNER & CO-OPERATOR
____________________________	____________________________
Mr. Ravnesh Amar Program Manager, DOE Site Closure The Boeing Company	Mr. Michael Lopez Project Manager, Santa Susana Field Laboratory Oakland Operations Office Department of Energy

2.0 FACILITY DESCRIPTION

2.1 FACILITY SIZE AND LOCATION

The locations of the SSFL and former ETEC are depicted in Figure 1. The boundaries of the RMHF are depicted in Figures 2 and 3.

The Radioactive Materials Handling Facility (RMHF) was a mixed waste storage facility that included an outdoor, asphalt-paved storage mixed waste storage yard and three mixed waste storage buildings (Building No. 4021, 4022 and 4621). RMHF has an area of about 69,000 square feet or approximately 1.5 acres and is located at the end of 12th street within the former ETEC. The former ETEC consists of approximately 90 acres located within a geographic area identified as Area IV.

Area IV consists of approximately 290 acres located in the westernmost part of the Santa Susana Field Laboratory (SSFL). The SSFL encompasses 2,850 acres of land located in the southeastern portion of Ventura County.

2.2 LAND USE

Land use within a one-mile radius of the RMHF is depicted in Figure 4. As it is shown, the only development within a one-mile radius of the RMHF is the infrastructure of the SSFL. The adjacent properties within one-mile of RMHF are undeveloped and the land use is agricultural, consisting of livestock grazing (Figure 4).

2.3 HYDROGEOLOGIC CONDITIONS

The SSFL is located in the Simi Hills of southeastern Ventura County. The Simi Hills are in the northern part of the Transverse Range geomorphic province and separate the Simi Valley from the western part of the San Fernando Valley.

2.3.1 Geologic Units and Structure

The primary subsurface units present near the RMHF are the unconsolidated Quaternary Alluvium and unconsolidated fill, and the Cretaceous Chatsworth Formation.

The alluvium is generally a mixture comprised primarily of sand and silty sand with minor amounts of silt and clay. The thickness of the unconsolidated material is expected to range from less than 5 feet up to possibly more than 15 feet.

In general at SSFL, the Chatsworth formation is composed of well-consolidated massive sandstone with interbeds of siltstone and claystone. The fracture systems within the Chatsworth Formation are associated with bedding planes, jointing and faulting. The unfractured Chatsworth Formation has very low hydraulic conductivity, on the order of

10^{-4} to 10^{-11} centimeters per second (cm/s) with a geometric mean on the order of 10^{-5} cm/s (Montgomery Watson, 2000). Movement of groundwater is primarily along fractures; not through the interstices of the unfractured formation.

2.3.2 Water and Groundwater

2.3.2.1 Groundwater Occurrence

Groundwater occurs at SSFL in the unconsolidated alluvium, weathered bedrock, and un-weathered bedrock (Haley & Aldrich 2004). First-encountered groundwater exists under water table conditions and may be encountered in any of these media. For the purposes of this Closure Plan, near-surface groundwater is defined as groundwater that is present in the alluvium and weathered bedrock, and groundwater that occurs below the weathered bedrock is referred to as Chatsworth Formation groundwater.

2.3.2.1.1 Near-Surface Groundwater

Near-surface groundwater has a limited areal extent at SSFL, typically occurring in narrow alluvial drainages (topographic lows) and broad alluvial valleys (e.g., Burro Flats in Area IV). Where near-surface groundwater exists, the near-surface and Chatsworth Formation groundwater are often times vertically continuous (i.e., not separated by a vadose zone). In this case, the separation of near-surface groundwater and Chatsworth Formation groundwater is a descriptive term only.

In the vicinity of RMHF, Near-Surface groundwater has been monitored at wells PZ-116, RS-25 and RS-28. Since 1996, shallow groundwater has been identified in wells RS-25 and RS-28 on a seasonal basis only. The wells are generally dry except during the period from January to April, during the precipitation season. Groundwater was identified in PZ-116 (constructed in November 2001) during April 2003, 2004, and January, March and May 2005.

PZ-116, RS-25 and RS-28 are completed in the drainage north of the RMHF area. The apparent horizontal direction of Near-Surface groundwater flow has a westerly component from RS-25 to RS-28 to PZ-116, based on water level elevations measured at the wells. This also reflects the topographic differences between the shallow wells in the drainage.

2.3.2.1.2 Chatsworth Formation

The principal water bearing system at the Facility is the fractured Chatsworth Formation composed of poorly- to well-cemented, massive sandstone with interbedded mudstone.

Within the vicinity of RMHF, Chatsworth Formation groundwater has been identified in monitor wells RD-17, RD-19, RD-27, RD-30, RD-34A through C, and RD-63. Depths to groundwater in these wells have ranged from at land surface to more than 100 feet. Water levels at individual wells have been observed to vary from several feet to tens of feet. This variability is indicated in response to seasonal precipitation and groundwater pumping. At monitor well RD-27 located in the RMHF area, the depth to water has varied from about 40 to 60 feet below land surface.

The horizontal direction of Chatsworth Formation groundwater flow in the vicinity of RMHF is indicated by water level elevations at the wells to be to the northwest.

2.3.2.2 Groundwater Quality

The SSFL conducts extensive groundwater monitoring. A monitoring schedule has been established with the California Department of Toxic Substances Control (DTSC). Results are presented to DTSC in quarterly and annual groundwater monitoring reports in accordance with the current Sampling Analysis Plans (SAP) for the facility (GWRC 1995a, 1995b). Figure 3 depicts the groundwater wells and groundwater withdrawal well (RD-63) in the vicinity of the RMHF. The latest detailed results regarding groundwater quality of the quarterly and annual reports are available for review at the DTSC or at Boeing document repositories.

The groundwater monitoring program at SSFL fulfills the requirements of multiple regulatory programs prescribed by the Post-Closure Permits (California DTSC, 1995), a Class 2 Permit Modification of the Post-Closure Permits (California DTSC, 2001), the LUFT program overseen by DTSC, and various characterization efforts conducted at SSFL.

2.3.2.2.1 Near-Surface Groundwater

Near-surface groundwater quality beneath the permitted units at the RMHF has not been determined.

In the vicinity of RMHF, Near-Surface groundwater quality has been determined by the collection and analysis of groundwater samples from RS-25, and RS-28 located north of RMHF. Groundwater samples have been analyzed for multiple constituents in Near-surface groundwater including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), general mineral constituents and metals.

Volatile organic compounds were not detected in groundwater samples collected from shallow monitor well RS-25. Results of analyses indicated detectable VOC concentrations in groundwater from RS-28. The concentration ranged up to about 29 micrograms per liter trichloroethylene in groundwater samples collected during 2001.

2.3.2.2.2 Chatsworth Formation

The quality of Chatsworth Formation groundwater beneath the permitted units at the RMHF has not been determined.

In the vicinity of the RMHF, Chatsworth Formation groundwater quality has been determined by the collection and analysis of groundwater samples from wells RD-17, RD-19, RD-27, RD-30, RD-34A through C, and RD-63. Groundwater samples have been analyzed for multiple constituents including VOCs, SVOCs, general mineral constituents and metals.

Volatile organic compound (VOC) detections have not been confirmed in Chatsworth Formation groundwater from monitor well RD-27 located at the RMHF area. Some samples of groundwater from RD-27 were reported to contain toluene, trichloroethylene, methylene chloride and acetone, but all occurrences are attributed to laboratory or field contamination issues.

Toluene was reported at concentrations of 7 and 3 micrograms per liter (µg/l) in samples collected during September and October 1989, soon after the well was completed during August 1989. The toluene reported in the September 1989 sample was validated as non-detected due to the presence of toluene in an associated field blank. Toluene in the October 1989 sample was not representative of groundwater from this well and the result of carryover from a previously analyzed field blank sample or residual contaminants from drilling or well completion activities.

Trichloroethylene (TCE) was reported at a concentration of 0.5 µg/l and an estimated concentration, between the method detection limit and the reporting limit, of 0.36 µg/l in RD-27 groundwater samples collected during February 1995 and March 2002. Trichloroethylene in the February 1995 was determined to be a laboratory contaminant, and in the March 2002 sample, TCE was attributed to carryover from a previously analyzed sample at the laboratory.

Methylene chloride is a common laboratory contaminant, and was reported in the groundwater sample collected during March 2002 at an estimated concentration of 0.24 µg/l. Acetone is a common laboratory contaminant, which was reported in the groundwater sample collected during August 2004 at a concentration of 11 µg/l and validated as non-detected due to its presence in an associated field blank.

No VOCs were confirmed as detected in over forty groundwater samples analyzed from RD-27 since the well was constructed during 1989. Within the vicinity of RMHF, VOCs have been detected in groundwater samples collected north of the RMHF. VOC concentrations ranged up to about 50 micrograms per liter trichloroethylene (TCE) in groundwater samples collected from well RD-30 during 1989 and concentrations have decreased since that time to approximately 5 micrograms per liter TCE in groundwater samples collected during February 2004.

[Source: Haley & Aldrich, Inc., 2006. "Report on Annual Groundwater Monitoring, First Quarter 2005, January through March 2005, Santa Susana Field Laboratory, Ventura County, California." 31 May 2005.]

2.3.3 Sources of Drinking Water

Groundwater is not used as a source of drinking water at SSFL. Bottled water is provided for drinking at the facility and water for non-potable uses is provided at the facility by the Calleguas Municipal Water District.

2.3.4 Surface Water Bodies

The locations of surface water bodies within one mile of the RMHF are shown on Figure 4. All surface water bodies within one mile of the facility are artificial or man-made structures. The primary functions of the on-site surface water impoundments are the recycling of water for industrial purposes and the retention of water from site operations and site runoff**.**

2.4 SOIL AND GROUNDWATER CONDITIONS

The soil and groundwater conditions at the RMHF have not been investigated for waste residues from the permitted units. As described in this Plan, the soil underneath the former storage and treatment units will be evaluated to determine the presence of waste residues. The SSFL Site wide Risk Assessment Methodologies presents the established background data (i.e., the concentrations of constituents which occur naturally in the soil). The statistical comparison methods found in the SRAM will be used to determine if residues have been released from the RMHF units. The purpose of using the SRAM is to ensure a consistent approach for site-wide clean up standards and the manner by which potential impacts from site activities are evaluated and determined.

For soil, the conditions used to evaluate closure will be the background soil data set for metals included in the SRAM Revision 2-Final, MWH, September 2005 or subsequent approved version. For groundwater, the conditions used to evaluate closure will be the groundwater comparison concentrations included in the SRAM Revision 2-Final, MWH, September 2005 or subsequent approved version.

However, the SRAM uses the term “Site Related Chemical” (SRC) to identify a broad spectrum of contaminants that have potentially impacted the subsurface from various onsite activities; while the chemicals treated and stored at the RMHF are identified as “constituents of concern” (COCs) and represent a small subset of SRCs. This Closure Plan only addresses the SRCs that are listed in the Part A Application that were approved for treatment and storage in the RMHF. The full range of SRC’s will be evaluated under the RCRA Corrective Action program.

2.4.1 Soil Conditions

Soil conditions used to evaluate closure of the RMHF will be the background soil data set for metals included in the SRAM Revision 2-Final, MWH, September 2005 or subsequent approved version. This background soil data set will serve as the basis for any soil comparisons required in support of RMHF closure activities. A copy of the current SRAM is provided in Appendix B.

2.4.2 Groundwater Conditions

Groundwater conditions used to evaluate closure of the RMHF will be the groundwater comparison concentrations included in the SRAM Revision 2-Final, MWH, September 2005 or subsequent approved version. These groundwater comparison concentrations will serve as the basis for groundwater comparisons required in support of RMHF closure activities.

2.5 WEATHER AND CLIMATE

2.5.1 Climate

The climate in the area of SSFL is characterized as "Mediterranean." The mean temperature during the winter months is approximately 50 degrees Fahrenheit (^{o}F) and the mean temperature in the summer months is approximately 70^{o}F.

Based on meteorological data collected between 1985 and 2003 from the SSFL weather station, rainfall has ranged from approximately 8 inches to approximately 35 inches on a calendar year basis. Average rainfall is on the order of 18 inches per year. The majority of the rainfall occurs between October and April.

2.5.2 Wind Pattern

A westerly wind ranging from 5 to 10 knots typically occurs from April to October. From November to March, the wind pattern is interrupted by weather fronts and "Santa Ana" wind conditions. During the passage of a weather front, gusty winds up to 20 knots occur from the southeast to the south. Winds shift to westerly or northerly following frontal passage and winds exceeding 25 knots may occur. During the fall, winter, and spring months, Santa Ana wind conditions can cause winds from the north or northeast in excess of 30 knots.

A Wind Rose Diagram that presents data from the weather station in Area IV is provided in Figure 5.

3.0 FACILITY DESIGN AND OPERATION

The RMHF was a mixed waste storage and treatment facility operating under RCRA interim status located at the former ETEC. Treatment activities conducted at the RMHF included elementary neutralization, stabilization, and size reduction. The RMHF was also used to store and treat low-level radioactive wastes that are regulated by the DOE. These Interim Status activities were conducted pursuant to the Part A Permit Application dated October 24, 1997 as authorized by the Department of Toxic Substances Control in the Interim Status Authorization Letter received by Boeing in December 1997. Copies of these documents are provided in Appendix A.

Storage and/or treatment will be conducted within these Interim Status units on a periodic basis until closure of these units is announced.

The maximum permitted mixed waste storage capacity at the RMHF was equivalent to 200 cubic yards in a total of 200 containers. The maximum permitted treatment volume, on an annual basis was 15,000 gallons or 136 cubic yards.

The entire RMHF facility is paved with either concrete or bituminous asphalt or is occupied by buildings with concrete foundations. The storage units at the RMHF consist of three buildings (4021, 4022, & 4621) and outdoor, asphalt-paved, mixed waste storage area.

Five ancillary buildings used for equipment and supply storage and offices for RMHF administration are also located at the RMHF facility; however, none of these buildings is used for the storage or treatment of mixed waste.

- Available “as-built” plans for RMHF structures are provided in Appendix C.
- The locations of structures and features at the RMHF are depicted in Figure 3.
- Table 1 provides a list of the units at the RMHF that are utilized in the treatment and storage of mixed waste (i.e., waste containing hazardous waste constituents)[3].
- Descriptions of the types of wastes that are stored in each unit are provided in Tables 2 and 3.
- Photographs of salient features of the RMHF are provided in Appendix D.

[3] The areas and units at the RMHF that handled only non-hazardous waste have not been included.

3.1 BUILDING 4621 AND OUTDOOR MIXED WASTE STORAGE YARD

Building 4621 and the outdoor mixed waste storage yard were used for the storage of low-activity, containerized mixed waste. Building 4621 construction is a steel frame, sheet steel sides and roofing. The floor is a concrete slab on grade. Generally, Building 4621 is used for the storage of mixed wastes in 55-gallon drums, while the area of the outdoor storage yard in the vicinity of Building 4621 is used for the storage of metal boxes containing dry mixed waste.

The remaining area of the outdoor storage yard was used to store dry mixed waste in large roll-off metal bins with capacities of up to 30 cubic yards. Containers holding mixed waste in liquid form were stored upon spill containment pallets within Building 4621. No waste containers were opened nor are wastes otherwise transferred or handled in the outdoor mixed storage yard. The outdoor storage yard was used solely for the storage of closed container wastes pending shipment offsite.

Building 4621 and the mixed waste storage yard are surrounded by a berm which would, in conjunction with the slope of the RMHF, direct a spill that is not immediately controlled to the storm water catch basin.

As previously discussed, the storm water catch basin, with a capacity of approximately 30,000 gallons, is used to contain storm water runoff from the RMHF and is located immediately to the west of the RMHF. The catch basin is also used to contain the spread of any accidental release of radioactive material and is monitored remotely for radioactivity and high liquid level with alarms reporting to the RMHF office and the Security Control Center.

3.2 BUILDING 4022 STORAGE VAULTS

Building 4022 is a high bay building with below grade storage vaults. Building construction is steel frame with sheet steel sides and roofing. The below grade portion of the building is constructed of reinforced concrete and consists of seven individual, air-cooled vaults for the storage of radioactive and mixed waste. A Floor Plan for Building 4022 is provided in Figure 6.

The vaults vary in size from 7.5 feet wide by 24.5 feet long to 17.5 feet wide by 25 feet long with 30-inch thick concrete walls. The vaults vary from 11.5 feet to 20 feet in depth and access is through removable, 30-inch thick magnetite concrete cover blocks. All seven vaults have a common drain system, which drains to a sump. Liquids captured in the sump were pumped into the facility’s radioactive liquid handling system.

Although the design capacity of the storage vaults exceeds the permitted storage capacity, the volume of waste was monitored through administrative controls to ensure that the amount in storage does not exceed the permitted storage capacity. The typical volume of waste stored in the vaults was 50 cubic yards of containerized waste. Mixed wastes stored in the vaults are double contained and the typical volume is based on the primary container volume.

Vault 1 and Vaults 3 through 7 were used for the storage of mixed waste and low-level radioactive waste. The storage of mixed waste in these vaults was consistent with the DOE policy of reducing personnel exposure to As Low As Reasonably Achievable (ALARA). Vault 2 was used to house an 8,000 gallon non-hazardous radioactive liquid storage tank.

3.3 BUILDING 4021 (DECONTAMINATION AND WASTE PACKAGING)

Building 4021 consists of a packaging room, a decontamination room with a work area, a hot and cold change room, and a laundry room. Building construction is steel frame with sheet steel roofing and sides. The floor is a concrete slab on grade.

Activities conducted within Building 4021 consisted of the treatment of small quantities of mixed waste, as well as the handling and processing of low-level radioactive wastes. Treatment is typically performed on a bench-scale basis and consists of elementary neutralization and stabilization to meet RCRA Land Disposal Restriction requirements for off-site disposal. A list of equipment used to carry out the approved treatment of mixed waste is provided in Table 4.

A portion of Building 4021 was also used to house the non-hazardous, radioactive liquid storage and evaporation system. The system was used to manage non-hazardous wastewaters resulting from decontamination operations such as rinsing and steam cleaning. Floor drains inside the building lead to an intermediate 300-gallon holding tank housed in a lined, subterranean vault. The system was designed to pump liquids that accumulate in the holding tank through a filter system in Building 4021 to the 8,000-gallon in Building 4022. The non-hazardous liquid was subsequently pumped back to the evaporator unit in Building 4021 on a demand basis.

A Schematic Layout of Buildings 4021 and 4022 is provided in Figure 7.

3.3.1 Elementary Neutralization

Elementary neutralization was performed in Building 4021 on a small scale, batch basis within one of two fume hoods. One hood is located in the decontamination area and the second is located in the waste packaging area.

The treatment equipment typically consisted of a magnetic stirring stand, graduated burette or similar apparatus to measure and introduce the neutralizing liquid, and a two-liter, borosilicate beaker or similar container that holds the waste that is to be neutralized. The mixture was stirred and the pH is monitored using a pH meter to confirm when neutralization was successfully completed.

Equipment was rinsed and the rinsate was collected into the same container that held the neutralized waste. The neutralized waste was subsequently stabilized prior to off-site disposal.

The maximum permitted treatment capacity of the batch elementary neutralization process was five gallons of waste per day.

3.3.2 Stabilization and Amalgamation

Waste stabilization was primarily conducted on mixed waste to meet state and federal land disposal restrictions ("land ban") requirements. Following stabilization, the waste was sent offsite for disposal. Stabilization was also used to solidify waste oil. A special form of stabilization known as "amalgamation" was the treatment process used for high mercury-content mixed waste. This treatment technology is specified in the state land ban regulations in 22 CCR 66268.40.

Three types of equipment were used for waste stabilization. Small quantities of waste were stabilized or amalgamated in five gallon containers. In this process, waste was poured into the container and the appropriate quantities of water and stabilizing or amalgamating material were added. Mixing was accomplished using hand-held equipment, such as a hand drill equipped with a paint stirring attachment.

Larger quantities of waste were stabilized in either a commercial-type concrete mixer or a barrel-style mixer. Waste that was stabilized in either of these pieces of equipment was subsequently transferred to appropriate containers, such as 55-gallon open head drums, for offsite disposal. The equipment was decontaminated with clean water after each use and the rinsate was collected, stabilized and managed appropriately.

Prior to conducting any stabilization activities, the area floor drain was covered to prevent the migration of spills.

The maximum permitted treatment capacity for stabilization was 55 gallons per day.

4.0 HAZARDOUS WASTE CONSTITUENTS

4.1 WASTE GENERATION PROCESS

Currently, the RMHF is dedicated for the exclusive support of D&D activities, which involve conducting initial radiation surveys, installing protective equipment (air locks, tenting, shielding, temporary ventilation systems), removing contaminated materials and equipment, decontaminating external sources, conducting final verification surveys, and packaging waste for shipment.

In addition, to radiological contamination, certain structures within ETEC that are scheduled for D&D are suspected of containing hazardous materials such as lead-based paint, asbestos insulation, solvents, oils, and greases. In these circumstances, samples will be collected during the initial survey activities and submitted for chemical analysis for proper hazardous waste characterization. Radiological wastes and mixed wastes are sent to the RMHF for interim storage and/or treatment prior to offsite shipment for disposal. All wastes must be characterized prior to acceptance at the RMHF.

4.2 HAZARDOUS WASTE CONSTITUENTS

Mixed wastes stored at the RMHF generally fall into one of the following categories: inorganics, organics, organic liquids containing inorganic constituents, waste acids containing metals, solidified oil containing F-listed wastes, asbestos, and used oil.

Hazardous waste constituents potentially present in the wastes that are typically stored and treated at the RMHF are presented in Table 3.

5.0 ESTIMATE AND MANAGEMENT OF MAXIMUM INVENTORY

5.1 MAXIMUM INVENTORY

The maximum permitted storage capacity for mixed waste was the equivalent of 200 cubic yards in 200 containers.

5.2 MANAGEMENT OF MAXIMUM INVENTORY

Mixed waste will be shipped to an approved mixed waste disposal facility. Mixed waste requiring treatment prior to shipment will be treated with the appropriate treatment method as described in Section 3.3 of this Closure Plan.

6.0 FACILITY CLOSURE

6.1 OBJECTIVES

The objectives of this Closure Plan are to meet the Closure Performance Standards prescribed in 22 CCR, Section 66265.111 and to achieve clean closure of the RMHF pursuant to facility closure requirements for Interim Status Facilities in 22 CCR, Division 4.5, Chapter 15 by demonstrating that hazardous waste and hazardous constituent residues have been removed or are left in place at levels that are protective of public health and the environment, while assuring that exposures to ionizing radiation and releases of radioactive materials are reduced to As Low As Reasonably Achievable (ALARA) pursuant to the established site clean up standard.

In addition to mixed waste activities, DOE has also used some of the mixed waste storage and treatment units to be closed and nearby areas within the RMHF to store or treat DOE-regulated, low-level radioactive wastes. In parallel with DOE removing the RMHF from service as a hazardous waste facility through this DTSC-approved closure plan, DOE will remove the RMHF from all radiological service (i.e., mixed waste, low-level radioactive waste service) through its decontamination and decommissioning (D&D) program. These DOE activities are being independently undertaken by DOE under its exclusive Atomic Energy jurisdiction. Compliance with DOE's D&D requirement that residual radioactivity be reduced to a level that permits release of the RMHF site for unrestricted use is not a requirement for facility closure pursuant to this Closure Plan.

All activities required to meet Interim Status closure requirements for hazardous waste facilities are subject to DTSC's jurisdiction. Some closure activities may be sequenced to D&D activities subject only to DOE jurisdiction. Specifically, in any area subject to the closure requirements, the chemical cleanup under the Closure Plan may take place following pre-demolition radiological release under the D&D program. Similarly, subsequent to building demolition some cleanup of chemical releases to soils may take place following D&D radiological release by DOE.

6.1.1 General Approach to Closure

The general approach to facility closure is to reduce the chemical hazards to levels that can be safely managed with minimal exposure to personnel or impacts to the environment prior to dismantlement. The dual characteristics of mixed waste present a set of unique considerations relative to the techniques and methods that are best suited for the closure of the RMHF. Essentially,

- the methods used for closure must meet the intent of, and achieve the performance goals for hazardous waste and hazardous waste constituents pursuant to facility closure requirements for Interim Status Facilities in 22 CCR, Division 4.5, Chapter 15; and,

- the methods used for closure of the RMHF must ensure that exposures to ionizing radiation and releases of radioactive materials are reduced to As Low As Reasonably Achievable (ALARA) pursuant to DOE requirements.

6.1.2 Project Control Documents

The principal project control elements governing the Closure of the RMHF pursuant to Interim Status Facility requirements are state hazardous waste regulations and this Closure Plan after it has been approved by DTSC.

Principal project control elements governing the performance of closure activities in DOE radiologically controlled areas or on equipment, buildings, structures or other areas contaminated with DOE radioactive materials consist of multiple documents, which include radiological project management plans, standard operating procedures, and detailed D&D workplans. In addition, the project will comply with 10 CFR 835 (Occupational radiation protection), 10 CFR 851 (Worker safety and health program), DOE order 450.4, Safety management system policy.

6.1.3 Role of the California Department of Health Services during Closure Activities

In 2002, the Governor of California issued a moratorium on the disposal of waste materials originating from former radiological facilities that passed the approved numerical release criteria but potentially contained amounts of manmade radioactivity above background. These materials were defined as "Decommissioned Materials" (DM) and were no longer permitted to be disposed of in Class III or unclassified (unlined) waste disposal sites. Under the Governor's moratorium, the materials below the release criteria from a demolished former radiological facility can only be disposed of at a Class I or Class II disposal waste facility when they have zero radiological activity present above background levels.

Boeing has established the following process for identifying materials that fall within the category of decommissioned materials: The Boeing Health, Safety and Radiation Services department first works with the Boeing DOE Site Restoration department personnel to assure that contamination levels are below the designated criteria. Documentation is then provided to the DHS-RHB. The DHS-RHB then performs a verification survey, provides written concurrence, and the materials are then sent to a Class I hazardous waste facility.

6.2 CLOSURE SURVEYS

During the course of the facility closure process, it will be necessary to conduct one or more of the following surveys to ensure the safety of the workers and the proper handling and management of the equipment and demolition debris. Implementation of these surveys will typically occur prior to building demolition, but could also occur or be repeated at any point during the closure process as necessary to properly characterize demolition debris.

6.2.1 Radiation Survey

Initially and during the course of the closure process, it will be necessary to survey building contents or structures for radiological contamination. The results of the survey will be used to estimate the effort required to reach DOE release criteria, as well as to safety manage any materials determined to contain radiological contamination.

6.2.2 Residual Waste Characterization Survey

Initially, and during the course of facility closure, it will be necessary to conduct a visual inspection of certain RMHF appurtenances to assess whether there is evidence of residual chemical contamination, such as discoloration or wetness of the concrete, or an obvious accumulation of waste outside a container. Each area in which evidence suggests that a release will have occurred is documented in the field records (described in Section 7.6 of this Closure Plan) and the boundary of the affected area is demarcated.

Verification sampling, as described in Section 8.0 of this Closure Plan will be conducted on each affected area to characterize the contaminants. The analytical data will be used in the decision making processes for the proper management of the demolition debris as described in Sections 6.3.4.1 through 6.3.4.6 of this Closure Plan.

6.2.3 Underground Utilities Survey

An underground utilities survey will be necessary to locate and mark underground utilities. The purpose of this survey is to identify the locations at which underground utilities will be isolated and disconnected, as well as to ensure that live utilities are not damaged during the excavation of foundations and pavement. If conducted, the survey will be conducted by a contracted locator service, such as ULS Services.

6.2.4 Land Survey

The purpose of the land survey is to ensure that the locations of improvements are recorded and documented. A land survey will be conducted of the RMHF to a survey mark established by a registered land surveyor. This information will be used to meet the objectives of the soil and groundwater sampling program described in Section 9.0 of this Closure Plan.

6.2.5 Asbestos Survey

An asbestos survey will be necessary to verify whether asbestos-containing material (ACM) is present in or on any of the buildings or structures. If the presence of asbestos is confirmed, a certified asbestos abatement/removal contractor will be hired to remove the ACM and certify clearance. ACM will be disposed of at an appropriate off-site disposal facility.

6.3 CLOSURE PROCESS

Progression of closure of the RMHF will follow the general sequence of:

1. Treatment and removal of the mixed waste inventory.
2. Decontamination and removal of non-essential equipment.
3. Implementation of Closure Surveys
4. Demolition and disposal of all buildings and structures
5. Decontamination or disposal of the remaining equipment.
6. Soil sampling (refer to Section 9.0 of this Closure Plan.

These sequential steps are discussed further in the following subsections. A General Flow Diagram for the Demolition and Closure of the RMHF is provided in Figure 9.

6.3.1 Treatment and Removal of Mixed Waste Inventory

Step 1 of the closure process is to remove any remaining waste inventory. The RMHF is no longer accepting waste, except that which will be generated during closure, and the removal of the current inventory of mixed waste is nearly complete. Notwithstanding this, any remaining mixed waste requiring treatment or remaining in inventory at the commencement of RMHF closure will be treated and/or shipped to offsite, permitted disposal facilities as standard practice. In October 2006, approximately 83 cubic feet of lead characteristic waste were in storage. No significant additions to this estimated inventory are anticipated.

6.3.2 Removal of Non-Essential Equipment

Step 2 of the closure process is to remove all equipment that is non-essential for use in the closure of the RMHF (e.g., piping, tanks, fume hoods, miscellaneous tools and equipment). The following decision-making process will be used to determine appropriate disposition of this equipment:

Equipment will first be evaluated to: 1) determine whether radiological contamination is present and 2) assess whether hazardous waste constituents can feasibly be removed. The outcome of this decision-making process will determine whether the equipment will be:

- disposed of as mixed waste;
- decontaminated to remove hazardous waste constituents and transferred for use in other locations of SSFL; or,
- decontaminated to remove hazardous waste constituents and disposed of as radioactive waste.

Decontamination activities will be conducted according to the decontamination procedures described in Section 7.0 of this Closure Plan. Verification sampling for chemical constituents as described in Section 8.0 of this Closure Plan will be performed on waste treatment equipment that has been decontaminated.

6.3.3 Conduct Closure Surveys

Step 3 of the closure process is to conduct the closure surveys described in Section 6.2 of this Closure Plan. Data collected during these surveys will be used to: 1) ensure the safety of the workers; 2) determine the proper handling and management requirements for the demolition debris; and, 3) further the closure process of the RMHF. Data collected from these surveys will be maintained as part of the Closure Records described in Section 7.6.

6.3.4 Demolition of the Buildings and Structures

Step 4 of the closure process is to initiate demolition of the buildings and structures. The methods used for the demolition of the buildings, their foundations, and other structures will be selected based on the amount and type contamination that is determined by the closure surveys.

In some instances, contaminated materials may require sectioning (i.e., size reduction) in place for immediate packaging as radioactive waste, while other materials may be entombed or encapsulated after they have been removed. Selection of the most appropriate demolition alternative will be at the discretion of the project manager with oversight of the RMHF closure.

Above-grade, structural components of the buildings will be razed prior to removal of building foundations or the asphalt and concrete pavement. The purpose is to provide a “cap” barrier to any potential sources of subsurface radiological contamination.

Currently, it is anticipated that all buildings and structures will be razed and disposed. All resulting construction debris will be appropriately characterized for waste disposal.

Notwithstanding the complete removal of buildings and structures, any RCRA unit (building, equipment, and structures) that remains onsite after closure will be sampled to verify that closure performance standards have been met (i.e., no chemical contamination is present). If verification sampling reveals chemical contamination on any of the buildings, equipment, or structures, then micro-decontamination procedures as described in Section 7.0 will be used to achieve the closure performance standards in Section 11.0.

6.3.4.1 Building 4022

The data that are collected during the closure surveys of Building 4022 will be evaluated and the following decision-making process will be used to determine the most appropriate method by which to manage the demolition debris:

- If no radiological or chemical contamination are present, the debris can be disposed of as decommissioned waste.

- If radiological contamination is not present but evidence of chemical contamination is present, the building debris can be disposed of as hazardous waste.

- If radiological contamination is present, but there is no evidence of chemical contamination:

    - the radiological contamination can be removed and the building can be disposed of as decommissioned waste; or
    - the debris can be packaged as low-level radiological waste.

- If both radiological contamination and chemical contamination are present:

    - the radiological and chemical contamination may be removed and the demolition debris can be disposed of as decommissioned waste; or,
    - the chemical contamination may be removed and the debris can be dismantled and packaged as low-level radiological waste; or,
    - the debris can be packaged as mixed waste.

6.3.4.2 Building 4021

Building 4021 has extensive interior radiological contamination and many areas are inaccessible. Radiological decontamination is infeasible and it is expected that the entire building and its contents will, at minimum, be packaged as low-level waste; however, if waste characterization data indicate that chemical contamination at hazardous waste levels is present the debris will be disposed of as mixed waste.

6.3.4.3 Building 4621

The data that are collected during the closure surveys of Building 4261 will be evaluated and the following decision-making process will be used to determine the most appropriate method by which to manage the demolition debris:

- If no radiological or chemical contamination are present, the debris can be disposed of as decommissioned waste.

- If radiological contamination is not present but evidence of chemical contamination is present, the building debris can be disposed of as hazardous waste.

- If radiological contamination is present, but there is no evidence of chemical contamination:

  - the radiological contamination can be removed and the building can be disposed of as decommissioned waste; or
  - the debris can be packaged as low-level radiological waste.

- If both radiological contamination and chemical contamination are present:

  - the radiological and chemical contamination may be removed and the demolition debris can be disposed of as decommissioned waste; or,
  - the chemical contamination may be removed and the debris can be dismantled and packaged as low-level radiological waste; or,
  - the debris can be packaged as mixed waste.

6.3.4.4 Outdoor Mixed Waste Storage Yard and Building Foundations

The data that are collected during the closure surveys on the entire footprint of the RMHF (including the outdoor mixed waste storage yard and the building foundations) will be evaluated and the following decision-making process will be used to determine the most appropriate method by which to manage the demolition debris:

- If no radiological or chemical contamination are present, the debris can be disposed of as decommissioned waste.

- If radiological contamination is not present but evidence of chemical contamination is present, the building debris can be disposed of as hazardous waste.

- If radiological contamination is present, but there is no evidence of chemical contamination:

  - the radiological contamination can be removed and the building can be disposed of as decommissioned waste; or
  - the debris can be packaged as low-level radiological waste.

- If both radiological contamination and chemical contamination are present:

  - the radiological and chemical contamination may be removed and the demolition debris can be disposed of as decommissioned waste; or,
  - the chemical contamination may be removed and the debris can be dismantled and packaged as low-level radiological waste; or,
  - the debris can be packaged as mixed waste.

6.3.5 Disposition of the Remaining Equipment

Equipment used during closure activities will include that which is re-useable or disposable in nature. Examples of re-useable equipment include forklifts, backhoes, bulldozers, cranes, vacuum trucks, and electric-powered pumps, steam-cleaning equipment and certain hand tools. Examples of disposable equipment include single use hand pumps and sampling equipment, used absorbent materials, certain personnel protective equipment, and single use hand tools.

As the closure of the RMHF progresses, equipment that is no longer required to implement or facilitate closure will either be:

- disposed of as mixed waste;
- decontaminated to remove hazardous waste constituents and transferred for use in other locations; or,
- decontaminated to remove hazardous waste constituents and disposed of as radioactive or decommissioned waste.

Hazardous waste decontamination procedures are discussed in Section 7.0 of this Closure Plan.

6.4 DISPOSITION OF DECONTAMINATION WASTE AND DEMOLITION DEBRIS

6.4.1 Estimated Volume of Waste Generated During Closure of the RMHF

The estimated volume of waste and demolition debris that are anticipated to be generated during closure of the RMHF are presented in Table 5.

The estimated volume of soil that will be removed during RCRA closure of the RMHF is 200 cubic yards.

6.4.2 Waste Determination Procedures

During the course of RMHF closure, it will be necessary to collect and analyze samples to properly characterize wastes generated during demolition activities. These samples will be collected and analyzed according to the applicable and appropriate analytical methods identified in Section 10.0 of this Closure Plan.

6.4.3 Waste Accumulation

Hazardous wastes that are generated during the closure of the RMHF will be accumulated in appropriate containers or portable tanks for less than 90 days in accordance with hazardous waste generator requirements prior to being shipped offsite to the designated disposal facilities. Where possible, the wastes will be pumped directly onto the transport vehicles for transport to the designated disposal facilities.

6.4.4 Designated Disposal Facilities

Wastes (including contaminated soils) and debris generated during closure will be shipped offsite for disposal. Hazardous or mixed waste and debris will be shipped to authorized, offsite hazardous or mixed waste facilities, as appropriate using Uniform Hazardous Waste Manifests. Low level radioactive waste and debris will be shipped to an appropriately authorized/licensed offsite low level radioactive waste facility (e.g., Nevada Test Site). Other waste and debris that contain radioactivity above background levels will be shipped to a California Class I hazardous waste facility according to the process described in Section 6.1.3 of this Closure Plan.

Table 6 identifies the designated disposal facilities to which debris and wastes generated during closure are expected to be shipped.

7.0 HAZARDOUS WASTE DECONTAMINATION PROCEDURES

This Section details the decontamination procedures techniques that will be used during the closure of the RMHF.

7.1 MICRO-DECONTAMINATION

If, during the closure of the RMHF, chemical decontamination is required, Micro-decontamination procedures will be used to the fullest extent practicable to mitigate the volume of decontamination wastes that are generated and, more specifically, the volume of decontamination liquids that are generated. The rationale for using Micro-decontamination techniques is supported by the following:

- Micro-decontamination is consistent with the waste minimization requirements of DOE Order 435.1 for radioactive waste.
- Gross decontamination procedures such as steam cleaning of an entire building would generate larger, unnecessary volumes of potentially mixed waste.

If, after a residual waste characterization survey, the project manager with oversight of the RMHF closure determines that decontamination is necessary, the area will be decontaminated using one or more of the following Micro-decontamination procedures:

- Wipe cleaning the immediate area that has been affected by a release.
- Limited steam (or water washing, etc.) cleaning of the affected area.
- Isolating and removing the affected area and managing the affected material as a mixed waste.

Selection of the most appropriate decontamination technique will be at the discretion of the project manager with oversight of the RMHF closure. In instances where decontamination is selected, verification sampling and analysis, as described in Section 8.0 of this Closure Plan, will be used to confirm that the area has been properly decontaminated.

7.2 DECONTAMINATION OF BUILDINGS AND STRUCTURES

Areas identified during residual waste characterization surveys as having residual chemical contamination will be decontaminated using Micro-decontamination procedures. As discussed previously, Micro-decontamination techniques are designed to mitigate the volume of wastes that are generated during decontamination activities and include the following techniques:

- Wipe cleaning the immediate area that has been affected by a release.
- Steam cleaning (or water washing, etc.) the affected area.
- Isolating and removing the affected area and managing the affected material as a mixed waste.

- Managing the decontamination products as described in Section 7.5.

Selection of the most appropriate decontamination technique will be at the discretion of the project manager with oversight of the RMHF closure. Wastes that are generated during decontamination activities will be containerized and characteristics determined using applicable State and Federal regulations. In instances where decontamination is selected, verification sampling and analysis, as described in Section 8.0 of this Closure Plan, will be used to confirm that the area has been properly decontaminated.

7.3 DECONTAMINATION OF EQUIPMENT

The following provisions have been made to decontaminate equipment during closure of the RMHF should a need for such procedures arise. The decontamination and disposition of personal protective equipment (PPE) is not discussed in this Closure Plan. More appropriately, it will be addressed in the various contractor Health & Safety Plans that will be prepared for the closure of the RMHF after the Closure Plan for the RMHF has been approved by DTSC.

Decontamination procedures will include steam-cleaning, scrubbing the equipment with an industrial grade detergent and rinsing with tap water, or simply wiping the equipment clean. The selection of the appropriate decontamination method will be at the discretion of the project manager responsible for overseeing closure activities. However, the use of wiping for decontamination purposes will be reserved for small equipment; such as powered hand tools.

7.4 PROVISIONAL DECONTAMINATION AREA

As closure proceeds toward completion, it may become necessary to decontaminate large pieces of equipment. Therefore, the following provisions have been made to construct a temporary decontamination area should it become necessary.

A suitable location within the RMHF that is situated apart from the physical demolition activities will be selected for the decontamination pad. A containment berm will be established around the perimeter of the pad using sand bags or the equivalent. The entire pad and containment berm will be covered with a heavy mil visqueen (minimum of 10mil) and anchored on the outside of the berm using sand bags or other appropriate means. Liquids generated from decontamination activities will be squeegeed to one end of the pad and simultaneously vacuumed into a truck or pumped into drums and managed appropriately.

7.5 MANAGEMENT OF DECONTAMINATION WASTES

Wash water generated from decontamination activities will be collected using a vacuum truck or will be pumped into appropriate shipping containers. Used wipe rags and disposable equipment generated from decontamination activities will be collected and placed in appropriate shipping containers. Wastes generated from decontamination activities will be characterized and managed as appropriate. The accumulation of these wastes will be performed in accordance with Section 6.4 of this Closure Plan.

7.6 FIELD RECORDS

Field records will be maintained to demonstrate that closure activities are conducted in a manner that is consistent with the approved Closure Plan. Field Records for the closure of the RMHF will be complied in a bound field notebook.

Information recorded in the notebook may include:

- Date
- The time at which daily activities commence
- Weather conditions
- Daily tailgate meeting information
- Activities that are scheduled for the day, including a notation as to whether they have been completed on that day
- Name of personnel onsite and their representative companies
- D&D information
- Sampling information
- Waste shipment information
- Other data germane to the closure of the RMHF
- Unusual conditions
- Issues that delay closure activities
- Communications between personnel
- Communications to, and from oversight Agencies
- Project Comments

Photographs may be taken to photo-document certain activities where necessary and appropriate. Photographs taken of closure activities will be maintained as part of the RMHF closure field records.

8.0 VERIFICATION SAMPLING

The purpose of verification sampling is to confirm that either:

- Equipment, structures, and/or buildings are not contaminated; and,
- Contaminated equipment, structures, and/or buildings have been properly decontaminated.

As discussed in Section 6.2 of this Closure Plan, verification sampling will be performed after decontamination activities. Should verification sampling be necessary, the sampling will be conducted using the following guidelines:

- Chip samples will be collected of concrete surfaces.

Chip samples are collected using a chisel, drill, hole saw, or similar tool. A minimum of 100 g of the sample is collected to a depth of 2 cm, or to an alternate depth appropriate to collect the amount of sample necessary for analysis. The collected chips will be of any convenient size unless otherwise specified by the laboratory designated to perform the analysis. The sample is transferred to an appropriate sample container and managed according to proper chain-of-custody procedures.

- Wipe samples will be collected of metal surfaces.

Wipe sampling is conducted using a plastic or cardboard template approximately $1 ft^2$ (e.g., 1 foot x 1 foot or other shape totaling $144 in^{2)}$. The sample media (e.g., clean filter paper) is moistened with 1 to 2 ml of de-ionized water or a pre-moistened wipe will be used. The template is placed over the area to be sampled; however, if the object has a total surface area of less than $1 ft^2$ the whole surface area will be sampled and the surface area is recorded. The surface is wiped using firm pressure, using 3 or more S-strokes (in one direction to cover the entire surface area). The sampling medium is then placed in a plastic bag or vial, sealed, and managed according to proper chain-of-custody procedures.

Samples will be analyzed for organic constituents and Title 22 Metals identified in Section 10.0 of this Closure Plan. If sample analyses indicate that hazardous waste or hazardous waste constituents are still present at concentrations that require management as a hazardous waste, the project manager having oversight of facility closure activities will assess whether to:

- attempt further decontamination; or,
- manage the material as a hazardous waste; or
- manage the material as a mixed waste, as appropriate.

9.0 SOIL SAMPLING

Soil sampling will be conducted and groundwater sampling may be conducted pursuant to this sampling plan after buildings and structures have been removed from the RMHF to:

1. support the closure of the Radioactive Materials Handling Facility (RMHF) pursuant to facility closure requirements for Interim Status Facilities in 22 CCR, Division 4.5, Chapter 15; and
2. evaluate whether the subsurface media have been impacted by RMHF activities.

The overall goal of this sampling plan is to develop the data necessary to demonstrate clean closure of the RMHF, i.e., that hazardous waste and hazardous constituent residues have been removed or, alternatively, are left in place at levels that are protective of public health and the environment.

9.1 SOIL AND GROUNDWATER CONDITIONS

The soil underneath the former storage and treatment units will be evaluated to determine the presence of waste residues. The SSFL Site wide Risk Assessment Methodologies presents the established background data (i.e., the concentrations of constituents which occur naturally in the soil). The statistical comparison methods found in the SRAM will be used to determine if residues have been released from the RMHF units. The purpose is to ensure a consistent approach for site-wide clean up standards and the manner by which potential impacts from site activities are evaluated and determined.

For soil, the conditions used to evaluate closure will be the background soil data set for metals included in the SRAM Revision 2-Final, MWH, September 2005 or subsequent approved version. For groundwater, the conditions used to evaluate closure will be the groundwater comparison concentrations included in the SRAM Revision 2-Final, MWH, September 2005 or subsequent approved version.

However, the SRAM uses the term “Site Related Chemical” (SRC) to identify a broad spectrum of contaminants that have potentially impacted the subsurface from various onsite activities; while the chemicals treated and stored at the RMHF are identified as “constituents of concern” (COCs) and represent a small subset of SRCs. This Closure Plan only addresses the SRCs that are listed in the Part A Application that were approved for treatment and storage in the RMHF. The full range of SRC’s will be evaluated under the RCRA Corrective Action program.

9.2 INVESTIGATION AREAS

The RMHF will be divided into investigation areas consisting of:

- Building 4021;
- Building 4022;
- Building 4621; and,
- The outdoor mixed waste storage yard.

Biased sampling will be performed of all areas, including:

- the footprint of each building that was used for storage and/or treatment of mixed waste;
- the storage vaults located within Building 4022;
- the areas in proximity to the overhead doors of Building 4022 where loading/unloading of mixed waste containers occurred;
- the location of interior sumps and/or drains within the ISD units; and,
- any location within the ISD Units in which significant cracks or visible staining is observed.

Samples of soil matrix will be collected and managed as detailed in Sections 9.4 and 9.5. Groundwater samples will not be collected during the initial sampling activities; however, a contingency for groundwater sampling is included in this Closure Plan and the procedure is described in Section 9.6. Soil matrix samples will be analyzed for the organic and inorganic constituents detailed in Section 10.0 “Analytical Test Methods.”

9.3 SAMPLE LOCATIONS

A combination of biased and random sample locations will be used for soil sample collection. Random samples will be collected in Building 4621 outdoor storage yard where only mixed waste with no liquids was stored in closed containers. Biased sample locations have been designated in the other permitted units in which open containers of mixed waste was handled, stored or treated.

The density of random samples is consistent with the US Department of Energy’s “Visual Sampling Plan” program and the density of biased sample locations equals or exceeds sampling program requirements. Therefore, it is believed that the number and locations of random and biased samples is adequate for closure purposes.

If analytical results indicate that subsurface soils have been impacted by a release from a permitted unit that requires additional investigation, an additional soil sampling workplan will be prepared to determine the nature and extent of the release.

Information from the land survey conducted as part of the pre-demolition closure activities (refer to Section 6.2.4 of this Closure Plan) will be used to identify the perimeters of the former locations of Buildings 4021, 4022, 4621, and the Building 4621 Mixed Waste Storage Yard.

The perimeters of these locations will be staked and marked to assist in the placement of the sample locations. A total of 44 sampling locations have been identified for the RMHF. Figure 10 depicts the proposed biased sample locations: 1) along the perimeters of the buildings and 2) at the locations of the areas of additional investigation. Figure 11 depicts the sample locations within the interior of Building 4022. The methodology used for the selection of these locations is described in the following sections.

An additional 15 random, gridded sampling locations have been included for the Mixed Waste Storage Yard at the RMHF. The locations of these samples will be selected using the sampling method described in Section 9.3.9. These areas, which are depicted in Figure 12, will also be staked and marked to assist in placement of the borings.

9.3.1 Building 4021

A total of 13 sample locations have been identified for Building 4021. Four sample locations will be designated at each corner of a rectangular footprint and a fifth location will be designated in the center of the footprint. Four additional sample locations will be placed along the perimeter of the building footprint spaced less than 25 feet apart.

Two sumps are located within Building 4021. One sump, located in the Decontamination Room, is approximately 19” X 19” X 32” deep. The second sump is located in the Packaging Room and is 30” X 30” X 15” deep. A sample location will be designated at the based of each of these sumps (two sample locations total)

The remaining two sample locations will be designated in proximity to, and along the length of the overhead door where mixed waste containers were loaded/unloaded. This overhead door is located along the north side of the building.

Additional biased sample locations may be identified within Building 4021 using the following procedure.

Prior to building demolition, the interior area of the Building 4021 will be inspected for visual evidence of staining. Each location in which such evidence is identified will be noted on a diagram of the building’s interior corresponding to the physical location of the staining. The diagram will be used in conjunction with the land survey to stake and mark additional biased sample location(s). These locations are not depicted in Figure 10.

9.3.2 Building 4022

A total of 26 sample locations have been identified for Building 4022. Sample locations will be determined by identifying the rectangular footprint for the building. Four sample locations will be designated at each corner of a rectangular footprint. Six additional sample locations will be identified along the perimeter of the footprint. These locations will be selected at intervals of approximately 20 feet from the corners. Two sample locations each will be designated in Vaults 1, 2, 5 and 6 (eight sample locations total) and one sample location each will be designated in Vaults 3, 4 and 7 (three sample locations total). All samples will consist of existing soil beneath the vaults.

Four sample locations will be designated in proximity to, and along the length of the two overhead doors where mixed waste containers were loaded/unloaded (two sample locations per door). One overhead door is located along the north side of the building and the second overhead door is located on the south side of the building.

One sump is located exterior to Building 4022 at the southwest corner (refer to Figure 10). The sump is 3 feet in diameter and approximately 27 feet in depth. One soil sample will be collected from beneath this sump.

Additional biased sample locations may be identified within Building 4022 using the following procedure.

Prior to building demolition, the interior area of the Building 4022 will be inspected for visual evidence of staining. Each location in which such evidence is identified will be noted on a diagram of the building's interior corresponding to the physical location of the staining. The diagram will be used in conjunction with the land survey to stake and mark additional biased sample location(s). These locations are not depicted in Figure 10.

9.3.3 Building 4621

A total of 5 sample locations have been identified for Building 4621. Four sample locations will be designated at each corner of a rectangular footprint and a fifth location will be designated in the center of the footprint. No sumps are associated with this building.

Additional biased sample locations may be identified within Building 4621 using the following procedure.

Prior to building demolition, the interior area of the Building 4621 will be inspected for visual evidence of staining. Each location in which such evidence is identified will be noted on a diagram of the building's interior corresponding to the physical location of the staining. The diagram will be used in conjunction with the land survey to stake and mark additional biased sample location(s). These locations are not depicted in Figure 10.

9.3.4 Outdoor Mixed Waste Storage Yard

The Building 4621 Mixed Waste Storage Yard is the open-area of RMHF north, east and west of building 4621. Random, grid-based sampling of the Mixed Waste Storage Yard will be conducted at approximately 15 locations.

A 25-foot square grid will be established within the perimeter of the Mixed Waste Storage Yard corresponding to the grid identified in Figure 12. A Mixed Waste Storage Yard sample will be located at each grid node. Based on the US Department of Energy, "Visual Sampling Plan" program, this grid spacing and sample location density would provide for the definition of any elliptical "hotspot" with a semi-major axis length of about 17 feet at a 95% confidence interval (Battelle Memorial Institute, 2005).

The grid nodes marked on the map will be transferred to the ground by survey and these locations will be staked and marked. These will serve as the locations from which the gridded soil samples will be collected. The grid map and other information generated as part of the sample location selection process will be documented in the Field Records described in Section 7.6 of the Closure Plan.

Additional biased sample locations within the outdoor mixed waste storage yard may be identified if visual evidence (i.e., staining) suggests that a release may have occurred.

9.4 SAMPLE COLLECTION

9.4.1 Soil Matrix Samples

Soil samples will be collected using hollow-stem-flite-auger drilling equipment and a "split-spoon" type drive sampler at the biased locations shown on Figures 10 through 12. EPA Method 5035 will be used for collecting soil samples for analysis of VOCs.

Sampling equipment will be cleaned using a non-phosphate cleaning solution and a long-handled scrub brush. Equipment will be tripled rinsed in distilled water. Brass sample tubes will be cleaned and air dried prior to usage. All drilling tools will be thoroughly cleaned with a non-phosphate cleaning solution and rinsed before commencing the drilling of individual borings.

Soil matrix sample depths have been specified for all borings as:

- At the surface or just below the surface cover (6 inches below ground surface).
- At depths of 2 feet, 6 feet and 10 feet below ground surface, or
- The depth of auger and sampler refusal, whichever is less.

Samples will be described based on visual observations and the data recorded on lithologic logging forms.

After collecting the sample, the soil-matrix sample tubes will be capped with Teflon sheeting, plastic caps will be placed over both ends of the tube, a label affixed. The rock-core samples will be placed in 4oz, wide-mouth, glass jars with Teflon lined threaded caps and a label affixed. Each sample container will be placed in its own self-sealing plastic bag. Each label will identify the name of the site, date, time, sample identification, and analyses required.

The sample containers will be immediately placed in an insulated cooler with ice stored in double, re-sealable plastic bags. The temperature in the coolers will be maintained at or below 4^{o} Celsius, from the time of sample collection to the time of delivery to the analytical laboratory. The sample cooler will be taped shut, and two custody seals will be taped across the cooler lid, one in the front and one in the back. All samples will be delivered, transported by laboratory courier, or will be shipped by overnight carrier to the laboratory. Chain-of-custody documentation will be completed and will accompany each sample shipment as described in Section 9.3.4.

Soil and rock matrix samples will be identified using the following system:

B(Boring Number)_Date_Depth Below Land Surface

For example, sample B11-113004-20 will have been collected from boring 11 on November 30, 2004 at a depth of 20 feet below land surface. The initial “B” signifies a matrix sample boring.

Each sample boring location will be backfilled with bentonite and the surface will be patched with asphalt or concrete, if appropriate.

9.4.1.1 Field Screening Soil Samples for Volatile Organic Compounds

Concurrent with the collection of soil samples for laboratory analysis, a second sample will be collected from each location and field screened for volatile organic compounds (VOCs) using a photo-ionization detector (PID) with a 11.4 eV bulb. The PID will be calibrated with isobutylene.

Each discrete sample will be placed in a plastic, re-sealable baggie to approximately half full and zipped to close. The soil will be loosened in the bag, to the extent practical, and shaken vigorously to allow for headspace development.

After allowing for equilibration, the appropriately calibrated PID sampling probe will be inserted into the bag by unzipping the corner approximately one to two inches and inserting the probe, or insert the probe through the plastic.

The samples and their corresponding maximum meter responses will be recorded in the field log book for comparison purposes.

9.4.2 Groundwater Sampling

Groundwater samples will not be collected during the initial sampling activities. However, a monitoring well will be developed at one location for each of the ISD units (a maximum of four monitoring wells) when analysis of the soil sample obtained at 10' below ground surface (BGS) indicates the presence of an analyte at a concentration that statistically exceeds the background soil data set included in the SRAM Revision 2-Final, MWH, September 2005 or subsequent approved version.

If it is determined that monitoring wells are required, a separate water quality sampling and analysis plan (WQSAP) will be prepared.

The monitoring well will be developed at or in close proximity to the biased soil sample location in which the analytes were detected. In the event that analytes are detected at more than one biased sample location within a given ISD unit, the monitoring well will be developed at the biased soil sample location with the highest concentration of analytes at the lowest depth.

The monitor wells will be drilled by the continuous coring method. This method allows for detailed description of the lithology encountered during drilling and the detection of first groundwater during drilling. The core provides a durable and tangible record of the geology at a particular location.

The boreholes for the wells will be cored to a depth of approximately 10 below the first indications of groundwater. The presence of groundwater will be detected by visual observation of the core and cutting/fluid discharges at the wellhead during drilling operations, and by periodic monitoring for groundwater using an electric sounder or bailer during coring. In low yield boreholes, which may be encountered in the vicinity of RMHF, it may be necessary to discontinue drilling operations and allow groundwater to recover for a period of 2 or more hours followed by the downhole monitoring of water conditions using an electric sounder or a bailer.

Following drilling to total depth, borehole geophysical logs will be obtained from each well consisting of and optical televiewer log and a natural gamma log. The optical televiewer log provides a permanent, electronic visual record of the subsurface materials encountered in the borehole (as with video logs) above the water table and in clear borehole fluids (low turbidity groundwater). It aids in the visual determination of lithology, structural features (fractures), and sedimentary features (bedding and contacts), allows for the calculation of attitude (direction and magnitude of strike and dip) of the structural and sedimentary features, and allows for the calculation of borehole deviation and alignment. The natural gamma log aids in the interpretation of lithology and contacts by differentiating sandstone and mudstone units based on the variation in natural gamma radiation between sand (if predominately quartz) and clay minerals.

Water quality samples will be collected from each well after completion of well development and sufficient water level recovery. Groundwater samples will be analyzed for the constituents detailed in Section 10.0 “Analytical Test Methods”.

Groundwater samples will be identified using the system that has been established for the groundwater monitoring program at SSFL.

9.5 Management of Samples

All soil, soil vapor, and groundwater sample containers will be properly labeled as described in the preceding sections. Additional information may also include:

- the sample number,
- the type of sample, i.e., grab sample,
- the date when the sample was collected,
- the time that the sample was collected,
- the name of the individual collecting the sample,
- the sampling site,
- the preservative used (where necessary), and
- the analyses required.

All samples will be placed in coolers containing ice or another appropriate cooling medium to maintain the temperature at or below 4^{o} Celsius, from the time of sample collection to the time of delivery to the analytical laboratory. The sample cooler will be taped shut, and two custody seals will be taped across the cooler lid, one in the front and one in the back. All samples will be delivered, transported by laboratory courier, or will be shipped by overnight carrier to the laboratory. Chain-of-custody documentation will be completed and will accompany each sample shipment as described in Section 9.3.4.

9.6 Chain-of-Custody Procedures

The following information will be recorded on the chain-of-custody record for each sample:

- the project name,
- the name of the project manager,
- the sample number,
- the sample matrix,
- the type of sample, i.e., grab sample,
- the date when the sample was collected,
- the time that the sample was collected,
- the name of the individual collecting the sample,
- the sampling site,
- the preservative used (where necessary),
- the analyses required, and
- any special instructions.

The chain-of-custody record will also record the signature of the sampler; the signature of each person relinquishing the samples and the date of time relinquishment; and the signature of each person receiving the samples and the date and time of receipt.

Should a situation develop where the chain-of–custody procedure has been broken, the circumstances and the analytical data will be evaluated to determine whether the data can be used, or whether re-sampling may be necessary. A written explanation of the circumstances surrounding the event, as well as a written determination whether to use the data or conduct re-sampling will be added to the sampling record to mitigate any potential data gaps.

9.7 QA/QC Procedures

A Quality Assurance/Quality Control (QA/QC) program is necessary and appropriate to ensure the precision, accuracy, completeness, and reproducibility of field and laboratory data. The QA/QC program for the soil sampling program for the closure of the RMHF will consist of Laboratory QA/QC procedures and Field Sampling QA/QC procedures are described in the following sections.

9.7.1 Laboratory QA/QC Procedures

Pursuant to state-certification requirements, laboratory QA/QC will be performed in accordance with the laboratory's own written QA/QC program.

9.7.2 Field Sampling QA/QC Procedures

9.7.2.1 Duplicate Samples

Duplicate field samples will be collected to measure the consistency and precision of the sample collection. Approximately 10% of the soil samples will be duplicated (6 samples total). One duplicate sample will be collected at each of the former locations of Buildings 4021, 4022 and 4621. Three additional samples will be collected at selected sample locations in area of the former outdoor mixed waste storage yard. The duplicate samples will be collected during the initial sampling event and will be analyzed for the same analytical parameters as all other collected samples.

9.7.2.2 Trip Blanks

Trip blanks consist of a sealed sample container of ultra-pure water that is not opened in the field. The purpose of the trip blank is to verify whether contaminants observed in collected samples could be a result of laboratory contamination. One trip blank per cooler per day will accompany the samples. Trip blanks will be analyzed for the constituents identified in Section 10.0 of this Closure Plan.

9.8 Data Quality Objectives

The data quality objectives (DQO) process (USEPA, 2000) was used to guide the development of the soil sampling plan for the RMHF. The DQO process consists of the following seven steps:

- State the problem;
- Identify the decision;
- Identify inputs to the decision;
- Define the study boundaries;
- Develop a decision rule;
- Specify limits on decision errors; and
- Optimize the design for obtaining data.

The DQO developed for the RMHF soil sampling plan is presented in Table 8. The problem statement for the soil sampling portion of the RMHF closure plan was developed through a collaborative effort and is: *Achieve clean closure of the RMHF by demonstrating that hazardous waste and hazardous constituent residues have been removed or are left in place at levels that are protective of public health and the environment.*

Two decision questions, one for organic constituents and the other for inorganic constituents were developed during the DQO process. The data inputs necessary to resolve these two decision questions were specified along with the study boundaries for the target locations. The study boundaries were developed based on historical facility operations and existing data about subsurface conditions at the SSFL and RMHF. A decision rule and associated limits on decision errors were specified for each for the two decision questions. The sampling plan presented in Section 9 was optimized through the development of the DQO process shown in Table 8.

10.0 ANALYTICAL TEST METHODS

10.1 Analyses of Soil Samples for the Purposes of Determining Compliance with Closure Performance Standards

Soil samples will be analyzed for the mixed waste constituents that the RMHF was permitted to treat and/or store. These constituents and their corresponding state and federal waste codes are presented in Table 3 of this Closure Plan.

10.2 Sample Submission

All samples will be submitted to a state-certified laboratory for analysis. Table 7 provides a summary of the analytical methods that will be used to analyze verification samples and soil samples that are collected as part of the closure of the RMHF. Appendix E provides the Method Reporting Limits for the analytical methods for Table 7.

To minimize the volume of paper generated in the production of this closure plan, the analytical methods specified in Table 7 can be found in their entirety at the following address **http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm.** In addition, the state-certified laboratories selected for analysis are required to maintain and have access to the most current versions of these analytical test methods.

11.0 PERFORMANCE STANDARDS

The goal of this Closure Plan is to achieve clean closure of the RMHF by demonstrating that: 1) all hazardous waste and hazardous constituent residues have been removed; or, 2) are left in place at levels that are protective of public health and the environment.

As directed by DTSC, data derived from the SRAM will be used to evaluate the closure of the RMHF units. The purpose is to ensure a consistent approach for site-wide clean up standards, investigation methods, and the manner by which potential impacts from site activities are evaluated and determined.

However, the SRAM uses the term “Site Related Chemical” (SRC) to identify a broad spectrum of contaminants that have potentially impacted the subsurface from various onsite activities; while the chemicals treated and stored at the RMHF are identified as “constituents of concern” (COCs) and represent a small subset of SRCs. Therefore, this Closure Plan only addresses the SRCs that are listed in the Part A Application that were approved for treatment and storage in the RMHF.

11.1 Performance Standards for Soil

11.1.1 Organic Constituents

The Primary Performance Standard for organic constituents in soil is “non-detect” for the analytes using the EPA Methods identified in Section 10.0 of this Closure Plan. No buildings, structures or equipment are planned to remain after closure; however if this plan changes, the performance standard for VOCs for buildings, structures or equipment that remain is “non-detect” or health risk based levels based on an unrestricted land use scenario.

To verify that the Primary Performance Standard for organic constituents has been met, samples will be analyzed for the organic compounds under the hazardous waste codes for which the RMHF was permitted to treat and/or store. These waste codes are identified in Tables 2 and 3.

The EPA analytical methods that will be used for the organic analyses are identified in Table 7. The results of the organic analyses will be reviewed to determine whether any organic constituents are present at a concentration above the background soil data set levels.

11.1.2 Inorganic (Metal) Constituents

The Primary Performance Standard for metals concentrations in soil is at or below background soil data set levels for the analytes using EPA Methods identified in Section 10.0 of this Closure Plan. The results of the metals analyses will be compared against the background soil data set included in the SRAM Revision 2-Final, MWH, September 2005 or subsequent approved version to determine if any inorganic constituents are present at a concentration above background soil data set levels.

No buildings, structures or equipment are planned to remain after closure; however if this plan changes, the performance standard for inorganics for building, structures or equipment that remain is background or health risk based levels based on an unrestricted land use scenario.

11.2 Risk Assessment

Organic compounds that are detected, and inorganic compounds that are detected at concentrations above groundwater comparison concentration levels, will be evaluated pursuant to a risk assessment conducted in accordance with the SRAM Work Plan, which is consistent with DTSC's risk assessment protocols. If DTSC determines that results of the risk assessment are within an acceptable range for the risk endpoints, then no further action will be necessary to achieve clean closure.

If, however, DTSC determines that the risk endpoints are not within an acceptable range, then an iterative process of soil removal and subsequent risk assessments may be necessary until the risk endpoints are within an acceptable range.

The use of a health based risk assessment has been established for the site-wide SSFL RCRA Corrective Action program and accepted for use at the Hazardous Waste Management Facility closure.

12.0 CLOSURE COST ESTIMATE

Closure cost requirements for Interim Status facilities are located in 22 CCR, Chapter 15, Article 8. However, 22 CCR 66265.140(c) stipulates that state and federal governments are exempt from Article 8.

The RMHF is owned by the United States Department of Energy and is exempt from the requirement to prepare a cost estimate for closure.

13.0 FINANCIAL ASSURANCE

Financial assurance requirements for Interim Status facilities are located in 22 CCR, Chapter 15, Article 8. However, 22 CCR 66265.140(c) stipulates that States and federal government are exempt from Article 8.

The RMHF is owned by the United States Department of Energy and is exempt from the requirement to provide financial assurance for closure.

14.0 CLOSURE IMPLEMENTATION SCHEDULE

The overall radiological decontamination, decommissioning and demolition of RMHF involves the removal of all nine buildings, their foundations and utilities, the surrounding pavement and the excavation of impacted soil as required. The effort to remove the RMHF occurs concurrently with the RCRA Facility closure effort described in this Closure Plan (see Figure 9).

Several buildings within the RMHF are internally contaminated with radioactive materials. To protect human health and the environment, work practices to maintain radioactive material exposure to As Low As Reasonably Achievable are utilized. The work practices necessary to safely decontaminate and demolish the RMHF are expected to require a period to time normally expected for the completion of closure activities.

The tentative schedule for closure of the Radioactive Materials Handling Facility is presented in Table 9. As depicted, the schedule for closure is estimated at greater than two years due to the number of buildings that will undergo demolition and the significance of their construction.

Because it is fully anticipated that the period of 180 days allowed for final closure will be exceeded, a formal written request for an extension in accordance with 22 CCR 66265.113(c) is included in Appendix F.

15.0 CLOSURE CERTIFICATION

15.1 CLOSURE RECORDS

Upon closure of the permitted hazardous waste treatment and storage units, Boeing will maintain the following records on-site and will make them available to DTSC upon request:

- The closure plan as approved by DTSC;
- Copies of the independent professional engineer's field observation reports;
- Copies of the analytical results of the samples collected during closure;
- Documentation to demonstrate that QA/QC procedures were properly employed during closure;
- Copies of manifests showing disposition of the waste inventory, demolition debris, and wastes generated during closure;
- The Closure Certification Report;
- Other Documentation that may be pertinent to demonstrate proper closure of the HWMUs and SWMUs.

15.2 CLOSURE CERTIFICATION

During closure activities, an independent consulting/engineering firm will provide field oversight to confirm that DTSC-approved closure procedures are followed (this is estimated to be 10 days of staff time over the total closure period). Following completion of all tasks, the engineering firm will prepare a report for submittal by Boeing that will include the following information:

- A description of closure procedures followed by all contractors;
- Modifications and amendments to the closure plan, where necessary (and approved by DTSC);
- A description of the Supervisory personnel;
- A summary of closure activities;
- Field engineer observation reports;
- A summary of the total quantities of wastes removed/disposed (by waste type), how, and where each was disposed;
- Copies of hazardous waste manifests showing the disposition of the waste;
- Copies of all analytical data from confirmation sampling;
- A written discussion and evaluation of the analytical results;
- Photographs where necessary and appropriate; and
- A signed statement certifying that each unit has been fully decommissioned in accordance with the approved closure plan so that post-closure care is not needed.

16.0 PERSONAL PROTECTIVE EQUIPMENT (WORKER HEALTH AND SAFETY)

16.1 HEALTH AND SAFETY PLAN

It is anticipated that closure activities will be conducted by one or more independent contractors. While the Boeing Company is responsible for the health & safety of these contractors while performing work onsite, each independent contractor will be responsible for preparing a health and safety plan specific to closure activities. Work performed by Boeing will also be performed under a health and safety plan. In addition, project activities (performed by Boeing or their contractors) will comply with 10 CFR 835 (Occupational radiation protection), 10 CFR 851 (Worker safety and health program), DOE order 450.4, Safety management system policy.

Each contractor will be required to submit a health & safety plan at least 30 days prior to the start of their work activities for review and approval by Boeing. The health & safety plan must describe precautions to be taken during the execution their specific work activities. At a minimum, each plan must address:

- Hazard identification and evaluation;
- Required personal protective and safety equipment;
- Designated site work and exclusion zones;
- Emergency procedures;
- Confined spaces;
- Ambient air monitoring procedures;
- Procedures and action levels for upgrading levels of protection;
- On-site safety orientation and training meetings;
- Personnel and equipment decontamination procedures;
- Designated site safety officer requirements;
- Limitations from access to work zones;
- Physical examinations and training for field staff required under 29 CFR 1910.120;
- A map showing the address and location of the nearest hospital.

Each contractor's health and safety plan will be maintained at the location of the RMHF until closure activities have been completed.

17.0 SITE SECURITY

The RMHF is surrounded by an 8-foot chain link fence topped with barbed wire. Access to the RMHF is controlled by locked gates and monitored foot traffic entry.

In addition, access to the location of the RHMF can only be achieved by gaining access to the SSFL. The SSFL is surrounded by fencing and access to the private SSFL road system is controlled by a security checkpoint at the entrance to SSFL, which is manned 24 hours a day. Security personnel conduct routine surveillance of the SSFL, including the RMHF.

18.0 REFERENCES

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7. U.S. Environmental Protection Agency (EPA). 2000. Data Quality Objectives Process for Hazardous Waste Site Investigations (EPA QA/G-4HW Final). Office of Environmental Information. EPA/600/R-00/007.