

**ATTACHMENT 8**  
**CLOSURE PLAN, POST-CLOSURE PLAN REQUIREMENTS**

# Contents

---

<b>1.0</b>	<b>Introduction .....</b>	<b>8-1</b>
<b>2.0</b>	<b>Closure Performance Standard.....</b>	<b>8-1</b>
2.1	Closure Plan.....	8- <del>3</del> 4
2.2	Maximum Waste Inventory .....	8-4
2.3	Partial Closure and Final Closure Activities.....	8-4
2.4	Closure Time.....	8-5
2.5	Inventory Disposal, Removal, and Decontamination of Equipment .....	8-6
2.6	Disposal of Contaminated Soil and Residues .....	8-10
2.7	Concrete and Asphalt Samples for Release Assessment.....	8-10
2.8	Decontamination of Cleanup Materials and Equipment .....	8-11
<b>3.0</b>	<b>Removal and Disposal of Contaminated Equipment and Soils .....</b>	<b>8-12</b>
3.1	Certification of Closure.....	8-12
3.2	Plat Survey, Post-Closure Plan, and Post-Closure Notice .....	8-12
3.3	Notice to Local Land Authority and Notice in Deed to Property .....	8-12
3.4	Closure Cost Estimate.....	8- <del>12</del> 13
3.5	Financial Assurance Mechanism for Closure .....	8-13
3.6	Post-Closure Estimate.....	8-13
3.7	Financial Assurance Mechanism for Post-Closure .....	8-13
3.8	Liability Insurance .....	8-13

## **Tables**

- 8-1 Estimated Closure Schedule for Each Unit
- 8-2 Anticipated Decontamination Methods and Cleaning Agents
- 8-3 Proposed HWSF Verification Analytical Methods
- 8-4 Estimates of Waste Quantities to be Generated During Decontamination
- 8-5 Clean Closure Standards
- 8-6 HWSF Waste Storage Capacity

## **Appendices**

- 8-A Conforming Storage Facility, Baseline Sampling Plan, Hill AFB, UT, January 1994, and Resulting Analytical Data.
- 8-B HWSF Closure Sampling and Analysis Plan, Hill AFB, UT.



**1.0 Introduction**

**1.0.1** This document is submitted in accordance with the requirements of Utah Administrative Code (UAC) R315-264-110 through 120, and R315-264-178. Tables referenced in this document are provided at the end. References to the Director are to the “Director, Division of Waste Management and Radiation Control, State of Utah Department of Environmental Quality”.

**2.0 Closure Performance Standard [UAC R315-264-111]**

**2.0.1** This closure plan is designed for the “clean closure” of the Hazardous Waste Storage Facility (HWSF), see Attachment 1 (Facility Description), Figure 1-2 for a facility map. Under this clean closure plan, the HWSF will not require further maintenance and controls, and will minimize potential threats to human health and the environment upon completion of closure. This section describes the closure performance standards to be met during closure of the two container storage buildings (Building 898 and Building 888) and the hazardous waste Outdoor Storage Areas within the HWSF.

**2.0.2** Closure shall be accomplished by removing the entire inventory of regulated wastes from the HWSF and removing or decontaminating all containers, equipment, surfaces, and structures or other materials containing or contaminated with hazardous waste or waste residues.

**2.0.3** Areas within the HWSF that cannot be successfully decontaminated will be dismantled and transported offsite to a permitted treatment, storage, and/or disposal (TSD) facility.

**2.0.4** If there is any evidence of spills or leaks at the time of closure, samples shall be taken and analyzed to determine the extent of contamination in either of the units used to store hazardous wastes or within outside storage areas, from the soil, and, if necessary, from groundwater. Contaminated soil shall be excavated, removed, and disposed of properly.

**2.0.5** Verification samples from each unit or area shall be analyzed for the presence of hazardous constituents that have been stored in the unit or area. Specific procedures for decontamination, verification sampling and analysis at each storage unit or area are described in Section 2.5 of this closure plan.

**2.0.6** Decontamination shall be considered successful when no hazardous waste constituents are detected at concentrations greater than the performance standards established.

**2.0.7** The concentrations in Table 8-5 shall be used as numerical closure performance standards to evaluate whether clean closure has been achieved.

**2.0.8** These values shall be used to evaluate whether sufficient decontamination has taken place and whether releases have occurred. The proposed clean closure standards for solids are background concentrations.

- 2.0.9** Prior to construction of Building 888, soil samples were taken in May 1994 from various locations under Building 888 and near buildings 888 and 898. These samples form a baseline for closure sample analyses. These samples were analyzed using EPA test methods for total metals (Methods 6010, 7471, and 200 series); PCBs (Method 8080); volatile organics (Method 8260); semivolatile organics (Method 8270); benzene, toluene, ethylbenzene, and xylene (BTEX [including naphthalene], Method 8020); and TPH (as diesel and JP-4, Method 8015M). Copies of the test results are included in Appendix 8-A of this closure plan.
- 2.0.10** Clean closure includes the following:
- 2.0.11** Verifying the degree to which decontamination meets the closure performance standards.
- 2.0.11.1** This verification shall be completed through laboratory analysis of the final decontamination rinsate collected from the units. Decontamination of outdoor storage areas is not anticipated. However, should any spill occur during operation of the outside storage areas, these areas shall be assessed for decontamination and verification sampling requirements.
- 2.0.11.2** Rinsate samples shall be collected from each unit after decontamination is complete. Rinsate samples shall be analyzed for chemical constituents representative of the types of wastes handled at the specific unit being decontaminated (analytes may vary based on what was stored in the unit).
- 2.0.11.3** When the rinsate water quality meets the Land Disposal Restriction for Universal Treatment Standard (UTS) wastewater concentrations listed in Table 8-5 for the waste types handled, then that unit shall meet the clean closure standards and can be clean-closed. Rinsate shall also be sampled and analyzed to determine the proper disposal method.
- 2.0.11.4** Baseline water supply and fresh decontamination solution samples may also be collected and analyzed. If necessary, these analyses will verify that the water supply or decontamination solutions do not contain constituents that would interfere with measuring the effectiveness of the decontamination activities. If the baseline water supply and/or fresh decontamination solution contain target chemical constituents, these constituents shall be treated as background concentrations.
- 2.0.12** Determining whether a release from the storage areas has occurred.
- 2.0.12.1** If the final decontamination rinsate samples from storage units do not meet the clean closure standards after multiple decontamination attempts, then samples of the concrete underlying the unit shall be collected and analyzed. Asphalt samples from outside storage areas and soil samples from underneath asphalt surfaces will be collected in areas that show indications of a potential release.

- 2.0.12.2** Samples of concrete floors or asphalt surfaces may be collected in areas where a suspected pathway to subsurface soil exists to verify that a release from the units or outside storage areas has not occurred.
- 2.0.12.3** Samples shall be collected in areas where cracks or other openings in concrete indicate a breach in the integrity of the pavement or slab. If no structural breaches are observed, samples shall be collected of concrete under the coatings in stained areas (if any).
- 2.0.12.4** Concrete samples shall be collected by removing the protective coating, then grinding or otherwise collecting a sample from the underlying concrete. Asphalt samples shall be collected by coring or other approved method.

## **2.1 Analytical Parameters, Test Methods, and Standards**

- 2.1.1** Samples collected during closure activities shall be analyzed for total metals and organic constituents representative of the types of wastes handled in the area in accordance with the applicable SW-846 methods or other approved methods. A Utah certified analytical laboratory shall analyze the samples.
- 2.1.2** The analytical results from the samples shall be compared to EPA's risk based Regional Screening Levels (RSLs) listed in Table 8-5. Background concentrations have been previously established for most metals in soil as part of the pre-construction sampling.
- 2.1.3** A metal concentration above the background value presented in Table 8-5 or above the background concrete or asphalt sample's concentration shall indicate that a release may have occurred. For all other constituents, concentrations exceeding EPA's risk based RSL concentrations may indicate that a release has occurred.
- 2.1.4** At completion of clean closure of the HWSF or partial clean closure of one of the storage units, hazardous waste inventories shall be removed from the unit(s) to a permitted facility for treatment, storage, and/or disposal.
- 2.1.5** No hazardous wastes at concentrations exceeding the closure performance standards shall remain in the storage unit(s).

## **2.1 Closure Plan [UAC R315-264-112]**

- 2.1.1** This section describes procedures and techniques that will be used to implement and complete the closure of the HWSF at any point during its intended operating life, and to completely close the HWSF at the end of its intended operating life.
- 2.1.2** Hill AFB personnel shall maintain a copy of the closure plan onsite with revisions to the plan until the Certification of Closure has been submitted and accepted by the Director of the Division of Waste Management and Radiation Control, State of Utah Department of Environmental Quality.

- 2.1.3** Hill AFB shall notify the Director at least 45 days prior to the date that final closure activities for the HWSF are expected to begin.
- 2.1.4** The closure plan shall be amended whenever any changes are made to the existing equipment, structures, instruments, or procedures related to the management of the HWSF. In addition, the closure plan shall be amended to reflect any new information on the expected year of closure of the HWSF.
- 2.2** **Maximum Waste Inventory [UAC R315-264-112(b)(3)]**
- 2.2.1** The maximum waste inventory for the storage of containers is dependent upon the containment system capacity and arrangement of pallets in the storage areas. Pallets shall not be stacked in the HWSF.
- 2.2.1.1** Commercial grade pallet racks capable of storing containers at various levels shall be used.
- 2.2.1.2** The Permittee shall not store greater than 128,040 gallons and 16,830 gallons of hazardous waste in storage at buildings 888 and 898 respectively, at any given time, during the operational life of the storage facility. Capacity and spill containment calculations are provided in Attachment 9 (Container Management Plan) of this Permit.
- 2.2.2** The Permittee shall not store more than 5 containers greater than 2 cubic yards in size (e.g. roll-off containers or compactors) that contain hazardous waste in outside storage areas at a given time.
- 2.3** **Partial Closure and Final Closure Activities and Certification [UAC R315-264-115]**
- 2.3.1** Partial closure is closure of a building or an individual waste management area, (e.g., the bulking pad). For example, Building 898 may be closed before Building 888, since Building 898 is smaller and is older. Closure activities are described in Section 2.5 below. It is expected that closure activities would be equally applicable to a partial closure or a final closure.
- 2.3.2** Certification that final closure of the HWSF has been done in accordance with the approved closure plan will be made by the Permittee, as well as a qualified, independent Utah-licensed professional engineer. The qualified, independent Utah-licensed professional engineer or the engineer's representative will also observe all closure activities to verify that this closure plan is followed.
- 2.3.3** Upon completion of partial or final closure, the Permittee shall submit to the Director a certification signed by the appropriate Hill AFB official (the Commanding Officer or designee) and by a qualified independent Utah-licensed professional engineer, that the HWSF or one of the buildings or waste management areas has been closed in accordance with the specifications in the approved closure plan.

**2.3.4** Submittal of closure certification shall be made within 60 days of completing partial or final closure.

**2.4 Closure; Time Allowed for Closure [UAC R315-264-113]**

**2.4.1 Schedule for Closure [UAC R315-264-112(b)(6), R315-264-112(d)(1) and (2)]**

**2.4.1.1** For the purposes of this closure plan, it is assumed that the entire HWSF will close in 2039.

**2.4.1.2** Notification of intent to close shall be sent to the Director, not less than 45 days prior to beginning final closure of any unit. Final closure shall be observed and certified by a qualified, independent Utah-licensed professional engineer.

**2.4.1.3** After receipt of the final volume of hazardous wastes, closure activities shall be initiated. Table 8-1 presents an estimated schedule for closure, which gives an estimate of the total time required to close the HWSF and the time required for intervening closure activities.

**2.4.2 Extensions for Closure Time [UAC R315-264-113(a), (b), and (c)]**

**2.4.2.1** No extension for closure time is anticipated. If, however, an extension would be necessary to properly close the HWSF, then a petition shall be sent at least 30 days prior to the end of the affected closure period(s). The petition will be sent to the Director, and would demonstrate one of the following:

- Removal of Hazardous Waste
  - More than 90 days is needed to remove and dispose of the wastes, or
  - The HWSF has the capacity to receive additional wastes; and there is a reasonable likelihood that someone else will re-start operation of the unit within 1 year; and closure of the unit is incompatible with continued operation of the base.
- Completion of Closure Activities
  - More than 180 days is needed to close the HWSF, or
  - The HWSF has the capacity to receive additional wastes; and there is a reasonable likelihood that someone else will re-start operation of the unit within 1 year; and closure of the unit would be incompatible with continued operation of the base.

**2.4.2.2** The petition would also demonstrate that steps to prevent threats to human health and the environment, including compliance with applicable permit requirements, have and will be taken. Requests for a change in the approved closure plan schedule will be submitted in writing to the Director and will be in compliance with the applicable regulations.

The operator or operator's authorized representative will notify the Director at least 45 days prior to the date the HWSF expects to begin final closure.

**2.5 Inventory Disposal, Removal, and Decontamination of Equipment [UAC R315-264-114]**

**2.5.0.1** Upon formal notification to proceed with closure, no additional hazardous waste shall be accepted into storage.

**2.5.0.2** Hazardous waste remaining in inventory shall be transported to a permitted hazardous waste TSD facility or recycling site(s).

**2.5.0.3** The HWSF shall be inspected for loose items (i.e., papers, pallets or empty containers) after the final inventory of waste is removed. These items shall be removed and properly disposed of.

**2.5.1 Decontamination, Sampling, and Analytical Procedures**

**2.5.1.1** The decontamination and sampling procedures applicable to buildings 888 and 898 are as follows:

**2.5.1.1.1** The Permittee shall clear the storage areas of portable equipment, pallets, containers, etc., and sweep the building floors. The sweepings shall be collected in 55-gallon drums and stored as hazardous waste in accordance with UAC R315-264-114 until they can be consolidated with other hazardous debris or sampled to show that they are not hazardous.

**2.5.1.1.2** The Permittee shall visually examine the concrete and asphalt surfaces, defining storage areas and unloading areas to identify cracks, holes, discoloration, and other signs of damage. The purpose of this examination is to minimize the potential for release of rinsate solutions to subsurface soil during decontamination and to identify potential concrete sampling locations. These areas shall be marked with brightly colored spray paint in a manner that does not obscure the suspect areas.

**2.5.1.1.3** The Permittee shall surround entrance ramps and doors to rooms not requiring decontamination with absorbent or temporary berms so that run-off does not enter these rooms.

**2.5.1.1.4** If necessary, the Permittee shall collect samples of the water supply and fresh decontamination solutions to evaluate the baseline quality of the water and solutions. The proposed sample collection and analysis procedures for these samples are provided in Appendix 8-B, the Closure Sampling and Analysis Plan (SAP).

**2.5.1.1.5** The Permittee shall determine the mean and standard deviation of the analytical results of these baseline samples.

**2.5.1.1.6** The Permittee shall begin the decontamination activities by cleaning all portable equipment that has contacted hazardous wastes.

- 2.5.1.1.7** The Permittee shall decontaminate the secondary containment structures of units being closed and equipment using commercially available steam-cleaning or high-pressure washing equipment. Washing by hand may be used in confined and small spaces. Table 8-2 summarizes the decontamination methods and cleaning agents that may be used for each of the various groups of contaminants that may be encountered. The decontamination method selected from Table 8-2 will be based on the types of wastes managed in each area.
- 2.5.1.1.8** The Permittee shall collect the rinsate in secondary containment structures. The secondary containment structures shall be pumped out during decontamination as often as required during closure activities so that overtopping does not occur. All in-place sumps will be tested and verified not to be leaking before being used as a decontamination collection point.
- 2.5.1.1.9** The Permittee shall collect the rinsate water using a vacuum or portable pump and place solutions into 55-gallon drums or portable tanks and properly label them.
- 2.5.1.1.10** The Permittee shall collect and analyze one sample from each batch of rinsate water generated. A batch of rinsate is generated each time the containment system is pumped to a container or portable tank. The samples will determine whether the rinsate meets the discharge limits for sanitary sewer disposal or if the rinsate will require shipment to a TSD facility for disposal.
- 2.5.1.1.11** The Permittee shall perform a final rinse on each storage unit, structure, and piece of equipment.
- 2.5.1.1.12** The Permittee shall collect the final rinsate from each unit in separate containers or portable tanks.
- 2.5.1.1.13** The Permittee shall collect and analyze a sample from each batch of final rinsate. One sample shall be collected from each batch of final rinse water used to decontaminate the waste storage and unloading areas. The rinsate shall be collected from the secondary containment.
- 2.5.1.1.14** The Permittee shall collect a minimum of 10 samples from Building 898 (one from each of the 10 bays) and 19 samples from Building 888 (one from each of the 11 bays, one from each of the seven storage closets, and one from the staging area). Final rinsate samples will be collected from the secondary containment of each storage bay and the staging area in Building 888.
- 2.5.1.1.15** The Permittee shall analyze the samples for chemical constituents representative of the wastes handled in the units to verify that the closure performance standards discussed in Section 2.0 have been met.
- 2.5.1.1.16** The Permittee shall compare the sample analytical results to the numerical clean closure standards presented in Table 8-5. Specific sampling and analytical methods are presented in Appendix 8-B, the Closure SAP.

- 2.5.1.1.17** The Permittee shall dispose of the final rinsate either by directing it to the sanitary sewer or by shipping it to a permitted TSD facility, depending on the analytical results.
- 2.5.1.1.18** The Permittee shall decontaminate the pumps and tubing used to collect liquids by washing them with warm water and detergent.
- 2.5.1.1.19** The Permittee shall place the liquid, absorbent, brushes, brooms, personal protective clothing, and other debris resulting from closure activities in 55-gallon drums for transport to an offsite permitted TSD facility, or an appropriately-permitted landfill.

## **2.5.2 Sampling Protocols**

- 2.5.2.1** Specific proposed sampling and analysis procedures are presented in Appendix 8-B, Closure SAP and the Hill AFB Basewide Quality Assurance Project Plan (Basewide QAPP). The Basewide QAPP may be updated as analytical procedures and agency requirements change. During closure activities, the Basewide QAPP shall be followed as it reads at the time of closure.

## **2.5.3 Analytical Methods**

- 2.5.3.1** The Permittee shall only accept and use analytical results from a Utah Department of Health certified laboratory (Utah Certified Laboratory).
- 2.5.3.2** Samples shall be analyzed using EPA-approved methods approved by the Director to determine whether the closure performance standards have been met.
- 2.5.3.3** A closure plan amendment shall be prepared prior to implementation of closure activities if additional or different specific parameters are required.

## **2.5.4 Quality Assurance**

- 2.5.4.1** Sample analyses and associated quality assurance practices shall be performed as described in the Base-wide QAPP (as updated). The Basewide QAPP and the Closure SAP together address the following:
- Project description
  - Data quality objectives for measurement
  - Sampling procedures
  - Sample custody
  - Analytical procedures
  - Data reduction, validation, and reporting
  - Internal quality control
  - Data precision, accuracy, and completeness

- Corrective actions

## **2.5.5 Criteria for Determining Acceptable Decontamination**

- 2.5.5.1** The effectiveness of decontamination shall be verified by sampling and analyzing the final rinsate water after decontamination has been completed, as described in Section 2.5.1. If the final rinse water is sampled and analyzed, the procedure shall be proposed for approval by the Director at the time of closure.
- 2.5.5.2** The following procedures shall be followed for sampling and analysis of the final rinse water:
- 2.5.5.3** The verification of acceptable decontamination shall be accomplished by performing a final clean-water rinse of decontaminated areas, then collecting and analyzing rinsate samples for residual contamination.
- 2.5.5.4** The rinse water analytical results shall be compared to the clean closure standards presented in Table 8-5 and background water supply and rinsate solution concentrations.
- 2.5.5.5** Decontamination shall be deemed acceptable if one of the following conditions is met:
- 2.5.5.5.1** Rinsate concentrations are below the levels presented in Table 8-5.
- 2.5.5.5.2** Rinsate concentrations are below the 95 percent upper confidence limit concentration for detected analytes in the baseline samples collected directly from the clean-water decontamination fluid supplies prior to starting decontamination.
- 2.5.5.6** All surfaces that are still contaminated based on sampling results shall repeat the cycle of decontamination and verification. Concrete slabs and asphalt surfaces may require additional treatment if the closure performance standards cannot be achieved using the decontamination methods described above.
- 2.5.5.7** Physical and chemical extraction treatment technologies may be used to achieve the closure performance standards. The physical and chemical treatment methods may include:
- 2.5.5.7.1** Abrasive blasting (blasting using steel shot, aluminum oxide grit, plastic beads, etc.), or
- 2.5.5.7.2** Scarification, grinding, and planing concrete surfaces to remove contaminated surface layers, or
- 2.5.5.7.3** Spalling, drilling, or chipping holes at appropriate locations and depths in the debris to remove a surface layer, or
- 2.5.5.7.4** Vibratory finishing using scrubbing media, flushing fluid, and oscillating energy to remove the top 0.6 cm of the surface, or

- 2.5.5.7.5 Chemical extraction using acids, bases, and detergents to remove the hazardous contaminants from the debris surface.
- 2.5.5.8 Wastes resulting from this treatment (e.g., blasting grit) shall be disposed of according to the requirements of this Permit. The remaining concrete slabs and asphalt surfaces are not considered hazardous (UAC R315-268-45).
- 2.5.5.9 During the lifetime of the HWSF, an operating record is maintained in accordance with UAC R315-264-73. This operating record shall be reviewed for incidents where the contingency plan was implemented noting substance released and where it was spilled in HWSF.

## **2.6 Disposal of Contaminated Soil and Residues**

- 2.6.1 Closure of permitted HWSFs constructed and managed in accordance with UAC R315-264 has shown that such units can usually be clean-closed by decontamination. If cracks or stains are noted in the concrete secondary containment, concrete samples shall be collected and analyzed.

## **2.7 Concrete and Asphalt Samples for Release Assessment**

- 2.7.0.1 Concrete or Asphalt samples shall be collected in areas identified as being potential pathways for contaminants to enter subsurface soils. These areas include cracks, holes, or other breaches in secondary containment structures or in surfaces of outdoor storage areas. Samples shall be collected using a biased approach where hazardous wastes were handled and stored in containers (e.g., the staging area in Building 888, the area in the bay where wastes were handled the most).

- 2.7.0.2 One concrete or asphalt sample shall be collected at each selected location using a hand grinder to remove the surface coating. The grit in the ground-off area will be thoroughly removed and cleaned with a whiskbroom. Then another 1/8-inch layer of concrete shall be ground off and removed. The next 1/8- to 1/4-inch layer of concrete shall be ground off and sampled. Asphalt samples shall be collected by coring or other approved method.

### **2.7.1 Sampling Protocols**

- 2.7.1.1 Specific sampling and analysis protocols are presented in Appendix 8-B, the Closure SAP, and the Basewide QAPP.

### **2.7.2 Analytical Methods**

- 2.7.2.1 The subsurface soil samples shall be analyzed for total metals using EPA Methods 6010/7000 series, total cyanide using EPA Method 335.2, TPH using EPA Method 8015M, SVOCs using EPA Method 8270C, and VOCs using EPA Method 8015, 8021, or 8260, as discussed in Appendix 8-B, the Closure SAP. Other analytical methods may be used which would reflect methods approved by the Director at the time of closure.

**2.7.2.2** Concrete or asphalt samples shall be analyzed for constituents suspected of being released in the area. For example, the concrete from a secondary containment where only metal-containing acids were stored would be sampled for total metals and pH.

**2.7.2.3** Disposal of contaminated soil is not addressed in this closure plan. If contaminated soil is found, a request for an extension to the closure period may be necessary. The responsibility for the remediation of contaminated soil would be transferred to the Hill AFB Installation Restoration Program.

## **2.8 Decontamination of Cleanup Materials and Equipment**

### **2.8.1 Disposal of Rinsates and Supplies, Decontamination of Equipment**

**2.8.1.1** All washwaters and rinsates from decontamination of cleanup materials and equipment shall be collected in containers or portable tanks.

**2.8.1.2** Washwaters and rinsates shall be analyzed (parameters will be based on possible wastes present) to determine whether they are hazardous according to UAC R315-261 or whether they meet the sewer discharge limits.

**2.8.1.2.1** Table 8-4 presents an estimate of the volume of fluids and other wastes expected to be generated as part of this closure. If these fluids are hazardous, they shall either be treated on-site at the industrial wastewater treatment plant (IWTP) or be transported to an off-site TSD facility. If the fluids are non-hazardous and meet discharge limits, they may be discharged into the sanitary sewer.

**2.8.1.4** Decontamination supplies such as disposable PPE, brooms, brushes, mops, squeegees, and rags shall be packaged into 55-gallon drums for disposal or treatment. The volumes of disposable equipment and other solid wastes expected to be generated during this closure are presented in Table 8-4. Any necessary notification of or approvals from local jurisdictions shall be made or obtained prior to transport.

**2.8.1.5** Decontamination methods for non-disposable equipment are provided in Appendix 8-B, the Closure SAP. Other items such as portable tanks, pumps, and other non-disposable equipment shall be triple-rinsed with water prior to being removed from the site.

**2.8.1.5.1** Rinsate water from decontamination activities shall be treated on-site at the IWTP or transported to an off-site TSD facility for appropriate disposal. Equipment that cannot be suitably decontaminated shall be disposed of at an off-site TSD facility.

- 3.0 Removal and Disposal of Contaminated Equipment and Soils [UAC R315-264-112(e) and 264-114]**
- 3.0.1** Contaminated soils, structures, and equipment shall be removed, containerized, and transported in accordance with Department of Transportation regulations to a permitted hazardous waste disposal facility. Manifests for container removal shall be maintained by Hill AFB Environmental Management.
- 3.1 Certification of Closure [UAC R315-264-115]**
- 3.1.1** Certification that final closure of the HWSF was performed in accordance with the approved closure plan shall be made by the owner and operator of the HWSF and by a qualified, independent Utah-licensed professional engineer. Certification of closure shall be submitted to the Director within 60 days of completion of final closure.
- 3.1.2** Hill AFB representatives and the qualified, independent Utah-licensed professional engineer or designee shall conduct weekly inspections and shall witness the major closure activities described above to verify that the activities are being conducted in accordance with this closure plan. A detailed inspection schedule shall be developed at the beginning of the closure period and shall be documented in the closure logbook. At the completion of the closure, the qualified, independent Utah-licensed professional engineer shall review the logbook, sampling and analytical data, and other closure records, including waste manifests, to see that activities have been properly completed.
- 3.2 Survey Plat, Post-Closure Plan, and Post-Closure Notice [UAC R315-270-14(b)(13), R315-264-116 through 119]**
- 3.2.1** A survey plat, post-closure plan, and post-closure notice will not be needed because this Permit only addresses a hazardous waste storage facility (HWSF). Wastes will be removed and the storage areas will be decontaminated at closure. Wastes are not expected to remain onsite.
- 3.3 Notice to Local Land Authority and Notice in Deed to Property [UAC R315-264-119]**
- 3.3.1** The HWSF is not a disposal facility. Therefore, notice to the local land authority is not necessary. A notice in deed is not necessary to inform potential purchasers of restrictions associated with a disposal site, as required by the regulations cited for this section.
- 3.4 Financial Requirements [UAC R315-264-140]**
- 3.4.1** The federal government is exempt from the financial requirements of hazardous waste regulations (R315-264-140(c)) for closure, post-closure cost estimates.

- 3.5 Financial Assurance Mechanism for Closure [UAC R315-264-143]**
- 3.5.1** The federal government is exempt from the financial requirements of hazardous waste regulations (UAC R315-264-140(c)) for financial assurance mechanism(s) pertaining to the cost estimates.
- 3.6 Post-Closure Estimate [UAC R315-264-144]**
- 3.6.1** The federal government is exempt from the financial requirements of hazardous waste regulations (UAC R315-264-140(c)) for post-closure cost estimates.
- 3.7 Financial Assurance Mechanism for Post-Closure [UAC R315-264-145]**
- 3.7.1** The federal government is exempt from the financial requirements of hazardous waste regulations (UAC R315-264-140(c)) for financial assurance mechanism(s) pertaining to the cost estimates.
- 3.8 Liability Insurance [UAC R315-264-147]**
- 3.8.1** The federal government is exempt from the financial requirements of hazardous waste regulations (UAC R315-264-140(c)) for financial assurance mechanism(s) pertaining to the third-party liability cost estimates and mechanism.

**TABLE 8-1**  
**Estimated Closure Schedule for Each Unit**

Activity	Days
Notify Director of Closure	45 days prior to start of closure
Receipt of final volume of hazardous waste	On or before start of closure
Removal/disposal of final waste inventory	Within 90 days of closure initiation
Inspect storage areas and loading/unloading areas for cracks and visible signs of contamination	0-5
Decontaminate storage areas and building structures	5-35
Clean all portable equipment	35-40
Sample rinsate from storage areas, equipment, and building; analyze samples to verify successful decontamination	40-80
Confirm clean or decontaminate again, if necessary; demolish and/or dispose of structures/equipment if additional decontamination is not feasible	80-120
Sample subsurface soil in suspect areas to confirm that soil has not been affected	135-170
Manage closure-derived waste	170-180
Complete Closure activities	180
Prepare closure certification and submit to the Director	240

**TABLE 8-2**  
**Anticipated Decontamination Methods and Cleaning Agents**

Contaminant	Methods-Localized Areas	Methods-Other Areas <sup>a</sup>
Metals	<ol style="list-style-type: none"> <li>1. Brush with detergent solution</li> <li>2. Brush with chelating agent (e.g., EDTA disodium salt)</li> </ol>	<ol style="list-style-type: none"> <li>1. High-pressure steam and water</li> <li>2. Chelating agent (e.g., EDTA disodium salt)<sup>b</sup></li> <li>3. Top layer removal (e.g., abrasive blasting)<sup>b</sup></li> </ol>
Waste oils/organics	<ol style="list-style-type: none"> <li>1. Brush with detergent solution</li> <li>2. High-pressure steam and water<sup>b</sup></li> <li>3. High-pressure steam with detergent<sup>b</sup></li> </ol>	<ol style="list-style-type: none"> <li>1. High-pressure steam and water</li> <li>2. High-pressure steam with detergent<sup>b</sup></li> <li>3. Top layer removal (e.g., abrasive blasting)<sup>b</sup></li> </ol>
Acids	<ol style="list-style-type: none"> <li>1. Neutralize with sodium bicarbonate or calcium bicarbonate or similar compound</li> <li>2. Pick up neutralized solid and place in proper waste container</li> <li>3. Brush with detergent solution</li> <li>4. High-pressure steam with detergent<sup>b</sup></li> </ol>	<ol style="list-style-type: none"> <li>1. Neutralize with sodium bicarbonate or calcium bicarbonate or similar compound</li> <li>2. Pick up neutralized solid and place in proper waste container</li> <li>3. High-pressure steam and water</li> </ol>
Bases	<ol style="list-style-type: none"> <li>1. Neutralize with sodium dihydrogen phosphate or similar compound</li> <li>2. Pick up neutralized solid and place in proper waste container</li> <li>3. Brush with detergent solution</li> </ol>	<ol style="list-style-type: none"> <li>1. Neutralize with sodium dihydrogen phosphate or similar compound</li> <li>2. Pickup neutralized solid and place in proper waste container</li> <li>3. High-pressure steam and water</li> <li>4. High-pressure steam with detergent<sup>b</sup></li> </ol>
Solvents and organic compounds	<ol style="list-style-type: none"> <li>1. Brush with detergent solution</li> </ol>	<ol style="list-style-type: none"> <li>1. High-pressure steam and water</li> <li>2. High-pressure steam with detergent<sup>b</sup></li> </ol>

Note: If no spills have occurred in the containment structure, steam cleaning or high-pressure water washing is expected to be sufficient for decontamination.

<sup>a</sup>For use where hand cleaning is impracticable; e.g., high ceilings, large floor areas.

<sup>b</sup>To be used only if previous procedural step fails to remove contamination.

Sources:

Unterberg, W., et al., *Reference Manual for Hazardous Substance Release*. Hemisphere Publishing Corporation, 1989.

Esposito et al., *Decontamination Techniques for Buildings, Structures, and Equipment*. Noyes Data Corporation, 1987.

**TABLE 8-3**  
**HWSF Closure Verification Analytical Methods**

Waste Stream	EPA Analytical Method
Baseline water supply	VOCs: 8015, 8021, or 8260 SVOCs: 8270 Cyanide: 335.2 Metals: 6010/7000 series TPH: 8015M
Fresh decontamination solution	VOCs: 8015, 8021, or 8260 SVOCs: 8270 Cyanide: 335.2 Metals: 6010/7000 series TPH: 8015M
Final decontamination rinsate	VOCs: 8015, 8021, or 8260 SVOCs: 8270 Cyanide: 335.2 Metals: 6010/7000 series TPH: 8015M
Spent decontamination fluids	VOCs: 8015, 8021, or 8260 SVOCs: 8270 Cyanide: 335.2 Metals: 6010/7000 series TPH: 8015M
Concrete	VOCs: 8015, 8021, or 8260 SVOCs: 8270 Cyanide: 9012 Metals: 6010/7000 series TPH: 8015M
Asphalt	VOCs: 8015, 8021, or 8260 SVOCs: 8270 Cyanide: 9012 Metals: 6010/7000 series

<sup>a</sup>Analysis selected from methods listed based on expected contaminants. Analytical methods may be changed to reflect EPA-approved methods at time of closure through modification of the Permit in accordance with UAC R315-270-42.

**TABLE 8-4**  
**Estimates of Minimum Waste Quantities to be Generated During Decontamination**

Waste Material	Estimated Minimum Quantities to be Generated	Disposal Method
Steam-cleaning, pressure-washing, and final rinse solutions collected from first phase of decontamination activities	200 gallons	Treat onsite in the IWTP, or discharge to sewer if water discharge requirements are met, or dispose of at a permitted TSD facility.
Steam-cleaning, pressure-washing, and final rinse solutions collected from second phase of decontamination activities	200 gallons	Discharge to sewer if water discharge requirements are met, or dispose of at a permitted TSD facility.
Disposable rubber gloves, boots, and other personal protective gear	275 gallons (five 55-gallon drums)	Dispose of at a hazardous or solid waste landfill.
Miscellaneous rags, maps, absorbents, neutralizing agents, paper and disposable sampling materials	275 gallons (five 55-gallon drums)	Dispose of at a hazardous or solid waste landfill.
Solids (equipment used during closure, structures that have been demolished or cannot be decontaminated)	10 yd <sup>3</sup>	Dispose of at a hazardous or solid waste landfill

**TABLE 8-5**  
Clean Closure Standards

Constituent	UTS Wastewater Concentration <sup>a</sup> (mg/L)	Pre-Construction 95% UCL for Soil <sup>c</sup> (mg/kg)	Utah DEQ UST Screening Levels for Soil <sup>b</sup> (mg/kg)	EPA Residential RSLs for Soil <sup>d</sup> (mg/kg)
<b>Inorganics</b>				
Antimony	1.9	--		<u>31</u>
Arsenic	1.4	<u>3.59</u>		0.68
Barium	1.2	45.6		<u>15,000</u>
Beryllium	0.82	ND		<u>160</u>
Cadmium	0.69	4.8		<u>9.2</u> <sup>e</sup>
Chromium (Total)	2.77	12.0		--
Chromium VI				<u>0.3</u> <sup>f</sup>
Copper	--	75.5		<u>3,100</u>
Lead	0.69	33.2		<u>400</u> <sup>g</sup>
Manganese	--	161.6		<u>1,800</u> <sup>h</sup>
Mercury	0.15	ND		11 <sup>i</sup>
Methylmercury				<u>7.8</u> <sup>i</sup>
Nickel	3.98	6.39		<u>1,500</u>
Selenium	0.82	ND		<u>390</u>
Silver	0.43	--		<u>390</u>
Thallium	1.4	--		<u>0.78</u>
Vanadium	4.3	--		<u>390</u>
Zinc	2.61	112.5		<u>23,000</u>
<b>Organics</b>				
Acetone	0.28	--	--	<u>61,000</u>
Benzene	0.14	--	0.2	<u>1.2</u>
Carbon tetrachloride	0.057	--	--	<u>0.65</u>
Chlorobenzene	0.057	--	--	<u>280</u>
Ethyl acetate	0.34	--	--	<u>620</u>
Ethyl benzene	0.057	--	5	<u>5.8</u>
Isobutyl Alcohol	5.6	--	--	<u>23,000</u>

**TABLE 8-5**  
Clean Closure Standards

Constituent	UTS Wastewater Concentration <sup>a</sup> (mg/L)	Pre-Construction 95% UCL for Soil <sup>c</sup> (mg/kg)	Utah DEQ UST Screening Levels for Soil <sup>b</sup> (mg/kg)	EPA Residential RSLs for Soil <sup>d</sup> (mg/kg)
Methanol	5.6	--	--	<u>120,000</u>
Methyl ethyl ketone	0.28	--	--	<u>27,000</u>
Methyl isobutyl ketone	0.14	--	--	33,000
Methylene chloride	0.089	--	--	<u>57</u>
Naphthalene	0.059	--	51	<u>1,600<sup>i</sup></u>
Pentachlorophenol	0.089	--	--	<u>1.0</u>
Pyridine	0.014	--	--	78
Tetrachloroethylene	0.056	--	--	24
Toluene	0.08	--	9	<u>4,900</u>
1,1,1-Trichloroethane	0.054	--	--	<u>8,100</u>
1,1,2-Trichloroethane	0.054	--	--	<u>1.1</u>
Trichloroethylene	0.054	--	--	<u>0.94</u>
Vinyl chloride	0.27	--	--	<u>0.059</u>
Xylenes (total)	0.32	--	142	<u>580</u>
<b>Other Constituents</b>				
TPH (as gasoline)	--	--	<u>150</u>	--
TPH (as diesel)	--	--	<u>500</u>	--
Total Recoverable Petroleum Hydrocarbons (TRPH)	--	--	<u>1,000</u>	--
Total cyanide	1.2	--	--	--
Cyanide (CN <sup>-</sup> )	--	--	--	<u>23</u>
PCBs (Total) <sup>k</sup>	0.1	--	--	<u>40.41</u>

<sup>a</sup> UTS = Universal Treatment Standards for wastewaters (UAC R315-268-48). Wastewaters may be land disposed of if the UTS concentrations are met (e.g., through an NPDES permitted facility).

<sup>b</sup> The Utah DEQ published these Initial Screening Levels associated with the Underground Storage Tank program in November 2005 ( <https://documents.deq.utah.gov/environmental-response-and-remediation/ust-lust/branch/initial-screening-levels.pdf> )(as referenced in UAC R311-211-6[a]).

<sup>c</sup> Background mean concentration for inorganics is the 95th percentile upper confidence limit on the mean based on the 12 samples taken during the pre-construction sampling event (Appendix 8-A).

<sup>d</sup> RSL = EPA Regional Screening levels (generic Table, residential soil, THQ = 1) Risk Based Concentrations found at <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-table> (accessed December 31, 2018).

**TABLE 8-5**  
 Clean Closure Standards

<b>Constituent</b>	<b>UTS Wastewater Concentration<sup>a</sup> (mg/L)</b>	<b>Pre-Construction 95% UCL for Soil<sup>c</sup> (mg/kg)</b>	<b>Utah DEQ UST Screening Levels for Soil<sup>b</sup> (mg/kg)</b>	<b>EPA Residential RSLs for Soil<sup>d</sup> (mg/kg)</b>
--------------------	--	--	---	--

<sup>e</sup> The RSL table has risk-based concentrations for cadmium in soil for protection of food (71 mg/kg) and for protection of water (9.2 mg/kg). This concentration is for protection of water and is the lower of the RSLs.

<sup>f</sup> Chromium VI is the more toxic of the two chromium valence states typically encountered in the environment (chromium III and chromium VI). The RSL table gives values for both (Cr +3 = 120,000 mg/kg; Cr+6 = 0.3 mg/kg)

<sup>g</sup> EPA suggests that 400 mg/kg be used as a screening level for residential soils. They have not calculated an RSL for inorganic lead (see <https://www.epa.gov/risk/regional-screening-levels-frequent-questions#FQ40> , accessed December 31, 2018).

<sup>h</sup> The RSL table lists a manganese concentration for ‘non-diet’ soils (1,800 mg/kg), there is no listing for dietary in soils.

<sup>i</sup> The RSL table lists soil concentrations for mercury (elemental) – (11 mg/kg), methylmercury (7.8 mg/kg), and mercuric chloride (23 mg/kg).

<sup>j</sup> Naphthalene was not listed in the RSL table. The former RBC (risk-based concentration) screening value remains.

<sup>k</sup> Arochlor 1260 was detected near the detection limit in three of the pre-construction samples. PCB Totals for Aroclors will be the sum of the following: 1016, 1221, 1232, 1242, 1248, 1254, 1260, and 5460. If not an Aroclor then all 209 congeners shall be screened.

NOTE: Underlined concentrations are proposed as clean closure concentrations for soils.

mg/kg = milligram(s) per kilogram

mg/L = milligram(s) per liter

-- = No standard exists for this compound.

ND = Analyte was not detected during pre-construction sampling. See Appendix 8A to this Attachment.

**TABLE 8-6**  
**HWSF Storage Capacity**

<b>Bay Type</b>	<b>Number of Bays &amp; Building Number</b>	<b>Approximate Bay Dimensions</b>	<b>Approximate Area of Bay Type (Square Feet)</b>	<b>Number of Pallets per Room (Number of 55-gal Drums)</b>	<b>Storage Capacity (gallons)</b>
Type A	7 – Bldg 888	20'x30'	600	36 (144)	7,920
Type B	4 – Bldg 888	40'x34'	1,360	72 (288)	15,840
Type C	10 – Bldg 898	20'x20'	400	8.5 (34)	1,870*
Storage Closet	7 – Bldg 888	10.5'x4'	42	6 (24)	1,320
<b>Total Capacity</b>	<b>Bldg 888</b>				<b>128,040</b>
<b>Total Capacity</b>	<b>Bldg 898</b>				<b>16,830</b>
<b>Total Capacity HWSF</b>	<b>Bldg 888 &amp; Bldg 898</b>				<b>144,870</b>

\*Storage limits in building 898 are as stated in Condition III.G.1 and as described in Attachment 9, Table 9-1.