ATTACHMENT II-7

CLOSURE PLAN

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A. CLOSURE PLAN

1.0 INTRODUCTION

This closure plan is set forth to comply with the applicable requirements of the following regulations and methods:

A. Utah Admin. Code R315-261-Identification and Listing of Hazardous Waste

- Appendix VII – Basis for Listing Hazardous Waste
- Appendix VIII – Hazardous Constituents

B. Utah Admin. Code R315-262-Standards Applicable to Generators of Hazardous Waste

- Subpart A (262.11) – Hazardous Waste Determination and Recordkeeping

C. For RCRA Facilities: 40 CFR 264–Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

- Utah Admin. Code R315-264-110 through 120) - Closure and Post-Closure
- Utah Admin. Code R315-264-140 through 151) - Financial Requirements
- Utah Admin. Code R315-264-170 through 179) – Use and Management of Containers; Specifically 264.178 - Closure
- Utah Admin. Code R315-264-190 through 200) – Tank Systems; Specifically 264.197 – Closure and Post-Closure Care
- Utah Admin. Code R315-264-220 through 231) – Surface Impoundments; Specifically 264.228 – Closure and Post-Closure Care
- Utah Admin. Code R315-264-300 through 317) – Landfills; Specifically 264.310 – Closure and Post-Closure Care, and 264.313 – Special Requirements for Incompatible Wastes

D. Utah Admin. Code R315-268-Land Disposal Restrictions

- Subpart D (268.45) – Treatment Standards for Hazardous Debris

E. For TSCA Facilities: 40 CFR 761-Polychlorinated Biphenyls (PCB's Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions

- Subpart C (761.40-45) – Marking of PCBs and PCB Items
- Subpart D (761.50-79) – Storage and Disposal
- Subpart G (761.120-135) – PCB Spill Cleanup Policy
- Subpart J (761.780-193) – General Records and Reports
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- Subpart P (761.300-316) – Sampling Non-Porous Surfaces for Measurement-Based Use, Reuse, and On-Site or Off-Site Disposal Under §761.61(a)(6) and Decontamination Under §761.79(b)(3)
- Subpart Q (761.320-326) – Self-Implementing Alternative Extraction and Chemical Analysis Procedures for Non-liquid PCB Remediation Waste Samples
- Subpart R (761.340-359) – Sampling Non-Liquid, Non-Metal PCB Bulk Product Waste for Purposes of Characterization for PCB Disposal in Accordance With §761.62, and Sampling PCB Remediation Waste Destined for Off-Site Disposal, in Accordance With §761.61
- Subpart S (761.360-378) – Double Wash/Rinse Method for Decontaminating Non-Porous Surfaces
- Appendix IX – Ground-Water Monitoring List

F. EPA Publications

- EPA SW-846 – Test Methods for Evaluating Solid Waste

The contents apply to the Grassy Mountain facility (GM), EPA ID# UTD991301748 to reflect the most current approved permit and facility operations. Detailed descriptions of the relevant units/areas are provided in the specific modules as referenced herein to the permit. Only general descriptions are provided within this plan. Specific closure plan information is identified for each individual unit and/or process area, within the overall facility, as appropriate. This information may be referenced as necessary to provide a comprehensive closure plan, which meets the stated regulatory requirements.

In compliance with applicable regulations, this plan sets forth the necessary actions and requirements to close GM in a manner that minimizes the need for further maintenance and controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters, or to the atmosphere.

In order to facilitate the development of a closure cost estimate for the entire facility, a sequence of closing the current waste management units is presented. However, the actual sequence of unit closures may be different than what is presented. The sequence of closing a unit in this plan is based on minimizing potential exposure of personnel to contaminants and the potential of releasing contaminants to the environment. It is less likely that this sequence will vary from that presented, but it is possible based on circumstances at the time of closure. The plan assumes maximum inventory levels by waste type and provides procedures for disposing of that inventory, for decontaminating and/or disposing of equipment and containment systems and for obtaining closure certification. The cost estimate assumes the use of third parties to perform all closure work.

All tables referenced in this plan are presented in the attached appendices. Appendix A provides closure/post-closure inventories, standards, and reference tables. Appendix B provides closure/post closure cost summary tables. Appendix C provides closure/post closure cost worksheets. Appendix D is the cost documentation appendix (CDA) that provides tables of unit and other specific costs used for cost analysis..

2.0 FACILITY UNIT DESCRIPTIONS

2.1. General Information

2.1.1. Location

The Grassy Mountain facility is located approximately 83 miles west of Salt Lake City, Utah in Section 16 of Township 1 North, Range 12 West in Tooele County, Utah. The active site, that portion of the property used for active and closed waste management units, is located inside a fence and comprises most of this section. The waste management units are permitted for treatment, storage and disposal of hazardous waste pursuant to the regulations administered by the State of Utah and/or the United States Environmental Protection Agency. Attachment II-1 contains a site plan that shows locations of the various waste management units and the fenced portion of the section. In addition, the facility owns a ½ mile buffer around all of Section 16..

2.1.2. General Hydrogeologic Conditions

The facility is located upon exposed sediments of ancient Lake Bonneville. This geologic formation is a silty clay deposit believed to be up to 10,000 feet thick. It contains no potable water and subsurface water movement is extremely slow. The sediments underlying the site have a range in hydraulic conductivity of 1×10^{-4} to 10^{-6} cm/sec and extremely high sodium concentrations. Subsurface water contains total dissolved solids concentrations of 50,000 to 100,000 mg/l. The region receives approximately 6 inches of precipitation annually with evaporation rates of over 40 inches per year. There are no rivers or streams within 20 miles of the facility and the nearest body of water is the Great Salt Lake (30 miles northeast).

2.2. Hazardous Waste Storage/Treatment/Process Units

The following sections provide a description of the currently permitted hazardous waste management units and facilities subject to closure. The descriptions provide an accounting of units and containments which are covered by this closure and post-closure plan, so that future and pending modifications may be clearly delineated. More detailed unit information is provided within referenced permit modules for each unit at the facility.

2.2.1. Container Management Facility (Module III)

The Container Management Facility is an elevated slab, pre-engineered steel roof and side wall structure. Physical features of the structure prevent escape of contaminants should spills or leaks occur and protect the unit from weather and precipitation while the containerized waste material is being managed prior to disposal. The unit has separated drainage areas provided by concrete containment curbing, sumps for containment, and ramps for access. The slab and sump structures are constructed with waste compatible joint materials and water stops to prevent intrusion by waste into the structural unit, as well as leakage through the unit to underlying soils. Specific details about the container management facility, including the capacity of the facility, are provided in Table A.1.

Dock 1 and Storage Pads 2 and 3 are utilized to store all wastes accepted at the facility, including wastes not subject to regulation under Subtitle C of RCRA.

2.2.2. Facility Tanks

Specific details about the tanks discussed in this section are contained in Table A, "Existing Tanks, Information Summary". Facility Tanks Include:

Stabilization Tanks
Leachate Storage Tanks

Some of the tanks have ancillary pipes and valves, and other tank equipment. All are located within secondary containment. Secondary containment areas are comprised of concrete slabs with containment curbing, sumps for collection/containment of run-off from selected portions of the units and secondary containment/leak detection in tank areas. All floor slabs, containment and sump structures are constructed with waste compatible joint materials and water stops to prevent intrusion by waste into the structural unit, as well as leakage through the unit to underlying soils.

2.2.2.1. Waste Stabilization Facility

The Waste Stabilization Facility consists of open-top, square tanks, in which reagents are mixed with the wastes, typically using a backhoe/trackhoe type device. Since the tanks are not storage units, there is no inventory of wastes associated with these units. The facility containment areas include open tank treatment units and secondary containment, transport vehicle unloading areas, treated waste haul vehicle staging areas and ramps for access.

Waste Stabilization Tanks 122-TN-001, 122-TN-002, 122-TN-003

2.2.2.2. Leachate Tanks

The Leachate Tank is located in a secondary containment area. RCRA leachate is stored in the tank prior to disposal.

Leachate Storage Tank 119-TN-002

2.2.3. Surface Impoundment Units (Module V)

Surface Impoundment A is a 1,587,759-gallon, above-grade, impoundment with a surface area of approximately one acre and a maximum depth of approximately 15 feet. In October 1988 the unit was retro-fitted with a double synthetic liner and leak detection system to meet the minimum technology requirements for hazardous waste surface impoundments. Surface Impoundment B is a proposed 5.0 million-gallon, above-grade, impoundment with an inside area of approximately three acres and a depth of 13.4 feet from the low point to the top of the raised embankments. Prior to closing surface impoundment units, receipts of wastes will be stopped and the balance of stored liquid will be allowed to evaporate. Thus, no capacity is considered in computation of maximum inventory of waste for these units. Decontamination and disposal of the liner systems is included in the closure cost estimate.

2.2.4. Landfill Disposal Units (Module VI)

Grassy Mountain currently has two active hazardous waste landfill disposal cells approved for operation: Cells 7 and B/6. There are also six additional proposed hazardous waste disposal cells (Cells 8, 9, 10, 11, 12, and 13) that are anticipated to be constructed, actively operated, and closed at different times during the life of the facility. Final closure design engineering reports are submitted for each unit either at the time of closure for each cell, or with the design engineering reports submitted with the permit application for the cells, in accordance with Module VI of the Part B permit, regulatory requirements, and any approved or required applicable modifications. Landfill closures will utilize an approved Geosynthetic Clay Liner (GCL) closure design. The closure plan designs that include GCL are shown in Module VI. All closure activities shall be in compliance with the CQA Plan for Construction of Surface Impoundments, Landfills, and Landfill Closures.

3.0 PARTIAL FACILITY CLOSURE ACTIVITIES

Due to the size and complexity of the facility, partial closure activities are common. This activity will be implemented most often to facilitate the upgrade of treatment, storage and disposal facilities to more technically, advanced units, to close out-of-date or uneconomic processes, to close landfill cells, and to dispose of expendable supplies. In order to facilitate delineation of typical, partial, facility closure activities, this section will first present a typical, final closure activity scenario based on the conditions of the current facility. The final closure scenario is used as the basis for the closure cost estimate. The final closure scenario is envisioned as follows:

A number of operational units must remain functional to assist in the final closure of the facility. Since it is required that a landfill unit with adequate capacity to contain the final inventory of wastes and contaminated materials remain available for final closure, at least one of the hazardous waste landfill cells will be allocated for the final closure. This landfill will, at least, have available the volume listed in Table A.2 for compliance with Landfill Capacity Assurance requirements. The Leachate Storage Tanks will be required to store the landfill leachate liquid prior to shipping it for disposal during final closure and through post closures of the facility. It is expected that the container management facility and the stabilization system will remain operational until just before final closure of the last open landfill. These will remain open to ensure the proper handling of remaining wastes and waste residues, in accordance with regulations at the time of closure.

Other final closure activities include site monitoring, routine site inspections, groundwater monitoring, decontamination of equipment, structures and areas, and verification sampling and analytical efforts. A summary of the major facility process areas or portions thereof, which likely will remain operational until final closure, follows:

- Hazardous Waste Landfill Cell
- Leachate Storage Tanks
- Stabilization Treatment Tank System
- Container Management Facility

Utilizing this information, all other facility units and/or process areas, or portions of those listed above, may be subject to the partial closure scenario. Each of the major facility process areas have been evaluated for this possibility and specific tasks within this site-wide closure plan, have set forth the necessary elements of partial closure within the requirements of the regulations. Each process area's closure activities meet the regulatory requirements for final closure with the exception of notification and certification requirements for tanks and container storage areas. Notification and certification of closure of these non-disposal units is not required until final closure in accordance with current regulations. If however, certification of a closed area under partial closure is made, it will not have to be certified again at the time of facility closure. Candidates for partial closure based on current facility operations include but are not limited to:

- Portions of the Container Management Facility
- Portions of the Vat Stabilization Tank System
- Leachate Storage Tank
- Surface Impoundment Units
- Individual Hazardous Waste Landfill Cells

Partial closure includes discontinuance of use, removal of wastes and residues, and cleaning the particular unit, apparatus or area, as applicable, with or without filing for notification or certification of final closure. If certification is not received at partial closure, it will be required at final closure. Partial closure of any unit may take place at any time.

Equipment after decontamination may, at the discretion of the owner or operator, remain in place or may be removed. If an item cannot be decontaminated it must be removed for disposal. If an item cannot be decontaminated in place, it will be removed and either disposed or decontaminated in a fixed or temporary containment area. Equipment will not be left in place after the end of the post-closure period.

4.0 MAXIMUM EXTENT OF OPERATIONS

This closure plan delineates the maximum extent of operations of the current facility. This is utilized as a “worst case" scenario for unexpected closure at any time during the facilities operation.

4.1. Management of Maximum Inventory

The information provided in Table A.1 describes the capacity of each container, tank, and storage unit/area considered at the maximum extent of operations for the facility at any given time during the permit period. Capacity information is used to reasonably quantify the inventory for removal, treatment, transport and/or disposal, as appropriate, at the time of closure. An estimate of residual waste generated during closure procedures (e.g. decontamination of units and soils and residue clean-up from routine operations/treatment) is provided based on the facility decontamination portion of the closure plan. Remaining waste inventory and decontamination residuals are two categories of potential hazardous wastes to be managed during facility closure.

4.1.1. Estimate of Maximum Remaining Waste Inventory

No waste inventory is attributable to the open landfill cells since such cells would be receiving wastes for disposal - not generating wastes from closure of the units. Liquids that may be present in the surface impoundment at the time of final closure are assumed to be evaporated prior to closure. Therefore no costs are associated with management of the potential surface impoundment inventory.

The potential maximum inventory of wastes contained in Table A.1 is assumed to be the amount in storage at the time of closure. Assumed maximum waste inventory at the time of closure is based strictly on the capacity of the container management facility, and capacities of current, active, tank systems.

4.1.1.1. Maximum Inventory Management - Container Management Facility

Most Containerized Wastes will be disposed in an on-site landfill after any necessary or required treatment or amendment activities are performed. Up to 50 55-gallon drums of flammable waste will be sent off site for incineration. Any handling and processing of this containerized inventory will be performed in accordance with the current permit conditions and applicable regulations at the time of closure.

4.1.1.2. Maximum Inventory Management – Inactive and Active Tank Systems

Stabilization tanks are not used for storage so there is no associated waste inventory. No waste is considered in inventory for listed, inactive tanks that have been previously emptied and cleaned as described within this plan. The leachate tank will be needed through post-closure and thus will not be closed until the end of the post-closure period. The total permitted volume is considered to be disposed, however, for closure cost estimate purposes. The tank capacities for the computations of inventory have been taken from Module IV of this permit (stabilization tanks are only listed for completeness).

4.1.2. Estimate of Closure - Generated Residual Waste lnventory

Table A.2 summarizes the estimates of closure-generated residual waste as necessary to quantify closure management costs. Estimates are based on the decontamination methods and practices anticipated to be employed for the various units and are categorized according to the final management anticipated. The table provides a summary of the details presented in Appendix D, “Cost Documentation Appendix (CDA)," and the closure cost “Worksheets” in Appendix C. The table outlines estimated landfill capacity assurance quantities, as required.

4.1.3. Procedures for Handling Hazardous Waste Inventory and Decon Residues

This section presents a general discussion of typical management activities for the waste streams expected to comprise the inventory. Specific procedures related to a particular unit are included in the detailed closure cost estimates included in Appendix C and in Appendix D. Specific waste streams and any ancillary handling requirements such as removal, containerization and transportation, are included in the cost estimates as required for financial assurance.

4.1.3.1. RCRA/TSCA Waste Stream Inventory Management

It should be noted that less than 5% of the total waste inventory of the Container Management Building may be RCRA/TSCA combination waste materials. These materials will not materially affect the cost of disposal of inventory as they will either be calculated into the landfillable volume or into the incinerable volume as the closure plan exists today.

4.1.3.2. On-Site Management

In general, management activities related to the hazardous waste inventory will be handled on-site. As an example, the current facility has the capability of performing such activities as: containerization and re-containerization of wastes as necessary, off-site shipment of non-landfillable wastes, stabilization of residues and (inventory) waste streams, hazardous waste landfill disposal, providing and using container handling equipment and facilities, and mobilization of other equipment as necessary. These management activities reflect a continuation of current, routine, operating practices at the site.

4.1.3.3. Off-Site Management

The off-site management practices expected for closure are the manifesting and loading of wastes destined for incineration or other suitable organic waste management practices, and disposal of leachate and decontamination liquids.

5.0 FACILITY DECONTAMINATION

General facility areas subject to processing hazardous waste will receive a final evaluation of the necessity for decontamination. In addition, this section includes the decontamination of areas such as roads, staging areas, scale areas, laboratory, truck/wheel wash units, etc.

This section presents a discussion of typical decontamination procedures for all operational areas/units. The criteria, procedures and methods of decontamination presented below are typical in nature and will have Director approval should Clean Harbors modify the procedures described. Individual circumstances at the time of closure may require optional approaches to typical decontamination efforts listed below. The closure standards are performance based and thus specifying the exact method of achieving decontamination is not provided. However, the typical methods described have been used to develop the closure cost estimate.

Implementation of Module VIII will, for any portion of the facility at the time of partial closure of a unit or area or total closure of the facility, take precedence over the decontamination procedures described in this closure plan and will, when completed, meet closure requirements.

5.1. Contaminated Equipment, Structures and Facility Areas

The contaminated equipment, structures and other areas to be decontaminated are: the Stabilization Tanks, Leachate Treatment Tanks, Leachate Building and the Container Management Building.

The container management containment surfaces will be assumed to be contaminated. Storage tanks listed in Table A.1 are considered to be contaminated even if they are in a clean condition after being placed on an inactive status. Surface impoundments will also require cleaning as part of closure. Details for each specific unit/process area component are considered below and delineated further on the closure cost estimate Worksheets (CMF and CLO) in Appendix C and Cost Documentation (CDA) in Appendix D. Final Closure Costs based on the listed criteria and assumptions are discussed in Section 14 and are presented in Appendix C.

5.2. Typical Decontamination Procedures

5.2.1. Remove Waste Inventory

The waste inventory will be processed and/or treated in accordance with current regulations, the procedures outlined in the permit and/or Waste Analysis Plan. As noted previously, RCRA/TSCA combination waste streams will not alter the combination of waste types or disposal methods already in place in this RCRA Closure Plan.

5.2.2. Inspection of Areas/Equipment

Inspect slab areas, tanks, ancillary process equipment, liquid transfer lines, sump structures and secondary containment areas for spills or evidence of spills, leaks, cracks or other evidence of potential release of contaminants to the environment and document the findings.

5.2.2.1. Remove any accumulated materials; i.e. dust, dirt, etc., that would inhibit recognition of spills or releases during the decontamination process;

5.2.2.2. Inspect containment surfaces for cracks, holes, or evidence of potential leakage or loss of integrity,

5.2.2.3. If cracks, holes, or evidence of potential leakage is documented, a core will be taken at the point(s) where integrity is questioned, through the concrete and no less than one foot into the soil beneath. Samples will be taken from 0-4 inches of depth, 5-8 inches of depth and 9-12 inches of depth. The samples will be analyzed for the constituents found in Utah Admin. Code R315-261 Appendix VIII.

5.2.2.4. Identify, record, and enter into the operating record the location of damage which could have caused the loss of integrity of the containment system if leakage is quantified during the test and use this information to accomplish step 5.2.6.3 after decontamination of the containment surfaces, and

5.2.2.5. Repair any cracks or other damage to containment surfaces that could release waste waters to the ground during decontamination efforts.

5.2.3. Decontamination of Areas/Equipment

5.2.3.1. Decontamination of tanks and/or piping in place or remove them to fixed or temporary containment for decontamination utilizing decontamination methods for hard surfaces;

5.2.3.2. Decontaminate tanks and equipment inside and out;

5.2.3.3. Remove equipment from containment as necessary to ensure the containment surfaces are properly decontaminated;

5.2.3.4. Dispose of tanks and equipment in lieu of decontaminating them.

5.2.4. Decontaminate Structures

Decontaminate structures removing all stains (chemical stains do not have to be removed) utilizing decontamination methods for hard surfaces (6.1);

5.2.5. Decontaminate Secondary Containment Surfaces

Decontaminate secondary containment surfaces utilizing decontamination methods for hard surfaces;

5.2.6. Re-Inspect

Re-inspect all sump areas, secondary containment and leak detection systems for cracks, holes, or evidence of potential leakage or loss of integrity that was not identified prior to initiation of closure:

5.2.6.1. Collect core samples of the concrete and soil in order to identify the presence of contamination of the subsoils. If contamination is confirmed, go to step 5.2.6.2 and 5.2.6.3, and then proceed with Section 5.2.7.

5.2.6.2. Remove all concrete and soil within six inches of the crack and dispose of it as contaminated.

5.2.6.3. Sample the soil from the trench left after removing the concrete and analyze for volatile, semi-volatile and pesticide/herbicide parameters provided in the Ground-Water Monitoring List found in Utah Admin. Code R315- 264-1107 (40 CFR 264 Appendix IX by reference). Continue expanding the trench both laterally and vertically until the analyses of the samples come back less than or equal to the concentrations listed and dispose of the removed soil according to the Waste Analysis Plan.

5.2.7. Soils Adjacent to the Unit

This sections applies to soils immediately adjacent to the units within six (6) feet [or ten (10) feet in the case of the Container Management Facility] of the outside of the containment areas and in areas where trucks or other equipment had been staged for storage or transfer of wastes.

5.2.7.1. Inspect the area and map the location of stained or discolored soils,

5.2.7.2. Remove the top six (6) inches of exposed soils, and

5.2.7.3. Take a grab sample of the excavated soil from each excavated area and analyze it for volatile, semi-volatile and pesticide/herbicide parameters provided in the Ground-Water Monitoring and for PCB's from the current SW-846 method and the standards identified in Section 6.3 of this Closure Plan.

5.2.7.4. If the analysis shows levels at or below those identified in Section 6.3 of this plan, the unit may be declared closed and the soil disposed of in the landfill.

5.2.7.5. If the analysis shows levels above those identified in Section 6.3 of this plan dispose of the soil (landfill disposal assumed) according to the regulations and go to Section 5.2.7.6.

5.2.7.6. Sample and analyze the soil from areas where the soil has been removed

5.2.7.6.1 Take surface (0" to 6") grab samples approximately every 50 feet.

5.2.7.6.2 Take additional surface (0" to 6") grab samples from the locations of stained or discolored soils identified prior to removing the surface layer of soils.

5.2.7.6.3 Analyze soil samples for volatile, semi-volatile and pesticide/herbicide parameters listed in the Ground-Water Monitoring List found in Utah Admin. Code R315-264-1107 (40 CFR 264 Appendix IX by reference), and for PCB's for the current SW-846 method and using the numerical standards set-forth in the PCB Commercial Storage Closure Plan.

5.2.7.6.4 If contamination is identified that exceeds the Regional Screening Level (RSL) risk assessment values for industrial soils, remove at least six (6) inches of soil and repeat steps 5.2.7.6.1 through 5.2.7.6.3 until the soil no longer exhibits levels of volatile, semi-volatile and pesticide/herbicide parameters that exceed the RSL's.

5.2.8. Facility Roadways

The access road to the facility is maintained by Tooele County and consists of asphalt. Asphalt paving continues inside the facility to the north of the Sampling Pad which is located north of the Administration Building. The remainder of the roads at the facility consist of gravel covered dirt roads or dirt road without the gravel. The non-asphalt roadways within the facility have been placed into one of three categories. The categories are defined based on the type of vehicles and their respective payloads that primarily utilize, or have in the past utilized the roadway. The categories are defined later in this section.

The asphalt roadways within the fence line of the facility lead from the gate, to and from the scales, to the sampling/parking area, and to the dirt/dirt-gravel roads identified above. Stained areas, sampling platforms and the scales will be decontaminated according to the plan for hard surfaces. The non-asphalt roadways shall be decontaminated as follows:

5.2.8.1. Sampling

A sampling program will be initiated to determine the existence and extent of any contamination that may be present on the dirt and gravel roadways. The soil sampling program will be conducted utilizing a grid system. Samples will be obtained in any areas of obvious contamination and elsewhere within the grid system. Samples will be taken at a depth of 0 to 6 inches. Composites will be prepared from these samples at a ratio of 2 to 1 and analyzed. The dimensions of the grids will vary depending on the classification of the roadway. Five sampling locations within each grid will be selected randomly. However, within each grid, if an area(s) of potential contamination is noted (i.e., soil discoloration and/or odor), one or more of the sampling locations shall from those areas of suspected contamination. Samples from those locations will be discreet and not be composited and will be documented as such in the sample field log book.

At each sampling location (5 per grid), the sample will be obtained by advancing a bucket or hand auger to a depth of 0 to 6 inches. Each sample will be visually characterized, noted in a field log book and placed in precleaned glassware with teflon-lined caps. Each sample container will be labeled as to sample location and depth interval, and the chain of custody will be initiated for shipment to an approved analytical laboratory. During the sampling activity, the bucket-type hand auger and auxiliary sampling equipment will be cleaned using detergent, distilled water and acetone. The sampling equipment will then be rinsed using distilled water between each sample to avoid cross contamination.

5.2.8.1.1 Road Type A: Type A roads are those used currently, or in the past, for large haul trucks transferring waste from the Stabilization Tanks to the disposal cells and from the disposal cells to the wheel wash. When moving waste from the Stabilization Area to the disposal cells, the haul trucks are uncovered. Type A roads will have 5 samples taken from a 500 square foot grid and shall be conducted as stated above.

5.2.8.1.2 Road Type B: Type B roads are those used by transport vehicles hauling hazardous waste on the way to the Stabilization Tanks, the container storage buildings, and the Bulk Solid Storage Areas. Tarps and other covering systems are removed in the Sampling Platform area. The bulk containers then are transported to its location on site uncovered. Type B roads will have 5 samples taken from a 750 square foot grid and shall be conducted as stated above.

5.2.8.1.3 Road Type C: Type C roads are other facility roads that have not had waste transported on them and are most likely not contaminated. Type C roads will have 5 samples taken from a 1000 square foot grid and shall be conducted as stated above.

5.2.8.2. Road Dimensions and Volumes Based on Type

An inventory of facility roads, with their dimensions and types, are presented in Table A.3.

5.2.8.3. Decontamination

Samples will be taken in the areas described above and analyzed for soil pH and constituents found in Utah Admin. Code R315-264-1107 (40 §CFR 261, Appendix IX by reference). If contamination is found that exceeds risk-based remedial action objectives (RAO's) based on United States Environmental Protection Agency (USEPA) Regional Screening Levels (RSL's) for Industrial Settings in Soils (June 2017), the extent of contamination must be determined in a horizontal and vertical direction. Contaminated soils must be removed until a 6-inch horizontal and vertical stratum of soil in the contaminated area meets the requirements specified below for decontamination as determined by representative soil samples within the contamination zone. As an alternative, instead of determining the vertical and horizontal extent of contamination, a six inch layer of soil will be removed from the entire grid, managed according to the Permit and placed in an active landfill. Sampling and analysis shall then be repeated in areas that were identified as contaminated during the previous sampling in order to demonstrate that the contamination has been completely removed.

Soils will be considered decontaminated when analysis of soil pH and 40 §CFR 261, Appendix IX results indicate that the above criteria have been met. Test methods and procedures will be those specified in the Waste Analysis Plan. Contaminated soils will be transferred to a RCRA or RCRA/TSCA cell at the facility or to an off-site permitted hazardous waste disposal facility.

5.2.9. Personal Protective Equipment

Equip the personnel involved in the decontamination process with appropriate personal protective equipment as designated by the closure safety officer.

5.2.10. Decontaminate Equipment Used

Decontaminate or dispose of equipment used in the decontamination process, to transport, and/or participate in final on-site disposal according to the decontamination procedures in this plan

5.3. Surface Impoundment Unit Decontamination

Surface Impoundment A is a triple-lined impoundment (two synthetic, one clay) with a primary and a secondary leak detection/removal system. The basic components include clay liner and berms, 80 mil HDPE primary liner, 100 mil secondary liner, PVC and HDPE piping, synthetic drainage net, geotextile fabric, concrete pipe supports, gravel drainage media, and stone mulch (rock armor) for exterior berm protection. Surface Impoundment B will be a double-lined impoundment consisting of a 60-mil geomembrane top liner system and a 60-mil HDPE geomembrane and 3 feet of compacted clay bottom composite liner system. A drainage layer consisting of geonet provides for a leak detection system between the two liner systems. Details of the designs are contained in Module V of the permit. The surface impoundments will be closed "clean" pursuant to regulatory requirements. In compliance with these requirements, unit hard surfaces will be cleaned as indicated in Section 6, Criteria for Evaluating Decontamination. The hard surfaces may be disposed of instead of decontaminated at the discretion of the Permittee.

5.3.1. Remove Wastewater

Remove wastewater (may be allowed to evaporate) and solid residue and manage in accordance with the waste analysis plan.

5.3.2. Clean the Surfaces

Clean the primary and secondary liners and drainage nets to a hard surface standard. Treatment of rinse waters will depend upon the waste codes associated with the surface impoundment. For closure cost purposes, it is assumed the rinse waters are disposed of as leachate.

5.3.3. Remove the Primary and Secondary Surfaces

Remove and cut the primary and secondary liners and associated drainage nets into sections of manageable proportions for disposal. Reuse of these sections is acceptable at either Grassy Mountain or other hazardous waste facilities. (Disposal is assumed for closure cost purposes.)

5.3.4. Remove the Geotextile Surfaces

Remove and cut the geotextile under layer into sections of manageable proportions for disposal. Reuse of these sections is acceptable at either Grassy Mountain or other hazardous waste facilities. (Disposal is assumed for closure cost purposes.)

5.3.5. Remove the Leachate Collection System

Remove the leachate collection system components for disposal. Reuse is acceptable at either Grassy Mountain or other hazardous waste facilities. (Disposal is assumed for closure cost purposes.)

5.3.6. Examine the Clay Liner

Examine the clay liner for visual evidence of contamination.

5.3.6.1. Take grab samples of the visually contaminated areas;

5.3.6.2. Analyze the samples for parameters appropriate for the waste managed in the surface impoundment;

5.3.6.3. Remove visually contaminated soil for disposal (assumed to be landfill disposal) if required, based on the analyses of the samples;

5.3.6.4. When no visual contamination is found, samples will be taken from the areas of most likely to be contaminated (the sump area) and analyzed. The results will determine reuse or disposal of the clay.

5.3.7. Clay Liner Removal

Leave the clay liner in place or remove and stockpile it for future use.

5.3.8. Groundwater Monitoring Wells

Groundwater monitoring wells utilized for monitoring of the surface impoundments shall continue to be monitored.

5.3.8.1. Sample these wells and analyze the samples in accordance with Module VII of the Permit upon closure of this waste management unit.

5.3.8.2. Continue routine groundwater monitoring for one year after closure.

5.3.8.3. Review the data collected for this final year, as well as the complete historic monitoring results.

5.3.8.4. Ensure that no statistically significant hazardous contamination has been detected.

5.3.8.5. If none, abandon the monitoring wells in-place or remove in accordance with regulatory or industry-established standards.

5.3.8.6. If contamination is detected in any of the three groundwater monitoring wells, follow the procedures specified in Modules VII & VIII for corrective action.

6.0 CRITERIA FOR EVALUATING DECONTAMINATION

6.1. Closure of "Hard Surface" Waste Treatment or Containment Items

Closure of "hard surface" items (steel tanks, concrete containment, equipment, HDPE liners, etc.) is performance-based and any cleaning method may be used to achieve the standard. The standards for successful decontamination vary with the disposition of the items being decontaminated as described in the following paragraphs.

6.1.1. Items Allowed Unrestricted Use

Decontamination may be declared when rinse water of the item(s) being decontaminated meets the parameters and concentration limits listed in Section 6.3.

6.1.2. Left On-Site Or Sold To An Equipment Broker, For Which No End User Is Known

Decontamination may be declared when the visual standard set forth in 40 CFR 268.45 for a “clean debris surface" is met and at least 10% of like items from a given waste area have been rinsed and the rinse water of the item being decontaminated meets the parameters and concentration limits listed in Section 6.3.

6.1.3. Items To Be Used In Industrial Services That Are Not Related To Food, Feed or Drinking Water, Or Are To Be Scrapped For Remelt

Decontamination may be declared when the visual standard set forth for a “clean debris surface" is met.

6.1.4. Items Being Sold For Reuse In Used Oil Service, Low Level Radioactive Waste Service, Or Other Industrial Services Approved by UDEQ

Decontamination may be declared after a single pass with a pressure washer, sandblaster or equivalent means is used to remove residue (without disassembly) from the interior of the equipment and the exterior is cleaned to either the rinsate standard in Section 6.3 or the visual standard for a "clean debris surface."

6.1.5. Items Being Sold For Reuse In Hazardous Waste Service

Decontamination may be declared after a single pass with a pressure washer, sandblaster or equivalent means is used to remove residue (without disassembly) from the interior of the equipment and the exterior is cleaned to either the rinsate standard in Table A.4 or the visual standard set forth in 40 CFR 268.45 for a "clean debris surface." If the unit is not to be containerized during shipment, the exterior must be cleaned to either the rinsate standard (Section 6.3 of this plan) or the visual standard for a clean debris surface.

6.1.6. Debris To Be Disposed Of In A RCRA Landfill

Decontamination may be declared after a single pass with a pressure washer, sandblaster or equivalent means is used to remove residue.

6.1.7. Numerical Standards for PCB Decontamination

Target levels for PCBs will be consistent with the Regional Screening Level Summary (RSL) Table for industrial soils. The version of the RSL to be used will be the current version at the time of closure.

6.2. Decontamination Residuals Management

6.2.1. Determine Disposal Method

Determine the appropriate disposal method of residual wastes generated during closure utilizing the regulatory standards.

6.2.2. Solids

Solids will generally be treated, if required, and landfilled.

6.2.3. Wash and Rinse Water

Wash and rinse water or other cleaning residues will be collected and handled as hazardous waste. The Closure Cost Estimate assumes that 5% of these residues will need to be treated, stabilized and landfilled and the liquids will be disposed of appropriately off-site. However, it is possible that the wastewater may also be stored in the leachate storage tanks and disposed of as leachate. Although wash water may be stabilized on-site, treated at a facility with an NPDES permit and discharged, deep well injected, or incinerated, etc., the method actually used will be decided at the time of closure, based upon site availability, regulatory approvals, and economics. The closure cost estimate assumes that liquids are sent to a facility with an NPDES permit and discharged.

If wash or rinse water is contaminated with PCBs, the wash or rinse water will be incinerated.

6.3. Decontamination Standards

6.3.1. Hard Surfaces

Hard Surfaces includes concrete surfaces, metal building materials, equipment manufactured fom metal and other non-porous materials. All decontamination will be done within secondary containment so that wash waters can be collected and sampled. Concrete surfaces will be hydroblasted with an appropriate industrial strength detergent solution. Wash water will be collected in sumps or within the secondary containment. Representative rinsate samples will be collected from sumps or secondary containment areas from the final rinse water.

Decontamination will be considered acceptable when the rinsate analytical result produces a TOC level of less than 50 ppm or less than 1 ppm of Utah Admin. Code R315-261, Appendix VIII constituents at no greater than maximum contaminant levels for drinking water, and pH between 6 and 9. Test methods will be those specified in the Waste Analysis Plan.

If test results fail to meet the decontamination standards the area of piece of equipment must be decontaminated again. This must be repeated until the standard is achieved.

Contaminated rinse water will be collected for either on-site treatment or for disposal at a permitted hazardous waste disposal facility.

6.3.2. Soils

A soil is defined as all soil media and includes soils adjacent to permitted units, soils collected from beneath sumps and secondary containment, roadways and any other soil that is excavated during the closure activities.

Metals, Volatile and Semi-Volatile compounds shall meet the Industrial Levels established in the most current version of the Regional Screening Levels (RSL) Risk Assessment Summary Table. Soils will be determined to be clean as long as the constituents present in Appendix VIII are at or less than the RSL levels and the sum risk from multiple contaminants equal the following:

> For carcinogens, the total cancer risk must be $\leq 1 \times 10^{-6}$.
>
> For all other contaminants (the non-carcinogen) for which there is a detection, the Total Hazard Index must be ≤ 1.

Section 6.3.3 below addresses Sum Risk from Multiple Contaminants.

6.3.3. Accumulated Risk (Based on the EPA RSL)

Using RSLs to Sum Risk from Multiple Contaminants

RSLs can be used to estimate the total risk from multiple contaminants at a site as part of a screening procedure. This methodology, which does not substitute for a baseline risk assessment, is often called the "sum of the ratios" approach. A step-wise approach follows:

6.3.3.1. Conduct sampling and perform analysis in accordance with the Waste Analysis Plan.

6.3.3.2. Identify contaminants in the SL Table. Record the SL concentrations of the various contaminants and note whether SL is based on cancer risk (indicated by 'c') or noncancer hazard (indicated by 'n'). Segregate cancer SLs from non-cancer SLs.

6.3.3.3. For sampling scenarios that have at least eight samples, a statistical approach to data evaluation can be used on a case by case basis when approved by the Director. Evaluations that use this approach can use a program developed by the EPA called ProUCL Software (or similar). For cancer risk estimates, take the site-specific concentration (maximum or 95th percent of the upper confidence limit (UCL) on the mean) and divide by the SL concentrations that are designated for cancer evaluation 'c' . Multiply this ratio by 10-6 to estimate chemical-specific risk for a reasonable maximum exposure (RME). For multiple pollutants, simply add the risk for each chemical. See equation below.

$$CR = \left[\left(\frac{CC_1}{SV_1}\right) + \left(\frac{CC_2}{SV_2}\right) + \left(\frac{CC_3}{SV_3}\right) + \cdots + \left(\frac{CC_n}{SV_n}\right)\right] \text{ x } 10^{-6} \qquad \text{(Eq. 1)}$$

6.3.3.4. For non-cancer hazard estimates, divide the concentration term by its respective non-cancer SL designated as 'n' and sum the ratios for multiple contaminants. The cumulative ratio represents a non-carcinogenic hazard index (HI). A hazard index of 1 or less is generally considered 'safe'. A ratio greater than 1 suggests further evaluation. Note that carcinogens may also have an associated non-cancer SL that is not listed in the SL Table. To obtain these values, the user should view the Supporting Tables. See equation below:

$$HI = \left[\left(\frac{CC_1}{SV_1}\right) + \left(\frac{CC_2}{SV_2}\right) + \left(\frac{CC_3}{SV_3}\right) + \cdots + \left(\frac{CC_n}{SV_n}\right)\right] \text{ x } 1 \qquad \text{(Eq. 2)}$$

Where:

HI = Hazard Index

CR = Cancer Risk

CC = Contaminant Concentration

SV – Screening Values (RSLs)

n = Number of Contaminants

Soils that exceed either the Total Cancer Risk or the Total Hazard Index must be disposed of in a permitted landfill cell. Soils that meet or are less than the established value can be left in place.

7.0 CLOSURE CAPPING OF LANDFILL CELLS

7.1. Final Cover System

Closure of the facility will require the application of the designed final cover system to all open hazardous waste landfill cells at the facility. All such landfill cell closures shall meet federal and state regulatory requirements, conditions of the facility permit, and conditions of this closure plan.

7.2. Intent to Begin Closure

Notification of intent to begin closure activities, affecting an individual landfill cell, or partial/final closure of the facility will include, for plan approval, a unit-specific closure plan application for final cover. Typical major components of any closure application for the final cover of any cell is listed below:

7.3. Design Engineering Report (DER)

A Design Engineering Report (DER) with commentary that may include such design considerations as:

- Preparation of waste mound materials and surface prior to placement of final cover;
- Design considerations to accommodate settlement and subsidence of the final cover, considering initial settlement, primary and secondary consolidation, slope stability and all historic experience concerning these issues at the site;
- Design modifications to reflect recent technological advancements of any portion of the design or Construction Quality Assurance Plan (Attachment VI-2). This will include design changes, which are a result of site-specific (or other related) experience concerning a design or construction element.

7.3.1. Engineering Drawings

Engineering Drawings for the final cover of the specific cell, which demonstrate that, the regulatory requirements have been complied with.

7.3.2. Construction Quality Assurance Plan (CQA)

The most recent Construction Quality Assurance Plan (CQA) (Attachment VI-2) approved for landfill construction by the regulatory authority applicable to the particular cell(s) designated for closure.

7.3.3. Closure Plan Approval Application

The application for closure plan approval for the facility includes an engineering report and any necessary engineering drawings and specifications, as applicable, for the disposal of all treated leachate from the closed units during the closure activities and the post-closure period.

7.3.4. Closure Certification

Final cover closure activities shall meet the closure certification requirements outlined in Section 11.

8.0 GROUNDWATER MONITORING REQUIREMENTS

The groundwater monitoring requirements during partial or final closure does not change from that during the facility operation, which is governed by Module VII of the permit. Module VII provides for groundwater monitoring of all land disposal units at the facility including those subject to Utah Solid Waste Management Rules, Utah Hazardous Waste Management Rules, RCRA (Resource Conservation and Recovery Act) and TSCA (Toxic Substances Control Act) for the PCB Cells on site.

Module VII allows routine operational, closure and post-closure groundwater monitoring for the TSCA waste management areas to be governed by EPA's PCB Approvals for these units. These approvals are more stringent than or equivalent to the Module VII requirements.

The site will maintain the groundwater monitoring protection program including all monitored wells active at the time of closure. However, the TSCA cell monitoring wells are excluded from the closure cost estimate. Those groundwater monitoring costs are accounted for in the closure cost estimates in the EPA's PCB Approvals for those units. Table A.5 provides a current list of the all existing and proposed Grassy Mountain land disposal units and their associated number of monitoring wells.

9.0 ANCILLARY CLOSURE ACTIVITIES

At the time of closure, either partial or final, there will be pertinent activities which will be necessary to ensure that the closure activity will satisfy regulatory requirements. These ancillary activities will include leachate management, run-on/run-off control, and site security, described in the following paragraphs.

9.1. Leachate Management

9.1.1. Leachate & Landfill Cells

Apply leachate management during closure activities only to the land disposal units.

9.1.2. Management of Leachate and Leachate Collection Systems

Manage leachate and leachate collection and removal systems in accordance with Module VI of the facility permit and applicable regulations.

9.1.3. Monitor and Maintain Records

Monitor and maintain records for each leak detection/collection system in accordance with the requirements of Module VI of the permit.

9.1.4. Leachate Storage

Collect and store leachate in the leachate storage tanks prior to shipping the leachate off-site for disposal. This disposal method is assumed for closure cost estimate purposes. However, any appropriate treatment or disposal method available at the time of closure may be utilized at the discretion of the Permittee.

9.1.5. Routine Maintenance

Perform all routine maintenance and repairs necessary for the proper operation of the leachate management system.

9.2. Run-On/Run-Off Control

Run-On/Run-Off control in the context of this plan refers to the non-contaminated precipitation at the site. In general, the site-wide run-off control will be managed in the same predominantly passive manner as during normal operations, utilizing the site grading, collection system and collection basins. This in-place system will be maintained during the closure period.

9.3. Security/Inspection

9.3.1. Security

9.3.1.1. Maintain security during final closure in accordance with the regulatory requirements, and in accordance with Module II and Attachment II-2 of the RCRA permit.

9.3.1.2. Provide additional security measures during partial closure activities at the facility, as required by the Health and Safety Plan applicable to that closure activity.

9.3.2. Inspections

Conduct inspections in accordance with Module II and Attachment II-4 for waste management units still storing and/or managing waste except that:

9.3.2.1. The Permittee may cease conducting inspections for a storage and/or treatment unit that has been certified by an Independent, Utah Registered Professional Engineer as being closed in accordance with this closure plan. The inspection form for that area may be so annotated until it is removed from the permit via a permit modification.

9.3.2.2. After waste is removed from a treatment and/or storage unit, emergency equipment specified in the contingency plan for that area is no long required to be present or maintained as long as work permits for these units are issued and include a list of emergency equipment required for the closure activities being performed.

9.3.2.3. During the closure of a unit, emergency equipment specified in the contingency plan may be replaced with different but equivalent equipment.

9.3.2.4. Record on the appropriate inspection form when closure activities or the status of the unit being closed preempt or negate the need for the standard inspection requirements.

9.3.2.5. Continue performing standard inspections that require looking for spills, leaks, abnormal conditions, etc. Where inspections aren't otherwise required, these inspections will be performed each day closure work is performed in an area.

9.4. Final/Partial Closure Application for Plan Approval

All closure activities require notification of the pending activity (and accompanying plan modifications) to reflect changed conditions, as appropriate. The application for plan approval of affected Closure activity must address required changes to all the major components outlined by this Site-Wide Closure Plan or any unit-specific closure plan. As discussed throughout, this may include, for example, the closure schedule, engineering requirements, groundwater monitoring and/or other ancillary closure activities.

10.0 SURVEY PLAT

No later than the submission of the certification of closure of each hazardous waste disposal unit or facility, the Permittee will file with Tooele County and submit to the Director of the Division of Waste Management and Radiation Control, a survey plat indicating the location and dimensions of the closed landfill cells with respect to permanently surveyed benchmarks. This plat must be prepared and certified by a professional land surveyor. The plat filed with Tooele County must contain a note prominently displayed, which states the owner's or operators obligation to restrict disturbance of the hazardous waste disposal unit in accordance with the applicable post-closure requirements.

11.0 CLOSURE CERTIFICATION

Submit within 60 days of completion of closure of a waste management unit or the facility by registered mail or other proof of delivery, certification that the facility has been closed in accordance with the specifications in the approved closure plan, Attachment II-7. An independent, registered professional engineer qualified by experience and education in the appropriate engineering field must sign the certification.

12.0 COMPLETE UNIT AND FINAL FACILITY CLOSURE SCHEDULE

Disposal unit closure plan applications for plan approval will include a schedule of the closure activities. This will include the total time expected for complete closure of the unit and the time period required for complete removal of any inventory to assure regulatory compliance. Complete closure of a storage and/or treatment unit will be conducted in accordance with the schedule presented in Table A.6 unless a request for an alternate schedule is requested of the Division of Solid Waste and Radiation Control.

The final facility closure schedule presented in Table A.6 depicts a reasonable projection of closure activities based on conditions currently anticipated within the scope of this plan. This schedule presents the more critical “milestone" projections to allow for tracking of the progress of closure and to define the length of time closure will take.

The time frame established begins with the actual closure effort, assuming sixty (60) day notification of closure and initiation of work within thirty (30) days of receipt of the last waste. The submittal of final closure certification and filing the survey plat with the local land authority within sixty (60) days of completion are depicted by the last two months. The ninety (90) day requirement for complete waste inventory management is also depicted.

The projected completion of final site wide facility closure is anticipated to take longer than the regulatory requirement of 180 days. The schedule projected in Table A.6 presents a minimum 24-month schedule based on the size and complexity of the current overall operation. The maximum extent of operations predicts that two landfill cells will be operational prior to final site wide closure. However, this closure plan and respective closure cost estimate acknowledges that currently three RCRA landfill cells are operational. Since these units require extensive efforts for closure governed by construction quality assurance issues that require efforts and physical conditions that are restricted during 4-5 months of the winter season, the final facility closure will, of necessity, require more than the statutory 180 days to complete.

During this extended time frame, as well as throughout the closure period, the Permittee will continue to take all steps to prevent threats to human health and the environment from the unclosed non-operating portions of the facility. This effort is supported by the requirements to continue all monitoring and maintenance of the facility in accordance with the permit throughout the closure period.

13.0 CONTINGENT CLOSURE REQUIREMENTS

There are no units located at the facility currently subject to state and federal contingent closure plan requirements. If, at the time surface impoundments are closed, unexpected conditions are found which prevent closure in accordance with the requirements of this closure plan, an amendment to the closure plan shall be prepared and submitted as provided for in state and federal regulations.

14.0 FINANCIAL REQUIREMENTS FOR CLOSURE

The closure cost estimate presented herein reflects the provisions for financial requirements in state and federal regulations. The cost estimates provided reflect the closure costs for the container management facility as a separate closure effort. The subsequent section addresses the general site wide closure, including the container management facility. Since closure of the container management facility will likely occur at the time of site wide closure, the certification costs would be redundant and have been subtracted from the site wide closure. The individual unit-specific Container Management Facility (CMF) Cost Worksheets (Tables C.1: Worksheet CMF-1 through Table C.4: Worksheet CMF-4) are followed by the site wide closure (CLO) Worksheets (Table C.5: Worksheet CLO-1 through Table C.11: Worksheet CLO-7). The Cost Documentation Appendix (CDA) included in Appendix D includes discussion and analysis worksheets supporting the estimated costs (Tables D.1 through D.11). The Cost Documentation Appendix, together with the Closure Cost Worksheets, provide appropriate documentation and references concerning the details of the cost estimates to allow the reviewer to evaluate their accuracy and appropriateness.

14.1. Closure Cost Estimate Support Information

The Closure Cost Worksheets in Appendix C provide the information utilized to develop the cost estimates provided in Appendix B. Additional details of the estimates and references are provided in Appendix D (CDA). The CDA provides tables outlined to generally follow the order of the Worksheets in Appendix C.

14.2. Container Management Facility Closure Cost Worksheets

The Closure Cost Worksheets for the Container Management Facility provided in appendix C (Table C.1: Worksheet CMF-1 through Table C.1: Worksheet CMF-4) provide the information utilized to develop the Container Management Facility (CMF) Closure Cost Estimate provided in Appendix B. The Container Management Facility Closure Cost Estimate generally follows the order of the Worksheets.

14.3. Site-Wide Closure Cost Estimate Support Information

The Site-Wide Closure Cost Worksheets provided in Appendix C (Table C.5: Worksheet CLO-1 through Table C.11: Worksheet CLO-7) provide the information utilized to develop the site-wide Closure Cost Estimate provided in Appendix B. The site-wide Closure Cost Estimate generally follows the order of the Worksheets.

B. POST-CLOSURE PLAN

15.0 INTRODUCTION

This facility post-closure document is set forth to comply with the financial requirements applicable state and federal regulations. The contents apply to the Grassy Mountain facility, EPA ID UTD991301748, to reflect areas and issues contained within the most current, approved permit. All portions of the permitted facility, which are interpreted to be affected by the post-closure requirements, are listed in Section 16.1 of this plan.

This plan sets forth the necessary actions and requirements, which could reasonably be expected, for post-closure care of the Grassy Mountain Facility. The post-closure monitoring and maintenance will, to the extent practicable, be developed to detect, in a timely manner, and prevent post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters, or to the atmosphere.

Post-closure care for all affected units will commence, in accordance with this plan, upon completion of closure requirements and issuance of any approved modifications of same.

16.0 FACILITY POST-CLOSURE REQUIREMENTS

16.1. Affected Hazardous Waste Management Units

Post-Closure care is required for all hazardous waste management units (HWMU's) at which hazardous wastes will remain after closure. Based on the current permit for the facility, the landfill units are the only HWMU's subject to post-closure care.

Grassy Mountain currently has twelve (12) landfill disposal units, of which nine (9) are approved under the permit: RCRA Cells 1, 2, 3, 4, and 5, RCRA/TSCA Cells B/6 and 7; and Industrial Cells 1 and 2. TSCA Cells X, Y, & Z at the facility are not subject to this permit, through authorization of EPA Region 8. Industrial Cells 1 & 2 have been closed as RCRA Cells and are managed as RCRA cells. RCRA Cells 1, 2, 3, 4, and 5 have been closed. Six (6) additional landfill disposal units: RCRA/TSCA Cells 8, 9, 10, 11, 12, and 13 are proposed to be added to the permit.

The RCRA Groundwater Program (RCRA Permit Module VII) covers that portion of the groundwater monitoring program for the TSCA cells that the TSCA groundwater monitoring program does not cover. The TSCA program covers Class 1 volatiles and semi-volatiles and Class 3 parameters. TSCA Cells X and Y are closed. The general configuration and location of each of the landfill cells at Grassy Mountain is illustrated in Attachment II-1. Specific details of the particular RCRA units are contained in Module VI of the permit and permit references such as the associated Design Engineering Reports (DERs), Constructed Cell Record Drawings, and QA/QC Documentation.

16.2. Monitoring and Maintenance Activities

After final closure of any landfill cell, the Permittee shall comply with the monitoring and maintenance requirements of the plan approval and Utah Admin. Code R315-8-14.5 that includes, at a minimum, the following:

- Groundwater monitoring and administrative reporting requirements;
- Required maintenance of the groundwater monitoring system;
- Operation of the leachate collection/detection and removal system until such time as leachate generation accumulates at a rate too small to pump. This shall include all administrative reporting requirements of the permit;
- Maintenance of the integrity and effectiveness of the final cover, including repairs to the cap as necessary to correct the effects of settling, subsidence, erosion, or other events,
- Prevention of run-on and run-off from eroding or otherwise damaging the final cover of any unit or cell; and
- Protection and maintenance of surveyed benchmarks used.

The specific activities detailed below include all tasks that could reasonably be expected during the post-closure care period. Typical monitoring and maintenance inspection, maintenance and operational tasks, and the expected frequency are discussed below.

16.2.1. Groundwater Monitoring

In accordance with state and federal regulations, the Permittee shall conduct post-closure groundwater monitoring activities for the HWMU's consistent with the most current plan approval conditions for these units. These conditions are outlined and set forth in Module VII of the permit.

The current conditions delineated in Module VII and Module II have been utilized for the purpose of projecting post-closure activities and estimating post-closure costs. The facility groundwater monitoring program includes all monitoring wells defined in Module VII for the RCRA Waste Management Areas at the time of closure. Fifty-five (55) wells, 23 TSCA, 30 RCRA, 3 IWC-3 and 4 background wells are considered in this estimation of post-closure care costs. The current annual groundwater monitoring, administration, reporting and maintenance costs (tabulated in Table C.9: Worksheet CLO-5) are utilized as the basis for post-closure groundwater monitoring costs. For closure cost estimate purposes, it is assumed that the monitoring costs of two of the background wells are covered by the TSCA post-closure plans.

16.2.2. Leachate Management

In accordance with state and federal regulations, the Permittee shall continue to operate the leachate collection and leak detection systems associated with each of the RCRA HWMU's until such time as leachate generation accumulates at a rate too small to pump with the existing pumps as defined in Table A.8. As presented in Table A.8, if pumping has been moved to a less frequent schedule and pumping produces more leachate than would have been produced at the previous frequency, then the pumping frequency will return to the previous frequency. This logic is repeated in the table. Any existing data may be used to determine the starting frequency during post-closure.

The management of these systems shall comply with the operational and reporting requirements in state and federal regulations of and applicable requirements contained in Module VI of the permit. The current permit conditions and operational procedures for leachate management have been utilized for the purpose of projecting post-closure activities and estimating post-closure costs as described in Table D.6 (CDA). Leachate Management Costs over a two-year period are discussed in the CDA and estimated in Table C.10 (Worksheet CLO-6) and in Section 9.1, "Leachate Management". No solid residuals are expected to be generated from collecting leachate from closed cells over the post-closure period. The total post-closure annual costs for leachate collection and disposal efforts exclude solids disposal. This method of estimating leachate costs is believed to be conservative based on a reasonable expectation that reduced rates of leachate generation will result at the closed cells over time.

16.2.3. Maintenance Activities

In accordance with state and federal regulatory requirements and applicable plan approval conditions, the Permittee shall maintain the integrity and effectiveness of the final cover, including making repairs as necessary to correct the effects of settling, subsidence, erosion or other events that could reasonably be expected to occur over the 30 year post-closure period. These maintenance activities include maintenance of the leachate management system and groundwater monitoring system as necessary. Groundwater monitoring system maintenance costs are included in the sampling and analysis cost estimates.

16.2.3.1. Routine Inspections

Routine inspections of pertinent facility systems are required by this plan and applicable regulations. Typical inspection items are listed below as a guide for the monitoring and inspection of the Grassy Mountain facility at such time when no hazardous waste operations are taking place. During facility operations, the units in "post-closure status" will be inspected and monitored in accordance with the operations inspection schedule presented in Module II.

Typical inspection items will include monthly site perimeter & general facility checks for items listed in this Post Closure Plan, such as; well integrity, locks, leachate risers integrity, leachate pump function (during leachate management), site and perimeter security and signage, etc.

Typical landfill cell checks will be performed monthly and after severe weather events to include observation for erosion, standing liquids, subsidence, burrows, and any deterioration of final cover, runoff management systems.

16.2.3.2. Maintenance of Waste Containment Systems

Maintenance of the final cover of any disposal cell shall be performed to comply with the permit conditions stated within. It is expected that an annual maintenance operation will be required to meet the needs of the facility. This annual operation will include replacement of soils lost to erosion which might threaten the integrity of the cover, maintenance of the drainage channels and culverts which direct any run-off away from the unit, controlling burrowing rodents as necessary to counter infestations, and control measures to prevent growth of woody or deep-rooted plants which might damage the integrity of the final cover.

16.2.3.3. Maintenance of the Leachate Management System

Maintenance of the leachate management system will include maintenance of the leachate evacuation pumping systems, temporary leachate storage units and other pertinent portions of the leachate collection/detection systems during such time as leachate is generated in quantities, which are able to be pumped. The leachate is expected to be managed at an appropriately permitted offsite treatment and disposal facility. The leachate collection/detection systems may be expected to occasionally require replacement of pumps and miscellaneous routine maintenance of equipment. These costs are estimated in the Table D.6 (Appendix D, CDA).

16.2.3.4. Maintenance of the Groundwater Monitoring System

The groundwater monitoring system will require routine and non-routine maintenance throughout post-closure. It is expected that pump repair and replacement and other minor maintenance will be required and these costs have been included in the semi-annual groundwater monitoring cost (Table D.5).

16.2.3.5. Maintenance of the Security System

The maintenance of the security system for this facility is expected to be minimal due to its remote location. Any security fencing and gates provided will be maintained and warning signs surrounding the facility will be maintained and replaced as necessary to prevent the inadvertent entry of unauthorized personnel.

16.2.4. Post-Closure Care During Facility Operation

It should be noted that there will be numerous units in post-closure status and care while the facility is still operating under the current and future permits. All maintenance and inspections of units in post-closure will be performed during the normal operation of the facility while it is still operational. This cost estimate is, therefore, believed to be conservative.

16.2.5. Post-Closure Contact

The anticipated post-closure contact for the Grassy Mountain facility is stated below. At the time of final closure of the facility any necessary modifications to this designated contact will be made.

Clean Harbors Environmental Services, Inc.
42 Longwater Drive
P.O. Box 9149
Norwell, Massachusetts 02161-9149
(781) 792-5000

16.2.6. Post-Closure Care Notices

The Permittee shall, no later than 60 days after certification of closure of each hazardous waste disposal unit, submit records to the local zoning authority and the Director of the Division of Waste Management and Radiation Control.

In addition, the Permittee shall, within 60 days of certification of closure of the first hazardous waste disposal unit and within 60 days of certification of closure of the last hazardous waste disposal unit, record, in accordance with State law, a notice on the deed which meets state and federal requirements. A certification that such notice has been executed shall be submitted to the Director of the Division of Waste Management and Radiation Control.

16.2.7. Post-Closure Certification

The Permittee shall, no later than 60 days after the completion of the 30 year post-closure period for any hazardous waste disposal unit, submit a certification to the Director stating that all post-closure requirements have been completed in accordance with this plan and any required modifications of same.

17.0 FINANCIAL REQUIREMENTS FOR POST-CLOSURE

The post-closure cost estimates reflect the state and federal financial requirements.

17.1. Post-Closure Care Cost Estimates

The above text provides the information utilized to develop the cost estimates provided in the Table B.3. Additional information is found in Tables D.8 and D.9 (Appendix D, CDA).

C. FINANCIAL ASSURANCE MECHANISM

18.0 FINANCIAL ASSURAIRICES

18.1. Financial Assurance for Closure

Clean Harbors Grassy Mountain, LLC, as the owner/operator of the Grassy Mountain facility, is required to provide assurances that there will be funds available to close the facility at some time in the future. The purpose of these assurances is to guarantee that closure can be performed by a third party, if for some reason Clean Harbors Grassy Mountain, LLC is unable to do so itself. The minimum dollar amount to be guaranteed for financial assurance, in 2017 dollars, for facility closure is provided in Table B.2. This figure will be updated at least annually in response to inflation, and as often as needed to reflect changes at Grassy Mountain.

There are six different methods allowed by the rules to guarantee the Closure Costs:

- Closure Trust Fund
- Surety Bond Guaranteeing Payment into a Closure Trust Fund
- Surety Bond Guaranteeing Performance of Closure
- Closure Letter of Credit
- Closure Insurance
- Financial Test and/or Corporate Guarantee.

Clean Harbors Grassy Mountain, LLC shall use one of these as the financial assurance mechanism for the Grassy Mountain facility. The financial assurance documentation or certification of such documentation is maintained at the office of the Division of Waste Management and Radiation Control. Clean Harbors Grassy Mountain, LLC shall remain in compliance with the applicable provisions of state and federal regulations as they relate to the mechanism used for the financial assurance mechanism for closure.

18.2. Financial Assurances for Post-Closure

In accordance with the regulations cited above, Clean Harbors Grassy Mountain), LLC, as the owner/operator of the Grassy Mountain facility, is required to provide assurances that there will be funds available to maintain the facility through the post- closure period. The purpose of these assurances is to guarantee that post-closure care can be performed by a third party, if for some reason Clean Harbors Grassy Mountain, LLC is unable to do so itself. The minimum dollar amount to be guaranteed for financial assurance, in 2017 dollars, for facility post-closure care is provided in Table B.3. This figure will be updated at least annually in response to inflation, and as often as needed to reflect changes at Grassy Mountain.

There are six different methods allowed by the rules to guarantee Post-Closure Care:

- Post-closure Trust Fund
- Surety Bond Guaranteeing Payment into a Post-Closure Trust Fund

- Surety Bond Guaranteeing Performance of Post-Closure Care
- Post-Closure Letter of Credit
- Post-Closure Insurance
- Financial Test and Corporate Guarantee for Post-closure Care.

Clean Harbors Grassy Mountain, LLC shall use one of these as the financial assurance mechanism for Grassy Mountain. The financial assurance documentation or certification of such documentation is maintained at the office of the Division of Waste Management and Radiation Control. Clean Harbors Grassy Mountain, LLC shall remain in compliance with the applicable provisions of state and federal regulations as they relate to the mechanism used for the financial assurance mechanism for post-closure.

18.3. Liability Requirements

Clean Harbors Grassy Mountain, LLC maintains liability insurance for sudden accidental occurrences, as required by the rules cited and Module II.Q.1. of the Clean Harbors Grassy Mountain, LLC, RCRA Permit. The certificate of insurance for the required liability insurance as specified by state and federal regulations is maintained on file at the office of the Division of Waste Management and Radiation Control.

18.3.1. Variance Procedures and Adjustments by the Regional Administrator

Clean Harbors Grassy Mountain, LLC has no plans to use variance procedures or adjustments, therefore, this section is not applicable. There are no known adjustments that have been made by either the Regional Administrator or the Director of the Division of Waste Management and Radiation Control.

18.3.2. Use of State Required Mechanisms

The facility is not covered by any State financial mechanism, therefore, this section is not applicable.

18.3.3. State Assumption of Responsibility

This section is not applicable to Clean Harbors Grassy Mountain, LLC.

D. PCB COMMERCIAL STORAGE CLOSURE COST ESTIMATE

19.0 ANNUAL REVIEW OF INITIAL COST ESTIMATE

This section includes the estimated cost of closure activities including the sampling, transportation, disposal, equipment costs and labor involved in such activities. The costs used for disposal reflect current industry pricing as of the date of this revision. The cost of closure estimates shall be adjusted annually for inflation and may be adjusted for changes in market conditions.

20.0 CLOSURE COST ESTIMATE

The PCB and used oil sample analysis costs for various media (e.g. oil, water, soil, wipe) are based on quotations received from one or more suitable laboratories, as defined in Section 1.2 of the Waste Analysis Plan. Uncoated concrete surfaces will be sampled using destructive core sampling. Coated (impervious) concrete surfaces will be wipe sampled if in good condition.

20.1. Tank Farm

20.1.1. PCB Oil (TSCA) and Used Oil (RCRA) Disposal Charges

Disposal charges for PCB oil (TSCA) and used oil (RCRA) are presented in Table C.12: Worksheet TCLO-1.

20.1.2. Bulk Tank Disposal

Bulk tank disposal charges associated with tank farm are presented in Table C.13: Worksheet TCLO-2.

20.1.3. Area Decontamination - Concrete Removal

Area decontamination and concrete removal costs, and disposal capacity requirements for the Tank Farm Containment Area (with a volume of 9,099 ft^3) are presented in Table C.14: Worksheet TCLO-3.

20.1.4. Underground Pipeline Removal

Costs for removal of the underground pipelines and capacity requirements for disposal of pipeline materials removed are presented in Table C.15: Worksheet TCLO-4.

20.1.5. Total for Tank Farm

The total closure cost estimate for the PCB Oil disposal, bulk tank disposal, crane, area decontamination and underground pipeline removal is summarized in Table B.4.

20.2. Container Storage Areas

20.2.1. Container Inventory Removal

Container inventory removal costs and disposal capacity requirements are presented in Table C.16: Worksheet TCLO-5.

20.2.2. Transformer Flush and Bulk Tank Disposal

The costs and disposal capacity requirements for transformer flush and bulk tank disposal are presented in Table C.17: Worksheet TCLO-6.

20.2.3. Area Decontamination and Concrete Removal

The concrete containment area has a surface area of 6,730 ft^2 and is 1 foot thick. The volume of concrete of the area is 6,730 ft^3. The costs for area decontamination and concrete removal and disposal capacity requirements are presented in Table C.18: Worksheet TCLO-7.

20.2.4. Total for Container Storage Area

The total closure cost estimate and disposal capacity requirements for the PCB Container Storage inventory removal, transformer flush and bulk tank disposal, area decontamination and concrete removal are provided in Table B.5.

20.3. Auxiliary Equipment

It is assumed that 4 roll-off boxes containing 30,000 pounds each of auxiliary equipment and debris will be accumulated and sent to a permitted chemical landfill. The total closure cost estimate and disposal capacity requirements associated with auxiliary equipment are provided in Table C.19.

20.4. Administrative and Supervisor Costs

It is assumed it will take 9 weeks for a Project Manager to coordinate and supervise the closure of the facility. Total administrative and supervisor closure costs are provided in Table C.20.

20.5. Closure Certification

The 14 weeks of closure activity must be witnessed and verified by a certified Professional Engineer. It is assumed that this engineer is on site or billing 25% of the time during closure. Closure costs associated with engineering observations and certifications are provided in Table C.21.

20.6. Total Estimated Landfill Capacity Assurance (in cubic yards)

The total estimated landfill capacity assurance for closure activities is presented in Table B.6.

20.7. Total Estimated Closure Cost

The total estimated cost for closure of the PCB (TSCA) commercial storage facilities is presented in Table B.6.

21.0 REVIEW AND ADJUSTMENT OF COST ESTIMATE

Adjustments to the cost estimate are required in two situations: (1) after certain modifications to the closure plan, and (2) annually to account for inflation. These situations are described below.

The owner/operator will revise the cost estimates within 30 days of Regional Administrator approval of any closure plan modification that increases the costs of closure. The following changes in facility conditions or activities could increase the closure cost estimate:

- An increase in facility size and/or capacity;
- An increase in the estimate of maximum inventory;
- Changes in regulatory requirements that affect the costs of closure activities;
- Contingencies over the operating life of the facility which affect the types of activities that will be required at closure (e.g., the occurrence of a spill necessitates additional closure activities); or
- Changes in surrounding land use (e.g., an increase in population density surrounding the facility warrants increased security provisions).

The owner/operator may also request that a reduction in the cost estimate be allowed if costs decrease. The following changes in facility conditions may justify a decrease in the closure cost estimate.

- Reductions in the size of the facility remaining to be closed over the remaining life of the facility;
- Changes in operating processes reduce the quantities of PCBs to be handled at the time of maximum estimated inventory;
- Reductions in costs of closure activities or disposal.
- Changes in regulations that allow for different disposal options than identified in the plan.

22.0 CLOSURE PLAN

22.1. Facility Description

22.1.1. General description

The Clean Harbors Grassy Mountain, LLC, PCB storage and transfer facility is located within the fenced perimeter of the Grassy Mountain facility and in close proximity to the PCB landfills that are also within the fenced perimeter of the Grassy Mountain facility. The storage and transfer area consists of a warehouse and a tank farm that are used to transfer and store Waste PCB liquids and PCB items.

22.1.2. Jurisdiction In Which Facility Is Located

The Grassy Mountain facility is located at the eastern edge of the Great Salt Lake Desert of Tooele County, Utah. It is approximately three miles east and seven miles north of the Knolls, Exit Number 41, off Interstate 80.

Latitude 40° 49’ 00" North
Longitude 113° 12’ 30” West

Township 1 North; Range 12 West; Section 16, plus a ½-mile perimeter buffer around the section.

The site address and contact telephone number is:

Clean Harbors Grassy Mountain, LLC
Exit 41, Off I-80
3 Miles East, 7 Miles North of Knolls
Grassy Mountain, Utah 84029
801-323-8900

22.1.3. Written Description and Topographic

22.1.3.1. PCB Storage Facilities

The PCB Transfer and Storage facility consists of a PCB Warehouse and a PCB Tank Farm. The warehouse is one building with bermed storage area inside used for PCB item storage, PCB Transformer Drain and Flush operations, and storage of PCB liquids in two 3,000-gallon storage tanks. The unenclosed bermed tank farm consists of four additional tanks used to store PCB liquids, one tank to store clean diesel fuel / used oil and one for clean oil. The building is designated as PCB Warehouse One. Some of the items stored in PCB Warehouse One are PCB oil, Askarel (pure PCB), other PCB contaminated liquids, transformers, capacitors and debris. One of the tanks in the Tank Farm is designated to store PCB contaminated water and the other three are designated to store any type of bulk PCB liquids

22.1.3.2. PCB Treatment and Disposal Facility

This section is not applicable.

22.1.3.3. Hazardous Waste Management Units

This section is not applicable.

22.1.3.4. All Buildings and Structures

See Section 22.1.3.1 above.

22.1.3.5. 100-Year Flood Plain

This facility is above any 100-year floodplain. The lowest point of elevation is 4,220 feet.

22.1.3.6. Adjacent Surface Waters or Wetlands

There is a man-made storm water run-off pond for the PCB landfills that EPA has identified as being surface waters. There are no surface waters within 1,400 feet of the PCB Transfer and Storage Facility. All storm water is contained on the Grassy Mountain facility property.

22.1.3.7. Surrounding Land Uses

The Grassy Mountain facility is located in the desert. The only other company in the proximity, is the Amax Magnesium Company. The Hill Air Force Range is approximately 7 miles north of the facility. Most of the land surrounding the facility is managed by the BLM.

22.1.3.8. Other Key Topographic Features

The Grassy Mountain facility is located in the Salt Lake Basin.

22.1.3.9. Traffic Patterns

Trucks may approach PCB Warehouse One from the East on the road that is bounded by PCB Landfill Cells X and Z on the North and Landfill Cell B/6 on the South or from the North on the same road bounded by Cells X and Y on the East and Grassy Mountain facility operations areas on the West. All road surfaces are clay and lime fines mixtures. Brine water from a well located in the adjacent Grassy Mountains is spread on the road surface for dust control. There are no special weight restrictions.

22.1.3.10. Location and Status of Underground Storage Tanks

There are no underground tanks for waste storage.

22.1.3.11. Location and Nature of Security Systems

22.1.3.11.1 24-Hour Surveillance System

A 6-foot high security fence with locked gates encloses the entire Grassy Mountain facility. All gates are kept shut and locked except when being used and/or monitored by security and/or operations personnel.

22.1.3.11.2 Barriers and Means to Control

See Section 22.1.3.11.1.

22.1.3.11.3 Safety Signs

Safety signs such as “No Smoking", “Fire Extinguisher", "Exit" and "Safety Shower"" are posted In accordance with OSHA in the active areas of the PCB storage facility.

22.1.3.12. Closed PCB Units

The PCB Oil Dechlorination Unit that was originally part of this facility was closed.

22.1.4. Description of Environmental Conditions On-Site

22.1.4.1. Proximity to Surface Waters Including Ponds, Lagoons, Wetlands and Storage Reservoirs

There are no surface waters in proximity to the Grassy Mountain facility. There is a man-made storm water run-off pond for the PCB landfills that EPA has identified as being surface waters. This pond is about 1,400 feet from the PCB Transfer and Storage Facility and there is a PCB landfill between the pond and the facility. There are no surface waters adjacent to the PCB Transfer and Storage Facility.

22.1.4.2. Proximity to Public or Private Drinking Water Sources

Bottled drinking water is brought to the site. Due to the high groundwater salinity, no groundwater in the vicinity can be used as drinking water.

22.1.4.3. Sewer Location and Design Which Could Result in Contamination of Sewers or Sewage Treatment Systems from PCB Spills

There are no surface sewer collection areas on the facility. PCB Warehouse One has an adjoining office with a bathroom, which is, served by a septic tank. The human waste is periodically pumped, solidified and placed in one of Grassy Mountain's RCRA permitted landfill cells.

22.1.4.4. Location of Nearby Grazing Lands, Farms and Vegetable Gardens

The nearest grazing areas are 20 miles from the facility.

22.1.4.5. Presence of a Shallow Well, Groundwater Near the Surface, or Which Poses a High Potential for Groundwater Contamination

22.1.4.5.1 There are no known injection or withdrawal wells either on-site or off-site within 1,000 feet of the facility.

22.1.4.5.2 There are no known intermittent streams within 1,000 feet of the facility.

22.1.4.5.3 There are no other known sources of groundwater that would be affected by possible PCB contamination.

22.1.5. Detailed Description with Engineering Drawings

22.1.5.1. Certification Statement

Under the civil and criminal penalties of law for the making or submission of false or fraudulent statements or representations (18 U.S.C. 1001 and 15 U.S.C. 2615), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section(s) of this document for which I cannot personally verify truth and accuracy, I certify as the company official having supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.

____

Mr. Shane Whitney
General Manager
Clean Harbors Grassy Mountain, LLC

22.1.5.2. Roof and Walls

The storage areas for containers and other PCB Items is in PCB Warehouse One. The building has a roof and walls that are in good repair and prevent rainwater from reaching stored PCBs and PCB items. PCBs may also be stored in bulk tanks in the Tank Farm, which is not enclosed by a roof and walls. Instead, these tanks meet the state and federal requirements for PCB storage tanks.

22.1.5.3. Flooring

PCB Warehouse One has a concrete floor. There are no expansion joints in the floor. The floor is inspected weekly for cracks or damage to sealed joints and repaired accordingly.

22.1.5.4. Curbing and Containment Volume

22.1.5.4.1 Curbing and Material of Construction Information

At the time the floor was constructed, reinforcement bar was placed to provide support for the curbing that was poured a few days later. The new concrete floor was freshly cured and required no surface preparation. Additional reinforcement bar was wired to the vertical studs of bar imbedded in the floor. This additional bar consisted of two strands, one above the other running parallel and horizontally around the area that was to form the berm. Wooden forms were constructed around the reinforcement bar and the curbing was poured using medium strength concrete.

22.1.5.4.2 Containment Volume

Table A.9 describes the containment capacity summaries for the storage areas in PCB Warehouse One along with the capacity calculations. These calculations assume that curbing exists between all storage areas in PCB Warehouse One. According to state and federal regulatory requirements, "… the floor and curbing must provide a containment volume equal to at least two times the internal volume of the largest PCB Article or PCB Container or 25 percent of the total internal volume of all PCB Articles or PCB containers stored, whichever is greater".

According to the reference, Area A, which has a containment capacity of 12,926 gallons, could store 51,704 gallons or 940 55-gallon drum equivalents. Area B, which has a containment capacity of 12,986 gallons, could store 51,944 gallons or 940 55-gallon drum equivalents. The maximum total capacity of 350 55-gallon drum equivalents, to be stored in the combined Area A and Area B, is well within the maximum allowed by the regulatory reference for either area even if the two 3,012-gallon tanks (the equivalent of about 110 55-gallon drums) are included.

Within PCB Warehouse One, Area B, are two tanks that may be used to store PCB Liquids. Each tank is constructed of all steel. The tanks are described in Table A.10.

22.1.5.5. Drain Valves, Floor Drains, Expansion Joints, etc.

The existing floor has no expansion joints, and no floor drains or other openings of any type.

22.1.5.6. Storage Pallets Outside of Storage Buildings (Including Locations and Numbers)

No pallets of large high voltage capacitors or PCB-Contaminated Electrical Equipment that has not been drained of free flowing dielectric fluid will be stored outside of the PCB storage areas in the building.

22.1.5.7. Tank Farm

22.1.5.7.1 Description of Tanks

Table A.11 some of the relevant aspects of each tank that may be used for PCB storage. Note that Tank 7 is used for RCRA used oil storage only.

In addition there is one four-inch waste underground pipeline that connects the Tank Farm to PCB Warehouse One. It is a steel pipe with welded connections. The underground portion is in a plastic sleeve so that inspections for leaks can be made and it is about 200 yards long. When full it would contain approximately 392 gallons.

Thus the total of the Tank Farm tank capacities for TSCA Regulated PCB Fluids and RCRA-regulated used oil is 84,728 gallons. Each tank described in Table A.11 is of all steel construction, and is used to contain the liquids identified in the table. The tanks were designed and constructed according to the American Petroleum Institute standard 650 (API 650), Welded Steel Tanks for Oil Storage, Edition 7. The API 650 standard encompasses all the parameters necessary for the design and construction of the tanks, including:

- Materials of construction;
- Design of bottoms, roofs, shells, joints, connections, and appurtenances;
- Anchoring;
- Fabrication and construction;
- Testing, repairs, and inspection;
- Welding; and
- Marking.

All tank seams were welded in accordance with the applicable standards to which each tank was built. Refer to the appropriate standard for more detailed information. Tanks 1, 2, 5, and 6 have the following spill prevention controls while Tank 4 and Tank 7 are not regulated by TSCA but have the same spill prevention controls.

- Float Type Level Gauges
  Before pumping into the tanks, the level is checked to determine the amount of material that may be pumped without possibility of spill. Use of these gauge readings is the normal procedure for determining the free board space.

- Internal Emergency Valve with Fusible Link
  Each of the above tanks has internal emergency valves with fusible links on the bottom valve openings. These valves are designed to automatically close if the temperature at that valve is above a predetermined set point. This safety factor is designed to seal the tank in case of fire.

- Emergency Vent
  This vent is designed to remain closed until a predetermined internal tank pressure is exceeded. The vent is meant to open if the tank requires additional venting capabilities, and provide additional protection against tank rupture.

- Normal breathing vent
  This vent provides for the normal venting of the tank during operation. This vent is normally closed, but opens at predetermined set points for pressure or vacuum.

- Manual Valving
  Each tank, in addition to the internal emergency valve, has a manual ball valve that can be visually checked to determine open or closed status.

- Physical Binding of Quick Connect Couplings
  This procedure insures that all quick connect couplings are wired or otherwise physically bound together to prevent accidental line decoupling during PCB transfer.

- Contingency Plan
  The tank farm area containing the tanks described in this section has a written protocol (Section 22.1.5.7.2), for the prevention and handling of spills or other emergencies.

- Spill Kit
  The tank farm area described in this section has a spill kit that contains supplies for spill containment and clean up.

22.1.5.7.2 Tank Management Practices

The following practices are employed as a means of spill prevention:

Typical inlets and tank outlets and quick connect couplings are preceded by a ball valve that enables operators to shut off the flow of liquids before connecting or disconnecting any hoses or other parts of the tank system for repairs, maintenance or regular operations. Most lines in the system are designed to allow them to be pumped dry by the pumps in operation before being opened or closed. When appropriate, connections and breaks in lines are done with an appropriately sized spill pan or absorbent pad underneath the connection so as to reduce the possibility of spills or spatters. Heavy-duty flexible oil transfer hoses, or their equivalent, are used.

Coupling connections are typically tied off with wire or an equivalent fastener to reduce the possibility of their coming undone during a transfer operation.

In order to minimize the potential for leaks from tanks during loading or unloading, the inlet and outlet lines of the large tanks are equipped with a locking ball valve that is locked in the closed position with a padlock when the facility is not in operation.

To minimize *de minimus* releases from lines, couplings are typically covered with fitted covers (if male) or plugged (if female) when not in use. The operator prior to initiating transfer operations checks all lines for obvious leaks and correct valve position.

The following equipment and procedures are typical of those used to prevent the overfilling of the bulk storage tanks during transfer operations.

All tanks are equipped with level sensing devices that enable operators to determine the level of the liquid in the tank to the nearest half-inch. All tank levels are recorded in the daily tank farm log at the beginning and end of the working day. When a transfer has occurred from one tank to the other the affected tanks are rechecked to verify liquid levels. Operations personnel to ensure that no mistakes have occurred and that, within reason, all material is accounted for check these figures.

Prior to a transfer operation taking place, the operations personnel check the level-sensing device on both tanks to make sure that it is the same as recorded on the operations log. The amount to be transferred is then calculated from a conversion chart that converts the level in the tank to gallons of material and vice-versa. The final levels for both tanks are calculated, the transfer lines are checked for valve position and leaks, and the transfer process is begun. At all times during the PCB transfer process there is an employee in the area of operations. An operations employee checks the level sensing devices at appropriate intervals to ensure that the predetermined amount is transferred, and that overfill does not occur. At the end of the transfer process, an operations employee records the transfer in the Daily Tank Farm Log, recalculates the final levels in the tank, and checks the level-sensing device to ensure that all calculations were correct. The new levels of the tanks are then recorded in the log.

22.1.5.7.3 Secondary Containment Requirements

22.1.5.7.3.1 Materials Managed in the Tanks

Section 22.1.5.7.1 describes materials that are managed in the tank farm. No incompatibilities exist between the materials described and the steel tank construction.

22.1.5.7.3.2 Containment System Design

The tank farm containment is constructed of concrete reinforced with rebar and the expansion joints are equipped with water stops. The joints were sealed with epoxy and the entire containment surface coated with an epoxy grout to form an impervious surface free of cracks and gaps. Any precipitation in the form of run-on is removed from the containment sumps for disposal at an EPA approved facility.

The following is a list of the materials used in the construction of the secondary containment system and their specifications:

Concrete
The concrete used was normal weight concrete with a compressive strength of 3,500 psi at 28 days curing time. Air entrained concrete shall be used for all concrete exposed to weather.

Reinforcing Steel
All reinforcing steel conformed to ASTM Standard Specification A185 and A82.

The secondary containment system was built in three separate parts: the tank foundations, the berm wall, and the floor. The secondary containment system is designed and maintained to be free of cracks or gaps. The containment area is inspected at least weekly according to the inspection schedule. When a crack in the floor, berm walls or internal ramps is noted, it is repaired as is appropriate. Typically, the repairs are accomplished by sealing the cracks. To seal the cracks, they are first thoroughly cleaned and any loose chips are removed. Then an appropriate sealant is applied. If a gap is noted in the floor, berm walls or internal ramps, it is repaired as appropriate. Roughening the surfaces of the gap and applying an epoxy-bonding agent to the surfaces typically accomplish this. This agent seals the surface and improves the adhesion of the filler material (concrete) that is then poured and set inside the gap if necessary. After the filler material has set, the edges of the repaired area are sealed again on all exposed surfaces using an appropriate sealant. The appropriate methods for repairing cracks or gaps may be employed (e.g., replacing the affected area) as long as the crack or gap is repaired in a timely manner. Further, interim measures may be employed to minimize the potential for escape of spilled material should the repair take an extended period of time (e.g. days) to accomplish.

Sealants appropriate for sealing of containment areas and crack repair shall be utilized.

22.1.5.7.3.3 Containment System Capacity

The containment system in the Tank Farm consists of three separate bermed areas. The capacity of the berms and the containment capacity calculations are described in Table A.12.

Each of the Tank Farm storage areas has the minimum capacity necessary to meet the state and federal containment requirements with a minimum containment capacity of 100% of the contents of the largest container including freeboard.

22.1.5.7.3.4 Control of Run-off

As described in Sections 22.1.5.7.3.2 and 22.1.5.7.3.5, the secondary containment system was designed and built to prevent the migration of liquids to the environment. Any precipitation, leaks or spills that enter the Tank Farm secondary containment system will be collected at a sump. Once collected, the materials are disposed of according to Section 22.1.5.7.3.5.

22.1.5.7.3.5 Removal of Spills or Leaks from the Containment System

The daily inspection of this area will reveal any collected liquids in the sump or any spilled or leaked material on the floor. Collected liquids in the sump will be pumped into an appropriate container. The material will be considered to be PCBs, unless the liquid is tested and found to be below the applicable Federal, State and local levels. It will be stored, treated, and disposed of in accordance with all applicable regulations.

The removal of spilled or leaked material from the containment system that has not migrated into the sump will be accomplished using appropriate clean-up procedures. All recovered material from the cleanup, and all liquid material that enters the containment system will be stored, treated, and disposed of as PCB material, if appropriate.

22.1.5.7.4 PCB Materials Volatility

The PCB materials typically handled with contaminated mineral oils, have a vapor pressure well below 78 mm Hg @ 25°C. The mineral oil itself has a vapor pressure that varies depending on the source but is approximately 0.01 mm Hg @ 20°C. The vapor pressure of PCBs varies depending on the amounts of the various Aroclors in the mixture. The vapor pressures of Aroclors vary from non-detectable to 0.001 mm Hg @ 100°F. As both of these materials are substantially below the limit of 78 mm Hg @ 25°C, the PCB contaminated Mineral Oils can be exposed to atmospheric conditions without migrating to the environment.

22.2. Disposal of PCB Waste Inventory

22.2.1. Maximum Inventory

22.2.1.1. Provide Design Capacity

Table A.9 provides the maximum capacities for the two storage areas in PCB Warehouse One. The total combined capacity of the two areas is 25,912 gallons or 471 55-gallon drum equivalents. Table A.12 shows the total of the Tank Farm PCB storage tank capacities is 64,142 gallons.

22.2.1.2. Estimate of Maximum Types and Quantities

Based on historical levels, the approximate percentages of each waste type that may be stored in PCB Warehouse One are described in Table A.13. The percentages are reflected in the waste capacities shown in the Table A.14.

22.2.2. Disposal of Inventory

22.2.2.1. Details to Ensure Compliance as a PCB Waste Generator

Grassy Mountain Facility will adhere to PCB waste generator requirements when managing PCB wastes created during the closure process. Some of these requirements are listed below:

Containers

Containers used to store PCB liquids or solids created during closure will meet the container specification requirements of state and federal regulations.

Marking and Labeling

Containers will be marked with formats specified in state and federal regulations, and date of storage for disposal shall be written on the container when it is placed in storage.

Manifesting

When shipped to a commercial storage or disposal facility, PCB wastes will be listed on a shipping manifest (such as EPA Form 8700-22 or a similar State manifest) that specifies the shipper/generator, the transporter, and the destination facility. In accordance with state and federal regulations, PCB wastes will be listed on the manifest with additional unique descriptive information, as appropriate. Shipment dates will be compared with receipt dates, and storage for disposal dates with dates on Certificates of Disposal to help ensure timely disposal of PCB wastes created during closure. Exception reports will be sent to EPA as required.

Recordkeeping

Records will be maintained to show the PCB wastes created during closure and their disposition. This information will be recorded in the facility's annual document log and included in the annual report as required. These records will be maintained at the owner/operator offices or will be sent as originals or copies to EPA.

22.2.2.2. Estimate of Maximum Inventory to be Sent for Disposal

Refer to Tables A.11, A.12, and A.14 for the Tank Farm and PCB Warehouse One maximum capacities of wastes in storage.

22.2.2.3. Description of Any Treatment Prior to Transport, If Applicable

Tanks used to store oil with greater than 50 mg/kg (ppm) PCBs will be landfilled or after decontamination, scrapped or stored for reuse or reused. The closure cost estimate includes the cost of land filling in a PCB landfill at Grassy Mountain using market prices for disposal.

22.2.2.4. Methods and Arrangements Used for PCB Waste Removal and Transportation to Approved Storage and Disposal Facilities

22.2.2.4.1 PCB Storage Tank Waste Removal

In the event of closure, each PCB storage tank in the commercial storage facility will be emptied as will the oil from the pipeline to the warehouse. Oil will be transferred into a bulk oil tanker or drums for shipment to a PCB disposal facility.

22.2.2.4.2 PCB Container Removal

Forklifts or other mechanical devices will be used to remove the waste containers. All PCB wastes will be sent to EPA approved facilities with appropriate disposal technology and capability. Liquids will either be transferred from drums into a tank truck or shipped in their original containers. Approximate loading time per tanker, flatbed, or van trailer is 2 hours. A tanker will hold approximately 54 drums or about 40,000 pounds of Askarel. Solids such as capacitors, debris drums and transformers will be loaded onto flatbed trucks and transported to an appropriate facility. Approximate loading time is 2 hours to load 80 drums per truck. Drums are assumed to weigh approximately 500 pounds. A 1,000-pound transformer would be considered as two (2) 55-gallon drums. It takes about 35 gallons of diesel fuel to flush a 55-gallon equivalent PCB transformer.

22.2.2.5. Description of Treatment/Disposal Methods at the Final Treatment/Disposal Facilities

These are presented only to represent what was assumed to calculate the Closure Cost Estimates. Any approved treatment and/or disposal facility may be used during actual closure even if not identified in this closure plan.

22.2.2.5.1 Disposal of Treatable Mineral Oils

22.2.2.5.2 Storage Container Disposal

For closure cost estimate purposes disposition of each category is as follows:

• Askarel / Untreatable Oil	Incineration
• Transformer Flush	Incineration
• Water	Incineration
• Transformers (Drained/Flushed)	Landfill
• Capacitors	Incineration
• Debris	Landfill

Disposal facilities assumed for closure cost estimate purposes for these categories are shown in Table A.15. Any approved facility may actually be used during closure.

22.2.2.6. Bulk Tank Removal, Transport, Tracking, and Disposal of Tank Capacity

Contaminated tanks will be removed using rigging and a crane. Tanks to be landfilled (rather than scrapped or reused) will be loaded onto transport vehicles and transported to the Grassy Mountain facility's PCB landfill cell.

22.2.2.7. Proposed Schedule to Complete Disposal within 90 Days from Closure Commencement

The Regional Administrator shall be notified at least 90 days prior to the intended beginning of closure activities. However, closure activities may begin before the end of that 90-day period. The schedule provided in Table A.17 indicates the activities and actions to take place after closure is initiated. The day closure activities are initiated is assumed to be day one.

22.3. Closure Plan Sampling, Decontamination

22.3.1. Equipment and Area Classification

22.3.1.1. Tank Farm

The Tank Farm will be closed to the standards identified in Section 6.3 of this Closure Plan. Pursuant to previous correspondence with EPA Region 8, the concrete containment will be removed. It will be disposed as Bulk PCB Remediation Waste. Any spills occurring outside of the containment areas during closure will be cleaned to the PCB Spill Cleanup Policy Standards in accordance with federal requirements. Any spills occurring inside the containment areas will be cleaned and double wash/rinsed, but no confirmatory sampling will be done as the containment will be disposed in a PCB landfill.

22.3.1.2. PCB Warehouse One - Container Storage Area

Warehouse One will be closed to the standards identified in Section 6.3 of this Closure Plan. For closure cost purposes, it is assumed that the uncoated concrete containment areas will be removed and disposed as Bulk PCB Remediation Waste. Any spills occurring outside of the containment areas during closure will be cleaned to the PCB Spill Cleanup Policy Standards in accordance with federal requirements. Any spills occurring inside the containment areas will be cleaned and double wash/rinsed, but no confirmatory sampling will be done as the containment will be disposed in a PCB landfill.

22.3.2. Numerical Standards

- Target levels for this classification are described in Table A.18.

22.3.3. Statistical Sampling Program

22.3.3.1. Safety Plan

The safety plan details precautions required to minimize the risk to personnel performing the on-site inspection and sampling in addition to the facility's or contractor's standard safety plan. It should be noted that this facility receives no RCRA hazardous wastes.

22.3.3.1.1 Personal Protective Equipment (PPE)

A minimum of a hard hat, safety glasses and steel-toed boots will be worn while work is being done in either the Tank Farm or PCB Warehouse One or while inspections are being performed. Appropriate additional PPE (such as Tyvek suits, face shields, leather gloves, chemical resistant gloves, chemical resistant boots, etc.) will be worn while sampling, working with liquids, transferring wastes, etc. If dust will be generated by an activity, either a half-face respirator with high efficiency filter and goggles will be worn or a full-face respirator with high efficiency filter will be worn.

22.3.3.1.2 Confined Space Entry

No confined space entries will be performed except by those trained in accordance with OSHA Standards.

22.3.3.1.3 Work Permits

Hot work permits will be issued prior any use of open flames or metal cutting.

22.3.3.2. Initial Inspection of the Facility

The facility owner/operator or (contractor) will perform the initial (visual) inspection of the facility. Visually contaminated areas, along with areas suspected of contamination due to operator knowledge will be assumed as contaminated with PCBs and will either require sampling to determine if the area is contaminated with PCBs or disposal as PCB waste. The inspection will cover the entire transfer and storage area, including tanks, valves, equipment, containment areas, and 100 feet from the perimeter of the facility containment areas. Because the owner/operator will perform the initial visual inspection of the facility, valuable historical insight can be considered when investigating areas that may need remediation. This methodology will include historical use of buildings, types of exposure to PCB (i.e. liquids or solids contact, high-level or low-level PCBs), protection of surfaces such as epoxy floor coatings, traffic through buildings and throughout the plant, and containment and/or migration protection.

All PCB storage takes place within bermed concrete containment areas. The concrete surfaces may have come in contact with PCBs over the history of the use of the buildings and tank farm. All containment areas will be tested for contamination using grid sampling or, alternatively, random sampling where random sampling is deemed desirable or removed and disposed as PCB Bulk Remediation Waste without sampling. The closure cost estimate assumes the latter.

Prior to removing the containment, the underground PCB waste pipe will be removed, any residual liquid drained into a waste container and the structures over the containment will be washed to remove any buildup of dust. Any visually stained areas remaining after this washing will be sampled to determine if they are PCB or not. Soil samples will be taken from around PCB Warehouse One and the Tank Farm and from the soil under the containment after the containment is removed wherever staining or operator knowledge would indicate potential PCB contamination. While it is not expected that areas around or under the containment will be contaminated because PCB spills have always been cleaned in accordance with the PCB Spill Cleanup Policy throughout the life of the facility, it is assumed for Closure Cost Estimate purposes that soil samples will be taken.

Random wipes will be used for solid surfaces on equipment where contamination is either likely or suspected or the equipment will be decontaminated per 40 CFR 761.79 or the equipment will be disposed. For cost estimate purposes, it is assumed that the equipment is disposed. Liquid transfer and storage equipment such as pipes, hose and tanks will be assumed to be contaminated. Equipment will be assessed as to the practicality of decontamination versus disposal in a chemical waste landfill. For closure cost estimate purposes, disposal is assumed.

Records of PCB concentration and/or type of PCB waste are recorded with each unit's unique identification number in the case of drums, transformers, capacitors, and associated materials. These records shall be compared against the actual physical inventory of PCB material in the container storage and Tank Farm areas. In the event of obvious discrepancies, the material shall be sampled to determine the proper method of disposal.

22.3.3.3. Sampling Plan

The facility PCB commercial storage activities are limited to the PCB Warehouse One and the Tank Farm. The warehouse is used for the handling and storage of PCB items including but not limited to PCB and PCB contaminated transformers, PCB debris, PCB capacitors, and PCB and PCB contaminated liquids. The levels of PCBs handled range from 0 to 1,000,000 ppm PCB. All PCB storage takes place within a concrete containment berm. The Tank Farm is the location where the majority of the PCB liquids are stored in bulk. This area is located within a bermed concrete containment area. The Tank Farm has no roof. Several bulk tanks are located within this area.

After the concrete containment of each of these areas has been removed, the soils that were under the containment as well as its surrounding soils, will be sampled in accordance with regulatory procedures to identify any presence of PCB contamination above restricted standards. Appropriate sampling methods for the items and surfaces to be tested will be in accordance with regulatory procedures associated with sampling for impervious surfaces and sampling for non-impervious surfaces.

22.3.3.3.1 PCB Warehouse One Sampling Plan

The PCB Warehouse One container storage area is composed of five berms (A through E). However, only the A & B berms are used to manage PCBs. During the operational life of the facility, PCB Transformers, crushed PCB drums, PCB capacitors, PCB Article Containers, and PCB Containers will be stored in berms A and B. The berms have concrete floors and sidewalls. The closure cost estimate assumes that no sampling of these Areas will be done. Containment berms A and B will be removed and disposed as PCB wastes in the adjacent Grassy Mountain PCB landfill cell.

There is no reason to suspect that the walls or roof (inside or out) would be contaminated with PCBs. Nor is there any reason to suspect that the soil under the containment or the soils surrounding the warehouse are contaminated with PCBs as all PCB spills throughout the life of the facility will be cleaned to the PCB Spill Cleanup Standards. However, the walls and roof will be inspected for staining and any stained areas or areas suspected of being PCB contaminated based on operator knowledge will be sampled to determine if PCB contamination exists. As stated previously, the soil under the removed concrete will be sampled in accordance with required procedures. For closure cost estimate purposes it is assumed that 285 such samples will be taken, 275 soils and 10 wipes from impervious surfaces. A total of 56 analyses are included in the closure cost estimate to account for compositing the soil samples into 36 samples to analyze and 10% method blanks and 10% trip blanks.

The analytical method used to determine PCB concentration in samples will be the current SW-846 method for analyzing PCBs.

22.3.3.3.2 Tank Farm Sampling Plan

The Tank Farm is composed of three separate areas (Area I, Area II and Area III). Each berm has sump chambers and ramps. Area I has three tank pads for tanks 4, 5 and 6. Area III has three tank pads for tanks 1, 2 and 7 and is joined to Area II via a weir. During the operational life of the treatment facility that has already been closed, PCB Oils and water were stored and treated/decontaminated, clean fuel oil and used oil was stored in the Tank Farm. Subsequent to closure of the treatment unit, these same materials, except for treated oils, are stored in the tank farm. The tank used to store treated oils no longer stores any materials but could be used to store clean, non-volatile liquids in the future.

The Tank Farm areas have concrete floors and sidewalls, which are coated with an epoxy grout that extends up the berm wall and over the sealed expansion joints. However, this coating was applied to cap a spill that could not be cleaned to spill cleanup standards. Thus, the tank farm containment area will not be sampled, but will be removed and disposed as PCB waste in the adjacent Grassy Mountain Facility PCB landfill cell.

There is no reason to suspect that the soil under the containment is contaminated with PCBs as all PCB spills throughout the life of the facility (except as noted above) are cleaned to the PCB Spill Cleanup Standards. However, the area under the containment will be sampled according to required procedures to determine if PCB contamination exists. For closure cost estimate purposes it is assumed that 360 soil samples will be taken and composited into 45 samples to analyze. A total of 55 analyses are included in the closure cost estimate to account for 10% method blanks and 10% trip blanks.

The analytical method used to determine PCB concentration in the samples will be the current SW-846 method for analyzing PCBs.

22.3.3.3.3 Quality Assurance and Quality Control

22.3.3.3.4 Sampling Procedures

A comprehensive program is essential in order to ensure that all samples taken are appropriate for the analysis being performed, that the analysis is complete and accurate, and that the final reports contain sufficient information to achieve their intended purpose.

PCB wipe and solid samples will include 10% trip blanks and field blanks.

22.3.3.3.5 Sample Collection

PCB Wipe and solid samples will be taken in accordance with the standards presented in appropriate sections of the federal regulations.

22.3.3.3.6 Traceability

Traceability is achieved when the documentation surrounding a sample and its analysis is such that a set of data can be traced back through the analyst, to the person performing the sampling, and then to the material sampled itself. All samples receive a unique sample identification number to facilitate this process.

Chain-of-Custody procedures will be used when shipping samples off-site. In order to trace sample possession from the time of collection, a traceability record is filled out and accompanies the sample. The record contains the following information:

- sample ID;
- signature of the collector;
- date/time collected;
- waste type;

- signature of persons involved;
- inclusive date of possession; and
- cross-reference to manifest (if applicable).

22.3.3.3.7 Sample Labels

Sample labels are necessary to prevent misidentification of samples. The labels are gummed and affixed to the containers prior to or at the time of sampling. The labels are filled out at the time of collection.

22.3.3.3.8 Sample Seals

Sample seals are used to detect any tampering during shipment for samples sent off-site. The seals are initialed, dated, and then affixed to the sample containers or shipping containers before the samples leave the custody of the lab. Sample seals are not necessary for samples taken onsite at the facility and sent to the onsite laboratory or if being transported by facility or project personnel or the personnel from the laboratory that is going to perform the analysis.

22.3.3.3.9 Sampling Record

All information pertinent to field surveys or sampling is recorded in a record. Since sampling situations vary widely, no set of rules can be given as to the extent of information that must be entered in the record. However, sufficient information is recorded to allow someone to reconstruct the sampling without reliance on the collector's memory. This record includes at minimum the-following information:

- location of sampling point;
- volume of samples taken;
- date of collection;
- sample identification number;
- person sampling;
- comments or observations;
- sampling methodology

22.3.3.3.10 Chain-of-Custody

Sample chain-of-custody is maintained as required by the client or regulatory agency. A chain-of-custody is used to ensure the data from sample collection to data reporting is legally defensible. This includes the ability to trace the possession and handling of samples from the time of collection through analysis and final disposition.

The components of the chain-of-custody include the following: sample seals, a log and chain-of-custody record. The procedures for their use are described in further detail.

A sample is considered to be under a person's custody if:

- it is in a person's physical possession;
- in view of the person after possession has taken place;
- secured by that person so that undetected tampering with the sample cannot occur; or
- secured by that person in an area, which is restricted to authorized personnel.

Upon receipt of the sample(s) in the laboratory they are entered into the sample receipt log. All chain-of-custody samples are directed to the sample custodian. The shipping containers and sample bottles are inspected for proper seals and labels. The contents of the containers are then checked against the chain-of-custody record. The chain-of-custody record may include but is not limited to the following:

- Sampler Signature
- Date/Time Sampled
- Sample ID
- Type of sample (i.e. composite or grab)
- Number of Containers
- A place for comments
- Blocks for the person relinquishing the sample to sign, print his/her name, and put the date and time the sample was relinquished.
- Blocks for the person receiving the sample to sign, print his/her name, and put the date and time the sample was received.

If the chain-of-custody information is complete and the integrity of the samples has not been broken, each sample is assigned a unique identification number. If the information on the chain-of-custody record is not complete, the sample custodian shall contact the appropriate facility personnel to obtain the missing information, and a unique identification number is assigned. All problem resolutions will be documented in the sample receipt log. The samples are then put into storage to await analysis.

22.3.4. Tank Farm Decontamination Procedure

22.3.4.1. PCB Storage Tank Inventory Removal

See Section 22.2.2.4.1 for PCB Storage Tank Waste Removal.

22.3.4.2. Tank Decontamination/Removal/Disposal

Tanks that contained oil with greater than 50 ppm PCB will be designated for disposal at the on-site PCB permitted chemical landfill cell. Alternatively, such tanks may be decontaminated in accordance with federal requirements prior to scrapping or reuse. The closure cost estimate assumes disposal.

22.3.4.3. Tank Farm Containment Area

The tank farm containment will be removed and disposed in a chemical waste landfill approved by TSCA regulations for bulk PCB remediation waste disposal. The closure cost estimate provides for disposal in one of the adjacent Grassy Mountain Facility PCB landfills.

The amount of material to be removed from the Tank Farm storage areas including the ramps, sumps and tank pads are 1.5 feet times the total area of the internal containment area surfaces. This results in 337 cubic yards of material with an estimated weight (based on 3,000 pounds per cubic yard) of 505.5 tons. This assumes 2 feet of concrete for each pad and ramp and one foot of concrete for the remaining tank farm containment area. It also assumes the berms are three feet deep, 6 inches wide at the perimeter of the combined areas plus the two dividing berms yielding 25 yards of concrete and 17 yards for the 1-foot thick unload pad.

22.3.5. PCB Warehouse One Storage Areas

22.3.5.1. Container Removal

See Section 22.2.2.

22.3.5.2. Container Storage Area Decontamination/Disposal

After all containers of waste have been removed from bermed areas and sent out for disposal, the walls and roof areas will be inspected for staining and sampled to determine if they need to be decontaminated. The containment area floor will be removed and disposed as Bulk PCB Remediation waste. The closure cost estimate provides for disposal in one of the adjacent Grassy Mountain Facility PCB landfills cells.

For closure cost calculations, the volume of concrete removed was determined by multiplying the area of the internal surfaces of the warehouse PCB containment areas (including the truck drive through areas) by the estimated average thickness of the concrete of 1.3 feet ($110 \times 44 \times 1.3 = 6{,}292\ ft^3$) plus the berm walls. The berm walls were calculated based on being 3 feet deep, six inches wide and 292 feet long or 438 cubic feet. The total volume then is 6,730 cubic feet.

The two 3,000 gallon storage tanks in the drain and flush area may be decontaminated if they are to be reused or scrapped otherwise, they will not be decontaminated. The drained PCB oils will be manifested to an EPA approved incineration facility for treatment. For closure cost estimate purposes it is assumed that the tanks will be disposed without prior decontamination at one of the Grassy Mountain facility EPA approved chemical waste landfill permitted to accept PCB solid waste for disposal.

22.3.6. Auxiliary Equipment

Auxiliary equipment will be handled in accordance with applicable regulations. All movable equipment will be evaluated as to its intrinsic value versus cost of decontamination. If the decontamination cost of the equipment is estimated to exceed the item's intrinsic value, that item will be disposed of in accordance with its Closure Plan for Grassy Mountain facility PCB

Warehouse One and Tank Farm regulatory classification. If the equipment is of sufficient value to warrant decontamination, it will be decontaminated to regulatory standards. The equipment identified for decontamination includes forklifts, barrel grabbers, hand trucks, and pallet grabbers.

Spill pans and other items used to collect PCB liquids will be cleaned in accordance with regulatory standards. Any auxiliary equipment not suitable for decontamination will be landfilled in an approved chemical waste landfill. It is anticipated that these materials will include items such as pipe, hose fittings, buckets, drip pans, tools and other material used in PPM operations. It is anticipated that the equivalent of 50 drums of equipment will be designated for landfill. A list of typical auxiliary equipment is provided in Table A.16 along with their anticipated treatment. Equipment to be landfilled will be dismantled as much as practical and placed in a rolloff box or similar container for bulk shipment to an approved chemical waste landfill. This material will constitute less than 15 cubic yards and will take only one rolloff box or similar container.

22.3.7. Post-Cleanup Verification Procedures

Sample location selection criteria, sampling methods (e.g. wipe tests, soil/concrete cores, etc.), analytical methods, QA/QC, sampling, equipment decontamination, and chain of custody for post cleanup verification shall be consistent with that of the Sampling Plan in Section 22.3.3.3.

Additionally, all PCB contaminated articles, debris, equipment, and associated material shall be handled in based on federal regulatory requirements. Where practical, sampling equipment will be double wash/rinsed with an approved solvent. All contaminated solvent rags, debris, and associated material will be containerized and disposed of as required. Volumes and disposal methods of material generated in the cleanup are provided in Section 22.3.4.

Disposal facilities for PCB materials generated during clean up are anticipated to include, but not be limited to those shown in Table A.15.

22.4. Other Closure Activities

22.4.1. Leachate Management

22.4.1.1. Apply leachate management during closure activities only to the land disposal units.

22.4.1.2. Manage leachate and leachate collection and removal systems in accordance with Module VI of the facility permit and applicable regulations.

22.4.1.3. Monitor and maintain records for each leak detection/collection system in accordance with the requirements of Module VI of the permit.

22.4.1.4. Collect and store leachate in the leachate storage tanks prior to shipping the leachate off-site for disposal. This disposal method is assumed for closure cost estimate purposes. However, any appropriate treatment or disposal method available at the time of closure may be utilized at the discretion of the Permittee.

22.4.1.5. Perform all routine maintenance and repairs necessary for the proper operation of the leachate management system.

22.4.2. Ground-Water Monitoring

Because the disposal activities at this site are limited to PCB transfer and storage and associated activities and do not entail surface impoundment, fill, or any other surface applications of waste, it is not necessary to provide for ground water monitoring or run-on and run off controls.

22.4.3. Security Devices

During the closure and post-closure periods, the Permittee shall comply with Permit Condition II.F.

22.5. Schedule for Closure

After the start date of closure activities has been determined, the closure schedule shown below in Table A.17 shall be followed. The Regional Administrator and the Director of the Division of Waste Management and Radiation Control shall be notified at least 60 days prior to the beginning of closure activities, however, closure activities may commence before the end of that sixty days. The in Table A.17 indicates the activities and actions to take place after closure is initiated. The day closure activities are initiated is assumed to be day one.

22.6. Modification to Closure Plans

Closure plans will be amended and then submitted to the agency for approval if a change in operating plans or facility design affects the closure plan, for example:

- Increases in facility size and/or capacity;
- Increases in the estimate of maximum inventory;
- Changes in regulatory requirements that affect closure activities;
- Changes in surrounding land use (e.g. drinking water wells are installed in close proximity to the facility or sewer extensions increase the possibility of contaminating sewage treatment plant operations in the event of a spill);

An unexpected event occurs while conducting final closure activities that affects the closure plan; there is a change in the expected year of closure; or financial status changes that may result in an inability to adequately pay for closure.

E. CLOSURE AND POST-CLOSURE PLAN FOR RCRA/TSCA CELLS

23.0 CLOSURE CAP LAYOUT AND GENERAL DESCRIPTION

The final covers for the cells are designed to provide long-term minimization of migration of liquid through the closed landfill; function with minimum maintenance; promote drainage and minimize erosion or abrasion of the cover; accommodate settling and subsidence so that the cover's integrity is maintained; and are provided with a cap liner system that has a permeability less than or equal to the permeability of any bottom liner system. The closure caps for RCRA/TSCA Landfill Cells have been designed taking into consideration these requirements.

The Design Engineering Report (DER) for each of the RCRA/TSCA landfills is incorporated as part of the permit documentation. The "Construction Quality Assurance (CQA) Plan for Construction of Surface Impoundments, Landfills, and Landfill Closures" is included as Attachment VI-2, Appendix A of the Grassy Mountain Facility Permit. The DER and the CQA Plan present material specifications, including clay, GCL and synthetic liners, drainage net, filter fabric, geocomposites, soil cover, and rock armor. The CQA Plan establishes procedures for installation, visual inspection, monitoring, and testing of the different elements of the closure cap. Both the DER and the CQA Plan work together to provide closure caps that meet the regulatory requirements for both TSCA and RCRA landfill cells.

The closure caps will consist of two feet of compacted clay or a geosynthetic clay liner (GCL), a HDPE geomembrane liner with an overlying drainage system, a protective cover over the liner and drainage system, and rock armor plating (stone mulch) over the protective cover for erosion protection. The closure caps are designed in the general shape of a "hipped roof or elongated pyramid, with the cap surface sloping toward the outer edges of the cap at minimum slope of approximately 5 percent. Grading the closure cap as proposed will assist in accommodating settlement and subsidence so that the cover's integrity and positive drainage of storm water from the closure caps are maintained. At the proposed slopes of five percent, the cap could settle or subside an additional three feet over a horizontal distance of 100 feet and still maintain a slope of approximately two percent, thus, promoting drainage off the surface of the cap. Downspout pipes will be located at each of the four comers and at intermediate locations around the perimeter of the closure caps, as needed, to convey precipitation runoff from the closure caps to drainage conveyance ditches located at the bottom of the exterior slopes of the landfill cells. The drainage conveyance ditches then convey storm water to retention ponds and containment areas within the facility’s storm water containment system.

24.0 DESIGN

Typical cross-sections of the closure cap are illustrated in the closure drawings for each of the RCRA/TSCA Landfill Cells and are located in Attachment VI-2. The closure cap will consist of the following:

- A final waste surface that has been graded, compacted and prepared to receive compacted clay cap material or a final waste surface that has been graded and cleared of all objects that may damage the overlying geosynthetic clay liner (GCL) and synthetic liners, that has received a 6-inch thick protective sand layer, and that is smooth and has been brought to its final grade.

- A 2-foot thick compacted clay cap with a maximum in-place saturated hydraulic conductivity (permeability) of 1 x 10^{-7} cm/sec. or a geosynthetic clay liner (GCL), which has equivalent or improved permeability characteristics to the two feet of compacted clay.

- A 60-mil HDPE geomembrane liner. Since the cap will consist of a geomembrane liner, it will have a permeability that is less than or equal to the permeability of the bottom liner system in the cells.

- A lateral drainage layer consisting of drainage net with overlying geotextile filter fabric, or a drainage geocomposite. The drainage layer will convey water that percolates through overlying closure cap materials off the underlying geomembrane liner. The edge of the drainage net will extend into the more permeable erosion protective cover material on the 2H: 1V or flatter exterior slopes around the perimeter of the cap. This will allow water that enters the drainage layer to discharge freely from the closure cap.

- A 2-foot protective soil cover that will provide protection from frost and from construction and other operations that will occur above the lining materials. The compatibility of protective soil cover materials with geosynthetic clay liner materials prior to use. The regional depth of frost penetration is about 21-inches at facility. The protective cover and rock armor plating (stone mulch) thickness should, therefore, provide adequate frost protection.

- Erosion protective cover will consist of six inches of rock armor plating (stone mulch) material over the entire closure cap surface. Rock will be used instead of vegetation due to the sparse nature of local vegetation. Annual rainfall is quite low and will not support vegetation thick enough to prevent erosion of the caps. Native vegetation will begin to grow by itself in the rock layer as verified by the growth of native vegetation in the rock armor plating that has previously been placed as erosion protection on the slopes and closure caps of landfill cells at the facility. Due to the climatic and soil conditions of the region, no deep-rooted vegetation is expected to develop which might penetrate the HDPE liner.

- Berms, ditches, downspout pipes, storm drainage pipes and other drainage facilities will be provided to control and convey runoff from the closure caps. Berms will be constructed at the top of the 2H:1V (or flatter) slopes around the perimeter of the caps The berms will form ditches around the top perimeter of the caps with a bottom slope of about 0.7 percent sloping toward the downspout pipes that will be located at the four comers and intermediate locations (if needed) around the closure caps. The ditches will collect precipitation runoff from closure cap surfaces and convey the runoff toward the downspout pipes. The downspout pipes will then convey the storm water to manholes, other storm drainage pipes, and storm drainage ditches that will convey the storm water to retention ponds and other containment areas of the facility.

- The cover system shall at least slope at five percent from the center of the landfill toward the crest of the landfill.

25.0 CLOSURE ACTIONS

25.1. Preparation of the Waste Mound

Proper selection, compaction, slope and grading of the waste materials and surfaces are necessary to ensure the integrity of the cap designs. If a GCL is used as an alternate to two feet of compacted clay cap material, waste free of sharp objects and debris will make up the final lift prior to placing the six-inch thick sand layer the overlying GCL and HDPE geomembrane materials. The waste will be shaped and contoured to conform to the final grading plan after adjustments are made to account for settlement of the cells. The caps will be graded at a minimum slope of approximately 5 percent. The contouring of the waste will reduce the subsequent need for additional fill material, facilitate grading of the cap, and reduce the possible formation of depressions that could pond water if the GCL is used as an alternate to compacted clay.

25.2. Compacted Clay or Geosynthetic Clay Liner (GCL)

If a compacted clay cap is used, the method of placement will be determined by methods outlined in the CQA Plan. The procedures used will result in a maximum in-place saturated hydraulic conductivity of 1×10^{-7} cm/sec. If a GCL is used in place of ‑a compacted clay cap, placement will be sequenced from the high areas of the closure caps toward the low areas in order to direct precipitation runoff away from the GCL. Note that the upper edge of the lower panel will be place under the lower edge of the upper panel to form a shingle-like affect. HDPE geomembrane will immediately be placed above the GCL to prevent moisture resulting from precipitation from coming into contact with the GCL.

25.3. HDPE Liner

A 60-mil HDPE geomembrane liner will be installed above the compacted clay or GCL. The HDPE geomembrane in conjunction with the underlying compacted clay or GCL will provide for the long-term minimization of liquid migration through the closed cell.

25.4. Drainage net and Geotextile Filter Fabric (or Geocomposite)

Drainage net with an overlying geotextile filter fabric (or a geocomposite) will be placed above the HDPE geomembrane to function as a drainage media for water that infiltrates the surface of the protective soil cover. The geotextile filter fabric installed directly above the drainage net is to prevent clogging of the drainage net by the overlying soil. The drainage net and the filter fabric (or geocomposite) will be installed at the same time as the protective cover.

25.5. Protective Cover

A 2-foot thick protective cover layer will be placed over the drainage layer. The protective soil cover will consist of soils that meet design and CQA plan requirements and may be obtained from borrow sources near the facility. Compatibility (with salinity) must be demonstrated prior to use with GCL materials.

25.6. Erosion Protective Cover

The erosion protective cover across the entire cap, including the berms and exterior 2H: 1V or flatter slopes around the perimeter of the cap, will consist of a 6-inch layer of rock armor plating (stone mulch) material.

25.7. Schedule of Events

The U.S. EPA and the Division will be notified sixty (60) days prior to the date that closure of a RCRA/TSCA cell is expected to begin. Closure activities will follow the schedule presented in Table A.19.

This schedule is based on the assumption that weather conditions will not interfere with closure activities. In the event that adverse weather conditions (e.g., wind storm) disrupt closure operations, a revised closure schedule will be prepared and provided to U.S. EPA and the Division of Waste Management and Radiation Control.

25.8. Closure Cost Estimates

Table B.7 provides a summary of the closure costs for RCRA/TSCA Cells B/6 and 7, and for the proposed RCRA/TSCA Cell 8. In the closure cost estimate, it should be noted that the closure costs for only Cells B/6, 7, and 8, and for Surface Impoundments A and B are addressed. For the purpose of calculations, it is assumed that the cells to be closed will be filled with wastes that have been approved for disposal in the cell to the operating capacity and then mounded.

Table C.22: Worksheet RTCLO-1 presents an estimate of the closure costs based on the actual closure costs of Cell 5 in 2011, using a geosynthetic clay liner. Inflation factors for each year were used to adjust the closure cost to current dollars. Tables D.10 and D.11 (CDA) present an estimate of the required quantity of closure materials and itemized costs based on the estimated quantities. Table C.23: Worksheet RTCLO-2 presents the total groundwater and leachate monitoring costs for a closure period of one year. Table C.24: Worksheet RTCLO-3 presents the unit costs associated with decontaminating and disposing of leachate. Table C.25: Worksheet RTCLO-4 presents the costs of disposing of all PCB cell leachate collected during a one year closure period and assumes all leachate must be decontaminated and disposed off-site even though it may be solidified and place in any active RCRA/TSCA cell. The total estimated cost for closing the RCRA/TSCA Cells is provided in Table B.7.

26.0 POST-CLOSURE CARE PLAN

The Permittee will provide post-closure care and leachate monitoring of the cell for thirty (30) years, beginning when certification is obtained that the cell has been closed in accordance with this closure plan. The Permittee will provide Post-Closure groundwater monitoring of each Waste Management Area (WMA), as defined in the RCRA Closure Plan Module VII, for thirty (30) years, beginning when certification is obtained that the last cell in the given WMA has been closed in accordance with this closure plan.

Post-closure care for the closed cells will be incorporated into the inspections and maintenance performed on the active cells until the facility undergoes final closure. After final closure, post-closure care and monitoring will consist of monthly inspections of grading, security fencing, signs on the fence, surface water drainage and containment dikes, and leachate collection systems. Groundwater monitoring well and leachate sampling and analysis events will take place annually. Except for frequency and the identification of wells to monitor, the groundwater monitoring program, as specified in the most recent revision of Module VII of the State-issued Part B Permit, will be followed.

The location of the wells is such that the migration of hazardous constituents beyond the point of compliance will be detected if such were to occur. If hazardous constituents were to be detected, the notification and corrective actions outlined in the most recent State-issued Part B Permit will be followed.

Either on-going operations or the person selected to oversee post-closure will provide for the continued integrity of the clay cap and final rock cover, runoff containment dike, and ground-water monitoring wells. There will be no post-closure use of the RCRA/TSCA Cells that will disturb the integrity of the final covers, containment systems, or ground-water monitoring wells.

The facility will maintain a copy of this RCRA/TSCA Cell Closure and Post-Closure Plan. The plan will be available for review at any time during the closure period.

The anticipated post-closure contact for the facility is stated below. During the post-closure care period, correspondence should be directed as follows:

Clean Harbors Environmental Services, Inc.
42 Longwater Drive
P.O. Box 9149
Norwell, Massachusetts 02161-9149
(781) 792-5000

The leachate collection system riser pipes will be visually inspected monthly for defects and wear or damage. Repairs or replacement will be performed as necessary. Warning signs will be inspected monthly and maintained or replaced as necessary to prevent the unknowing entry of unauthorized personnel.

The rock cover over the closed cell will be inspected monthly for any signs of erosion, burrowing rodent activity or depressions caused by secondary consolidation. Any damaged or eroded areas will be renovated as necessary. Appropriate control measures will be implemented if it is discovered that any burrowing animals disturbed the cell cover. Appropriate rodent control measures include trapping and the use of rodenticides. Appropriate control measures will be taken as needed to prevent the growth of woody or deep-rooted plants whose roots may penetrate and thus damage the synthetic or clay liners. Possible plant control measures include the use of soil sterilant or physically removing the plants. At closure, the cap will provide sufficient weight to prevent liner deformation.

During closure, leachate will be pumped, quantified and sampled at the same frequency as required and analyzed for the same parameters as in the most State-issued Part B Permit. During post-closure, leachate will be pumped and quantified according to the schedule provided in Table A20.

The facility may petition U.S. EPA and the Division for a different pumping schedule similar to the schedule provided in Table A.21 based on the history and quantity of leachate produced.

Leachate from the upper collection systems and from the leak detection sumps will be sampled and analyzed for PCB's and chlorinated organics based on the schedule provided in Table A.21.

All leachate will be transferred to a tank or tanker for disposal or treatment as per the TSCA and RCRA regulations effective at that time. If off-site disposal/treatment is required, sufficient volume will be collected for transportation to a permitted off-site disposal facility.

All sampling and testing procedures will be performed in accordance with the appropriate regulations and standards required at the time. Records of the analysis and ground-water surface elevations will be retained throughout the post-closure care period. Copies will be provided to the U.S. EPA and the Division upon request. Post-closure care will continue for thirty (30) years from cell closure unless specified otherwise in this document or a petition to the contrary is approved according to the guidelines specified by the U.S. EPA or the Division. The person designated to supervise post-closure care will keep the post-closure plan.

The post-closure plan will be amended when there are changes in operating procedures or facility design, which render the current plan incomplete or incapable of meeting the post-closure plan standard. The plan will be reviewed as appropriate and amended within sixty (60) days after changes or events occur which warrant an amendment.

26.1. Notice to Local Land Authority

Within ninety (90) days after final closure is complete, the Permittee will submit to the U.S. EPA and the Division, and the Tooele County recorder, a survey plat indicating the location and dimensions of the closed cell with respect to the surveyed benchmarks. This plat will be prepared and certified by a professional land surveyor. The plat will be filed with the land office and contain a prominently displayed attachment which states that the Permittee has an obligation to prevent disturbance of the site. A record of the type, location, and quantity of wastes disposed in the cell will be submitted to the above agencies.

27.0 POST-CLOSURE COST ESTIMATE

Table C.26:Worksheet RTPCLO-1 and Table C.26: Worksheet RTPCLO-2 provide details for developing the post-closure costs for the RCRA/TSCA Cells, and include leachate pumping and treatment costs. After closure, the results of inspections and leachate sampling will be reported annually. The results of groundwater sampling will be reported annually. This estimate of post-closure cost is based upon estimates received from independent contractors. The total estimated cost of post-closure over 30 years for the RCRA/TSCA Cells is provided in Table B.7.

27.1. Annual Update of the Closure/Post-Closure Cost Estimate

The closure and post-closure cost estimates will be adjusted for inflation by May 15th of each year. The estimate is adjusted by multiplying the previous estimate by a ratio of the latest published Gross National Product (GNP) Implicit Price Deflator divided by the Deflator used the previous year. The annual GNP Implicit Price Deflator is published by the U.S. Department of Commerce, Economics and Statistics Administration, Bureau of Economic Analysis.

28.0 FINANCIAL ASSURANCE MECHANISM

28.1. Financial Assurance for Closure

In accordance with state and federal regulations, Clean Harbors Grassy Mountain, LLC, as the owner/operator of the Grassy Mountain facility, is required to provide assurances that there will be funds available to close the facility at some time in the future. The purpose of these assurances is to guarantee that closure can be performed by a third party, if for some reason Clean Harbors Grassy Mountain, LLC is unable to do so itself. This figure will be updated at least annually in response to inflation, and as often as needed to reflect changes at Grassy Mountain.

There are six different methods allowed by the rules to guarantee the Closure Costs:

- Closure Trust Fund
- Surety Bond Guaranteeing Payment into a Closure Trust Fund
- Surety Bond Guaranteeing Performance of Closure
- Closure Letter of Credit
- Closure Insurance
- Financial Test and/or Corporate Guarantee.

Clean Harbors Grassy Mountain, LLC shall use one of these as the financial assurance mechanism for the Grassy Mountain facility. The financial assurance documentation or certification of such documentation is maintained at the office of the Division of Waste Management and Radiation Control. Clean Harbors Grassy Mountain, LLC shall remain in compliance with the applicable regulatory requirements as they relate to the mechanism used for the financial assurance mechanism for closure.

28.2. Financial Assurances for Post-Closure

In accordance with state and federal regulations, Clean Harbors Grassy Mountain, LLC, as the owner/operator of the Grassy Mountain facility, is required to provide assurances that there will be funds available to maintain the facility through the post- closure period. The purpose of these assurances is to guarantee that post-closure care can be performed by a third party, if for some reason Clean Harbors Grassy Mountain, LLC is unable to do so itself. This figure will be updated at least annually in response to inflation, and as often as needed to reflect changes at Grassy Mountain.

There are six different methods allowed by the rules to guarantee Post-Closure Care:

- Post-closure Trust Fund

- Surety Bond Guaranteeing Payment into a Post-Closure Trust Fund
- Surety Bond Guaranteeing Performance of Post-Closure Care
- Post-Closure Letter of Credit
- Post-Closure Insurance
- Financial Test and Corporate Guarantee for Post-closure Care.

Clean Harbors Grassy Mountain, LLC shall use one of these as the financial assurance mechanism for Grassy Mountain. The financial assurance documentation or certification of such documentation is maintained at the office of the Division of Waste Management and Radiation Control. Clean Harbors Grassy Mountain, LLC shall remain in compliance with the applicable regulations as they relate to the mechanism used for the financial assurance mechanism for post-closure.

28.3. Liability Requirements

Clean Harbors Grassy Mountain, LLC maintains liability insurance for sudden accidental occurrences, as required by state and federal regulations and Module II.Q.1. of the Clean Harbors Grassy Mountain, LLC, RCRA Permit. The certificate of insurance for the required liability insurance is maintained on file at the office of the Division of Waste Management and Radiation Control.

29.0 SOIL SAMPLING PLAN

At closure of each RCRA/TSCA Cell, the Permittee will sample the berm surrounding the cell (vehicular drive) in order to detect soils contaminated with PCBs in excess of 25 mg/kg (ppm) dry weight basis. If sampling reveals that soils have PCBs in excess of 25 ppm, the top ½ foot of soil in the contaminated area will be removed and land filled. After excavation, sampling will be repeated to ensure that contamination from PCB's in excess of 25 ppm dry weight basis has been removed. The excavated area will be filled with clean soil.

The berm road will be sampled using the hexagonal grid system outlined in the U.S. EPA-560/5-86-017 "Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup" or applicable updates. Due to the operational success of the TSCA Cell X area, as analytically proven through a very extensive berm road sampling program, the proposed Soil Sampling Plan for subsequent cells will vary in their approach. The hexagonal grid will be applied across the entire nominal width of each berm road. For example, for Cell Y (which is now closed), the hexagonal grid system for the North berm is applied to 13 foot by 13 foot (square) sections, while the West berm will have a 16 foot by 16 foot pattern.

Samples will only be taken at sampling grid points lying within the square. A total of five (5) soil aliquots will be "grabbed" within a given grid; one from each of the quadrants, and one consistently from the middle point. Samples will be taken to a maximum depth of one (1) inch (2.54 cm) by using an appropriate sampling device and the soil will be placed into a clean glass bottle, capped and labeled. The sample collection data will be entered into a field log book and on the chain-of-custody form.

If individual disposable sampling devices are not used for each composite sample ensemble, then the sampling device will be wiped with a disposable wipe cloth to remove any visible particles before taking the next sample. After each sample set, decontamination debris will be disposed in a bag intended for disposal of PCB-contaminated materials.

Composite samples will be used to represent each sampled grid because of the large number of samples to be taken. Composite samples will be prepared using the following method:

- An individual sample will be mixed in a "clean" stainless steel bowl.
- One hundred grams of soil will be "grabbed" from the bowl and placed in the composite sample jar.
- After all five individual samples from the same grid are mixed and sub sampled, the five-hundred grams of soil will then be again mixed in a clean stainless steel bowl and returned to the composite sample jar.

Since a localized likelihood of a massive PCB release to the surrounding berm perimeter is extremely unlikely, and because of monitoring of the PCB disposal operations in the TSCA Cells, and also relying upon the PCB disposal operations berm analytical data for the closed TSCA Cell X as a basis, the frequency of sampling will be every other grid location on a given berm. In this way, five representative samples taken from one 13’ x 13’ or 16’ x 16’ sampling grid will comprise one composite sample of homogeneous soil mixture for subsequent PCB analysis. This composite sample will be used to represent two (2) grid locations.

All samples will be retained until the results of the analyses reveal that PCB's are not present in concentrations greater than 5 ppm PCB's in the composite samples.

If analysis detects soils with PCB's in excess of 5 mg/kg (ppm), dry weight basis, in a composite sample, both grids adjacent to the composite sample grid will be sampled and submitted as individual composite samples to locate the actual area of contamination; alternatively, all three (3) grids suspected of PCB contamination will be excavated prior to re-sampling.

A detection of 5 mg/kg (ppm), dry weight basis, PCB in a composite sample could possibly indicate that one area sampled was contaminated with 25 mg/kg (ppm), dry weight basis, PCB. Excavation of areas smaller than 13’x13’ or 16’x16’ is not practical. The Permittee may elect to excavate the top six inches of berm material prior to any sampling because of the rocky nature of the berm road construction material. Collecting and compositing of grid samples in this manner will define the PCB contamination to specific grids and this process will continue until all of the PCB contamination is identified for excavation, excavated and resampled for clean-up verification analysis.

Since PCB's are not readily dissolved in a water matrix, a six (6) inch soil depth is the recommended excavation depth from the berm surface for soils showing contamination. The TSCA Cell X sampling results confirm this strategy and documented earlier findings. Clean materials will then be backfilled into the excavated area once the area has been determined to be clean. The new material shall meet and be compacted to the specifications found in the Construction Quality Assurance Plan (Attachment VI-2, Appendix A) of this Permit.

29.1. Quality Assurance and Quality Control - Soil Sampling Plan

Each sample taken will be logged into a field log book with a description of the area, coordinates of the sample location, time and date of sampling, type of sample taken, (i.e. soil), and initials of the sampler. Each sample will then be entered onto a chain of custody form. The chain of custody record will have the following elements: unique sample identification number; date of sampling; time of sampling; sampling method (i.e., composite, grab); matrix type; and initials of sampler.

29.2. Analytical Procedures

Samples taken at each TSCA Cell will be analyzed, extracted, and cleaned according to standard U.S. EPA protocols using a laboratory approved per the Disposal Cell Operating Approval. These may include SW846 methods for analyzing PCBs or the US EPA Contract lab Protocols (CLP). Specific Cleanup Procedures cannot be foreseen until the time of analysis.

29.3. Replicate Samples

Replicate samples help evaluate the precision of a method. They help quantify the uncertainty of an analytical value. Replicates can exist in the form replicate sample analysis or replicate spiked sample analysis. If no analytes are expected to be found in an analysis it is better to choose to do replicate spiked samples.

Replicates samples, usually a duplicate, are to be analyzed at a minimum frequency of 20% or according to the analytical method requirements, whichever is more frequent. For tests which are run infrequently (once a month) duplicates will be analyzed with each batch.

After a sufficient number of replicates for a given sample matrix have been accumulated, control limits will be established. Replicates which exceed the control limits indicate the need to reanalyze the associated sample batch.

Exceptions may be documented by re-spiking/re-analysis and written comment on laboratory bench sheet.

29.4. Blanks

Blanks demonstrate that the method is free from interferences or alternately, allow the analyst to monitor the background and keep it from reaching levels which would interfere with the detection and quantification of the target analytes. Blanks also serve to inspect the reagents used for contamination. If a reagent is found to be injecting unacceptable quantities of interference into the measurement system, it needs to be replaced with a higher grade/interferant-free material.

Blanks are to be run with each sample batch or 1 for every 20 samples, whichever is more frequent. Analyte concentration in the blank should not exceed 2 times the method detection limit. 1f the level of blank contamination is constant and can be controlled, appropriate control limits can be established: Blank values must be recorded on an ongoing basis in this case.

29.5. Field Blanks

Field contamination evaluation will be accomplished by preparing field blanks. For every twenty (20) composites collected, the Permittee will collect one (1) field blank. The blank will be prepared in the field by pouring a commercially available sand over the entire sampling train. The sand will then be placed into a prepared bottle and shipped to the laboratory for analysis. By obtaining these samples, the Permittee can be assured that the sampling technique has not introduced contaminants to the samples.

The bottles into which the samples may be put will be purchased pre-cleaned from an appropriate vendor. The bottle will be purchased for the intended use (i.e., amber glass bottles suitable for semi-volatile analysis). Bottles will not be reused, thereby eliminating the possibility of cross-contamination.

29.6. Chain-of-Custody

The chain-of-custody form being used by the facility at the time of closure will be used.

APPENDIX A

CLOSURE/POST-CLOSURE INVENTORY, STANDARDS, AND REFERENCE TABLES

TABLE A.1: Container Management Facility, Leachate Tanks, Leachate Building, Bulk Solids Storage Area, and Stabilizatin Tanks Maximum Inventory at Time of Closure

STORAGE UNIT NAME	MAXIMUM INVENTORY	MAXIMUM INVENTORY (equivalent volume)
Container Management Facility **Dock 1 (TD01)** **Storage Pad 2 (SP01 & NP01)** **Storage Pad 3A (TD02)** **Storage Pad 3B (SPAD)**	123,915 Gallons	2,253 55-Gallon Drums
Container Management Facility Flammable Storage (TD01)	2,750 Gallons	50 55-Gallon Drums
Leachate Tanks 119-TN-002	12,600 Gallons	
Bulk Solids Storage Area	1,010,000 Gallons	132 20-CY Boxes
Note: Waste Stabilization Tanks 122-TN-001, 122-TN-002, and 122-TN-003 are not present in this table since waste is not stored in them.		

Table A.2: On-Site Management - Landfill Disposal
Closure Waste Inventory / Decontamination Residue Quantity Estimates

UNIT DESCRIPTION	OFF-SITE MANAGEMENT	ON-SITE MANAGEMENT (LANDFILL DISPOSAL)	
	WASTE INVENTORY (55-Gallon Equivalents)	WASTE INVENTORY (Cubic Yards)	DECONTAMINATION RESIDUAL INVENTORY (Cubic Yards)
Container Management Facility	50 (Table C.1, 4a)	754 (Table C.1, 7a)	110 (Table C.2, 4q)
Bulk Solid Storage Areas (BSSAs)	N/A	3,200 (Table C.1, 1d)	N/A
Put-Piles in Landfill	N/A	12,803 (Table C.5, 3q)	N/A
Stabilization Tank System	N/A	N/A	82 (Table C.7, 2s)
Leachate Tank System	N/A	N/A	37.2 (Table C.7, 3s)
Leachate Building	N/A	N/A	N/A
Surface Impoundment Units A & B	N/A	N/A	10,262 (Table C.7, 4q)
Ancillary Closure Activities	N/A	N/A	1,203 (Table C.10, 9b)
Type A road decontamination	N/A	N/A	2,452 (Table A.3,F.8)
SUMMARY TOTALS:	**50**	**16,757**	**11,694.4**
"Landfill Capacity Assurance Requirement at the Time of Closure:			**28,501**

Note: The information presented in this tabel has been consolidated from the closure cost CMF and CLO worksheets (Tables C.1 to C.10) and Cost Documentation Appendix (Tables D.1 to D.6).

Table A.3: Facility Roadways - Dimensions and Volumes Based on Type

Roadway Type/Location	Approximate Dimensions		Volume
Type A	**Length**	**Average Width**	**(0.5' depth)**
Stabilization to Cell B/6	1,351 ft	24 ft	600 cy
Stabilization to Cell 7	1,914 ft	19 ft	673 cy
SW Cell 7 Exist to WW	1,413 ft	24 ft	628 cy
E-W Road N of Cell 7	1,240 ft	24 ft	551 cy
		Type A Total Volume	**2,452 cy**
Type B			
Fr. Sampling Pad to SE corner of Cell Z	1,668 ft	30 ft	927 cy
Fr. Above to PCB Building	1,260 ft	30 ft	700 cy
Fr. Above to Stabilization	2,370 ft	24 ft	1,053 cy
Fr. PCB tanks to Type A road	340 ft	24 ft	151 cy
		Type B Total Volume	**2,831 cy**
Type C			
Fr. Old WW to corner E of Cell A	1,288 ft	30 ft	716 cy
From above to road west side of Cell Y	2,281 ft	30 ft	1,267 cy
		Type C Total Volume	**1,983 cy**

Table A.4: Reserved

Contents are now incorporated into the permit in Section 6.3 of the Closure Plan	

Table A.5: List of Existing and Proposed Disposal Units and Surface Impoundments and the Number of Existing and Proposed Associated Groundwater Monitoring Wells

<table>
<tr><th>EXISTING UNITS</th><th>MONITORING WELLS</th></tr>
<tr><td>RCRA/Utah HWMR Units
(Landfill Cells 1, 2, 3, 4, 5, 7 & IWC-1 and IWC-2)
(Table C.9)</td><td>64

(Includes 12 background wells)</td></tr>
<tr><td>TSCA Regulated Units
(Cells X, Cell Y, Cell Z, B/6)
(Table C.9)</td><td>26</td></tr>
<tr><td>RCRA/TSCA Cell B/6 Utah Regulated Unit</td><td>8</td></tr>
<tr><td>Surface Impoundment A
(Table C.9)</td><td>3</td></tr>
<tr><th>PROPOSED UNITS</th><th></th></tr>
<tr><td rowspan="2">TSCA/RCRA Cells 8, 9, 10, 11, 12, 13 Utah Regulated Units
(Table C.9)</td><td>4
(existing)</td></tr>
<tr><td>8
(proposed)</td></tr>
<tr><td>Surface Impoundment B
(Table C.9)</td><td>3</td></tr>
</table>

Table A.6: Site Wide Closure Schedule (Elapsed Time in Months)

Inventory Management																								
Decontamination																								
Non-Operating Cell Closure																								
Last Cell Closure																								
Ancillary Operations																								
Certification/Notice																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Table A.7: TSCA Total Estimated Landfill Capacity Assurance (in cubic yards)

PCB Oil Disposal (off-site incineration)	0
Bulk Tank Disposal (Table B.4)	7.5
Area Decontamination (Table B.4)	337
Underground Pipeline Removal (Table B.4)	4
Container Inventory Removal (Table B.5)	55
Transformer Flush & Bulk Tank Disposal (Table B.5)	1
Area Decontamination and Concrete Removal (Table B.5)	222
Auxiliary Equipment (Table B.6)	9
Type A Roadways (Table A.3)	2,452
Sub-Total:	**3087**
10% Contingency	309
Total Estimated Landfill Capacity Assurance:	**3396** **Yards^3**

Table A.8: Leachate Pumping Rates and Frequencies

Frequency	If at or less than this amount, go to the next frequency	Average Daily Pumping Rate	If greather than this amount for any one period, return to previous frequency
Daily	650 Gallons/7-Days for Two Weeks	92.9 Gallons/Day	N/A
Weekly	150 Gallons/Week for Two Months	21.4 Gallons/Day	650 Gallons/Week
Monthly	250 Gallons/Month for Two Months	8.2 Gallons/Day	650 Gallons/Month
Bi-Monthly	167 Gallons/Two-Month Period for Three two-Month Periods	2.7 Gallons/Day	500 Gallons/Two-Month Period
Semi-Annual	250 Gallons/Six Months	1.4 Gallons/Day	501 Gallons/Six Months
Annual	N/A	N/A	500 Gallons/Year

Table A.9: PCB Warehouse One Containment Capacities

	Area A	Area B
Length (Feet)	40	40
Width (Feet)	44	44
Height (Feet)	1	1
Gross Volume (Ft^3)	1,760	1,760
Sump Volume (Ft^3)	32	8
Ramp Volume (Ft^3)	64	32
Net Volume (Ft^3)	1,728	1,736
Net Volume (Gallons)	12,926	12,986
Net Volume (55-Gallon Drum Equivalents)	235	236
Maximum Number of 55-Gallon Drum Equivalents	350 55-Gallon Equivalents plus 2 tanks of 3,012 Gallon capacity each for a total of 471 55-Gallon Equivalents	
Typical Container Size (Gallons)	55	55

Table A.10: Bulk Tank Descriptions PCB Warehouse One, Area B

Tank ID	Tank 3A	Tank 3B
Length (Feet)	14.25	14.25
Diameter (Feet)	6.00	6.00
Capacity (Gallons)	3,014	3,014

Table A.11: Bulk Tank Descriptions - Tank Farm

Tank ID	1	2	4	5	6	7
Height (Ft)	25	25	15	15	15	25
Diameter (Ft)	12	12	11	11	11	12
Capacity (Gallons)	21,138	21,138	10,657	10,657	10,657	21,138
Year Made	1985	1985	1985	1985	1985	1985
Contents	Askarel or Other PCB or PCB Contaminated Fluids	Askarel or Other PCB or PCB Contaminated Fluids	Askarel or Other PCB or PCB Contaminated Fluids	PCB Contaminated Water	Clean Oil	Used Oil (RCRA)

Table A.12: Tank Farm Containment Capacities

	Area I	Area II[6]	Area III[6]
Length (Feet)	48.75	20.00	27.00
Width (Feet)	64.417	64.417	60.417
Height (Feet)	1.167	1.333	3.333
Gross Volume (Ft^3)	3,665	1,717	5,437
Sump Volume (Ft^3)	42.67	16	42.67
Ramp Volume (Ft^3)	131.3	53.2	0
Tank Pad Volume (Ft^3)	601.5	0	715.8
Net Volume (Ft^3)	2,975	1,680	4,764
Net Volume (Gallons)	22,252	12,568	35,636

Table A.13: Estimate of PCB Waste Type Percentages

Waste Type	Percentage
Askarel	42%
Transformers (Drained)	42%
Capacitors	14%
Debris	2%

Table A.14: PCB Warehouse One Waste Capacities

Waste Type	55-Gallon Drum Equivalents
PCB Transformers (Drained and assuming worst case that all transformers are > 50 mg/kg (ppm).	193
Capacitors	65
Debris	9
PCB Liquids (Includes 6,000 gallons of PCB Liquids in bulk storage tanks.	193
Total PCB Inventory	460

Table A.15: Disposal Facilities for PCB Materials

Facility Location	Material	Disposal Method
Clean Harbors Aragonite, LLC. Aragonite, Utah	Incinerables. Including liquids and sludges below 500 mg/kg (ppm).	Incineration
Clean Harbors Grassy Mountain, LLC. Knolls, Utah.	Solids.	Landfill

Table A.16: Auxiliary Equipment

Description	Treament Method
Forklifts	Decontaminate
Barrel Grabbers	Decontaminate
Slings	Landfill
Portable Scales	Landfill
Hand Trucks	Decontaminate
Pallet Grabbers	Landfill
Pallet Trucks	Landfill
Tools	Landfill
Hoses	Landfill
Pumps	Landfill
Storage Shed (Portable)	Landfill
Fittings	Landfill
Pipe	Landfill
Buckets, Drip Pans	Landfill
Spill Pans	Landfill
Brooms, Shovels	Landfill
Vacuums	Landfill

Table A.17: Anticipated Closure Schedule

Activity	Day
A. Container Storage Areas	
Inventory Removal	15-45
Area Decontamination/Removal/Disposal	45-70
Sampling	70-80
B. Auxiliary Equipment	
Decontamination and/or Disposal	1-70
C. Closure Certification, Monitoring	
Follow-Up Decontamination (If Necessary)	80-100

Table A.18: Numerical Standards for PCB Decontamination

CONDITIONS	DECONTAMINATION STANDARDS
High Contact Indoor or Outdoor Solid Surfaces	Clean to 10-micrograms/100 cm^2 (as measured by standard wipe test)
Low Contact, Outdoor, Impervious Solid Surfaces	Clean to 10-micrograms/100 cm^2 (as measured by standard wipe test)
Low Contact, Outdoor, Non-Impervious Solid Surfaces	Clean to 10-micrograms/100 cm^2 (as measured by standard wipe test)
For Spill Cleanups, PCB Contaminated Soil	Remove to 10 ppm (provided soils is excavated to a minimum of 10 inches) Excavated soil to be replaces with clean soil < 1 mg/kg dry weight basis (ppm) PCB's.
As Bulk PCB Remediation Waste, PCB Contaminated Soil and Other Non-Pervious Surfaces	Remove to 1 ppm

Table A.19

Table A.19: Anticipated Closure Schedule for RCRA and RCRA/TSCA Cells

Day	Activity
Day 0	Receipt of final volume of waste needed to reach mound capacity; begin work force mobilization and continue compaction and grading of waste materials.
Day 60	Begin placement and compaction of clay and GCL cap.
Day 90	Complete placement, compaction, and grading of waste materials.
Day 105	Complete placement of clay or GCL cap.
Day 165	Complete placement of HDPE liner.
Day 210	Complete placement of drainage layer and grading of soil cover.
Day 240	Rock cover placed and final drainage completed.
Day 265	Closure completed and certified.

Table A.20: Post-Closure Leachate Pumping and Quantifying Frequency

POST-CLOSURE YEAR	FREQUENCY
1	Weekly
2-3	Bi-Weekly
4-5	Monthly
6	Bi-Monthly
7	Quarterly
8	Semi-Annually
9-30	Annually

Table A.21: Post-Closure Leachate Sampling Frequency

POST-CLOSURE YEAR	FREQUENCY
Upper Collection Systems	
1-30	Annually
Leak Detection Sumps	
1-30	Annually
Note: Sampling for PCB's, pH, specific conductance, and Chlorinated Organics (Class I volatile and semi-volatile compounds)	

APPENDIX B

CLOSURE/POST-CLOSURE COST SUMMARY TABLES

Table B.1: Container Management Facility and BSSA Closure Cost Estimate

CONTAINER MANAGEMENT FACILITY AND BSSA CLOSURE COST ESTIMATE		
Re-Containerization of Waste	(Table C.1)	$27,888
Container Mobilization	(Table C.1)	$16,985
Off-Site Management of Inventory	(Table C.1)	$5,037
On-Site Treatment/Disposal of Continer Management Facility "other" Inventory and Bulk Solids Storage Area	(Table C.1)	$320,272
Surface Impoundment Solids Management	(Table C.1)	$144,364
Protective and Safety Equipment for Personnel	(Table C.2)	$13,970
Container Management Facility Structure Decontamination	(Table C.2)	$148,877
On-Site Treatment/Disposal of Decontamination Residuals	(Table C.2)	$297,665
Ancillary Closure Activities	(Table C.3)	$1,577
Sampling Analysis to Confirm Decontamination	(Table C.4)	$47,551
Closure Certification Documents by Independent Professional Engineer	(Table C.4)	$98,454
SUBTOTAL ESTIMATED CMF & BSSA CLOSURE COST:		**$1,122,639**
Administrative and Contingency Costs (10%)		**$112,264**
TOTAL ESTIMATED (2017 $’s) OF CMF AND BSSA CLOSURE COSTS:		**$1,234,903**

Table B.2: Total Site-Wide Facility Closure Cost Estimates

Total Site-Wide Facility Closure Cost Estimate		
Inventory Management of Hazardous Waste Treatment/Storage/Process Units	(Table C.5)	$521,066
Hazardous Waste Management Unit (HWMU) Decontamination	(Table C.6)	$1,013,586
Treatment and Disposal of Decontamination Residuals	(Table C.7)	$1,013,208
Final Cover/Landfill Closure (RCRA Cells 1-5 and IWC 1 & 2 are all closed)	(Table C.8)	$0
Groundwater Monitoring During Closure Activities	(Table C.9)	$1,108,277
Ancillary Closure Activities	(Table C.10)	$1,137,275
Closure Certification	(Table C.11)	$336,486
Container Management Facility Closure Cost (Table B1 Less Admin. and Contingency Less Table D.7 Closure Certification)	(Table B.1 & Table D.7)	$1,024,185
Subtotal Total Site-Wide Facility Closure Cost		**$6,154,084**
Administrative and Contingency Costs (10%)		**$615,408**
Total Estimated Present Worth (2017 $'s) Of Closure Costs		**$6,769,493**

Table B.3: Post-Closure Care Cost Estimate Summary

Post-Closure Care Cost Estimate Summary (Includes all but RCRA/TSCA Cells B6 & 7, and proposed RCRA Cell 8 provided in Table B.6)		
Annual Groundwater Monitoring	(Table C.9: CL0-5)	$455,625
Annual Average Leachate Management Over 30-Years	(Tables D.8 & D.9: CDA)	$5,387
Annual Leachate Collection System Maintenance and Pump Replacements	(Table D.8: CDA)	$38,747
Annual Cap Maintenance	(Table D.8: CDA)	$15,275
Annual Routine Inspections	(Table D.8: CDA)	$6,483
Annual Independent Professional Post-Closure Review/Certification	(Table D.9: CDA)	$33,479
Subtotal Estimated Annual Facility Post-Closure Costs =		**$554,996**
Annual Administrative & Contingency Costs (Table D.9: CDA)	10%	$55,500
Annual, For Potential RFI’s / Corrective Action (Table D.9: CDA)	10%	$55,500
Total Estimated Present Annual Post-Closure Care Costs	(est. 2017 $'S)	$665,995
Total Present Worth of Annualized Post-Closure Costs (Annual Costs x Duration of Post-Closure)		$19,979,850
Total Cost of Final Certification of Post-Closure Activities	(Table D.9: CDA)	$41,217
Total Estimated Present Worth of Facility Post-Closure Care Costs =		**$20,021,067**

Table B.4: Tank Farm Estimated Closure Cost and Required Disposal Capacity

PCB Oil (TSCA) and Used Oil (RCRA) Disposal Charges (Table C.12)	$114,562	
Bulk Tank Disposal (Table C.13)	$6,402	7.5 cy
Area Decontamination and Concrete Removal (Table C.14)	$131,925	337 cy
Underground Pipeline Removal (Table C.15)	$7,271	4 cy
Total Estimated Closure Costs (2017 $'s) and Disposal Volume:	**$260,160**	**348.5 cy**

Table B.5: Container Storage Area Estimated Closure Cost and Required Disposal Capacity

Container Inventory Removal (Table C.16)	$34,204	55 cy
Transformer Flush and Bulk Tank Disposal (Table C.17)	$9,545	1 cy
Area Decontamination and Concrete Removal (Table C.20)	$44,289	222 cy
Total Estimated Closure Costs (2017 $'s) and Disposal Volume:	**$88,039**	**278 cy**

Table B.6: PCB Commerical Storage Facilities
Total Estimated Closure Cost

Tank Farm Closure (Table B.4)	$260,160	349 cy
20.2 Container Storage Areas Closure (Table B.5)	$88,039	278 cy
20.3 Auxiliary Equipment Disposal (Table C.19)	$11,769	9 cy
20.4 Administrative and Supervisory (Table C.20)	$38,929	
20.5 Closure Certification (Table C.21)	$19,627	
Sub-Total:	**$418,524**	**635 cy**
10% Contingency	$41,852	64 cy
Total Estimated Closure Costs and Disposal Capacity:	**$460,376**	**699 cy**

Table B.7: Summary of Closure/Post-Closure Costs for Cells B6, 7 and 8

Description	Cell B6	Cell 7	Cell 8
Closure Costs			
Landfill Cover and Closure (Table C.22)	$3,350,042	$3,090,102	$3,331,204
Groundwater and Leachate Monitoring Costs During 2 Years of Closure (Table C.23)	$376,944	$326,220	$326,220
Maintenance Activities for 2 Years of Closure (Table C.24)	$13,747.08	$13,747.08	$9,164.72
Leachate Collection, Treatment, Storage and Disposal for 2 Years of Closure (Table C.27)	$310,800	$293,148	$293,148
Sub-Total Closure Costs	**$4,051,533**	**$3,723,217**	**$3,959,737**
Contingency (10%):	**$405,153**	**$372,322**	**$395,974**
Total Closure Costs in 2017($):	**$4,456,686**	**$4,095,539**	**$4,355,711**
Post-Closure Costs			
Post-Closure Ancillary Costs (Table C.26)	$2,036,160	$1,111,347	$1,031,640
Post-Closure Leachate Collection, Treatment, Storage and Disposal (Table C.27)	$1,107,812	$1,044,893	$1,044,893
Sub-Total Post-Closure Costs:	**$3,143,972**	**$2,156,241**	**$2,076,533**
Contingency (10%):	**$314,397**	**$215,624**	**$207,653**
Total Post Closure Costs in 2017($):	**$3,458,369**	**$2,371,865**	**$2,284,187**
Closure/Post-Closure Costs Combined			
Total Closure/Post-Closure Costs in 2017($):	**$7,915,055**	**$6,467,403**	**$6,639,897**

APPENDIX C

CLOSURE/POST-CLOSURE COST WORKSHEETS

Table C.1: Worksheet CMF-1
Inventory Management

1. CONTAINER INVENTORY (Maximum in 55-Gallon Equivalents)		
a.	Total number of containers in all the storage areas. (From Table A, TD01, Pad 2, TD02, SPAD in 55-Gallon Equivalents)	2,303
b.	Maximum inventory of containerized on-site management waste. (From Table A.1))	2,253
c.	Maximum inventory of Bulk Solids Transport Containers On-Site. (Cubic Yards)	2,000
d.	Maximum inventory of Bulk Solids after treatment. (1c x 1.6)	3,200
2. RE-CONTAINERIZATION OF WASTE		
a.	Number of damaged containers that may require overpacking or other modified packaging. (See Table D.1: CDA for recontainerization fraction of 0.03)	96
b.	Re-containerization Unit Cost (See Table D.1: CDA) ($/Container)	$290
c.	**TOTAL RE-CONTAINERIZATION COST [2a x 2b]:**	**$27,888**
3. CONTAINER MOBILIZATION		
a.	Number of pallets to be loaded for on-site disposal/transport. (1b x 0.25)	563
b.	Mobilization Unit Cost. (See Table D.1: CDA) ($/Pallet)	$30.17
c.	**TOTAL CONTAINER MOBILIZATION COST [(3a x 3b)]:**	**$16,985**
4. OFF-SITE MANAGEMENT OF INVENTORY		
a.	Quantity of containers to be managed off-site (Table A.1):	50
b.	Truck capacity: (Number of 55-gallon equivalents per truck.)	80
c.	Number of loads: (4a / 4b) (Partial shipments are invoiced as though a full shipment.)	1
d.	Transportation Cost, $/Load to Aragonite (See Table D.1: CDA).	$287
e.	Estimated Transportation Cost: (4c x 4d)	$287
f.	Off-site incineration costs, $/55-Gallon Equivalent (See Table D.1: CDA)	$95
g.	Total Estimated Off-Site Incineration Costs (4a x 4f)	$4,750
h.	**TOTAL ESTIMATED OFF-SITE MANAGEMENT COSTS [4e + 4g]:**	**$5,037**

Table C.1 (CMF-1)

5. ON-SITE TREATMENT/DISPOSAL OF CONTAINER MANAGEMENT FACILITY "OTHER" INVENTORY AND BULK SOLIDS STORAGE AREA		
a.	Quantity of containers to be treated on-site by stabilization prior to disposal: (0.40 x 1b)	901.2
b.	Unit cost of stabilization followed by landfill disposal, $/Container (See Table D.1: CDA):	$55.00
c.	Total estimated cost for on-site treatment (stabilization) of container inventory: (5a x 5b)	**$49,566**
d.	Quantity of containers designated for direct landfill disposal: (0.60 x 1b) = number of containers	1351.8
e.	Unit cost for direct landfill disposal of containers, $/Container (See Table D.2: CDA):	$3.87
f.	Total estimated cost for direct landfill disposal of container inventory: (5d x 5e)	**$5,234**
g.	Unit cost of bulk inventory stabilization/treatment, $/Cubic Yard (See Table D.1: CDA):	$110
h.	Unit cost of bulk inventory direct landfill disposal, $/Cubic Yard (See Table D.2: CDA):	$14.21
i.	Estimated cost of stabilization/treatment of bulk solids: (BSSA) (1c x 5g)	**$220,000**
j.	Estimated cost of landfill disposal of bulk solids after treatment: (BSSA) (1d x 5h)	**$45,472**
k.	**TOTAL ESTIMATED COST OF ON-SITE MANAGEMENT (5c + 5f + 5i + 5j):**	**$320,272**
6. SURFACE IMPOUNDMENT SOLIDS MANAGEMENT		
a.	Thickness of solids remaining in surface impoundment at time of closure: (Feet)	1.5
b.	Surface area of surface impoundment A, Square Feet (See Table D.3: CDA):	50,976
c.	Surface area of surface impoundment B, Square Feet (See Table D.3: CDA):	147,693
d.	Total estimated volume for disposal, Cubic Yards (See Table D.3: CDA):	10,159
e.	Unit cost for direct landfill disposal, $/Cubic Yard (See Table D.2: CDA):	$14.21
f.	**TOTAL ESTIMATED COST FOR ON-SITE MANAGEMENT (6c + 6d):**	**$144,364**
7. TOTAL LANDFILL CAPACITY ASSURANCE REQUIRED		
a.	Treated container inventory “on-site disposal” volume estimate: (See Table D.2: CDA - Gallons to Cubic Yards) {[(5a x 1.6) + 5d] x 0.27}	754
b.	Untreated container inventory “on-site disposal” volume estimate: (See Table D.2: CDA for cubic yard conversion) (Containers) (5d) 1381 containers x 26 cubic feet/container/27 = cubic yards required for untreated containerized waste	1,302
c.	Treated bulk inventory “on-site disposal” volume estimate: (See Table D.2: CDA for Landfill Capacity Assurance) (Cubic Yards) (1d)	3,200
d.	Untreated surface impoundment “on-site disposal” volume estimate: (See Table D.2: CDA for Landfill Capacity Assurance) (Cubic Yards) (6c)	10,159
e.	**TOTAL LANDFILL CAPACITY ASSURANCE REQUIRED (Cubic Yards) [7a + 7b + 7c + 7d]:**	**15,415**

Table C.2: Worksheet CMF-2
Facility Decontamination

1.	**PROTECTIVE AND SAFETY EQUIPMENT FOR PERSONNEL**	
a.	Number of personnel requiring safety equipment for decontamination: (See Table D.3: CDA)	34
b.	Equipment cost, $/person: (See Table D.3: CDA)	$410.87
c.	**TOTAL COST OF PERSONNEL SAFETY EQUIPMENT (1a x 1b):**	**$13,970**
2.	**EQUIPMENT DECONTAMINATION**	
a.	Since these units will close during final facility closure, the costs attributable to this category are included in the site-wide closure cost estimate (See CDA):	N/A
3.	**CONTAINER MANAGEMENT FACILITY STRUCTURE DECONTAMINATION**	
a.	Area of pad and building interior to be decontaminated, Square Feet: (See Table D.3: CDA)	46,511
b.	Structure decontamination unit cost-initial wash-down, $/Square Feet: (See Table D.3: CDA)	$2.37
c.	Structure decontamination unit cost-final wash-down, $/Square Feet: (See Table D.3: CDA)	$0.83
d.	**TOTAL CONTAINER MOBILIZATION COST [(3ax3b)+(3a x 3c]:**	**$148,877**
4.	**ON-SITE TREATMENT/DISPOSAL OF DECONTAMINATION RESIDUALS**	
a.	Residual generation rate for initial wash-down of container management facility, Gallons/Square Feet (See Table D.3: CDA)	1.625
b.	Residual generation rate for final wash-down of container management facility, Gallons/Square Feet (See Table D.3: CDA)	1.0
c.	Quantity of aqueous residuals to be treated: (Gallons) [(4a + 4b) x 3a)]	120,929
d.	Unit cost of transportation to San Jose Facility for aqueous treatment and discharge: (See Table D.3: CDA)	$2.43
e.	Estimated cost of aqueous residual treatment: (4c x 4d)	**$293,856.00**
f.	Quantity of solid residuals from decontamination to be stabilized, Cubic Yards (See Table D.3: CDA)	19
g.	Unit cost of stabilization, $/Cubic Yard: (See Table D.1: CDA)	$110
h.	Estimated cost of solids residual treatment: (4f x 4g)	**$2,078**
i.	Unit cost of on-site landfill disposal of bulk solids, $/Cubic Yard: (See Table D.2: CDA)	$14.21
j.	Estimated volume of treated residuals, Cubic Yards. (4f x 1.6)	30.2
k.	Estimated cost of on-site landfill disposal of bulk solids: (4i x 4j)	**$429**
l.	Quantity of soils to be removed adjacent to container management facility, Cubic Yards: (See Table D.3: CDA)	80
m.	Unit cost of soils removal, $/Cubic Yard: (See Table D.3: CDA)	$2.06
n.	Estimated cost of landfill disposal of soils: [4l x (4i + 4m)]	**$1,302**
o.	**TOTAL COST OF ON-SITE TREATMENT/DISPOSAL OF DECONTAMINATION RESIDUALS: (4e + 4h + 4k + 4n)**	**$297,665**
p.	Decontamination residuals “on-site disposal” volume estimate, Cubic Yards: (See Table D.2: CDA for Landfill Capacity Assurance) (4l + 4j)	110
q.	**TOTAL LANDFILL CAPACITY ASSURANCE REQUIRED (Cubic Yards) [4p]:**	**110**

Table C.3: Worksheet CMF-3
Ancillary Closure Activities

1.	**SITE REGRADING**	
a.	Quantity of soils for regrading to compensate for removals, Cubic Yards (See Table D.3: CDA)	80
b.	Cost of hauling, regrading and miscellaneous requirements, $/Cubic Yard (See Table D.3: CDA)	$5.59
c.	**Total cost of site regarding: (1a x 1b)**	**$447**
2.	**SUMP TESTING**	
a.	Number of sumps within container management facility:	5
b.	Unit cost of hydrostatic testing of sumps, $/Sump (See Table D.6: CDA)	$225.90
c.	Total cost of hydrostatic testing of sumps, $/Sump. (2a x 2b)	$1,129.49
d.	**TOTAL COST OF ANCILLARY CLOSURE ACTIVITIES (1c + 2c):**	**$1,577**

Table C.4: Worksheet CMF-4
Closure Certification

1	**SAMPLING AND ANALYSIS TO CONFIRM DECONTAMINATION**	
a.	Number of samples for confirmation of “clean” wash water: (See Table D.5: CDA)	6
b.	Unit cost of liquid analysis, $/Sample: (See Table D.7: CDA)	$1,468
c.	Total cost of liquid sample analysis for decontamination confirmation: (1a x 1b)	$8,810
d.	Number of samples for soil decontamination confirmation: (See Table D.7: CDA)	20
e.	Unit cost of soil/sludge analysis: (See D.7: CDA) ($/Sample)	$1,535
f.	Cost of soil/sludge sample analysis for decontamination confirmation: (1e x 1d)	$30,707
g.	Number PCB samples for liquid analysis: (See Table D.7: CDA)	10
h.	Unit cost of liquid samples for PCB analysis: (See Table D.7: CDA) ($/Sample)	$124
i.	Cost of liquid sample analysis for decontamination confirmation: (1g x 1h)	$1,236
j.	Number PCB samples for soil analysis: (See Table D.7: CDA)	55
k.	Unit cost of soil samples for PCB analysis: (See Table D.7: CDA) ($/Sample)	$124
l.	Cost of liquid sample analysis for decontamination confirmation: (1g x 1h)	$6,798
m.	**TOTAL ESTIMATED ANALYTICAL COSTS FOR CMF CLOSURE (1c +1f + 1i + 1l):**	**$47,551**
2.	**CERTIFICATION DOCUMENTS BY INDEPENDENT PROFESSIONAL ENGINEER**	
a.	Certification documents by independent Professional Engineer: (See Table D.7: CDA)	$98,454
m.	**TOTAL CERTIFICATION COSTS BY INDEPENDENT PE (2a):**	**$98,454**

Table C.5: Worksheet CLO-1
Inventory Management of Hazardous Waste Treatment/Storage/Process Units

1.	**CONTAINER MANAGEMENT UNIT INVENTORY**	
a.	See previous Worksheets CMF-1 through CMF-4	N/A
2.	**CURRENT MAXIMUM FACILITY TANK SYSTEM INVENTORY**	
a.	Leachate Storage Volume, Gallons: (See Table A.1)	12,600
3.	**PUT-PILE INVENTORY**	
a.	Maximum inventory of put piles: (See Table D.2: CDA)	250
b.	Average unit cost to analyze: (See Table D.2: CDA)	$150
c.	Total cost to initially analyze put piles: (See CDA) (3a x 3b)	**$37,500**
d.	Average failure rate of put pile treatment, Fraction of Piles: (See Table D.2: CDA)	0.2
e.	Number of put piles that must be retreated: (3a x 3d)	50.0
f.	Volume expansion factor due to retreatment, Factor: (See Table D.2: CDA)	1.3
g.	Average size of each put pile, Cubic Yards: (See Table D.2: CDA)	45
h.	Total Yards Requiring Retreatment: (Cubic Yards) (3e x 3f x 3g)	2,925
i.	Unit cost to retreat, analyze and move put piles, $/Cubic Yard: (See Table D.2: CDA)	$150
j.	Total cost to retreat failed put piles: (3h x 3i)	**$438,750**
k.	Unit cost to move failed put piles, $/Cubic Yard: (See Table D.2: CDA)	$2.29
l.	Total cost to move failed put piles: (3h x 3k)	**$6,698**
m.	Cost to re-analyze re-treated put piles: (3e x 3b)	**$7,500**
n.	**TOTAL COST TO INITIALLY ANALYZE, RETREAT, MOVE PUT PILES ($) (3c + 3j +3l + 3m):**	**$490,448**
o.	Put-pile volume estimate, treatment successful on first time, Cubic Yards: (See Table D.2: CDA for Landfill Capacity Assurance) [3a x 3g x (1-3d)]	9000
p.	Put-pile volume estimate, treatment not successful on first time, Cubic Yards: (See Table D.2: CDA for Landfill Capacity Assurance) [3h x 1.3]	3803
q.	**TOTAL LANDFILL CAPACITY ASSURANCE REQUIRED (Cubic Yards) [3o + 3p]:**	**12,803**
4.	**LEACHATE INVENTORY MANAGEMENT**	
a.	Maximum hazardous waste inventory for off-site treatment, Gallons: (2a)	12,600
b.	Unit cost of bulk liquid treatment off-site, includes mobilization $/Gallon: (See Table D.3: CDA)	$2.43
c.	**TOTAL ESTIMATED OFF-SITE MANAGEMENT COSTS (4a x 4b):**	**$30,618**
	TOTAL ESTIMATED INVENTORY MANAGEMENT (3n + 4c):	**$521,066**

Table C.6: Worksheet CLO-2
Hazardous Waste Management Unit (HWMU) Decontamination

1.	**PROTECTIVE AND SAFETY EQUIPMENT FOR PERSONNEL**	
a.	Number of personnel requiring safety equipment for decontamination: (See Table D.3: CDA)	34
b.	Initial equipment cost per person: (See Table D.3: CDA)	$411
c.	Total initial equipment cost: (1a x 1b)	**$13,974**
d.	Renewing equipment cost per person per day: (See Table D.3: CDA)	$29
e.	Number of closure days: (See Table D.3: CDA)	416
f.	Total renewing equipment cost: (1a x 1d x 1e)	**$410,165**
g.	**TOTAL COST OF PERSONNEL SAFETY EQUIPMENT [1c + 1f)]:**	**$424,139**
2.	**CONTAINER MANAGEMENT FACILITY**	
a.	See Appendix No. 2.2 (Closure Costs for Container Management Facility are included in Section III – Financial Requirements for Closure).	N/A
3.	**STABILIZATION TANK SYSTEM**	
a.	Containment area to be decontaminated, Square Feet: (See Table D.3: CDA)	7,825
b.	Tank and equipment area to be decontaminated, Square Feet: (See Table D.3: CDA)	6,480
c.	Total HWMU area to be decontaminated: (3a + 3b)	14,305
d.	Unit cost for initial decontamination wash-down, $/Square Foot: (See Table D.3: CDA)	$2.37
e.	Unit cost for final decontamination wash-down, $/Square Foot: (See Table D.3: CDA)	$0.83
f.	Total cost for stabilization tank system decontamination: [3c x (3d + 3e)]	**$45,789**
g.	Number PCB samples for liquid analysis: (See Table D.7:CDA)	5
h.	Unit cost of liquid samples for PCB analysis, $/Sample: (See Table D.7: CDA)	$124
i.	Total cost of liquid sample analysis for decontamination confirmation: (3g x 3h)	**$618**
j.	Number PCB samples for soil analysis: (See Table D.7: CDA)	20
k.	Unit cost of soil samples for PCB analysis, $/Sample: (See Table D.7: CDA)	$124
l.	Total cost of liquid sample analysis for decontamination confirmation: (3j x 3k)	**$2,472**
m.	Dismantling/demolition costs for one stabilization tank assuming it leaked: (See Table D.3: CDA)	$1,920
n.	Number of stabilization tanks to be dismantled: (See Table A.1)	3
o.	Total cost for dismantling/demolition of stabilization tanks: (3m x 3n)	**$5,761**
p.	**TOTAL HWMU DECONTAMINATION COST [3f + 3i + 3l + 3o]:**	**$54,640**

Table C.6 (CLO-2)

4.	**LEACHATE TREATMENT TANK SYSTEM**	
a.	Tank and equipment area to be decontaminated, Square Feet: (See Table D.3: CDA)	6,914
b.	Unit cost for initial decontamination wash-down, $/Square Foot: (See Table D.3: CDA)	$2.37
c.	Unit cost for final decontamination wash-down, $/Square Foot: (See Table D.3: CDA)	$0.83
d.	Total cost for leachate tank system decontamination: [4a x (4b + 4c)]	**$22,132**
e.	Number of PCB Samples for liquid analysis: See Table D.7: CDA)	5
f.	Unit cost of liquid samples for PCB analysis, $/Sample: (See Table D.7: CDA)	$124
g.	Cost of liquid sample analysis for decontamination confirmation: (4e x 4f)	**$618**
h.	Number of PCB samples for soil analysis: (See Table D.7: CDA)	20
i.	Unit cost of soil samples for PCB analysis, $/Sample: (See Table D.7: CDA)	$124
j.	Cost of liquid sample analysis for decontamination confirmation: (4h x 4i)	**$2,472**
k.	**TOTAL HWMU DECONTAMINATION COST [4d + 4g + 4j]:**	**$25,222**
5.	**SURFACE IMPOUNDMENT UNITS A and B**	
a.	Containment liner area to be decontaminated, Square Feet: (See Table D.3-CDA)	198,669
b.	Unit cost for initial decontamination wash-down, $/Square Foot: (See Table D.3: CDA)	$2.37
c.	Total wash-down decontamination: (5a x 5b)	**$471,137**
d.	Quantity of liner and leak detection media removal, Cubic Yards: (See Table D.3: CDA – Landfill Capacity Assurance)	3,414
e.	Unit cost for liner components removal, $/Cubic Yard: (See Table D.3: CDA)	$7.19
f.	Total cost of liner component removal: (5d x 5e)	**$24,554**
g.	Quantity of clay liner for removal, Cubic Yards: (See Table D.3: CDA – Landfill Capacity Assurance)	6,745
h.	Unit cost of clay liner removal, $/Cubic Yard: (See Table D.3: CDA)	$2.06
i.	Total cost of clay liner removal: (5g x 5h)	**$13,895**
j.	**TOTAL HWMU DECONTAMINATION COST (5c + 5f + 5i):**	**$509,586**
	TOTAL FACILITY HWMU DECONTAMINATION COST (1g + 3p + 4k + 5fj):	**$1,013,586**

Table C.7: Worksheet CLO-3
Treatment and Disposal of Decontamination Residuals

1.	**CONTAINER MANAGEMENT FACILITY**	
a.	See CMF Closure Cost Worksheets	N/A
2.	**STABILIZATION TANK SYSTEM**	
a.	Residual generation rate of initial decontamination wash-down of unit, Gallons/Square Foot: (See Table D.3: CDA)	1.63
b.	Residual generation rate of final decontamination wash-down of unit, Gallons/Square Foot: (See Table D.3: CDA)	0.98
c.	Quantity of residuals to be treated off-site, Gallons: [(2a + 2b) x 3c{from Table C.6}]	37,193
d.	Unit cost of off-site transportation and management at treatment facility with NPDES permit, $/Gallon: (See Table D.3: CDA)	$2.43
e.	Quantity of solid residuals from decontamination, Gallons: (See Table D.3: CDA for solids generation rate of 0.05) (2c x Table D.3, C96)	1,860
f.	Total estimated cost of off-site transportation and management at treatment facility with NPDES: [(2c – 2e) x 2d]	**$85,859**
g.	Quantity of decontamination residuals to be stabilized prior to disposal: (See Table D.2: CDA to convert from 55-gallon drums to cubic yards) (2e/55 xTable D.2, C6)	9
h.	Unit cost of bulk stabilization for residuals, $/Cubic Yard: (See Table C.5: CDA)	$150
i.	Total cost of stabilization for landfill disposal of residuals: (2g x 2h)	**$1,350**
j.	Estimated solids volume of treated decontamination residuals, Cubic Yards: (See Table D.2: CDA for residual solids) [2g x Table D.2, C27)]	12
k.	Unit cost of on-site landfill disposal of bulk solids, $/Cubic Yard: (See Table D.2: CDA)	$14.21
l.	Total cost of on-site landfill disposal of stabilized residuals: (2j x 2k)	**$171**
m.	Quantity of soils removed for area decontamination, Cubic Yards: (See Table D.3: CDA – Landfill Capacity Assurance)	70
n.	Unit cost of soils removal, $/Cubic Yard: (See Table D.3: CDA)	$2.06
o.	Total cost of soils removal: (2m x 2n)	**$144**
p.	Total cost of on-site disposal of soils residuals: (2m x 2k)	**$995**
q.	**TOTAL COST OF TREATMENT/DISPOSAL OF DECON RESIDUES (2f + 2i + 2l + 2o + 2p):**	**$88,519**
r.	Decontamination residuals “on-site disposal” volume estimate, Cubic Yards: (2j + 2m)	82
s.	**TOTAL LANDFILL CAPACITY ASSURANCE REQUIRED (Cubic Yards) [2r]:**	**82**

Table C.7 (CLO-3)

3.	**LEACHATE TANK SYSTEM**	
a.	Residual generation rate of initial decontamination wash-down of unit, Gallons/Square Foot: (See Table D.3: CDA)	1.63
b.	Residual generation rate of final decontamination wash-down of unit, Gallons/Square Foot: (See Table D.3: CDA)	1.0
c.	Quantity of residuals to be treated, Gallons: [(3a + 3 b) x 4a{Table C.6}]	17,977
d.	Unit cost of off-site transportation and management at the Aragonite incinerator, $/Gallon: (See Table D.8: CDA)	$1.20
e.	Quantity of solid residuals from decontamination, Gallons: (See Table D.3: CDA for 0.05 factor) (3c x 0.05)	899
f.	Total estimated cost of off-site transportation and management at treatment facility with NPDES: [(3c – 3e) x 3d]	**$20,493**
g.	Quantity of decontamination residuals to be stabilized prior to disposal: (See Table D.2: CDA to convert from 55-gallon drums to cubic yards) (3e/55 x 0.27)	4.4
h.	Unit cost of bulk stabilization for residuals, $/Cubic Yard: (See Table C.5)	$150
i.	Total cost of stabilization for landfill disposal of residuals: (3g x 3h)	**$660**
j.	Estimated volume of treated decontamination residuals, Cubic Yards: (See Table D.3: CDA for conversion factor 1.6) (3g x 1.6)	7.2
k.	Unit cost of on-site landfill disposal of bulk solids, $/Cubic Yard: (see Table D.2: CDA)	$14.21
l.	Total cost of on-site landfill disposal of stabilized residuals: (3j x 3k)	**$102**
m.	Quantity of soils removed for area decontamination, Cubic Yards: (See Table D.3: CDA – Landfill Capacity Assurance)	30
n.	Unit cost of soils removal, $/Cubic Yard: (See Table D.3: CDA)	$2.06
o.	Total cost of soils removal: (3m x 3n)	**$62**
p.	Total cost of on-site landfill disposal of stabilized residuals: (3m x 3k)	**$426**
q.	**TOTAL COST OF TREATMENT/DISPOSAL OF DECON RESIDUALS (3f + 3i + 3l + 3o + 3p):**	**$21,743**
r.	Decontamination residuals "on-site disposal" volume estimate, Cubic Yards: (See CDA for Landfill Capacity Assurance) (3j + 3m)	37.2
s.	**TOTAL LANDFILL CAPACITY ASSURANCE REQUIRED (Cubic Yards) [3 p]:**	**37.2**

Table C.7 (CLO-3)

4.	**SURFACE IMPOUNDMENT UNITS A AND B**	
a.	Residual generation rate of initial decontamination wash-down of unit, Gallons/Square Foot: (See Table D.3 CDA)	1.625
b.	Quantity of aqueous residuals to be treated, Gallons: [(4a x 5a{Table C.6})	322,837
c.	Unit cost of off-site transportation and management at treatment facility with NPDES permit, $/Gallon: (See Table D.3: CDA)	$2.43
d.	Quantity of solid residuals from decontamination, Gallons: (See table D.3: CDA for solid residuals factor) (4b x 0.05)	16,142
e.	Total estimated cost of off-site transportation and management at treatment facility with NPDES: [(4b – 4d) x 4c]	**$745,269**
f.	Quantity of decontamination residuals to be stabilized prior to disposal, Cubic Yards: (See Table D.2: CDA to convert from 55-gallon drums to cubic yards) (4d/55 x Table D.2, C6)	79
g.	Unit cost of bulk stabilization for residuals, $/Cubic Yard: (See Table C.5: CDA)	$150
h.	Total cost of stabilization for landfill disposal of residuals: (4f x 4g)	**$11,850**
i.	Estimated volume of treated decontamination residuals, Cubic Yards: (See Table D.2: CDA – Landfill Capacity Assurance) [4d/55 xTable D.2,C6 x Table D.2,C27]	103
j.	Unit cost of on-site landfill disposal of bulk solids, $/Cubic Yard: (See Table D.2: CDA)	$14.21
k.	Total cost of on-site landfill disposal of stabilized residuals: (4i x 4j)	**$1,464**
l.	Quantity of liner component and leak detection media removed, Cubic Yards: (See Table C.6) (5d {from CLO-2})	3,414
m.	Total cost of liner/leak detection media and land disposal: (4l x 4j)	**$48,513**
n.	Quantity of clay liner/soils removed, Cubic Yards: (See Table C.6: CDA) (5g {from CLO-2})	6,745
o.	Total cost of clay liner land disposal: (4n x 4j)	**$95,851**
	TOTAL COST OF TREATMENT/DISPOSAL OF DECON RESIDUALS [4e + 4h + 4k+ 4m + 4o]:	**$902,946**
p.	Decontamination residuals “on-site disposal” volume estimate, Cubic Yards: (4i + 4l + 4n)	10,262
q.	**TOTAL LANDFILL CAPACITY ASSURANCE REQUIRED (Cubic Yards) [4p]:**	**10,262**
	TOTAL COST OF TREATMENT/DISPOSAL OF DECONTAMINATION RESIDUALS: [2q + 3q + 4q]	**$1,013,208**

Table C.8: Worksheet CLO-4
Final Cover/Landfill Closure

1.	FINAL COVER LANDFILL CLOSURE (BASED COSTS OF SIMILAR CLOSURE CAPS (See Table D.11: CDA)	
a.	Cell 1 (closed 1990)	$0
b.	Cell 2 (closed 1990)	$0
c.	Cell 3 (interim closure 1992, closed 1994)	$0
d.	Cell 4 (closed 2010)	$0
e.	Cell 5 (closed 2011)	$0
f.	IWC 1 (closed 1997)	$0
g.	IWC 2 (closed 1997)	$0
h.	**TOTAL COST OF FINAL COVER/LANDFILL CLOSURE (sum 1a to 1g):**	**$0**

Table C.9: Worksheet CLO-5
Groundwater Monitoring During Closure Activities

1.	**GROUNDWATER MONITORING - DETECTION MONITORING BACKGROUND & COMPLIANCE POINT**	
a.	Number of wells in HWMU monitoring system including background wells: (See Table D.5: CDA)	64
b.	Number of wells partially covered by TSCA sampling requirements for PCB, Volatile, Semi-Volatile and Class 3 parameters, including background wells: (See Table D.5: CDA)	26
	Number of RCRA wells assumed for RCRA/TSCA Cell B/6	8
	Number of RCRA wells assumed for RCRA Cell 7	4
c.	Number of RCRA wells for Surface Impoundment Unit A	3
d.	Number of RCRA wells for proposed Surface Impoundment B	3
e.	Number of RCRA wells for proposed RCRA Cells 8, 9, 10, 11, 12, and 13	4
f.	Number of proposed wells for proposed Cells 8, 9, 10, 11, 12, and 13	8
g.	Number of wells for full analysis including background wells:	90
h.	Quantity of samples collected per well per sampling event: (See Table D.5: CDA)	1
i.	Number of QA/QC duplicate analyses per sampling event ½ covered by TSCA closure: (See Table D.5: CDA)	3
j.	Number of field blank samples per sampling event: (SeeTable D.5: CDA) (Includes one bottle blank. Balance covered by TSCA.)	3
k.	Number of field blank samples for volatile constituents per sampling event: (See Table D.5: CDA) (Another 6 are done as part of the TSCA events.)	15
l.	Number of completed Class 1 and Class 3 analyses performed per event: [1a + 1d + 1e + 1f+1g]	86
m.	Cost per sample for complete Class 1 and Class 3 analysis (sampling and analyticals): (See Table D.5: CDA)	$4,134
n.	Total cost for completed Class 1 and Class 3 analysis: (1h x 1i)	**$355,524**
o.	Number of samples without volatile, semi-volatile and Class 3 parameters:	26
p.	Cost per sample for Class 1 parameters less volatiles and semi-volatiles (2015 Clean Harbors):	$432
q.	Total cost for Class 1 parameters less volatiles and semi-volatiles: (1k x 1l)	**$11,232**
r.	Unit cost of laboratory analysis for volatile field blank (2015 Clean Harbors):	$75
s.	Total analytical costs per sampling event for extra volatile samples: (1g x 1n)	$1,125
t.	Shipping and data package costs per sample (2015 Clean Harbors):	$50
u.	Shipping and data package costs:	$10,080
v.	Total analytical, shipping, and data page costs per sampling event: (1j + 1m + 1o + 1q)	**$377,961**
w.	Total cost for groundwater monitoring sampling, reporting, administration: (See Table D.5: CDA, annual cost/2) ($/Sampling Event)	**$176,000**
x.	Number of sampling events during closure: (See Table D.5: CDA)	2
y.	Annual monitoring well maintenance costs:	$178
z.	**Total Groundwater Monitoring Costs During Closure [1t x (1r + 1s + 1u)]:**	**$1,108,277**

Table C:10: Worksheet CLO-6
Ancillary Closure Activities

1.	**LEACHATE MANAGEMENT**	
a.	Leachate pumping and transfer from landfill cells, Average Gallons/Day: (See Table D.6: CDA)	67
b.	Number of RCRA cells: (Includes RCRA Cells 1, 2, 3, 4, & 5, and Industrial Waste Cells 1 and 2)	7
c.	Closure period expected for final closure is 2 years, Days:	730
d.	Leachate volume total, Gallons: (1a x 1c)	48,792
e.	Unit cost of leachate pumping and transfer, $/Gallon: (See Table D.6: CDA)	$7.12
f.	Total cost of leachate pumping and transfer: (1d x 1e)	**$347,200**
g.	Unit cost of off-site transportation and management at the Aragonite incinerator, $/Gallon: (See See Table D.8: CDA)	$1.86
h.	Quantity of solid residuals Gallons: (See Table D.3: CDA for solid residuals factor) (1d x Table D.3, C96)	2,440
i.	Total estimated cost of off-site transportation and management at treatment facility: [(1d – 1h) x 1g]	**$86,103**
j.	Quantity of leachate management residuals to be stabilized prior to disposal, Cubic Yards: (See Table D.2: CDA to convert from 55-gallon drums to cubic yards) (1h/55 x Table D.2, C6)	12
k.	Unit cost of bulk stabilization for landfill disposal of treated leachate residuals, $/Cubic Yard: (See Table C.7)	$150
l.	Total cost of stabilization of leachate residuals: (1j x 1k)	**$1,800**
m.	Estimated volume of treated residuals, Cubic Yards: (See D.1: CDA for treated residuals volume factor) ((1j x Table D.1, C29)	19
n.	Unit cost of on-site landfill disposal of bulk solids, $/Cubic Yard: (See Table D.2: CDA)	$14.21
o.	Total cost of on-site landfill disposal of stabilized residuals: (1m x 1n)	**$273**
p.	**TOTAL COST OF LEACHATE MANAGEMENT [1f + 1i + 1l + 1o]:**	**$435,375**
2.	**RUN-ON/RUN-OFF CONTROL MAINTENANCE**	
a.	Unit cost of maintenance crew, $/Day: (See Table D.6: CDA)	$2,772
b.	Estimated days of maintenance during 24 months of closure: (See CDA)	24
c.	**TOTAL COST OF RUN-ON/RUN-OFF CONTROL MAINTENANCE (2a x 2b):**	**$66,525**
3.	**SECURITY/INSPECTION**	
a.	Personnel required for security during closure, Hours/Day: (See Table D.6: CDA)	24
b.	Duration of period requiring security during closure, Days: (See Table D.6: CDA)	365
c.	Unit cost of personnel for security, $/Hour: (See Table D.6: CDA)	$54
d.	Fraction of security associated with RCRA closure: (See Table D.6: CDA)	0.67
e.	**TOTAL COST OF SECURITY DURING CLOSURE (3a x 3b x 3c x 3d):**	**$315,360**
4.	**MOBILIZATION/DEMOBILIZATION OF HEAVY EQUIPMENT**	
a.	Mobilization/demobilization of six heavy pieces of equipment (see Table D.6: CDA)	**$29,733**

Table C.10 (CLO-6)

5.	**SITE REGRADING/RESTORATION**	
a.	Volume of soil disturbance for decontamination, Cubic Yards: (See Table D.6: CDA)	200
b.	Quantity of fill material (on-site) for regrading, Cubic Yards: (See Table D.6: CDA)	200
c.	Unit cost of fill material for regrading – excavation and haul, $/Cubic Yard: (See Table D.3: CDA)	$4.99
d.	Total cost of fill material: (5a x 5c)	**$998**
e.	Quantity of other site regrading, Cubic Yards: (See Table D.3: CDA)	1,556
f.	Unit cost of site regrading, $/Cubic Yard: (See Table D.3: CDA)	$0.60
g.	Total cost of regrading: [(5b + 5e) x 5f]	**$1,054**
h.	**TOTAL COST OF SITE RESTORATION (5d + 5g):**	**$2,052**
6.	**SUMP TESTING**	
a.	Number of sumps affected: (See Table D.6: CDA)	44
b.	Unit cost of sump testing, $/Sump: (See Table D.6: CDA)	$226
c.	**TOTAL COST OF SUMP TESTING (6a x 6b):**	**$9,940**
7.	**EQUIPMENT DECONTAMINATION (GENERAL)**	
a.	Number of units of equipment to be decontaminated: (See See Table D.6: CDA)	42
b.	Unit cost of decontamination, $/Unit: (See Table D.6: CDA)	$175
c.	Total cost of miscellaneous equipment decontamination: (7a x 7b)	**$7,350**
d.	Decontamination residual generation rate, Gallons/Unit: (See Table D.6: CDA)	1,300
e.	Total decontamination residual generated, Gallons: (7a x 7d)	54,600
f.	Unit cost of off-site transportation and management at treatment facility with NPDES permit, $/Gallon: (See Table D.3: CDA)	$2.43
g.	Total estimated cost of off-site transportation and management at treatment facility: [(7e -7h) x 7f]	**$126,044**
h.	Quantity of solid residuals from decontamination, Gallons: (See CDA) (7e x Table D.3, C96)	2,730
i.	Quantity of decontamination residuals to be stabilized prior to disposal, Cubic Yards: (See Table D.2: CDA to convert from 55-gallon drums to cubic yards) (7h/55 xTable D.2, C6)	13.4
j.	Unit cost of bulk stabilization for landfill disposal of treated leachate residuals, $/Cubic Yard: (See See Table D.1: CDA)	$110
k.	Total cost of stabilization of leachate residuals: (7i x 7j)	**$1,474**
l.	Estimated volume of treated decontamination residual, Cubic Yards: (See Table D.2: CDA for conversion factors) [(7i x Table D.2, C29]	21.44
m.	Unit cost of on-site landfill disposal of bulk solids, $/Cubic Yard: (See Table D.2: CDA)	$14.21
n.	Total cost of on-site landfill disposal of stabilized residuals: (7l x 7m)	**$305**
o.	**TOTAL COST OF EQUIPMENT DECONTAMINATION (7c + 7g + 7k + 7n):**	**$135,173**

Table C.10 (CLO-6)

8.	**TRUCK WASH STATION DECONTAMINATION**	
a.	Number truck wash stations: (See Table D.6: CDA)	4
b.	Area of station for decontamination per station, Square Feet: (See Table D.6: CDA)	5,500
c.	Quantity of gravel/soils removal for decontamination per station, Cubic Yards: (See Table D.6: CDA)	237
d.	Unit cost for decontamination wash-down, $/Square Foot: (See Table D.3: CDA)	$2.37
e.	Unit cost for soils/gravel removal, $/Cubic Yard: (See Table D.3: CDA)	$2.06
f.	Total cost of decontamination: (8a x 8b x 8d) + (8a x 8c x 8f)	**$54,125**
g.	Decontamination residual generation rate, Gallons/Square Foot: (See Table D.3: CDA)	1.625
h.	Total aqueous decontamination residual generated, Gallons: (8a x 8b x 8g)	35,750
i.	Unit cost of off-site transportation and management at treatment facility with NPDES permit, $/Gallon: (See Table D.3: CDA)	$2.43
j.	Quantity of solid residuals from decontamination, Gallons: (See Table D.3: CDA for solid residuals factor) (8h x Table D.3, C96)	1,788
k.	Total estimated cost of off-site transportation and management at treatment facility: [(8h – 8j) x 8i]	**$82,529**
l.	Quantity of decontamination residuals to be stabilized prior to disposal, Cubic Yards: (See See Table D.2: CDA to convert from 55-gallon drums to cubic yards) (8j/55 x Table D.2, C6)	8.8
m.	Unit cost of bulk stabilization of residuals, $/Cubic Yard: (See Table D.1: CDA)	$110
n.	Total cost of stabilization of residuals: (8l x 8m)	**$965**
o.	Estimated volume of treated decontamination residuals, Cubic Yards: (See Table D.1: CDA for volume factor from treated residuals) [(8l x Table D.1, C29]	14.0
p.	Unit cost of on-site landfill disposal of stabilized residuals, $/Cubic Yard: (See Table D.2: CDA)	$14.21
q.	Total cost of on-site landfill disposal of stabilized residuals: (8o x 8p)	**$200**
r.	Quantity of fill material needed on-site for regrading of truck wash, Cubic Yards: (8a x 8c)	948
s.	Unit cost of fill material for regrading, excavation, haul, $/Cubic Yard: (See Table D.3: CDA)	$4.99
t.	Total cost of fill material: (8r x 8s)	**$4,731**
u.	Unit cost of site regrading, $/Cubic Yard: (See Table D.3: CDA)	$0.60
v.	Total cost of regrading: (8r x 8u)	**$569**
w.	**TOTAL COST OF TRUCK WASH DECONTAMINATION/RESTORATION (8f + 8k + 8n + 8q +8t + 8v):**	**$143,118**
9.	**TOTALS FOR ANCILLARY CLOSURE ACTIVITIES**	
a.	**TOTAL COST OF ANCILLARY CLOSURE ACTIVITIES [1p + 2c + 3e + 4a + 5h + 6c + 7o + 8w]:**	**$1,137,275**
b.	**TOTAL DECONTAMINATION RESIDUE FROM ANCILLARYCLOSURE ACTIVITIES (1m + 5a +7l + 8c x 8a + 8o) in cubic yards**	**1,202.7**

Table C.11: Worksheet CLO-7
Closure Certification

1.	**SAMPLING AND ANALYSIS TO CONFIRM DECONTAMINATION**	
a.	Number of liquid samples for HWMU decontamination confirmation: (See Table D.7: CDA less Container Management Facility samples)	15
b.	Number of liquid samples for confirmation of “clean” wash water: (See Table D.7: CDA)	10
c.	Unit cost of liquid analysis, $/Sample: (See Table D.7: CDA)	$1,468
d.	Cost of liquid sample analysis for decontamination confirmation: [(1a + 1b) x 1c]	**$36,709**
e.	Number of samples for soil decontamination confirmation: (See Table D.7: CDA less Container Management Facility samples)	67
f.	Unit cost of soil/sludge analysis, $/Sample: (See Table D.7: CDA)	$1,535
g.	Cost of soil/sludge sample analysis for decontamination confirmation: (1e x 1f)	**$102,868**
h.	**TOTAL ESTIMATED ANALYTICAL COSTS FOR FACILITY CLOSURE (1d + 1g):**	**$139,577**
2.	**CERTIFICATION DOCUMENTS BY INDEPENDENT PROFESSIONAL ENGINEER (SEE CDA)**	
a.	Certification documents by independent professional engineer (see Table D.7: CDA)	**$196,908**
	TOTAL CLOSURE CERTIFICATION COSTS (1h + 2a):	**$336,486**

Table C.12: Worksheet TCLO-1
PCB Oil (TSCA) and Used Oil (RCRA) Disposal Charges

(a) Askarel PCB Oil / Used Oil Disposal by Incineration at Aragonite:			
53,325 Gallons x 13.5 lb./Gallon	=	719,888	lbs.
Incineration unit cost (2018 Clean Harbors)	=	$0.13	/lb
Incineration cost	=	$92,107	
(b) Askarel PCB Oil / Used Oil Transportation To Aragonite:			
Truck, Tank, and Driver Daily Cost (See Table D.3: CDA)	=	$765.40	/Day
Number of Daily Loads	=	2	Loads/Day
Unit Cost per Load	=	$383	/Load
Weight per Load	=	40,000	lbs.
Transportation Unit Cost	=	$0.010	/lb.
Transportation Cost	=	$6,888	
(c) Water Disposal by Incineration at Aragonite:			
10,657 Gallons x 8.3 lbs. / Gallon	=	88,453	lbs.
Incineration unit cost (2018 Clean Harbors)	=	$0.13	/lb
Incineration cost	=	$11,317	
(d) Water Transportation To Aragonite:			
Truck, Tank, and Driver Daily Cost (See Table D.3: CDA)	=	$765.40	/Day
Number of Daily Loads	=	2	Loads/Day
Cost per Load	=	$383	/Load
Weight per Load	=	40,000	lbs.
$425 / Load / 40,000 lbs. (~5,000 Gal) / Load	=	$0.010	/lb
88,453 lbs. x $0.011 / lb.	=	$846	
(e) Personnel:			
Supervisor (1) Unit Cost (See Table D.3: CDA)	=	$57	
Daily Time	=	$12	
Number of Days	=	$5	
Total Supervisor Cost	=	$3,404	
Labor to load tanker provided by transportation company			
Sub-Total PCB Oil Disposal Charges	=	**$114,562**	
Note: 2018 Clean Harbors Cost is based on $95/55 Gallon Drum			

Table C.13: Worksheet TCLO-2
Bulk Tank Disposal

(a) Bulk Tank Disposal at Grassy Mountain			
Assume the tank weigh to Capacity Ratio.	=	1.5	lbs/Gal
(i.e. Each 10,000 gallon tank weighs 15,000 lbs. when empty.)			
63,590 Total Tank Farm Gallons x 1.5 lbs. / Gal.	=	95,385	lbs.
Landfill Disposal Unit Cost (2018 Clean Harbors)	=	$0.01	/lb.
95,385 lbs. x $0.06 / lb.	=	$837	
(b) Transportation to Grassy Mountain Cell			
Truck, Tank, and Driver Daily Cost (See Table D.3: CDA)	=	$765.40	/Day
Number of Daily Loads	=	2	
Unit Cost per Load	=	$382.70	/Load
Weight per Load	=	40,000	lbs/ Load
Transportation Unit Cost	=	$0.010	/ lb.
Transportation Cost	=	$913	
(c) Removal			
Technicians (2) x 2 Days x $566.60 / Day			
(See Table D.3: CDA)	=	$2,884	
(d) Crane			
Crane Plus Operator (See Table D.3: CDA)	=	$885	/Day
Number of Days	=	2	
Crane Plus Operator Cost	=	$1,769	
"Landfill Capacity Assurance" Required at Closure:		**7.5**	**Yards**
(95,385 lbs. x 0.000075 Yard^3/lb. of Carbon Steel)			
Sub-Total Bulk Tank Disposal	=	**$6,402**	
Note: 2018 Clean Harbors Cost based on $2.29/CY Load and Transport, $11.92/CY amortized cost of airspace, and an average density of 60 lbs/cubic foot			

Table C.14: Worksheet TCLO-3
Area Decontamination - Concrete Removal

(a) Concrete Breaker (Excavator with 5000 ft-lb Hydraulic Hammer)			
Daily Rate with Operator (2018 RS Means)	=	$927.38	/Day
Number of Days	=	5	Days
Concrete Breaker Cost	=	$4,637	
(b) Loader			
Daily Rate with Operator (See Table D.3: CDA)	=	$1,233.18	/Day
Number of Days	=	5	
$247.89 / Day x 5 Days	=	$6,166	
(c) Disposal at Grassy Mountain			
Quantity of Concrete	=	9,099	ft^3
at 27 ft^3 per Yd^3	=	337	Yd^3
at 3,000 lbs/Yd^3	=	1,011,000	lbs.
Disposal Unit Cost (2018 Clean Harbors)	=	$0.06	/lb
1,011,000 lbs. x $0.06 / lb.	=	$57,290	
(d) Transportation to Grassy Mountain Cell			
Truck, Tank, and Driver Daily Cost (See Table D.3: CDA)	=	$765.40	/Load
Number of Daily Loads	=	2	
Unit Cost per Load	=	$382.70	
Weight per Load	=	40,000	lbs
Transportation Unit Cost	=	$0.010	/lb
$0.011 / lb. x 1,011,000 lbs.	=	$9,673	
(e) Sampling			
Take 55 underlying soil samples after concrete removal to confirm clean.			
Unit Cost forAnalyticals (See Table D.7: CDA)	=	$123.60	/Sample
Number of Samples	=	55	
Sampling Cost	=	$6,798	
(f) Labor			
Engineering Staff Inspection, ESI (Technician) Rate (See Table D.7: CDA)	=	$85.80	/Hour
Number of Technicians for Observations	=	4	
Hours of Work Each Day	=	12	Hrs/Day
Number of Work Days	=	10	Days
Cost of Technician Observations	=	$41,184	
Number of Sampling Technicians	=	2	
Number of Sampling Days	=	3	
Cost of Technician Sampling	=	$6,178	
"Landfill Capacity Assurance" Required at Closure:		**337**	**Yards**
Sub-Total Area Decontamination	**=**	**$131,925**	
Note: 2018 Clean Harbors Cost based on $2.29/CY Load and Transport, $11.92/CY amortized cost of airspace, and an average density of 150 lbs/cubic foot			

Table C.15: Worksheet TCLO-4
Underground Pipeline Removal

(a) Backhoe			
Daily Rate, Excavator Backhoe and Operator (See Table D.6: CDA)	=	$82.57	/Hour
Hours of Each Work Day	=	10.00	Hrs/Day
Number of Days	=	2	Days
$354.12 / Day x 2 Days	=	$1,651	
(b) Labor			
Labor Rate (See Table D.3: CDA)	=	$54.02	/Hour
Number of Laborers	=	3	
Hours of Work Each Day	=	12	Hrs/Day
Number of Work Days	=	2	Days
Labor Cost (See Table D.3: CDA)	=	$3,890	
(c) Supervisor			
Supervisor, Operator Rate (See Table D.3: CDA)	=	$72.09	/Hour
Hours of Work Each Day	=	12	Hrs/Day
Number of Work Days	=	2	Days
Supervisor, Operator Rate Cost	=	$1,730	
"Landfill Capacity Assurance" Required at Closure:		**4**	**Yards**
Sub-Total Underground Pipeline Removal	**=**	**$7,271**	

Table C.16: Worksheet TCLO-5
Container Inventory Removal

(a) Cost Calculation[1]			
Treatable Oil: 500 lbs. / Drum, Incinerate and Landfill	=	$0.199	/lb
Treatable Oil: 500 lbs. / Drum, Incinerate and Landfill (2018 Clean Harbors)	=	$99.49	/Drum
Askarel Oil: 743 lbs. / Drum, Incinerate and Landfill	=	$0.134	/lb
Askarel Oil: 743 lbs. / Drum, Incinerate and Landfill (2018 Clean Harbors)	=	$99.49	/Drum
Capacitors: 250 lbs. / Drum, Landfill	=	$0.018	/lb
Capacitors: 250 lbs. / Drum, Landfill (2018 Clean Harbors)	=	$4.49	/Drum
Transformers (Drained): 500 lbs. / Unit, Landfill	=	$0.013	/lb
Transformers (Drained): 500 lbs. / Unit, Landfill (2018 Clean Harbors)	=	$6.74	/Unit
Debris: Assume 600 lbs / Drum Average, Landfill	=	$0.007	/lb
Debris: Assume 600 lbs / Drum Average, Landfill (2018 Clean Harbors)	=	$4.49	/Drum
(b) Disposal			
Treatable Oil Quantity	=	0	Drums
Treatable Oil Cost	=	$0	
Askarel Oil Quantity	=	193	Drums
Askarel Oil Cost	=	$19,202.24	
Capacitors Quantity	=	65	Drums
Capacitor Cost	=	$292.08	
Transformers Quantity	=	198	Units
Transformer Cost	=	$1,334.56	
Debris Quantity		9	Drums
Debris Cost	=	$40.44	
Total Disposal Cost		$20,869.31	
(c) Transportation			
Transportation prices for incinerables are calculated to the Aragonite, Utah, facility (i.e. water, Askarel and capacitors). Transportation prices for landfillables are calculated to the Grassy Mountain Cell (i.e. transformers and debris).			
Unit Cost per Load (2018 Clean Harbors)	=	$286.65	/Load
Number of Drums per Load	=	80	
Cost per Drum	=	$3.58	/Drum
Treatable Oil Cost	=	$0	
Askarel Oil Cost	=	$692	
Capacitors Cost	=	$233	
Transformers (Drained) Cost	=	$709	
Debris Cost	=	$32	
Total Transportation Cost		$1,666	

Table C.16 (TCLO-5) Cont

(d) Labor			
It will take 2 technicians 7 days to drain, flush and load the equivalent of 193 "pole-mount" transformers. It will take 2 technicians 2 days to remove and load the remaining container material from warehouse area.			
Technician Hourly Rate (See Table D.3: CDA)	=	$54.02	/Hour
Hours of Work Per Day	=	12	Hrs/Day
Technician Daily Rate	=	$648.28	/Day
Cost of 7 Technicians for 2 Days	=	$9,076	
Cost of 2 Technicians for 2 Days	=	$2,593	
"Landfill Capacity Assurance" Required at Closure:		**55**	**Yards**
(Transformers and Debris Only)			
(193 Transformers @ approx. 55 gal. ea. x 202 gal/yard[3]			
(9 drums @ 55-gallons)			
Sub-Total Container Inventory Removal	**=**	**$34,204**	
[1] 2013-2016 Clean Harbors contract with State of Washington			

Table C.17: Worksheet TCLO-6
Transformer Flush and Bulk Tank Disposal

(a) Oil Treatment and Disposal			
Number of "pole mount" Transformers	=	193	
Average Gallons per Flush per Transformer	=	35	Gal/Flush
Total Gallons from Flushing Transformers	=	6,755	Gallons
6,755 Gallons x 8 lbs. / Gallon	=	54,040	lbs.
Unit Price for Treatment and Disposal (2018 Clean Harbors)	=	$0.14	/lb
Treatment and Disposal Cost	=	$7,307	
(b) Oil Transportation To Aragonite			
Unit Cost per Load (2018 Clean Harbors)	=	$286.65	/Load
Weight Per Load	=	40,000	lbs.
Transportation Unit Cost	=	$0.007	/lb.
Transportation Cost	=	$387	
(c) Tank Disposal Charge			
Tank Capacity	=	3000	Gallons
Approximate Tank Weight per Gallon (See Table C.13)	=	1.5	lbs./Gal
Tank Weight	=	4500	lbs/Tank
Number of Tanks	=	2	
Total Weight of Tanks	=	9000	lbs
Disposal Unit Cost (2018 Clean Harbors)	=	$0.05	/lb
Tank Disposal Charge	=	$490	
(d) Transportation to Grassy Mountain Cell			
Transportation Unit Cost (Same as Above)	=	$0.007	/lb
Transportation Cost	=	$64	
(e) Labor			
Technician Hourly Rate (See Table D.3: CDA)	=	$54.02	/Hour
Hours of Work Per Day		12	Hrs/Day
Technician Daily Rate		$648.28	/Day
Cost of 2 Technicians for 1 day	=	$1,297	
“Landfill Capacity Assurance” Required at Closure:		**1**	**Yards**
(9,000 lbs. x 0.000075 yards^3/lbs.)			
Sub-Total Transformer Flush and Bulk Inventory Disposal	**=**	**$9,545**	

Table C.18: Worksheet TCLO-7
Area Decontamination and Concrete Removal

(a) Concrete Breaker (Excavator with 5000 ft-lb Hydraulic Hammer)			
Daily Rate with Operator (See Table C.14)	=	$927.38	/Day
Number of Days	=	10	
Concrete Breaker Cost	=	$9,274	
(b) Concrete Saw, 30 HP Gas Self-Propelled			
Daily Rate with Laborer (2018 RS Means)	=	$739.41	/Day
Number of Days	=	5	
Saw Cutting Cost	=	$3,697	
(c) Loader			
Daily Rate with Operator (See Table D.3: CDA)	=	$1,233.18	/Day
Days of Operation	=	10	
Loader Cost	=	$12,332	
(d) Disposal at Grassy Mountain			
Concrete Quantity	=	6730	ft^3
at 27 ft^3 per Yd^3	=	249	Yd^3
Concrete Weight at 3,000 lbs. / Yd^3	=	747,778	lbs.
Disposal Unit Cost (2018 Clean Harbors)	=	$0.006	/lb
747,000 lbs. x $0.06 / lb. [4]	=	$4,113	
(e) Transportation to Grassy Mountain Cell			
Unit Cost per Load (2018 Clean Harbors)	=	$286.65	/Load
Weight per Load	=	40,000	lbs.
Transportation Unit Cost	=	$0.007	/lb.
Transportation Cost	=	$5,359	
(f) Labor			
Technician Hourly Rate (See Table D.3: CDA)	=	$54.02	/Hour
Hours of Work Per Day	=	12	Hrs/Day
Technician Daily Rate	=	$648.28	/Day
Cost of 3 Technicians for 10 Days	=	$12,966	
Cost of 2 Sampler Technicians for 2 Days	=	$2,593	
(g) Surface Wipe Sampling			
Unit Cost for Surface Wipes (See Table D.7: CDA)	=	$123.60	/Sample
Estimated Number of Wipe Samples	=	12	Samples
Cost of Surface Wipe Samples	=	$1,483	
(h) Underlying Soil Sampling			
Unit Cost for Soil Samples (See Table D.7:CDA)	=	$123.60	/Sample
Estimated Number of Soil Samples	=	44	
Cost of Soil Samples	=	$5,438	
"Landfill Capacity Assurance" Required at Closure:		**222**	**Yards**
(747,000 lbs. Concrete x $Yards^3$/3,375 lbs.)			
Sub-Total Area Decontamination	=	**$44,289**	

Table C.19: Worksheet TCLO-8
Auxiliary Equipment Disposal

(a) Disposal of Debris at Grassy Mountain			
Disposal Unit Cost (See Table C.16)	=	$0.007	/lb
Total Estimated Weight of Debris	=	120,000	lbs
Disposal Cost	=	$899	
(b) Transportation to Grassy Mountain Cell			
Unit Cost per Load (2018 Clean Harbors)	=	$286.65	/Load
Weight per Load	=	30,000	lbs.
Transportation Unit Cost	=	$0.010	/lb.
Transportation Cost	=	$1,147	
(c) Labor [3]			
Technician Hourly Rate (See Table D.3: CDA)	=	$54.02	/Hour
Hours of Work Per Day	=	12	Hrs/Day
Technician Daily Rate	=	$648.28	/Day
Cost of 3 Technicians for 5 Days	=	$9,724	
"Landfill Capacity Assurance" Required at Closure:		**9**	**Yards**
(120,000 lbs. x 0.000075 yards3/lbs.)			
Total Auxiliary Equipment	=	**$11,769**	

Table C.20: Worksheet TCLO-9
Administrative and Supervisor Costs

(a) Labor [3]		
Supervisor (1) Unit Cost (See Table D.3: CDA)	=	$72.09
Hours of Work Per Day	=	12
Number of Work Days	=	45
45 Days x Project Manager (1) x $920.72 / Day	=	$38,929
Total Administrative and Supervisor Cost	=	**$38,929**

Table C.21: Worksheet TCLO-10
Closure Certification

(a) Labor [3]		
Engineer Hourly Rate (See Table D.7: CDA)	=	$140.19
Hours of Work Per Day	=	2
Number of Work Days	=	70
70 Days x Engineer (1) x 0.25 x $169.98 / Hour x 8 Hours / Day	=	$19,627
Total Closure Certification Cost	=	**$19,627**

Table C.22: Worksheet RTCLO-1
Estimated RCRA/TSCA Cell Closure Costs

Soil Sampling and Excavation, Waste Mound Preparation, Geosynthetic Clay Liner, HDPE Geomembrane (60 Mil), Drainage Net Installed, Non-Woven Geotextile Installed, Soil Protective Cover, Gravel Armor (Stone Mulch) Cover, Engineering QA/QC, Testing, Surveying, Certification. Closure costs based on Cell 5 actual closure costs from 2011 adjusted to 2017 by an average inflation of 2.2%.

RCRA/TSCA Cell B/6 Landfill Cover and Closure (See Table D.11)	$3,350,042
RCRA Cell 7 Landfill Cover and Closure (See Table D.11)	$3,090,102
RCRA Cell 8 Landfill Cover and Closure (See Table D.11)	$3,331,204
TOTAL CLOSURE COST FOR RCRA & TSCA CELLS	**$9,771,348**

Table C.23: Worksheet RTCLO-2
Groundwater & Leachate Monitoring Costs During Closure Activities

Description	TSCA Cells X, Y, & Z	RCRA/TSCA Cell B/6	RCRA Cell 7	Proposed RCRA Cell 8
Annual Ground Water Monitoring Cost for All TSCA wells, RCRA/TSCA wells and RCRA wells. (including wells for monitoring RCRA/TSCA Cell B/6 and RCRA Cells 7 & 8 (proposed) (Table D.5: CDA)	$107,484	$33,072	$16,536	$16,536
Average Annual Leachate Collection and Treatment Cost for TSCA Cells X, Y, and Z. (28 sumps total), RCRA/TSCA Cells B/6 (24 sumps), RCRA Cell 7 (12 sumps), and proposed RCRA Cell 8 (8 sumps) (Table C.27)	$223,767	$155,400	$146,574	$146,574
Assume Semi-Annual Performance Evaluation Cost: (for 1 Engineering Support (ES) for 2 days, and 8 hours per day split 0.85 day for TSCA Cells X, Y, and Z, 0.85 day for RCRA/TSCA Cells B/6 & RCRA Cell 7, and 0.3 day for proposed RCRA Cell 8) (See Table D.7: CDA)	$869	$483	$338	$241
Annual Performance Evaluation Costs per Year.	$1,738	$966	$676	$483
Labor and Reporting Costs Per Annual Event. (See Table D.7: CDA)	$3,625	$2,413	$1,207	$869
Total Annual Groundwater & Leachate Monitoring Costs During Closure:	**$229,131**	**$158,779**	**$148,457**	**$147,926**

Note these costs are for all TSCA Cells, including those cells that have already been closed. TSCA/RCRA Cell B/6 has 24 sumps (8 areas with primary, seconday, and tertiary) and TSCA Cells X (4 areas), Y (4 areas), and Z (6 areas) have a total of 28 sumps (primary and secondary in each area) for a total of 52 sumps that need monitoring. RCRA Cells 8-13 are each designed with 4 areas with a top and a bottom sump per area for a total of 48 sumps that will need monitoring when constructed. Costs for Cells 8-13 sumps are pro-rated at a ratio of 48/52 to the cost for TSCA/RCRA Cell B6 and TSCA Cells X, Y, and Z.
Currently there are 26 groundwater monitoring wells for TSCA/RCRA Cell B/6 and TSCA Cells X, Y, & Z. There are currently 4 monitored and 8 proposed groundwater monitoring wells for TSCA/RCRA cells 8, 9, 10, 11, 12 & 13. Pro-rate the analytical costs for each event accordingly to the ratio of 12/26.

Table C.24: Worksheet RTCLO-3 Closure Maintenance Activities				
Description	TSCA Cells X, Y & Z	RCRA/TSCA Cell B/6	RCRA/TSCA Cell 7	Proposed RCRA/TSCA Cell 8
Well System Maintenance Cost During Closure (See Table D.5: CDA) Annual well maintenance for the background and downgradient wells on RCRA Cells X, Y and Z (26 TSCA wells). TSCA/RCRA Cells B/6 (8 RCRA wells) & 7 (4 RCRA wells), and proposed RCRA/TSCA Cell 8 (4 RCRA wells).	$178	$167	$83	$83
Leachate System Maintenance Cost During Closure (See Table D.8: CDA) Annual leachate system maintenance for Cells B/6, X, Y and Z is based on annual replacement of leachate pumps within the 52 sumps assuming half the pumps will be replaced every 3 years (See Table D.8: CDA). TSCA/RCRA Cell 8 is proposed to have 4 sump areas per cell and 2 sumps per sump area providing a total of 8 sumps. Pro-rate costs accordingly. (See Table D.8: CDA)	$21,460	$18,394	$9,197	$6,131
Run-On/Run-Off Maintenance Cost During Closure (See Table D.8: CDA) Involves routine maintenance of the erosion and degradation of the landfill or other required cover structures, run-off trenches and piping and collection basins. Worst case is 10 hours per day of maintenance crew with 1 laborer, 1 operator, 1 backhoe/loader. Frequency of maintenance is 1 day per month for 24 months for all RCRA Cells and RCRA/TSCA Cells.	$13,747	$13,747	$9,165	$9,165
Security Cost During Closure (See Table C.10) Security and site inspection is expected to be maintained as currently required during the active site closure (i.e. decontamination, cover placement, etc.) of the facility. This would require security at the main gate during operating hours. It is expected that this will be necessary during the first 12 months of closure. Since the remainder of the closure effort (placement of landfill final cover) will take place after all probable exposure to hazardous constituents has been removed no continuation of security at this level is expected. The cost of security personnel, including all payroll and overhead requirements, have been computed as 10 hr/day, 260 days total. The cost for security will be shared with RCRA cells at a ratio of the 6 TSCA Cells to 13 total Cells.	$32,400	$10,800	$10,800	$10,800
Routine Inspection Cost During Closure (See Table D.8: CDA) Site inspection is expected to be performed as a function of facility maintenance. This would require one 10 hour workday once per month during the post-closure period. It is expected that this effort will coincide with the annual administrative certification report of compliance with the post-closure requirements. Any reporting effort will be coordinated with the appropriate authorized party during the post-closure period. (Prorate for all TSCA Cells and RCRA/TSCA Cells)	$6,483	$2,161	$2,161	$2,161

Table C.24 (RTCLO-3)

Mobilization/De-Mobilization of Equipment Cost During Closure (See Table D.6: CDA)				
The heavy equipment expected to be utilized in the general closure process has been assumed to be hired. Some equipment function will be mobilization over public highway, and thus mobilization is part of its function and has been included in the cost estimate. Assume mobilization and demobilization 6 pieces of equipment 1 time each year. (Prorate for all TSCA Cells and RCRA/TSCA Cells)	$29,733	$9,911	$9,911	$9,911
Equipment Decontamination and Disposal Cost During Closure (See Table C.10)				
Cost for decontamination, transportation to Aragonite and incineration of decontamination residuals generated for decontamination of 6 units, 1 time each year. (Prorate for all TSCA Cells and RCRA/TSCA Cells)	$56,430	$18,810	$18,810	$18,810
Truck Wash Station Decontamination and Disposal Cost During Closure (See Table C.10)				
At completion of facility, equipment and general decontamination, the truck wash units will be decontaminated. This area is ancillary to permitted units and requirement for housekeeping practices. The decontamination residuals generated will be disposed in accordance with the closure plan. Two truck washes need decontamination. resulting in half the cost provided for decontamination of the 4 truck wash stations assumed in Table C.10. (Prorate for all TSCA Cells and RCRA/TSCA Cells)	$35,780	$11,927	$11,927	$11,927
Total Cost of Closure Maintenance Activities:	**$196,210**	**$85,916**	**$72,053**	**$68,988**

Table C.25: Worksheet RTCLO-4
Leachate Collection, Treatment, Storage and Disposal

Leachate Collection, Treatment, Storage and Disposal Cost During Closure	
Annual Leachate Generation in TSCA Cells X, Y, Z, and RCRA/TSCA Cells B/6, RCRA Cell 7, and proposed RCRA Cell 8, Gallons: (2017 Clean Harbors Records, Table D.6 CDA)	476,398
Leachate Collection Cost for TSCA Cells, $/Gallon (See Table C.27)	$1.20
Total Leachate Collection, Treatment, Storage, Disposal:	**$571,678**

Table C.26: Worksheet RTPCLO-1
Post-Closure Ancillary Costs

Groundwater Monitoring - Annual	TSCA Cells X, Y, & Z	RCRA/TSCA Cell B/6	RCRA Cell 7	RCRA Cell 8
Annual cost for groundwater monitoring, $/year. (See Table D.5: CDA)	$107,484	$33,072	$16,536	$16,536
Groundwater monitoring cost for 30 years of post closure.	$3,224,520	$992,160	$496,080	$496,080
Leachate System Maintenance				
Number of sumps	28	24	12	8
Annual Pump Replacement assuming half the pumps are replaced every three years	5	4	2	1
Annual Pump Replacement Cost, $/Year (See Table D.8: CDA)	$15,499	$13,285	$6,642	$4,428
Leachate System Maintenance Cost for 30 Years of Post-Closure	$464,959	$398,537	$199,268	$132,846
Cap Maintenance				
Annual Maintenance Cost, $/Year Includes the routine maintenance of the erosion and degradation of the landfill covers o other required cover structures, run-off trenches, and/or piping and any collection basins. The number of crew days required annually for routine maintenance is based upon the overall post-closure schedule. Estimated time for the maintenance crew for all cells is 10 hours/day for 8 days/year. (See Table D.8: CDA)	$7,637	$2,546	$2,546	$2,546
Total Maintenance Cost for 30 years of Post-Closure	$229,118	$76,373	$76,373	$76,373
Routine Inspections				
Hourly Rate for Engineering Support (ES), assumed to be a junior level PE, $/Hour See Table D.9: CDA)	$120.72			
Includes security and site inspection is expected to be performed as a function of facility maintenance. This would require one 10 hour day per month and 12 months per year during the 28-year post-closure period (following the 2-year closure period). It is expected that this will coincide with the annual administrative and certification report of compliance with the post-closure requirements. Any reporting effort will be coordinated with the appropriate agency. (This includes all TSCA Cells). (See Table D.9: CDA for Engineering Support (ES) hourly rate, assumed to be a PE)	$217,298	$72,433	$72,433	$72,433

Table C.26 (RTPCLO-1)

Annual Independent PE Review				
Hourly Rate for Engineering Staff Inspection (ESI), $/Hour See Table D.9: CDA)	$85.80			
Hourly Rate for Engineering Support (ES), assumed to be a junior level PE, $/Hour See Table D.9: CDA)	$120.72			
Hourly Rate for Certifying Engineer (PE), $/Hour (See Table D.9: CDA)	$140.19			
Annual Cost, $/Year: During the post-closure period an annual report will be prepared by the Permittee or designated third party, which documents all of the activities for each hazardous waste management unit (HWMU) at the facility during each one year period. These documents will include copies of all other reporting requirements including site inspections, leachate generation, manifest documents for leachate management, groundwater monitoring results, etc. These documents will be maintained at a designated repository for use by the certifying authority at the end of the 30 year post-closure period for each HWMU. For estimating purposes, this report is assumed to be prepared by the independent professional engineer documenting the post-closure activities. The following information is the estimated effort in complying with this requirement. Engineering Staff Inspection (ESI) is for 90 hours and ES support is 45 hours. Professional Engineer (PE) for 10 hours. Miscellaneous expenditures are 15% of the total per year. Of the total annual cost, 40% is for Cells X, Y, & Z; 30% is for Cell B/6 only, 15% is for Cell 7, adn 15% is for Cell 8.	$5,823	$4,367	$2,183	$2,183
Total Costs includes 30 Years of Post Closure Review since the first two years are included with the Closure Costs:	$200,877	$150,658	$75,329	$75,329
Certification Documents by PE				
Total Certification Cost: The final certification for each HWMU to meet the requirements of Utah Admin. Code will be compiled utilizing the annual documents outlined hereinbefore. It is expected that this review will require approximately 30 hours by Engineering Support (ES) and 8 hours be a certifying engineer for each unit as the 30 year period is completed. In addition to this will be the required administration and documentation to accompany the certification, which is estimated to cost approximately 40% of the professional staff fees. There are 4 units (Cells X, Y, Z, B/6, and 7), subject to post-closure certification in 2017. Proposed Cell 8 is also included.	$19,921	$6,640	$6,640	$6,640
Sub-Total Post-Closure Costs:	**$4,356,693**	**$1,696,800**	**$926,123**	**$859,700**
Administrative and Contingency Costs (10%)	$435,669	$169,680	$92,612	$85,970
Contingency for Potential Corrective Action (10%)	$435,669	$169,680	$92,612	$85,970
Total Post-Closure Costs:	**$5,228,032**	**$2,036,160**	**$1,111,347**	**$1,031,640**

Table C.27: Worksheet RTPCLO-2
Post-Closure Leachate Collection, Treatment, Storage and Disposal

POST-CLOSURE COST CONSIDERATIONS

Leachate Pumping and Disposal Costs for the cells already closed during preparation of this plan, assume the leachate volumes collected will continue to decrease at a constant rate. It is assumed that the two year closure period and the first two years of post closure will produce volumes of leachate equal to those recorded from open cells in 2016 since the waste mound in those cells is above top of embankment level and significant amounts of water were applied to Cells Z and B for dust suppression and operations in 2017 generating significantly higher amounts of leachate than normal. The third year of post closure throught the post closure period will decrease at the rate assumed. TSCA Cells X and Y were closed in 1985 and 1990, respectively, therefore, they have been closed for 30 years and 25 years beyond the 2 year closure period and are assumed to reduce in leachate volume at the assumed constant rate.

Leachate reduction rate (Years 3-10) (% Reduction Per Year)	%	12%			
2017 Leachate Volumes (2018 Grassy Mountain)					
TSCA Cell X	Gal./Year	1521			
TSCA Cell Y	Gal./Year	9737			
TSCA Cell Z	Gal./Year	175890			
RCRA/TSCA Cell B/6	Gal./Year	129500			
RCRA Cell 7	Gal./Year	122145			
Total Leachate Collected / Year	Gal./Year	438,793			
Estimated Total Annual Leachate Rates During Closure and Post Closure		**TSCA Cells X, Y, & Z**	**RCRA/TSCA Cell B/6**	**RCRA Cell 7**	**Proposed RCRA Cell 8**
Year 1 Closure	Gal./Year	187148	129500	122145	122145
Year 2 Closure	Gal./Year	185797	129500	122145	122145
Year 3 Post-Closure	Gal./Year	163501	113960	107488	107488
Year 4 Post-Closure	Gal./Year	143881	100285	94589	94589
Year 5 Post-Closure	Gal./Year	126615	88251	83238	83238
Year 6 Post-Closure	Gal./Year	111422	77661	73250	73250
Year 7 Post-Closure	Gal./Year	98051	68341	64460	64460
Year 8 Post-Closure	Gal./Year	86285	60140	56725	56725
Year 9 Post-Closure	Gal./Year	75931	52923	49918	49918
Year 10 Post-Closure	Gal./Year	66819	46573	43928	43928
Year 11 Post-Closure	Gal./Year	58801	40984	38656	38656
Year 12 Post-Closure	Gal./Year	51745	36066	34018	34018
Year 13 Post-Closure	Gal./Year	45535	31738	29935	29935
Year 14 Post-Closure	Gal./Year	40071	27929	26343	26343
Year 15 Post-Closure	Gal./Year	35263	24578	23182	23182
Year 16 Post-Closure	Gal./Year	31031	21629	20400	20400
Year 17 Post-Closure	Gal./Year	27307	19033	17952	17952
Year 18 Post-Closure	Gal./Year	24030	16749	15798	15798
Year 19 Post-Closure	Gal./Year	21147	14739	13902	13902
Year 20 Post-Closure	Gal./Year	18609	12971	12234	12234
Year 21 Post-Closure	Gal./Year	16376	11414	10766	10766
Year 22 Post-Closure	Gal./Year	14411	10044	9474	9474
Year 23 Post-Closure	Gal./Year	12682	8839	8337	8337
Year 24 Post-Closure	Gal./Year	11160	7778	7337	7337
Year 25 Post-Closure	Gal./Year	9821	6845	6456	6456
Year 26 Post-Closure	Gal./Year	8642	6024	5681	5681
Year 28 Post-Closure	Gal./Year	7605	5301	5000	5000
Year 28 Post-Closure	Gal./Year	6692	4665	4400	4400
Year 29 Post-Closure	Gal./Year	5889	4105	3872	3872
Year 30 Post-Closure	Gal./Year	5183	3612	3407	3407

Table C.27 (RTPCLO-2)

Estimated Total Annual Leachate Costs during Closure and Post-Closure		TSCA Cells X, Y, & Z	RCRA/TSCA Cell B/6	RCRA Cell 7	Proposed RCRA Cell 8
Estimated Leachate Collection and Disposal Cost (2018 Clean Harbors)	$/Gal	$1.20			
Year 1 Closure	$	$224,578	$155,400	$146,574	$146,574
Year 2 Closure	$	$222,956	$155,400	$146,574	$146,574
Total Leachate Management Cost During Closure:	$	**$447,534**	**$310,800**	**$293,148**	**$293,148**
Average Annual Leachate Management During Closure:	**$/Year**	**$223,767**	**$155,400**	**$146,574**	**$146,574**
Year 3 Post-Closure	$	$196,202	$136,752	$128,985	$128,985
Year 4 Post-Closure	$	$172,657	$120,342	$113,507	$113,507
Year 5 Post-Closure	$	$151,939	$105,901	$99,886	$99,886
Year 6 Post-Closure	$	$133,706	$93,193	$87,900	$87,900
Year 7 Post-Closure	$	$117,661	$82,010	$77,352	$77,352
Year 8 Post-Closure	$	$103,542	$72,168	$68,070	$68,070
Year 9 Post-Closure	$	$91,117	$63,508	$59,901	$59,901
Year 10 Post-Closure	$	$80,183	$55,887	$52,713	$52,713
Year 11 Post-Closure	$	$70,561	$49,181	$46,388	$46,388
Year 12 Post-Closure	$	$62,094	$43,279	$40,821	$40,821
Year 13 Post-Closure	$	$54,642	$38,086	$35,922	$35,922
Year 14 Post-Closure	$	$48,085	$33,515	$31,612	$31,612
Year 15 Post-Closure	$	$42,315	$29,493	$27,818	$27,818
Year 16 Post-Closure	$	$37,237	$25,954	$24,480	$24,480
Year 17 Post-Closure	$	$32,769	$22,840	$21,543	$21,543
Year 18 Post-Closure	$	$28,837	$20,099	$18,957	$18,957
Year 19 Post-Closure	$	$25,376	$17,687	$16,683	$16,683
Year 20 Post-Closure	$	$22,331	$15,565	$14,681	$14,681
Year 21 Post-Closure	$	$19,651	$13,697	$12,919	$12,919
Year 22 Post-Closure	$	$17,293	$12,053	$11,369	$11,369
Year 23 Post-Closure	$	$15,218	$10,607	$10,004	$10,004
Year 24 Post-Closure	$	$13,392	$9,334	$8,804	$8,804
Year 25 Post-Closure	$	$11,785	$8,214	$7,747	$7,747
Year 26 Post-Closure	$	$10,371	$7,228	$6,818	$6,818
Year 28 Post-Closure	$	$9,126	$6,361	$6,000	$6,000
Year 28 Post-Closure	$	$8,031	$5,598	$5,280	$5,280
Year 29 Post-Closure	$	$7,067	$4,926	$4,646	$4,646
Year 30 Post-Closure	$	$6,219	$4,335	$4,089	$4,089
Total Post-Closure Leachate Management Cost:	**$**	**$1,589,406**	**$1,107,812**	**$1,044,893**	**$1,044,893**
Average Annual Post-Closure Leachate Management Cost:	**$/Year**	**$56,765**	**$39,565**	**$37,318**	**$37,318**
Note: Cell 8 values are based on assuming they will be comparable to Cell 7					

APPENDIX D

COST DOCUMENTATION APPENDIX

Table D.1: Cost Documentation (CDA)
Inventory Management

INVENTORY MANAGEMENT		
General Management Practices		
Re-Containerization of Waste Stream (2018 RS Means, 1 Forklift, and Operator, 1 Laborer and Filling 5 Drums per Day)		
Estimate Support: It has been assumed that the most common method for waste stream handling would be by containerization in 55 gallon units for transport to off-site disposal. It serves as the more conservative approach even if it is decided at final closure to transport by bulk to the treatment disposal site. Experience indicates that approximately 2% of the containers received at a facility will require re-containerization for a variety of reasons. It is estimated that an additional 1% of all containers transported to other treatment and disposal facilities will require re-containerization due to unexpected damage and shipment effects. Estimate a total 3% will be re-containerized.	\$/Drum	\$290.50
Fraction of Total Number of Drums	Fraction	0.03
Container Mobilization (Source: 2018 RS Means, Heavy Construction Costs)		
Forklift Rental & Operating Cost	\$/Workday	\$223.84
Equipment Operator	\$/Hour	\$68.84
Laborer	\$/Hour	\$54.02
Operated Unit Cost	\$/Day	\$1,206.75
Operated Unit Cost	\$/Pallet	\$30.17
Estimate Support: Container mobilization consists of pallet loading onto appropriate van type vehicles. Each van typically holds approximately 20 pallets or 80 – 55 gallon drums. It has been assumed that a typical 8 hour workday is consumed to process two complete loads of containerized wastes. Some waste will already be palletized and loaded; therefore it is assumed that only a fraction of any waste stream must be mobilized (palletized) for transport.	Fraction	0.25
Off-Site Management of Containerized Hazardous Waste Inventory		
The only inventory of wastes subject to off-site management is Container Management Facility (Drum Dock 1) waste streams destined for incineration and possible off-site management of leachate liquids. Additionally, it is assumed that a fraction of the remaining Container Management Facility waste inventory destined for incineration has been assumed.	Fraction	0.10
Transportation Cost: Truck, Van, and Driver Unit Cost (2018 Cost by Clean Harbors)	\$/Full Vanload	\$286.65
Number of Drums per Load	Drums/Load	40
Transportation Costs-: Unit cost of full van load shipments to Aragonite, Utah.	\$/Drum	\$7.17
Incineration Costs. (2018 Cost by Clean Harbors)	\$/Drum	\$95.00
Off-Site Management of Inventory		
Waste Categories/Estimated Quantities: Based on current record evaluations at the facility, the hazardous waste streams typical to the hazardous waste management units have been categorized by treatment requirements. Quantities will vary and these estimates represent a conservative estimate.		
Stabilization Treatment		
Of the remaining Container Management Facility inventory ("other" inventory), it is assumed that a fraction of these containers will be treated at the stabilization facility prior to ultimate landfill disposal. The waste inventory at the other units typically is liquid suitable for off-site disposition; otherwise solids in the waste inventory will be assumed to be designated for on-site management and require treatment at a stabilization unit prior to landfill disposal.	Fraction	0.40
Stabilization treatment charges including any required neutralization. (2018 Cost by Clean Harbors)		
Container Cost	\$/Drum	\$55
Bulk Cost	\$/Yd^3	\$110

Direct Landfill Disposal		
The remaining fraction of the inventory of the Container Management Facility will not require any specific treatment and can be transported directly to the landfill for disposal. Note that all inventory will require charges relative to landfill disposal since these charges are not contained within the other treatment unit costs.	Fraction to not be stabilized.	0.60
In order to more accurately assess the cost of landfill disposal, the waste streams treated by stabilization, it is assumed that the volume of waste will increase after stabilization. A "stabilization volume factor" applied to the original volume is used to account for the volume increase. This number is based on GM stabilization process experience. It is also utilized in landfill capacity assurance calculations through the Closure and Post-Closure Plan to compute capacity, which must be available at Closure.	Stabilization Volume Factor	1.6

Table D.2: Cost Documentation (CDA)
Landfill Capacity Assurance

LANDFILL CAPACITY ASSURANCE		
The current permit for the Grassy Mountain facility requires that the Permittee maintain sufficient landfill capacity to accommodate the appropriate disposal of all hazardous waste inventory as well as all decontamination residuals generated during closure of the facility. Table B contains the tabulation of the required landfill capacity needed to be remaining at closure. The information was obtained from the Worksheets and this CDA.		
Landfill Capacity Assurance (LCA) – Container Management Facility (CMF)		
Conversion factors used to convert from one volume type to another are:		
Gallons to Cubic Yards	Yd^3/55-Gallon	0.27
Cubic Feet to Gallons	Gal/Ft^3	7.48
Cubic Yards to Cubic Feet	Ft^3/ Yd^3	27.00
Containerized inventory for direct landfill	See CMF.	
Containerized inventory stabilized then landfill disposed.	See CMF.	
Landfill Capacity Assurance Waste Inventory Total Volume	See CMF & Table B.5	
Landfill Disposal Costs		
Costs associated with disposal of inventory and/or decontamination residues after stylization will be the on-site transport and placement within the cell and the cost of the airspace utilized (Grassy Mountain amortized cost of the cell volume).		
Operating labor, equipment, fuels (2015 Clean Harbors)	\$/ton or Yd^3	\$2.29
Amortized cost of airspace (Cell 7, 2018 Clean Harbors)	\$/Yd^3	\$11.92
Unit Landfill Disposal Cost (Bulk)	\$/Yd^3	\$14.21
Unstabilized load of drums	Drums/Yd^3	3.67
Stabilized load of drums	Drums/Yd^3	2.3
Unit Landfill Disposal Cost (Per Unstabilized Drums)	\$/Unstab. Drum	\$3.87
Unit Landfill Disposal Cost (Per Number of Drums to be Stabilized)	\$/3 Stab. Drum	\$6.18
Put-Pile Disposal Costs (Source: Grassy Mountain 2010 costs adjusted to 2017 at an annual rate of 2.2%)		
Put-piles will vary in size. Some smaller and some larger. Also, a majority of these will be successfully treated with initial stabilization. The cost of disposing of these put-piles is included in the landfill and stabilization costs. The remainder of the put-piles will have to be treated again and disposed. The following assumptions are used to develop the costs for those that have to be treated.		
Maximum number of put-piles	Number	250
Average put-pile size (Estimate from Grassy Mountain Facility)	Yd^3	45
Fraction of put-piles that must be retreated (Estimated from Grassy Mountain Facility)	Fraction	0.2
Average analysis cost (Source: 2018 Clean Harbors)	\$/Pile	\$150
Volume increase as a result of stabilization	Factor	1.3
Operating labor, equipment, fuels	\$/ton or Yd^3	\$2.29
Stabilization costs (includes analytical, transportation, analytical review, profit margin) (2018 Clean Harbors)	\$/Yd^3	\$150.00
Total Re-Stabilization Costs	\$/Yd^3	\$152.29

Table D.3: Cost Documentation (CDA)
Hazardous Waste Management Unit (HWMU)
Decontamination and Disposal of Decontamination Residues

HAZARDOUS WASTE MANAGEMENT UNIT (HWMU) DECONTAMINATION AND DISPOSAL OF DECONTAMINATION RESIDUES		
For purposes of the Closure Cost Estimate decontamination of the hazardous waste management units and related structures I assumed to be conducted by high-pressure washing. The initial wash-down would be performed with water and appropriate surfactant additives. This will be supplemented with scrubbing with brushes and solution as needed. This effort will be followed by a second complete washing/rinse with water only. Unless analytical sampling of the final rinse waters/residue indicated otherwise, no further decontamination will be performed. All water utilized for decontamination will be delivered to the site by tanker truck to ensure that non-contaminated water is employed in the process. It is assumed that the current potable water system will be the distribution system of this clean water. Cost estimates assume that all wash water will be treated at an off-site facility possessing appropriate permits. The solid residues generated by decontamination are assumed to be a fraction of the liquid decontamination total and are included in the closure plan worksheet section. The text hereinafter presents the "area" to be decontaminated and other pertinent information specific to each hazardous waste management unit and its ancillary equipment. Also included is the estimated quantity of soils removal for decontamination at each unit to be landfilled direct. It is assumed, for estimating purposes, that the soils removal will include the top 6 inches of soil within 6 feet of the outside containment perimeter.		
Protective Clothing and Safety Equipment		
The estimated number of personnel to be outfitted with full protective and safety equipment during closure operations is shown to the right of this text. This includes such operations as the landfill, stabilization, decontamination, drivers, lab operations, leachate treatment and some miscellaneous personnel.	# of persons	34
Protective Clothing, Basic Level B (Source: industrialsafety.com 2018)		
Splash Suit (Source: 2018, <$200/case of 25)	$/Item	$8.00
Chemical Resistant Boots	$/Item	$72.33
Nitrile Gloves, HD Disposable ($12.49/100)	$/Item	$0.12
Goggles	$/Item	$2.60
Full-Face Respirator	$/Item	$200.00
Respirator Cartridges	$/item	$20.00
Hard Hat	$/Item	$13.00
30% Surcharge for Disposable Equipment During Closure	$/Item	$94.82
Total Initial Cost:	$/Person	$410.87
Protective Clothing, Disposable Items	Item/Day/Person	1
Splash Suit	$/Item	$8.00
Nitrile Gloves (8 pair/day Disposable)	$/Item	$1.00
Cartidges	$/Item	$20.00
Total Renewing Cost	$/Item	$29.00
Closure Time	Years	2
	Hours/Year	2,080
	Hours/Day	10
	Days	416
Total Renewing Cost for Two Year Closure Period:	$/Person	$12,064

Table D.3-(CDA) HWMU

Overview of Decontamination Methods Assumed for Cost Estimating Purposes (Source: Americon 2001)		
High-pressure water wash systems provided in RS Means operated at 5 GPM and 7 GPM and at a pressure of 3000 psi (2018 RS Means pg. 546). Previous estimates used 5 GPM which is consistent with equipment provided in the RS Means, therefore, use 5 gallons per minute. Note: The following are crew production rates and residual production estimates were provided in previous closure estimates. Upon review of these rates of production, it is believed the rates previously listed should be conservative and reliable in determining costs to perform this work; therefore no change has been made to the production rates and estimates.		
Initial Wash		
Cleaning production is estimated at 1,200 square feet per shift.	Sq. Ft./Shift	1,200
Hours of activity per shift	Hours/Shift	6.5
Production	Sq. Ft./Min.	3.1
Spray unit residual generation	GPM	5
Residual generation rate	Gal./Sq. Ft.	1.625
Residual generation rate	Gal./Day	1,950
Final Wash/Rinse		
Cleaning production Rate	Sq. Ft./Shift	2,000
Hours of Activity Per Shift	Hours/Shift	6.5
Cleaning Production Rate	Sq. Ft./Min	5.1
Spray Unit Residual Generation	GPM	5
Residual Generation Rate	Gal./Sq. Ft.	0.975
Residual Generation Rate	Gal./Day	1,950
Crew/Equipment Overview (2018 RS Means for labor and equipment and internet for cleaning chemical)		
One Laborer Foreman	$/hour	$56.74
Four Laborers ($54.02/laborer)	$/hour	$216.08
One Pressure Washer (5 GPM @ 3000 psi)	$/day	$63.60
Tools, Accessories and Hoses (Estimated/Assumed)	$/day	$200.00
Portable Pump (Centrifugal gas @130 GPM)	$/day	$69.42
Cleaning Chemicals/Surfactants (source: cleanitsupply.com & zoro.com, $362 to $551/drum simple green, mix ratio about 1:20 for about 100 gal, or 2 drums per day)	$/day	$913
Total Washing Cost Per Shift	$/shift	$1,519
Total Rinsing Cost Per Shift	$/Shift	$606
High-Pressure Washing		
Estimated production of the crew and equipment for the decontamination wash.	Sq. Ft./Shift	1,200
Surcharge due to travel distances to the facility and other possible ramifications to cover travel time, mileage, etc.	Fraction	0.3
Estimated cost for the labor and equipment portion of the decontamination wash.	$/Sq. Ft.	$1.65

Table D.3-(CDA) HWMU

High-Pressure Rinsing		
The final rinse for the facility will be less costly due to higher production and elimination of any surfactant and/or chemicals.		
Estimated production of the crew and equipment for the decontamination rinse.	Sq. Ft./Shift	2,000
Surcharge due to travel distances to the facility and other possible ramifications to cover travel time, mileage, etc.	Fraction	0.30
Estimated cost for the labor and equipment portion of the decontamination rinse.	$/Sq. Ft.	$0.39
Wash/Rinse Water Supply		
It has been estimated, based on the production rates, that it will be necessary to provide approximately 1,950 gallons of potable water for decontamination each shift. One delivery of water is 10,000 gallons assuming it is stored in the facility's current potable water storage and distribution system (2018 RS Means).		
Tanker truck_4x2 220 HP @ $258.10, 10,000 gal. water tank @ $179.80/day, and driver @ $327.52/day	$/Day	$765.40
Water delivery	Gal.	10,000
Crew (One tanker truck and driver)	$/Gal.	$0.077
Water Cost ($1.55/1000 gal; 2017 FEMP Report - 2016 SLC Corp. Public Utilities)	$/Gal.	$0.002
Water Cost Including Transportation	$/Gal.	$0.078
Water Cost	$/Day	$156.18
Wash Water	$/Sq. Ft.	$0.1269
Rinse Water	$/Sq. Ft.	$0.0761
Temporary Decontamination Residue Storage		
Wash and rinse waters both require a vacuum tanker to remove and transport residual wash/rinse waters from the area of decontamination to the leachate storage tanks.		
One vacuum truck and driver (2018 RS Means: $359/day-5,000 gal truck, $368/day-driver)	$/Day	$719
Wash Water Storage	$/Sq. Ft.	$0.60
Rinse Water Storage	$/Sq. Ft.	$0.36
Total Cost of Water, Wash/Rinse and Temporary Storage		
Unit Cost – Initial High-Pressure Decontamination	$/Sq. Ft.	$2.37
Unit Cost – Final High-Pressure Decontamination	$/Sq. Ft.	$0.83
Aqueous Treatment of Residuals		
It is assumed that aqueous residuals would be shipped off-site to the Clean Harbors San Jose facility for treatment and disposal.		
Treatment facility costs (2018 Clean Harbors)	$/Gal.	$1.65
Transportation to SJ Facility (2018 Clean Harbors)	$/Load	$3,900
	Gal./Load	5,000
	$/Gal.	$0.78
Residuals Treatment	$/Gal.	$2.43
Container Management Facility Decontamination		
The structure for the Container Management Facility is comprised of the pad, foundations and enclosure structures for Drum Dock 1, Pad 2A, Pad 2B, Pad 3A and Pad 3B. The estimated internal surface area of this facility is 46,511 square feet.	Sq. Ft.	46,511
Time required for initial wash.	Days	39
Tanker cost for initial wash.	$	$29,666
Initial rinse cost per Square Foot.	$/Sq. Ft.	$0.64
Time required for final rinse.	Days	23
Tanker cost for final rinse.	$	$17,800
Final rinse cost per Square Foot.	$/Sq. Ft.	$0.38

Decontamination Residues		
Decontamination residues to be managed as a result of the closure of the Container Management Facility are: the aqueous residues and resulting solids residue from the decontamination effort, accumulating at the rates shown below.		
Wash water generation.	Gal.	75,580
Solids generation rate (Fraction of Wash Water)	Fraction	0.05
Solids generation rate.	Gal.	3,779
Conversion, Gallons to Cubic Yards	Gal./Cubic Yard	0.0050
Solids generation rate [1 gallon = (1/(7.48 x 0.27)) = 0.005 Cubic Yards].	Yd^3	18.9
Rinse water generation.	Gal.	45,348
LCA (Clean Harbors Estimated Quantity)	Yd^3	30
Solid residuals (sludges from wash down liquids) volumes are calculated similarly for Waste Management Units other than the Container Management Facility. These calculations are shown on the Worksheets (CLO).		
Removal of any potentially contaminated soils immediately surrounding the Container Management Facility structure has been considered. The quantity of soils (LCA) is estimated to be: (Clean Harbors Estimate)	Yd^3	80
Stabilization Tank System Decontamination (Quantity Estimates by Clean Harbors)		
This unit is broken down into tank units and containment/process area for convenience. The approximate surface area of the containment/process area to be decontaminated including the retaining walls and sumps is shown below. The approximate total surface area, interior and exterior, of the double-walled, free-standing, open topped tank units is shown below. For the purposes of this estimate all three of the tanks have been assumed to leak into the leak detection system, requiring dismantling and total decontamination. The increased tank surface area to be decontaminated is shown. The decontamination of these tanks will also generate gravel for landfill disposal and must be accounted for in the LCA.		
Containment	Sq. Ft.	7,825
Tank Exterior (Three Tanks)	Sq. Ft.	3,240
Tank Interior (Three Tanks)	Sq. Ft.	3,240
Total =	Sq. Ft.	14,305
Soils Removal (LCA)	Yd^3	70
Stabilization Tank Demolition/Dismantling (Source: 2018 RS Means)		
Steel tank demolition is assumed to require oxy/acetylene torch cutting with crane-aided mobilization of the dismantled components or parts. The unit costs presented here are applied to the Waste Stabilization Tanks assumed to require demolition for this estimate. Estimate Support: For the purpose of demolition of a Stabilization Tank, it has been assumed that approximately 246 linear feet of torch cutting will be required to dismantle a tank into manageable proportions. One 10 hour day is estimated to be needed to perform demolition and loading.		
Cost of Torch Cutting (1” Plate, 246 Feet of Cutting)	$/Foot	$4.21
Number of Feet to Cut	Feet	246
Cost of Operated Hydraulic Crane, 55 Ton Capacity	$/Day	$885
Crane Operating Days	Days	1
Unit Cost of Stabilization Tank Demolition	$	$1,920
Number of Tanks to Demolish/Dismantle	Count	3

Table D.3-(CDA) HWMU

Leachate Treatment Tank System (Quantity Estimates by Clean Harbors)		
The leachate treatment tank system will remain intact at closure because it will be needed to assist in managing leachate during post-closure. However, the cost to decontaminate these is included in the closure cost estimate to reflect the ultimate closure of this unit. The leachate treatment tank system containment area is a reinforced concrete containment and contains one storage tank. The interior tank surface area to be contaminated is based on the interior walls, floor, and top.		
Concrete Containment	Sq. Ft.	5,934
Tank (one)	Sq. Ft.	980
Total =	Sq. Ft.	6,914
Soils Removal (LCA)	Yd^3	30
Surface Impoundment unit Decontamination/Dismantling		
Cost estimate assumptions are that the Surface Impoundments will receive a completed high-pressure wash only on the primary liner, and if necessary, on the back of this liner and necessary areas of the secondary liner if leakage has occurred. The primary linear area to be decontaminated is approximated.		
Surface Impoundment A	Sq. Ft.	42,480
Surface Impoundment A Total Geosynthetic Quantity (2 geomembranes, 1 geonet)	Sq. Ft.	127,440
Surface Impoundment B	Sq. Ft.	145,113
Surface Impoundment B Total Geosynthetic Quantity (2 geomembranes, 1 geonet)	Sq. Ft.	435,339
It has been assumed, for estimating purposes, that no major leakage has occurred and only a fraction of the underside and the secondary liner components require an initial wash/rinse.	Fraction	0.20
Underside and secondary liner components requiring an initial wash/rinse.		
Surface Impoundment A	Sq. Ft.	8,496
Surface Impoundment B	Sq. Ft.	29,023
Summary of the estimate quantities of material and areas of decontamination:		
Surface Impoundment A Geosynthetics Disposal Subtotal:	Sq. Ft.	50,976
Surface Impoundment B Geosynthetics Disposal Subtotal:	Sq. Ft.	147,693
Since the liner and leak detection components will be disposed of in an on-site landfill, these liner components will only receive an initial wash/rinse on visible contamination. It is estimated that approximately 0.0149 cubic yards per 1 square foot of liner components will require landfill disposal (this provides a fluff factor of about 15 for (2) 60-mil geomembrane and (1) 200-mil geonet). After these synthetic components have been rinsed of any visible contamination and properly disposed of, the removal and landfill disposal of any contaminated soils will be performed. For estimating purposes, the quantity established by the initial 1 foot of clay sub-liner and leak detection piping and media has been utilized to establish a cost item.		
Surface Impoundment A Synthetic Liner Volume Requiring Dismantling and Disposal	Yd^3	755
Surface Impoundment A Gravel Collection Media (Primary)	Yd^3	10
Surface Impoundment A Gravel Collection Media (Secondary)	Yd^3	51
Surface Impoundment A Clay Liner Component Volume	Yd^3	1,556
Surface Impoundment B Synthetic Liner Volume Requiring Diamantling and Disposal	Yd^3	2,580
Surface Impoundment B Gravel Collection Media	Yd^3	18
Surface Impoundment B Clay Liner Component Volume	Yd^3	5,189
Subtotal (Landfill Capacity Assurance):	Yd^3	10,159

Table D.3-(CDA) HWMU

Geosynthetic Components Removal (Source: 2018 RS Means)		
The removal of the synthetic liner components is a separate task, not included in the decontamination. The following crew costs cover this demolition by utilizing loaders to pull the pieces out that have been cut and rolled up to be landfilled. The costs of trucking and landfill disposal are detailed in other portions of this cost appendix. Estimate Support: The unit cost per cubic yard is based on an estimate of three (3) days to remove the synthetic components during decontamination. This in turn was applied to the estimated volume of synthetic material to be removed. Previous time estimates to remove geomembrane and geonets are assumed in this estimate.		
Time to Complete Work (about 10,000 square feet of impoundment area per day)	Days	18.8
Length of Work Day	Hours/Day	10
Laborer Unit Cost	\$/Hour	\$54.02
Laborers	Number	4
Total Laborers Unit Cost	\$/Hour	\$216.09
Total Laborers Unit Cost	\$/Day	\$2,161
Operators	Number	1
Operator Unit Cost	\$/Hour	\$72.09
Total Operators Unit Cost	\$/Hour	\$72
Total Operators Unit Cost	\$/Day	\$721
Pumps - \$70.49/day/each, Hoses, Slings and Supplies (assume 2 pumps)	\$/Day	\$141
One Track (Crawler) Loader, 1-3/4 CY to 2-1/4 CY, 130 HP	\$/Hour	\$87.22
One Track (Crawler) Loader, 1-3/4 CY to 2-1/4 CY, 130 HP	\$/Day	\$872.20
Total (Unit Cost):	\$/Day	\$3,895
Total (Unit Cost):	\$/Yd^3	\$7.19
Excavation of Potentially Contaminated Soils (Source: 2018 RS Means)		
Excavate material and load to haul vehicle. Haul vehicle cost is included in disposal cost.		
Front-End Loader 4WD, 3 CY With Operator (\$511.39/day-Loader, \$721.79/day-Operator)	\$/Hour	\$123
Front-End Loader 4WD, 3 CY with Operator (Average 3 Minutes/Load Average)	Yd^3/Hour	60
Front-End Loader 4WD, 3 CY with Operator	\$/Yd^3	\$2.06
Site Regrading/Restoration (Source: 2018 RS Means)		
Site regarding includes replacement of soils from on-site locations during decontamination efforts at all units. The quantities utilized coincide with the volume of soils designated for landfill disposal in the decontamination section.		
Borrow Soil Excavation (\$1.74/CY-5 CY Loader) and Haul (\$3.25/CY-12 cy truck, 15 mph, 15 min wait, 1.5 mi cycle)	\$/Yd^3	\$4.99
Site Regrading (\$0.60/SY rough open sites, assume 1 CY/SY)	\$/Yd^3	\$0.60
Total (Unit Cost):	\$/Yd^3	\$5.59

Table D.4: Cost Documentation (CDA)
Final Cover and Landfill Closure

FINAL COVER AND LANDFILL CLOSURE		
Landfill closure requires a closure application for plan approval prior to closure certification. This application must include pertinent modifications to the existing closure document and any other supporting technical information to meet the regulatory requirements. The cost estimate provided in this document is based on final closure costs from construction of Landfill Cell 5 closure cap (which included use of a GCL) in 2011. This cost information includes all consultants, staff and other pertinent costs that could be related to the typical closure of a hazardous waste landfill cell. This includes: Design, Engineering, Permitting, Miscellaneous, Administrative, Compaction of Mounded Waste, Waste Grading, GCL Compatible Bedding Material Procurement, Transportation, Placement and Grading, Geosynthetic Components (GCL, high Density Polyethylene Geomembrane, Drainage Net, Geotextile Filter Fabric), Compacted clay Cover (where required around the cell cap perimeter, compacted clay includes borrow, processing, stockpiling, haul, placement, grading and maintenance), GCL Compatible Soil Protective Cover Procurement, Transportation, Placement and Grading, Rock Armor Plate (stone mulch), Drainage Run-Off Control, Field Engineering, QA/QC, Testing, surveying, and Engineers Certification (See Tables D.10 and D.11 (CDA) for Closure Cost and Quantity Estimate Details).		
Cell 7		
Approximate North/South Dimension	Feet	830
Approximate East/West Dimension	Feet	830
Approximate Cap Surface Area	Sq. Ft.	688,900
Closure Cap Cost (from 2011 construction of Landfill Cell 5 adjusted to 2017 at an annual rate of 2.2%)	$	$3,090,102
TOTAL ESTIMATE IN 2017:	**$**	**$3,090,102**

Table D.5: Cost Documentation (CDA)
Groundwater Monitoring During Closure/Post-Closure

GROUNDWATER MONITORING DURING CLOSURE/POST-CLOSURE		
As defined in Module VII, groundwater monitoring will be performed annually during closure and post-closure. Four (4) will take place during closure and 60 during post-closure. The detection monitoring system for RCRA units at Grassy Mountain consists of 37 wells including background wells. Each well is sampled for complete Class 1 and Class 3 analyses. The QA/QC requires 10% duplicate analysis for each sampling event. In addition, there is normally one volatile constituent blank for each day of sampling and one field blank for each week of sampling. Each sampling event requires a three person crew at approximately 10 hours per day for nine days. Each monitoring event requires supporting documentation of the sample analysis and the event records to support such aspects as QA/QC at the site and laboratory as well as the numerous other aspects of the event. The records must also be developed into the necessary format for submittal to the regulatory personnel. Sample analytical costs are listed separate.		
Number of RCRA Background Wells (2018 Cameron-Cole)	Number	12
Number of RCRA Down-Gradient Wells (Includes 6 incustrial Cell Wells, 8 wells for RCRA/TSCA Cell B6, 4 wells for RCRA Cell 7, and 4 Wells for Proposed RCRA Cells 8-13) (2018 Cameron-Cole)	Number	52
Number of Total RCRA Wells (Camron-Cole)	Number	64
Sample Days Per Well	Days	0.24
Sample Days Per RCRA Event	Days	15
Samples Per Well Per Sample Event	Count	1
Duplicate Samples Per Sample Event	Count	6
Volatile Samples (Duplicates)	Count/Day	1
Field Blanks (One/Week)	Count	3
Background Wells	Count	12
Number of TSCA Background Wells (2018 Cameron-Cole)	Count	2
Number of TSCA Down-Gradient Wells (2018 Cameron-Cole)	Count	24
Total Number of TSCA Wells (2018 Cameron-Cole)	Count	26
Future Cell Downgradient Wells (Cells 8-13)	Count	12
Total Existing RCRA and TSCA Wells	Count	90
Number of RFI Wells (2018 Cameron-Cole)	Count	17
Per well costs for groundwater sampling are based on the fact that monitoring wells are monitored annually (2018 Clean Harbors)	$/Well/Year	$2,750
Per well/sample laboratory analytical costs (2018 AWAL Laboratory Cost per sample)	$/Well/Year	$1,384
The groundwater sampling effort for all RCRA wells.	$/Year	$176,000
The groundwater sampling effort for all TSCA wells.	$/Year	$71,500
The groundwater analytical cost for all RCRA wells.	$/Year	$88,576
The groundwater analytical cost for all TSCA wells.	$/Year	$35,984
Per well costs for maintenance (2018 Clean Harbors)	$/Year	$20.82
Well maintenance for all RCRA wells.	$/Year	$1,332
Well maintenance for all TSCA wells.	$/Year	$177.66

Table D.6: Cost Documentation (CDA)
Ancillary Closure Activities

ANCILLARY CLOSURE ACTIVITIES		
Leachate Management		
Leachate management involves the removal, storage and assumed off-site transport to the Clean Harbors Aragonite facility for all leachate expected to be generated during the closure period. The current operation pumps the leachate from all cells to a portable tank unit that is transferred to the leachate storage tanks until transport off-site. For cells closed as of December 2017, the leachate volume for the closure time period of the other cells is assumed to be the same as the average daily leachate volume produced in 2016 since significant amounts of water were applied to Cells Z and B during 2017 generating artificially high leachate rates for that year.		
Leachate generation volume is derived from historical experience (January 2016 through December 2016). These rates are presented below. This assumption is conservative since closed landfill cell leachate generation rates will decrease over time after closure. The assumed volumes are applied against the expected 24-month closure period to obtain the estimated annual volume (RCRA cells and IWC's are all handled as RCRA).	Days/Year	365
IWC 1	Gal in 2016	2426
	Avg. Gal./Day	6.65
IWC 2	Gal in 2016	0
	Avg. Gal./Day	0.00
RCRA Cell 1	Gal in 2016	0
	Avg. Gal./Day	0.00
RCRA Cell 2	Gal in 2016	0
	Avg. Gal./Day	0.00
RCRA Cell 3	Gal in 2016	0
	Avg. Gal./Day	0.00
RCRA Cell 4	Gal in 2016	13140
	Avg. Gal./Day	36.00
RCRA Cell 5	Gal in 2016	8830
	Avg. Gal./Day	24.19
RCRA/TSCA Cell B6	Gal in 2016	129500
	Avg. Gal./Day	354.79
RCRA Cell 7	Gal in 2016	79875
	Avg. Gal./Day	218.84
Proposed RCRA Cell 8 (assumed same as RCRA Cell 7)	Estimated	79875.00
	Avg. Gal./Day	218.84
TSCA Cell X	Gal in 2016	1521
	Avg. Gal./Day	4.17
TSCA Cell Y	Gal in 2016	9737
	Avg. Gal./Day	26.68
TSCA Cell Z	Gal in 2016	175890
	Avg. Gal./Day	481.89
Total average RCRA leachate collected per day	Gal./Day	67
Total average RCRA leachate collected per week	Gal./Week	468
Total average TSCA and RCRA/TSCA leachate collected per day	Gal./Day	1,305
Total average TSCA and RCRA/TSCA leachate collected per week	Gal./Week	9,136
Leachate Collection and Storage Costs - Truck, Tank, and Driver (2018 RS Means)	$/Day	$832
Hours Operated Per Day	Hours/Day	10
Days Per Week Collection from Cells	Days/Week	4
Total	$/Week	$3,329
Unit Cost of Leachate Collection from RCRA Cells	$/Gal.	$7.12
Unit Cost of Leachate Collection from TSCA and RCRA/TSCA Cells	$/Gal.	$0.36

Run-On/Run-Off Control Maintenance (Source: 2018 RS Means)		
Run-On/Run-Off control maintenance involves the routine maintenance of the erosion and degradation of the landfill or other required cover structures, run-off trenches and piping and any collection basins at the facility. It has been estimated (worst case) that within the overall 24-month closure schedule, approximately one full crew day per month would be utilized for routine maintenance. The maintenance crew is comprised of the following (8 hours per day):		
1 Laborer	$/Hour	$54.02
2 Operators ($72.98/hour each)	$/Hour	$145.96
1 Articulating 4WD Loader ($574.6/day, 3-4-1/2 CY bucket)	$/Hour	$63.93
1 Excavator Backhoe ($742.20/day, 1CY bucket)	$/Hour	$82.57
Hourly Cost of Maintenance Crew and Equipment	$/Hour	$346.48
Unit Cost of Maintenance Crew (8 Hour Day)	$/Day	$2,772
Frequency of Maintenance	Days/Month	1
Security and Inspection		
Security and site inspection is expected to be maintained as currently required during the active site closure (i.e. decontamination, cover placement, etc.) of the facility. This would require 24-hour security at the main gate. It is expected that this will be necessary during the first 12 months of closure. Since the remainder of the closure effort (placement of landfill final cover) will take place after all probability exposure to hazardous constituents has been removed no continuation of security at this level is expected. The cost of security personnel including all payroll and overhead requirements have been computed as follows:		
Security Coverage	Hours/Day	24
Security Coverage	Days	365
Fraction associated with RCRA Cells (8 RCRA out of 12 Cells)	Fraction	0.67
Unit Cost of Personnel (Assume RS Means Laborer Rate)	$/Hour	$54.02
Mobilization/Demobilization of Heavy Equipment		
It is expected that the heavy equipment to be utilized in the closure process will already be on site for other closure activities, therefore no mobilization or demobilization costs have been added for container management facility closure. The heavy equipment expected to be utilized in the general process is listed below (for estimating purposes it has been assumed that all equipment must be hired). Some equipment may not be listed herein since its function will be mobilization over public highway, and thus mobilization is part of its function and has been included in the cost estimate. Current mobilization cost for tractor/flatbed or transport trailer (50 ton capacity) from Salt Lake City to the site (120 miles one-way) is $855 for the first 25 miles and an add of 10% for each additional 5 miles (or the remaining 95 miles). One way cost is, therefore, $855 plus 19 increments of 10% each or a multiplier of 2.9 (1+1.9) for a cost of $2,595.50. Round trip is 2 x $2,595.50 = $5,191.		
Unit Charges	$/Round Trip	$4,956
Number of Trips	Count	6
	Closure Cost	$29,733
Site Regrading (Source: 2018 RS Means)		
Includes replacement soils from on-site locations.		
Borrow Soil Excavation ($1.74/CY-5 CY Loader) and Haul ($3.25/CY-12 cy truck, 15 mph, 15 min wait, 1.5 mi cycle)	$/Yd^3	$4.98
Site Regrading ($0.60/SY rough open sites, assume 1 CY/SY)	$/Yd^3	$0.60
Unit Cost	$/Yd^3	$5.58
Replacement Volumes (Soils removed from around containment areas).	Yd^3	200
Replacement Volume Surface Impoundment	Yd^3	1,556

Sump Testing (Hydrostatic)		
Since most of the labor, equipment and materials will be available for the sump testing, a lump sum estimate ($/test) has been established. The engineering technician costs associated with the testing have been included in the closure certification costs. A total of 44 sumps (24 in Cell B6 resulting from 8 sump areas and 3 sumps per area, 12 in Cell 7 resulting from 4 sump arewas and 3 sumps per area, and 8 in proposed Cell 8 resulting from 4 sump areas and 2 sumps per area) are attributed to the areas being closed as part of this site-wide closure.		
Number of Sumps	Count	44
Unit Cost (2017 NACE Salary Survey for hourly cost of engineer staff Inspection)	$/Test	$225.90
Equipment Decontamination (General)		
Decontamination of equipment used in closure and HWMU decontamination activities will be performed at a truck wash area of the facility. For estimating purposes, each piece of equipment (or group of small tools/equipment) is considered a "unit". Each unit is estimated to have a constant surface area. The estimates for water generated to decontaminate containment areas is used to calculate the cost of decontamination.		
Areas Per Unit Decontaminated	Sq. Ft.	500
Usage Per Area (Initial and Final Rinse)	Gal./Sq. Ft.	2.6
Quantity of Water Per Unit	Gal./Unit	1,300
Unit Cost (Clean Harbors Estimated Cost)	$/Sq. Ft.	$0.35
Cost Per Unit of General Decontamination (2015 Clean Harbors)	$/Unit	$175
The following list provides typical units assumed to require decontamination at completion of closure operations. The decontamination residuals generated will be treated and disposed in accordance with other sections of this document.		
Tank Trucks	Count	2
Haul Trucks (20 Yards)	Count	8
Roll-Off Boxes	Count	24
Vacuum Trucks	Count	1
Front-End Loader	Count	1
Bulldozers	Count	2
Backhoes	Count	1
Unit of 4 Pumps and 200 feet of Hoses	Count	1
Lift Trucks	Count	1
Compactors	Count	1
Total Number of Units	Count	42
Truck Wash Station Decontamination		
At completion of facility decontamination and equipment/general decontamination, the truck wash unit will be decontaminated. This area is not a formally permitted unit but is ancillary to permitted units and a requirement of normal housekeeping practices by Grassy Mountain. The decontamination residuals generated will be treated and disposed of in accordance with other sections of this document. The unit may remain "in-service" after decontamination. The area to be decontaminated is about 5,500 square feet (55 x 100 feet). It is assumed that the contiguous soils and gravel ramps into and out of the units (20 x 40 feet x 4 ramps) will be removed to a depth of two feet and disposed on-site. This volume is calculated to be approximately 237 cubic yards of solids for landfill disposal.		
Number of Truck Wash Stations	Count	4
Area to be Decontaminated (55 x 100 feet)	Sq. Ft.	5500
Soils Excavation From Ramps (20 x 40 feet x 4 ramps)	Sq. Ft.	3200
Depth of Soil Excavation	Feet	2
Volume of Excavated Soil	Yd^3	237

Table D.7: Cost Documentation (CDA) Closure Certification

CLOSURE CERTIFICATION		
Decontamination verification will be performed to support the closure certification. For Closure Cost Estimate purposes, it has been assumed that sampling and analysis of grab samples from rinse waters from final decontamination efforts will be used to confirm decontamination even though other methods may be used.		
Sampling to Confirm Decontamination		
The number of rinse water samples is based on the number of tanks and the number of containment areas. The number of soil samples is based on random, 50 foot interval, grab sample basis. A breakout of samples is shown below. Note, it is assumed that the entire one-half acre beneath surface impoundment A and the entire three acre beneath surface impoundment B containment area will be sampled after removal utilizing a 50 foot grid spacing. In addition, 10 random samples are assumed to be taken of the "clean" water prior to using it for the decontamination process to establish		
Container Management Facility Samples	Water	6
Container Management Facility Samples	Soil	20
Container Management Facility PCB Samples	Water	10
Container Management Facility PCB Samples	Soil	55
Stabilization Tank System Samples	Soil	18
Stabilization Tank System Samples	Water	6
Stabilization Tank System PCB Samples	Soil	20
Stabilization Tank System PCB Samples	Water	5
Leachate Treatment Tank System Samples	Soil	4
Leachate Treatment Tank System Samples	Water	2
Surface Impoundment Unit A Samples	Soil	25
Surface Impoundment Unit A Samples	Water	1
Surface Impoundment Unit B Samples	Soil	56
Surface Impoundment Unit B Samples	Water	1
Background Samples	Water	10
Estimated Total Soil and Water Samples:		**239**
Rinse Water Analysis to Confirm Decontamination and Soil Analysis (Source: AWAL, 2018 and 2018 RS Means). For estimating purposes all liquid samples will be analyzed for appropriate 40 CFR Part 261 Appendix IX – Hazardous Constituents. For estimating purposes, all soil/solids samples will be analyzed in the same manner as the liquid samples with the additional Method 1311 TCLP analysis for appropriate parameters contained in 40 CFR Part 261, Appendix IX. Sampling costs are not presented as separate costs since it is expected that certification personnel will be providing this service as part of the certification documentation.		
Unit Labor Cost (Liquid Sample for PCB)	$/Sample	$48.60
Unit Analytical Cost (Liquid Sample for PCB)	$/Sample	$75
Unit Total Cost (Liquid Sample for PCB)	$/Sample	$123.60
Unit Labor Cost (Soil/Wipe Sample for PCB)	$/Sample	$48.60
Unit Analytical Cost (Soil/Wipe for PCB)	$/Sample	$75.00
Unit Total Cost (Soil/Wipe Sample for PCB)	$/Sample	$123.60
Unit Labor Cost (Liquid Sample)	$/Sample	$84.35
Unit Analytical Cost (Liquid Sample)	$/Sample	$1,384.00
Unit Total Cost (Liquid Sample)	$/Sample	$1,468.35
Unit Labor Cost (Soil/Solid Sample)	$/Sample	$84.35
Unit Analytical Cost (Soil/Solid Sample)	$/Sample	$1,451.00
Unit Total Cost (Soil/Solid Sample)	$/Sample	$1,535.35

Table D.7-(CDA) Clos Cert

Certification Documents by Independent Professional Engineer		
Inspection is not required during inventory processing and is not necessarily continuous during decontamination efforts. However, to be conservative, continuous inspection time by the engineering certification staff for the closure decontamination effort is estimated to be 12 hours per shift (day), considering site location and tasks (60 hours per week). The estimated duration of decontamination efforts is 75 shifts, or a maximum of 75 days, at 1 shift per day. This is 15 weeks broken down into 5 weeks for Container Management Facility and 10 weeks for the balance of the site wide closure activities. For a project of this magnitude, it would be unreasonable to expect that efficiencies would not be built into the project planning; therefore it is assumed that “concurrent” closure of the Container Management Facility would occur while the site wide closure takes place. However, the closure certification for the CMF is costed separately as if it were to occur independent of the site wide closure. Supervision of closure inspections by the certifying Professional Engineer (PE) is estimated to be approximately 10 hours per week (10 x 10 = 100 hours). Initial permit review and final report preparation is also estimated at 10 hours per week additional, for a total PE estimate of 200 hours. Other engineering staff (ES) task contributions are expected to be 50% of the effort spent on site inspection tasks. Thus 50% of 600 hours and 200 hours equals 400 hours. Clerical staff (CS) assistance per week of inspection time is estimated to be approximately 15 hours per week (15 x 10 = 150 hours). Note – task estimates have been provided based on experience and project comparisons with other closure activities. The certification and QA/QC inspection for landfill closure has been included in the cost of the final cover of each open cell, therefore no costs attributable to this activity have been included.		
Professional Engineer (PE) Billing Rate (2017 ASCE Salary Survey)	$/Hour	$140.19
Engineer Support (ES) Billing Rate (2017 ASCE Salary Survey)	$/Hour	$120.72
Engineer Staff Inspection (ESI) Billing Rate (2017 NACE Salary Survey)	$/Hour	$85.80
Clerical Staff (CS) Billing Rate (payscale.com/research/US/Job=Legal_Clerical_Assistant_Hourly_Rate)	$/Hour	$37.38
Number of Weeks	Weeks	10
Shifts Per Week	Shifts/Week	5
On-Site Engineering Staff Inspection Time (Site Closure - CMF concurrent with site wide closure)	No. Shifts	50
	Hours/Shift	12
	Hours	600
On-Site Engineering Staff Inspection Time (CMB Closure)	No. Shifts	25
	Hours/Shift	12
	Hours	300
Professional Engineer (PE) Supervision of Closure Inspections	Hours/Week	10
Professional Engineer (PE) Permit Review and Final Report Preparation	Hours/Week	10
Professional Engineer (PE)	Hours	200
Engineering Staff (ES) Support Functions	Fraction of Site Inspections	0.50
Engineering Staff (ES) Support Functions	Hours	500
Clerical Staff (CS)	Hours/Week	15
Clerical Staff (CS)	Hours	150
It is expected that the inventory management and facility decontamination will take approximately 133 crew days. The estimates included herein have been based on decontamination efforts only as it is not necessary to witness inventory management as those activities are the current ones performed under the permit. The estimate can be affected substantially downward by an increase in number of crews to shorten the calendar time required for closure and thus time required for closure certification inspectors to be on-site.	Crew Days	133

Table D.7-(CDA) Clos Cert

Site Wide Certification Summary		
Engineering Staff Inspection (ESI)	$	$77,219
Professional Engineer (PE-Certifying)	$	$28,038
Engineering Support (ES)	$	$60,361
Clerical Support (CS)	$	$5,606
Subtotal	$	$171,224
Miscellaneous Expenditures (Fraction of Total)	Fraction	0.15
Miscellaneous Expenditures	$	$25,684
Total Estimate	$	$196,908
CMF Cost Summary		
Note – Container Management Facility Cost, if separate, is half of this estimate based on a 5 week duration. (Fraction of Site Wide)	Fraction	0.50
Total Estimate CMB	$	$98,454
Landfill Capacity Assurance Sufficient landfill capacity must be remaining to maintain commitments for landfilling inventory and residuals destined for on-site disposal. This quantity is tabulated (based on calculations shown in the Worksheets) in the body of the Closure Plan within Table A-2.		

Table D.8: Cost Documentation (CDA)
Post-Closure Cost Considerations

POST-CLOSURE COST CONSIDERATIONS		
Leachate Management System Maintenance Leachate system maintenance primarily involves transportation and the replacement and reconditioning of the leachate collection and detection system evacuation pumps and miscellaneous related items. The replacement/reconditioning of half the pumps is estimated to be necessary every three years.		
Total number of RCRA leachate pumps including Industrial Waste Cells (IWC 1 {2}, IWC 2 [4], Cell 1 [1], Cell 2 [9], Cell 3 [18], Cell 4 [24], Cell 5 [12])	Count	70
Estimated RCRA Pumps Replaced Per Year	Count	12
Total number of leachate pumps in TSCA Cell X [8], Cell Y [8], & Cell Z [12], and RCRA/TSCA Cells B/6 [24], Cell 7 (12), & proposed Cell 8 (8))	Count	72
Estimated TSCA and RCRA/TSCA Pumps Replaced Per Year	Count	12
2 Laborers for 3 Hours at $54.02/hour (2018 RS Means)	$	$324
Pump Replacement Costs (2018 Quote by EPG Pumps)	$	$2,997
Single Pump Replacement Cost	$	$3,321
Estimated Annual Cost of RCRA Leachate Pump Replacements:	**$/Year**	**$38,747**
Estimated Annual Cost of TSCA and RCRA/TSCA Leachate Pump Replacements:	**$/Year**	**$39,854**
Leachate Pumping and Disposal Costs For the cells already closed during preparation of this plan, assume the leachate volumes collected will continue to decrease at a constant rate. It is assumed that the two year closure period and the first two years of post closure will produce volumes of leachate equal to those recorded from open cells in 2016 since the waste mound in those cells is above top of embankment level and significant amounts of water were added to Cells B and Z during 2017 for dust suppression that significantly increased leachate rates during 2017. The third year of post closure throught the post closure period will decrease at the rate assumed. RCRA Cells 4 and 5 were closed in 2010, therefore, they have been closed for 5 years beyond the 2 year post closure period and are assumed to reduce in leachate volume at the assumed constant rate. Assume Cell 7 will close in 5 years, therefore, 7 years at the current rate.		
Leachate reduction rate (Years 3-10) (% Reduction Per Year)	%	12%
2017 RCRA Cell Leachate Volumes (2018 Grassy Mountain) (TSCA and RCRA/TSCA Leachate Volumes are provided in Table C.27)		
IWC1	Gal./Day	6.6
IWC2	Gal./Day	0.0
RCRA Cell 1	Gal./Day	0.0
RCRA Cell 2	Gal./Day	0.0
RCRA Cell 3	Gal./Day	0.0
RCRA Cell 4	Gal./Day	36.0
RCRA Cell 5	Gal./Day	24.2
Total Leachate Collected / Day	Gal./Day	66.8
Total Leachate Collected / Year	Gal./Year	24,396

Table D.8 (CDA) Post-Clos Csts

Estimated Total Annual Leachate Rates During Closure and Post Closure (TSCA and RCRA/TSCA Leachate Rates for Closure and Post Closure are provided in Table C.27)		
Year 1 Closure	Gal./Year	21468
Year 2 Closure	Gal./Year	18892
Year 3 Post-Closure	Gal./Year	16625
Year 4 Post-Closure	Gal./Year	14630
Year 5 Post-Closure	Gal./Year	12875
Year 6 Post-Closure	Gal./Year	11330
Year 7 Post-Closure	Gal./Year	9970
Year 8 Post-Closure	Gal./Year	8774
Year 9 Post-Closure	Gal./Year	7721
Year 10 Post-Closure	Gal./Year	6794
Year 11 Post-Closure	Gal./Year	5979
Year 12 Post-Closure	Gal./Year	5262
Year 13 Post-Closure	Gal./Year	4630
Year 14 Post-Closure	Gal./Year	4075
Year 15 Post-Closure	Gal./Year	3586
Year 16 Post-Closure	Gal./Year	3155
Year 17 Post-Closure	Gal./Year	2777
Year 18 Post-Closure	Gal./Year	2443
Year 19 Post-Closure	Gal./Year	2150
Year 20 Post-Closure	Gal./Year	1892
Year 21 Post-Closure	Gal./Year	1665
Year 22 Post-Closure	Gal./Year	1465
Year 23 Post-Closure	Gal./Year	1289
Year 24 Post-Closure	Gal./Year	1135
Year 25 Post-Closure	Gal./Year	999
Year 26 Post-Closure	Gal./Year	879
Year 28 Post-Closure	Gal./Year	773
Year 28 Post-Closure	Gal./Year	681
Year 29 Post-Closure	Gal./Year	599
Year 30 Post-Closure	Gal./Year	527

Table D.8 (CDA) Post-Clos Csts

Estimated Total Annual Leachate Costs during Closure and Post-Closure (TSCA and RCRA/TSCA Leachate Costs for Closure and Post Closure are provided in Table C.27)		
Estimated Leachate Collection and Disposal Cost (2018 Clean Harbors)	$/Gal	$1.20
Estimated Leachate Transportation and Treatment (Incineration) Cost at Aragonite Facility (2018 Clean Harbors for 55 gallon drums)	$/Gal	$1.86
Year 1 Closure	$	$25,762.18
Year 2 Closure	$	$22,670.71
Total Leachate Management Cost During Closure:	$	**$48,432.89**
Average Annual Leachate Management During Closure:	**$/Year**	**$24,216.45**
Year 3 Post-Closure	$	$19,950.23
Year 4 Post-Closure	$	$17,556.20
Year 5 Post-Closure	$	$15,449.46
Year 6 Post-Closure	$	$13,595.52
Year 7 Post-Closure	$	$11,964.06
Year 8 Post-Closure	$	$10,528.37
Year 9 Post-Closure	$	$9,264.97
Year 10 Post-Closure	$	$8,153.17
Year 11 Post-Closure	$	$7,174.79
Year 12 Post-Closure	$	$6,313.82
Year 13 Post-Closure	$	$5,556.16
Year 14 Post-Closure	$	$4,889.42
Year 15 Post-Closure	$	$4,302.69
Year 16 Post-Closure	$	$3,786.37
Year 17 Post-Closure	$	$3,332.00
Year 18 Post-Closure	$	$2,932.16
Year 19 Post-Closure	$	$2,580.30
Year 20 Post-Closure	$	$2,270.67
Year 21 Post-Closure	$	$1,998.19
Year 22 Post-Closure	$	$1,758.40
Year 23 Post-Closure	$	$1,547.40
Year 24 Post-Closure	$	$1,361.71
Year 25 Post-Closure	$	$1,198.30
Year 26 Post-Closure	$	$1,054.51
Year 28 Post-Closure	$	$927.97
Year 28 Post-Closure	$	$816.61
Year 29 Post-Closure	$	$718.62
Year 30 Post-Closure	$	$632.38
Total Post-Closure Leachate Management Cost:	**$**	**$161,614**
Average Annual Post-Closure Leachate Management Cost:	**$/Year**	**$5,772**

Table D.8 (CDA) Post-Clos Csts

CAP (Final Cover Run-Off Control) Maintenance		
Cap maintenance involves the routine maintenance of the erosion and degradation of the landfill covers or other required cover structures, run-off trenches and/or piping and any collection basins at the facility. The number of crew days required annually for routine maintenance is base on the overall post-closure schedule.		
Crew Days Per Year	Days/Year	8
Hourly Cost of Maintenance Crew (2018 RS Means, $54.02 laborer, $72.98 equipment operator, $63.93 loader)	$/Crew	$191
Length of Day	Hours	10
Daily cost of Maintenance Crew	$/Crew Day	$1,909
Estimated Annual Cost for Cap Maintenance:	**$/Year**	**$15,275**
Routine Inspections		
Security and site inspection is expected to be performed as a function of facility maintenance. This would require one 10-hour workday once per month during the post-closure period. It is expected that this effort will coincide with the annual administrative/certification report of compliance with the post-closure requirements. Any reporting effort will be coordinated with the appropriate authorized party during the post-closure period.		
Inspection Time	Hrs./Month	10
Unit Cost of Personnel (use 2018 RS Means labor rate)	$/Hour	$54
Estimate of Annual Cost of Routine Inspections:	**$/Year**	**$6,483**

Table D.9: Cost Documentation (CDA)
Annual Post-Closure Certification and Administration

ANNUAL POST-CLOSURE CERTIFICATION AND ADMINISTRATION		
Annual Certification/Administration Report		
During the post-closure period an annual report will be prepared by the Permittee or designated third-party which documents all of the activities for each hazardous waste management unit (HWMU) at the facility during each one year period. These documents will include copies of all other reporting requirements delineated herein including site inspections, leachate generation, manifest documents for leachate management, groundwater monitoring results, etc. These documents will be maintained at a designated repository for use by the certifying authority at the end of the 30-year post-closure period for each HWMU. For estimating purposes, this report is assumed to be prepared by the Independent Professional Engineer documenting the post-closure activities. The following information is the estimate for effort in complying with this requirement.		
Annual Independent Professional Review		
The post-closure activities inspection time Engineering Staff (S) is estimated to be 180 hours per year considering site location and task delineated herein above. Inspection/management time annually by a Professional Engineer (PE) is estimated to be approximately 20 hours. Other technical staff (ES) support task contributions are expected to be 50% of the effort spent on site inspection tasks.		
Engineer Staff Inspection, ESI (2017 NACE Salary Survey)	$/Hour	$85.80
ESI Post-Closure Inspection Time	Hours	180
Engineering Support, ES	$/Hour	$120.72
ES Support Functions (2017 ASCE Salary Survey)	Hours	90
Total ES Costs:	**$/Year**	**$26,309**
Professional Engineer, PE (2017 ASCE Salary Survey)	$/Hour	$140.19
PE	Hours	20
Total PE Costs:	**$/Year**	**$2,804**
Subtotal	**$/Year**	**$29,113**
Miscellaneous Expenditures (Fraction of Subtotal)	Fraction	0.15
Miscellaneous Expenditures	$/Year	$4,367
TOTAL FINAL POST-CLOSURE CERTIFICATION:	**$/Year**	**$33,479**
Certification Documents by Independent Professional Engineer (Source: ERM, 2001)		
The final certification for each HWMU to meet the requirements of Utah Admin. Code R315-8-7 will be compiled utilizing the annual documents outlined herein before. It is expected that this review will require approximately 30 hours by professional staff for each unit as the 30-year period is completed. In addition to this will be the required administration and documentation to accompany the certification, which is estimated to cost approximately 40% of the professional staff fees. There are currently 8 units, which will be subject to post-closure certification. This is a one-time cost.		
HWMU Post-Closure Certification		
Professional Engineer	Hours/Unit	30
Professional Engineer	$/Hour	$140
Total PE	$/Unit	$4,206
Miscellaneous Expenditures (Fraction of Subtotal)	Fraction	0.4
Miscellaneous Expenditures	$/Unit	$1,682
Total unit Cost of Post-Closure Certification	$/Unit	$5,888
Number of Post-Closure units	Count	7
Estimated Total Cost of HWMU Post-Closure Certification	**$**	**$41,217**
Administrative and Contingency Fraction	**Fraction**	**0.10**
Contingency for Potential RFI's / Corrective Action Fraction	**Fraction**	**0.10**
Length of Post-Closure	**Years**	**30**

Table D.10: Cost Documentation (CDA)
Landfill Cell Closure Quantity Estimates
(Factors Determined Using the Surface Area and Perimeter Lengths of Each Cell)

			Cell B/6	Cell 7		Cell 8			
Perimeter (feet)			**3799**	**3,320**		**3141**			
Area (sq. ft.)			**744917**	**688,900**		**623953**			
Item Description	**Qty. Factor**	**Apply Factor To:**			**Average Factor**		**Average Factor**	**Comb. Avg. Factor**	**Use Factor**
Earthwork									
Imported Sand Material (Yd^3)	0.0220	Area	16436	15,200	0.02167	8132	0.01303	0.0207	0.0220
Clay Liner Placement (Yd^3)	4.0000	Perimeter	15218.9	13,300	3.60158	20950	6.66973	4.3685	4.0000
Clay Liner Finishing (Yd^2)	3.0000	Perimeter	1144.28	1,000	1.62445	24691	7.86102	3.6824	3.0000
Clay Soil Material (Yd^3)	4.0000	Perimeter	5721.39	5,000	1.39149	27695	8.81729	3.2260	4.0000
Anchor Trench (Linear Feet)	2.0000	Perimeter	3776.11	3,300	0.99807	8514	2.71058	1.4273	2.0000
Imported Soil Cover (Yd^3)	0.0720	Area	53633.2	49,600	0.07193	35043	0.05616	0.0681	0.0720
Gravel Armor Plating (Yd^3)	0.0139	Area	10380.6	9,600	0.0139	8169	0.01309	0.0137	0.0139
Road Base (Yd^3)	0.0800	Perimeter	194.527	170	0.04972	724	0.23037	0.0960	0.0800
Miscellaneous									
Drainage Pipe – 18# Dia. Linear Foot	0.3500	Perimeter	1740	1,160	0.39697	1200	0.38101	0.3367	0.3500
Inlet Boxes (Each)	0.0017	Perimeter	6	6	0.00169	4	0.00127	0.0016	0.0017
Manholes (Each)	0.0012	Perimeter	4	4	0.00125	3	0.00095	0.0010	0.0012
Outlet Structures (Each)	0.0003	Perimeter	4	1	0.00044	1.7	0.00054	0.0005	0.0003
Geosynthetics									
60-mil HDPE Liner (Sq. Ft.)	0.9750	Area	726318	671,700	0.97484	520547	0.83427	0.9400	0.9750
60-mil HDPE Textured Liner (Sq. Ft.)	25.0000	Perimeter	75980	66,400	18.8034	255557	81.3616	33.8630	25.0000
Drainage Net (Sq. Ft.)	0.9750	Area	726318	671,700	0.97484	555363	0.89007	0.9540	0.9750
Geotextile Fabric (Sq. Ft.)	1.0000	Area	726318	671,700	0.97484	1110725	1.78014	1.1765	1.0000
Geosynthetic Clay Liner (Sq. Ft.)	0.9240	Area	688256	636,500	0.92263	533135	0.85445	0.9101	0.9240
8-mil Poly Membrane (Sq. Ft.)	6.0000	Perimeter	18995	16,600	4.97353	34181	10.8822	6.4351	6.0000

Table D.11: Cost Documentation (CDA)
Landfill Cell Closure Costs

CDA - Landfill Closure	Unit Cost	Unit	TSCA/RCRA Cell B/6 (Closure)		TSCA/RCRA Cell 7 (Closure)		TSCA/RCRA Cell 8 (Closure)	
			Qty[1]	Total Cost	Qty[1]	Total Cost	Qty[1]	Total Cost
Mobilize/Demobilize	$229,605	EA	1	$229,605	1	$229,605	1	$229,605
Subgrade Preparation	$1	SY						
Embankment	$6	CY						
Clay Liner-New Cell	$14	CY						
Clay Liner-Closure	$20	CY	15,219	$297,018	13,300	$259,568	20,950	$408,861
Clay Soils Placement (Cost includes finishing.)	$13	CY	5,721	$72,251	5,000	$63,141	27,695	$349,741
60 mil HDPE (Cost includes 8 mil liner.)	$4	SY	91,255	$333,145	89,392	$326,344	90,032	$328,680
GCL	$5	SY	76,473	$358,194	77,087	$361,070	59,237	$277,463
Geotextile	$2	SY	80,702	$133,413	81,350	$134,484	123,414	$204,022
Geonet	$2	SY	80,702	$179,737	81,350	$181,180	61,707	$137,432
Perimeter HDPE Weld	$3	LF	3,332	$8,607	3,320	$8,576	2,755	$7,117
Excavate Anchor Trench	$8	LF	10,297	$82,752	3,320	$26,680	8,514	$68,419
Leachate Collection	$57,401	EA	1.25	$71,751	1	$57,401	1	$57,401
Imported Sand	$16	CY	16,436	$264,164	15,200	$244,299	8,132	$130,698
Protective Soil Cover	$7	CY	53,633	$369,432	49,600	$341,652	35,043	$241,380
Drainage (Covers Misc. from Quantity Estimates)	$86,102	LS	1.25	$107,627	1	$86,102	1	$86,102
Road Base Placement	$9	CY	195	$1,675	170	$1,464	724	$6,230
Gravel Armor	$10	CY	10,381	$101,296	9,600	$93,679	8,169	$79,719
Subtotal				**$2,610,667**		**$2,415,245**		**$2,612,870**
Design, QC, QA, PM, Survey	22%		22%	$574,347	22%	$531,353.90	22%	$574,831
Final Waste Grading	$86,102	EA	1.25	$107,627	1	$86,102	1	$86,102
Security	$57,401	LS	1	$57,401	1	$57,401	1	$57,401
TOTAL				**$3,350,042**		**$3,090,102**		**$3,331,204**

1 See Table D.10: CDA Cell Closure Quantity Estimates.

2 Unit costs are adjusted to 2017 dollars based on the total construction cost for Landfill Cell 5 in 2011.