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

EXISTING UNITS	MONITORING WELLS
RCRA/Utah HWMR Units (Landfill Cells 1, 2, 3, 4, 5, 7 & IWC-1 and IWC-2) (Table C.9)	64 (Includes 12 background wells)
TSCA Regulated Units (Cells X, Cell Y, Cell Z, B/6) (Table C.9)	26
RCRA/TSCA Cell B/6 Utah Regulated Unit	8
Surface Impoundment A (Table C.9)	3
PROPOSED UNITS	
TSCA/RCRA Cells 8, 9, 10, 11, 12, 13 Utah Regulated Units (Table C.9)	4 (existing)
	8 (proposed)
Surface Impoundment B (Table C.9)	3

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: 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)	

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**

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. (i.e. Each 10,000 gallon tank weighs 15,000 lbs. when empty.)	=	1.5	lbs/Gal
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: (95,385 lbs. x 0.000075 Yard^3/lb. of Carbon Steel)		**7.5**	**Yards**
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: (9,000 lbs. x 0.000075 $yards^3$/lbs.)		**1**	**Yards**
	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: (747,000 lbs. Concrete x $Yards^3$/3,375 lbs.)		**222**	**Yards**
	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					

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 equpiment portion of the decontamination wash.	$/Sq. Ft.	$1.65

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

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

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**

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.