APPENDIX J

Detailed Cost Estimate

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Feasibility Study for Load Line 7
Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio
Summary of Alternatives

Load Line 7 Area Alternatives		Duration	Non Discounted Cost		
			Soil		
			Capital Cost	O&M Cost	Total
1	No Action	0	$0	$0	$0
2	Land Use Controls	30 yrs	$10,293	$90,418	$100,711
3	Excavation and Off-site Disposal – Attain Unrestricted (Residential) Land Use	<1 yr	$163,794	$0	$163,794
4	Ex Situ Thermal Treatment – Attain Unrestricted (Residential) Land Use	<1 yr	$145,188	$0	$145,188

Notes:

1. Costs were estimated for comparison purposes only and are believed to be accurate within a range of -30% to +50%. Use of these costs for other purposes, including but not limited to, budgetary or construction cost estimating is not appropriate.

Feasibility Study for Load Line 7
Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio
Summary of AOC Areas and Volumes

	Alternatives	ISM Sample Locations	Treatment Interval (ft bgs)	Surface Area (sq ft)	*In situ*	*In situ with Constructability* [a]	*Ex situ* [a,b]	Total Volume (cy)
					Soil (cy)	Soil (cy)	Soil (cy)	
1	No Action				Not Applicable			
2	Land Use Controls	LL7ss-097M and LL7ss-098M		5,130	Not Applicable			
3	Excavation and Off-site Disposal – Attain Unrestricted (Residential) Land Use	LL7ss-097M and LL7ss-098M	0-1	5,130	190	230	290	290
3	Ex Situ Thermal Treatment – Attain Unrestricted (Residential) Land Use	LL7ss-097M and LL7ss-098M	0-1	5,130	190	230	290	290

[a] Includes 25% constructability factor
[b] Includes 20% swell factor

Feasibility Study for Load Line 7
Alternative 2 - Land Use Controls
Key Parameters and Assumptions

Key Parameters and Assumptions:

Item	Unit	Value	Notes
Capital Cost			
Land Use Controls			
Land Use Control Remedial Design (LUCRD)	hrs $/hr	20 120	Assume 20 hours to develop LUCRD for insertion into Property Management Plan.
Site Work			
Civil Survey	day	1.0	Survey AOC for land use controls. RSMeans 017123131100.
Civil Survey	$/day	1,025	
As Built Drawings	hours	8	Develop record drawings.
As Built Drawings	$/hr	70	
O&M Cost (Years 0 to 30)			
CERCLA Reviews			
CERCLA 5-Year Reviews	events	6	Assume 5 year reviews for 30 years.
CERCLA 5-Year Reviews	$/event	9,200	Assume 80 hours/review @ $90/hr. Add $2,000 for travel and miscellaneous expenses.

Feasibility Study for Load Line 7
Alternative 2 - Land Use Controls
Cost Estimate

CAPITAL COST **$10,293**

Activity (unit)	Quantity	Unit Cost	Total
Land Use Controls			
Base Master Planning Documents (hr)	20	$120.00	$2,400
Site Work			
Civil Survey (day)	1.0	$1,025.00	$1,025
As Built Drawings (hr)	8	$70.00	$560
Subtotal			$3,985
Design		70%	$2,790
Office Overhead		10%	$399
Field Overhead		25%	$996
Subtotal			$8,169
Profit		6%	$490
Contingency		20%	$1,634
Total			$10,293

OPERATION AND MAINTENANCE **$90,418**

Activity (unit)	Quantity	Unit Cost	Total Cost
CERCLA Reviews			
CERCLA 5-Year Reviews (ea)	6	$9,200	$55,200
Subtotal O&M			$55,200
Design		10%	$5,520
Office Overhead		5%	$2,760
Field Overhead		15%	$8,280
Subtotal			$71,760
Profit		6%	$4,306
Contingency		20%	$14,352
Total			$90,418

TOTAL ALTERNATIVE CAPITAL AND O&M COST (Non Discounted Cost) **$100,711**

Feasibility Study for Load Line 7
Alternative 3 - Excavation and Off-site Disposal – Attain Unrestricted (Residential) Land Use
Key Parameters and Assumptions

Key Parameters and Assumptions:

Item	Unit	Value	Notes
Capital Cost			
Site Work			
Site Area	sf	5,130	
Civil Survey	day	1.0	Survey AOC areas and set monuments. RSMeans 017123131100.
Civil Survey	$/day	1,025	
As Built Drawings	hours	8	Develop plat map for incorporation into the Base Master Plan.
As Built Drawings	$/hr	70	
Clearing	acre	0.20	Assume existing area requires clearing and is chipped and left onsite.
Clearing	$/acre	6,000	RSMeans 311110100200. Clear and chip medium trees to 12" dia.
Sediment and Erosion Control	lf	100	Includes silt fence and straw bales along down slope of excavation.
Sediment and Erosion Control	$/lf	12.19	RSMeans 312514161000 & 250.
Waste Characterization Sampling and Analysis			
Waste Characterization Samples	ea	1	Includes 1 sample for waste characterization.
Sampling Labor	hrs	8	Assumes 1 sampling technician at 8 hours.
Sampling Labor	$/hr	70	
Per Diem	$/event	140	1 person x $140/day
Truck Rental / Gas	$/event	110	1 truck x $90/day. Add $20 for gas.
Sample Materials	ea	1	Reference ECHOS 33 02 0401/0402 for ISM, processing, disposable
Sample Materials	$/ea	88	sampling and decontamination materials.
Sample Analysis	$/ea	360	Analyze samples for TCLP VOCs, SVOCs, Metals, RCRA Characteristics, and Paint Filter. (1 @ $360).
Data Management	hrs	4	Data validation
Data Management	$/hr	80	
Soil Excavation			
Soil Excavation Volume (In situ)	cy	190	Includes excavation of the AOC areas based on the areas and depths presented in the summary table.
Soil Excavation Volume (Ex situ)	cy	290	Includes soil volume to be transported and disposed. Ex situ volumes include a 25% constructability and 20% swell factor.
Soil Excavation Mass	tons	319	Includes soil mass to be transported and disposed.
Volume to Weight Conversion	tons/cy	1.10	Ex situ or loose soil conversion.
Soil Excavation Surface Area	sf	5,130	
Mobilization/Demobilization	ls	1,200	Includes mob/demob of excavation equipment and preparing submittals.
Excavate Soils	day	2	Includes 1/2 cy excavator, 3-22 cy off highway trucks, 1 O.E., 3 T.D.,
	$/day	6,910.00	1 L.S. spotter, 2 L.S. to prep trucks/and misc. Reduced productivity by 25% for loading trucks, small precise excavations, and security/S&H requirements. Average 150 cy/day and assume 2 days. RSMeans Crew B12-E.
Offsite Disposal	tons	319	Based on shipping waste to American Landfill, Waynesburg, Ohio (approximately 80 mi RT). Assumes a minimum of 22 tons /load.
	$/ton	52.00	Rate includes $16.60/ton tax from Portage County.

Feasibility Study for Load Line 7
Alternative 3 - Excavation and Off-site Disposal – Attain Unrestricted (Residential) Land Use
Key Parameters and Assumptions

Key Parameters and Assumptions:

Item	Unit	Value	Notes
Restoration			Includes native soil backfill. Assume productivity has been reduced by 25% to account for security and safety requirements.
Native Soil Backfill	cy	290	Includes 12-in lift of native fill assuming 20% swell. ECHOS 17030423 and RSMeans 312323160040, Unclassified Fill, 6" Lifts, offsite Source @ 20 miles, Includes delivery, spreading, and compaction.
Native Soil Backfill	$/cy	33.74	
Seeding, Vegetative Cover	MSF	11.0	RSMeans 329219142200. Seeding with mulch and fertilizer. Assume 0.25 acres is revegetated for excavation areas and equipment damage.
Seeding, Vegetative Cover	$/MSF	58.00	
SWPPP Inspections	hrs	20	Assume 4 hrs per week for 5 weeks.
SWPPP Inspections	$/hr	70	
Plans and Reports			
Report	hrs	160	Includes Construction QC data and preparing report.
Technical Labor	$/hr	90	

Feasibility Study for Load Line 7
Alternative 3 - Excavation and Off-site Disposal – Attain Unrestricted (Residential) Land Use
Cost Estimate

CAPITAL COST **$163,794**

Activity (unit)	Quantity	Unit Cost	Total
Site Work			
Civil Survey (day)	1	$1,025.00	$1,025
As Built Drawings (hrs)	8	$70.00	$560
Clearing (acre)	0.2	$6,000.00	$1,200
Sediment and Erosion Control (lf)	100	$12.19	$1,219
Waste Characterization Sampling & Analysis			
Sampling Labor (hrs)	8	$70.00	$560
Per Diem (event)	1	$140.00	$140
Truck Rental / Gas (event)	1	$110.00	$110
Sample Materials (ea)	1	$88.31	$88
Sample Analysis (lot)	1	$360.00	$360
Data Management (hrs)	4	$80.00	$320
Soil Excavation			
Mobilization/Demobilization (ls)	1	$1,200.00	$1,200
Excavate Soil (days)	2	$6,910.00	$13,820
Offsite Disposal (ton)	319	$52.00	$16,588
Restoration			
Native Soil Backfill (cy)	290	$33.74	$9,784
Seeding, Vegetative Cover (MSF)	11	$58.00	$638
SWPPP Inspections (hrs)	20	$70.00	$1,400
Plans and Reports			
Corrective Action Completion Report (ea)	160	$90.00	$14,400
Subtotal			$63,412
Design		70%	$44,389
Office Overhead		10%	$6,341
Field Overhead		25%	$15,853
Subtotal			$129,996
Profit		6%	$7,800
Contingency		20%	$25,999
Total			$163,794

Feasibility Study for Load Line 7
Alternative 4 - Ex Situ Thermal Treatment – Attain Unrestricted (Residential) Land Use
Key Parameters and Assumptions

Key Parameters and Assumptions:

Item	Unit	Value	Notes
Capital Cost			
Site Work			
Site Area	sf	5,130	
Civil Survey	day	1.0	Survey AOC areas and set monuments. RSMeans 017123131100.
Civil Survey	$/day	1,025	
As Built Drawings	hours	8	Develop plat map for incorporation into the Base Master Plan.
As Built Drawings	$/hr	70	
Clearing	acre	0.20	Assume existing area requires clearing and is chipped and left onsite.
Clearing	$/acre	6,000	RSMeans 311110100200. Clear and chip medium trees to 12" dia.
Sediment and Erosion Control	lf	100	Includes silt fence and straw bales along down slope of excavation.
Sediment and Erosion Control	$/lf	12.19	RSMeans 312514161000 & 250.
Soil Excavation			Includes excavation of the AOC areas based on the areas and depths
Soil Excavation Volume (In situ)	cy	190	presented in the summary table.
Soil Excavation Volume (Ex situ)	cy	290	Includes soil volume to undergo thermal treatment. Ex situ volumes include a 25% constructability and 20% swell factor.
Soil Excavation Mass	tons	319	Includes soil mass to undergo thermal treatment.
Volume to Weight Conversion	tons/cy	1.10	Ex situ or loose soil conversion.
Soil Excavation Surface Area	sf	5,130	
Mobilization/Demobilization	ls	1,000	Includes mob/demob of excavation equipment and preparing submittals.
	day	3	Includes 1/2 cy excavator, 1-22 cy off highway trucks, 1 O.E., 3 T.D., 1
Excavate, Load, and Backfill Soils	$/day	3,660.00	L.S. spotter, 1 L.S. to prep trucks/and misc. Reduced productivity by 25% for loading trucks, small precise excavations, and security/S&H requirements. Average 200 cy/day and assume 2 days to excavate and treat and 1 day to backfill. RSMeans Crew B12-E.
Standby Time	day	2	Assume 2 days equipment standby while analysis is being performed.
	$/day	1404.00	Assume no additional hot spot excavation.
Thermal Treatment of Contaminated	cy	290	Source: Endpoint Technology cost estimate using Vapor Energy
Soil	$/cy	41.00	Generator (VEG) Soil Remediation.
Confirmation Sampling			
Confirmation Samples	ls	1	Source: Endpoint Technology cost estimate using Vapor Energy
	$/ls	1,972	Generator (VEG) Soil Remediation Ten 7-point composite confirmation soil samples to be collected for each stockpile.
Restoration			Includes 4-inches of topsoil to assist with re-establishing vegetation since remediated soil will be placed back in removal area. Assume productivity has been reduced by 25% to account for security and safety requirements.
Topsoil	cy	63	Includes 4-in lift of topsoil and assumes 20% swell. ECHOS 17030423
Topsoil	$/cy	38.80	and RSMeans 312323160040, Assumes offsite source @ 20 miles, Includes delivery, spreading, and compaction.

Feasibility Study for Load Line 7
Alternative 4 - Ex Situ Thermal Treatment – Attain Unrestricted (Residential) Land Use
Key Parameters and Assumptions

Key Parameters and Assumptions:

Item	Unit	Value	Notes
Restoration (continued)			
Seeding, Vegetative Cover	MSF	11.0	RSMeans 329219142200. Seeding with mulch and fertilizer. Assume 0.25 acres is revegetated for excavation areas and equipment damage.
Seeding, Vegetative Cover	$/MSF	58.00	
SWPPP Inspections	hrs	20	Assume 4 hrs per week for 5 weeks.
SWPPP Inspections	$/hr	70	
Plans and Reports			
Corrective Action Completion Report	hrs	160	Includes Construction QC data and preparing report.
Technical Labor	$/hr	90	

Feasibility Study for Load Line 7
Alternative 4 - Ex Situ Thermal Treatment – Attain Unrestricted (Residential) Land Use
Cost Estimate

CAPITAL COST **$145,188**

Activity (unit)	Quantity	Unit Cost	Total
Site Work			
Civil Survey (day)	1	$1,025.00	$1,025
As Built Drawings (hrs)	8	$70.00	$560
Clearing (acre)	0.2	$6,000.00	$1,200
Sediment and Erosion Control (lf)	100	$12.19	$1,219
Soil Excavation and Thernmal Treatment			
Mobilization/Demobilization (ls)	1	$1,000.00	$1,000
Excavate, Load, and Backfill Soils (days)	3	$3,660.00	$10,980
Standby Time (days)	2	$1,404.00	$2,808
Thermal Treatment of Contaminated Soil (cy)	290	$41.00	$11,890
Confirmation Sampling			
Confirmation Sampling (ls)	1	$1,972.00	$1,972
Restoration			
Topsoil (cy)	63	$38.80	$2,457
Seeding, Vegetative Cover (MSF)	11	$58.00	$638
SWPPP Inspections (hrs)	20	$70.00	$1,400
Plans and Reports			
Corrective Action Completion Report (ea)	160	$90.00	$14,400
Subtotal			$51,549
Design		80%	$41,239
Office Overhead		10%	$5,155
Field Overhead		25%	$12,887
Subtotal			$110,830
Profit		6%	$6,650
Contingency		25%	$27,708
Total			$145,188