

Analysis of Brownfield Cleanup Alternatives

**Old Agency Dump Site
Fort Belknap Agency, Fort Belknap Indian Reservation
Blaine County, Montana**

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1.0 Introduction

Granite Peak Environmental, LLC (Granite Peak) prepared this Analysis of Brownfields Cleanup Alternatives (ABCA) in anticipation of cleanup at the Old Agency Dump Site (Site). The Fort Belknap Indian Community (FBIC) was awarded a U.S. Environmental Protection Agency (EPA) Brownfields Cleanup Grant to remediate brownfields sites on the Fort Belknap Reservation. A Phase II Environmental Site Assessment (ESA) completed in 2004 revealed pentachlorophenol (PCP) and di(2-ethylhexyl)phthalate (DEHP) in surface soils at concentrations above screening levels, but remediation of these contaminants has not been completed to-date. This ABCA was prepared to facilitate the cleanup of hazardous substances at the Site to allow for redevelopment by the FBIC.

2.0 Site Background

The Site is located southwest of Fort Belknap Agency on the Fort Belknap Indian Reservation in Blaine County Montana (**Figures 1 and 2**). The property is currently vacant with no permanent structures. The Agency Dump reportedly operated on the site from the 1970s to the mid-1980s and was used by residents, tribal entities, the Indian Health Services (IHS), and the Bureau of Indian Affairs (BIA). During its operation, the dump reportedly received a variety of wastes. After its closure in the 1980s, the Site became an unofficial dump for debris such as concrete, pipes, and cars. Waste and debris are still currently present and visible at the ground surface.

Two previous assessments have been completed on the Site. URS Operating Services, Inc. (UOS) completed an assessment in 2004 that identified DDE/DDT, PCP, and DEHP in surface soils at concentrations above generic regional screening levels (RSLs). Surface soil sample locations are shown on **Figure 3**. A second investigation was completed by NewFields Companies, LLC (NewFields) in 2021 to define the extent of contamination in surface soil in the identified contamination areas. As part of this additional investigation, NewFields calculated direct-contact site-specific screening levels (SSSLs) for the contaminants of concern consistent with the Montana Voluntary Cleanup and Redevelopment Act Application Guide (DEQ, 2020). When data from the initial UOS investigation was compared to these calculated SSSLs, PCP exceeded commercial/industrial direct contact SSSLs at one sample location (AD-SE-DP-01) and DEHP exceeded commercial/industrial SSSLs at four sample locations (AD-SO-DB-02, AD-SO-AA-01, AD-SO-OP-01, and AD-SO-TR-02). These samples were all collected from the auto salvage area and within two sections of the on-site depression/trench. DDE/DDT did not exceed calculated SSSLs. A comparison of the UOS (2004) soil sample results to generic and site-specific screening levels is shown in **Table 1** and NewFields' calculation of SSSLs is shown in **Table 2**.

NewFields then collected nineteen additional surface soil samples to determine the lateral extent of contamination at the Site. Additional sample locations are shown on **Figure 3**. These samples returned concentrations of PCP and DEHP below their respective SSSLs (NewFields, 2021b).

PCP is found in numerous glues, resins, and most prominently in wood treatment chemicals. It is a carcinogen that, with chronic exposure, can lead to respirator inflammation, anemia, and kidney and liver failure. DEHP is a manufactured chemical that is commonly added to plastics to make them flexible. DEHP has been linked to a range of adverse effects in the liver, reproductive tract, kidneys, lungs, and heart.

FBIC intends to redevelop the property after surface soils are remediated. The Site would be developed as a solar energy field to provide power to the proposed Eagle Valley Estates housing project located adjacent to the Site. As such, soils would be remediated to commercial direct contact site-specific cleanup levels.

3.0 Cleanup Standards

The objective of cleanup is to remove and surface soils impacted by PCP and DEHP and properly dispose of contaminated soil at a Class II Landfill. NewFields (2021b) calculated SSSLs and cleanup goals for the Site consistent with the Montana Voluntary Cleanup and Redevelopment Act Application Guide (DEQ, 2020). The calculated cleanup levels for each contaminant of concern are as follows:

- Pentachlorophenol: 4.0 mg/kg
- Di(2-ethylhexyl)phthalate: 160 mg/kg

3.1 Applicable Laws

While cleanup guidance for PCP and DEHP are not universally regulated by EPA or DEQ, both federal and state soil screening guidance defers to site-specific cleanup level calculations (DEQ, 2020 and EPA, 1996). All cleanup activities will be conducted in accordance with federal and state laws, as applicable, in order to achieve a clean and healthful environment.

4.0 Cleanup Alternatives

GPE has determined there are three (3) cleanup alternatives for the Site, as follows:

Alternative 1 – No Action. Under this alternative, no actions would be taken to address the surface soil contaminants at the site.

Alternative 2 – Isolated removal of areas with PCP and DEHP to concentrations below the industrial/commercial direct contact SSSLs. Under this alternative, surface soils in three distinct areas (auto salvage area and northern and southern depression/trench areas) would be excavated to a depth of two feet. Approximately 900 cubic yards of soil would be excavated and disposed of at the Hill County Class II Landfill outside Havre, Montana. After soils are excavated, confirmation samples will be collected from the sidewalls and bottom of the excavations at a frequency consistent with DEQ regulations. Once confirmation samples indicate remaining soils do not contain contaminants of concern above SSSLs, the excavations will be backfilled and reseeded. A consultant will be retained to oversee the remedial work, subcontracting to an excavation firm as needed to complete the project. A final cleanup report describing all soil removal activities completed at the site would be prepared and transmitted to FBIC, EPA, and DEQ.

Alternative 3 – Isolated removal of areas with PCP and DEHP to concentrations below the industrial/commercial direct contact SSSLs and the leaching to groundwater RSLs. Under this alternative, surface soils in three distinct areas (auto salvage area and northern and southern depression/trench areas) would be excavated to a depth of four feet to remove direct contact and leaching to groundwater risks. Approximately 2,200 cubic yards of soil would be excavated and disposed of at the Hill County Class II Landfill outside Havre, Montana. After soils are excavated, confirmation samples will be collected from the sidewalls and bottom of the excavations at a frequency consistent with DEQ regulations. Once confirmation samples indicate remaining soils

do not contain contaminants of concern at concentrations above direct contact and leaching to groundwater SSLs, the excavations will be backfilled and reseeded. A consultant will be retained to oversee the remedial work, subcontracting to an excavation firm as needed to complete the project.

5.0 Evaluation of Alternatives

Each of the alternatives identified for the facility are evaluated in this section using three criteria: long-term human health risk reduction, implementability, and costs relative to human health risk reduction. **Table 1**, below, summarizes the evaluation and cost estimates for the action alternatives, which are also included in **Appendix A**.

Alternative 1 – While there would be no cost associated with this Alternative, future users of the site could be exposed to contaminants causing adverse human health impacts. This Alternative is cost effective and implementable but results in no environmental benefit and no reduction of human health risks.

Alternative 2 – This Alternative is labor intensive, poses a limited risk to site workers, and is implementable. This alternative is effective as it would remove the soils that currently pose unacceptable direct contact human health risks. Concentrations in soil would remain above leaching to groundwater generic RSLs; however, as discussed in **Section 4.0**, removal of additional soil to protect groundwater is likely not warranted based on the absence of groundwater within 50 feet of ground surface.

Alternative 3 – Alternative 3 is labor intensive, poses a limited risk to site workers, and is implementable. It is an effective remediation strategy as it would remove the soils that pose unacceptable direct contact human health risks under a future industrial/commercial reuse scenario, and it reduces the risk of contaminants leaching to groundwater.

Alternative	Criteria		
	Risk Reduction	Implementability	Cost
Alternative 1 – No Action	None	Implementable	\$0
Alternative 2 – Isolated removal of areas with PCP and DEHP to concentrations below the industrial/commercial direct contact SSLs.	Removes future human health risks, slight risks during excavation	Highly Implementable	\$114,481
Alternative 3 – Isolated removal of areas with PCP and DEHP to concentrations below the industrial/commercial direct contact SSLs and the leaching to groundwater RSLs.	Removes future human health risks, slight risks during excavation	Highly Implementable	\$244,833

6.0 Preferred Alternative

The preferred action is Alternative 2. This alternative presents the most cost-effective option to (1) reduce future human health risks for commercial and/or construction workers using the Site and (2) allow redevelopment of the Site as a solar energy field for the adjacent housing development. Alternative 2 would eliminate surface soil direct contact risks for PCP and DEHP, the contaminants of concern. Alternative 3 would also accomplish this and remove additional soils

to lower PCP and DEHP concentrations even further to below leaching to groundwater SSSLs; however, removal of additional soils to protect groundwater would cost considerably more and is likely not necessary for the following reasons:

- It is likely that removal of soil to a depth of two feet, as proposed in Alternative 2, would effectively lower PCP concentrations to below leaching to groundwater SSSLs. PCP and DEHP have a strong affinity to bind to organics and are likely detected in the upper foot of soil at much higher concentrations than soils below.
- Based on site drilling, groundwater was not encountered within 50 feet of ground surface. Therefore, even if PCP or DEHP were present in soil at concentrations above the leaching to groundwater RSL at two feet below grade, the risk of these contaminants leaching to groundwater greater than 50 feet below grade is minimal.

7.0 Climate Change and Severe Weather Events

The EPA requires a discussion of whether climate change could be impacted by the preferred alternative. According to the Montana Climate Assessment, climate changes predicted for Montana include:

- Increased mean annual air temperatures with winter and springs temperatures increasing the most
- Increased precipitation in winter, spring, and fall, with decreasing precipitation in summer
- Decreased snowpack with peak runoff occurring earlier
- Increased frequency of flooding
- Increased time of drought
- Increased frequency and longer season for wildfires
- Decreased carbon capturing forests

The proposed cleanup would not significantly impact the climatic changes described above, except for potentially increasing mean annual temperature through the burning of fossil fuels. The site is not in a floodplain and the preferred alternative would not increase the potential for flooding. It is recommended that equipment used for abatement be turned off when not in use.

8.0 References

Montana Department of Environmental Quality (DEQ), 2020. Voluntary Cleanup and Redevelopment Act Application Guide. January.

NewFields Companies, LLC (NewFields), 2021a. Analysis of Brownfields Cleanup Alternatives. Old Agency Dump Site, Fort Belknap Agency, Fort Belknap Indian Reservation, Blaine County, Montana. November.

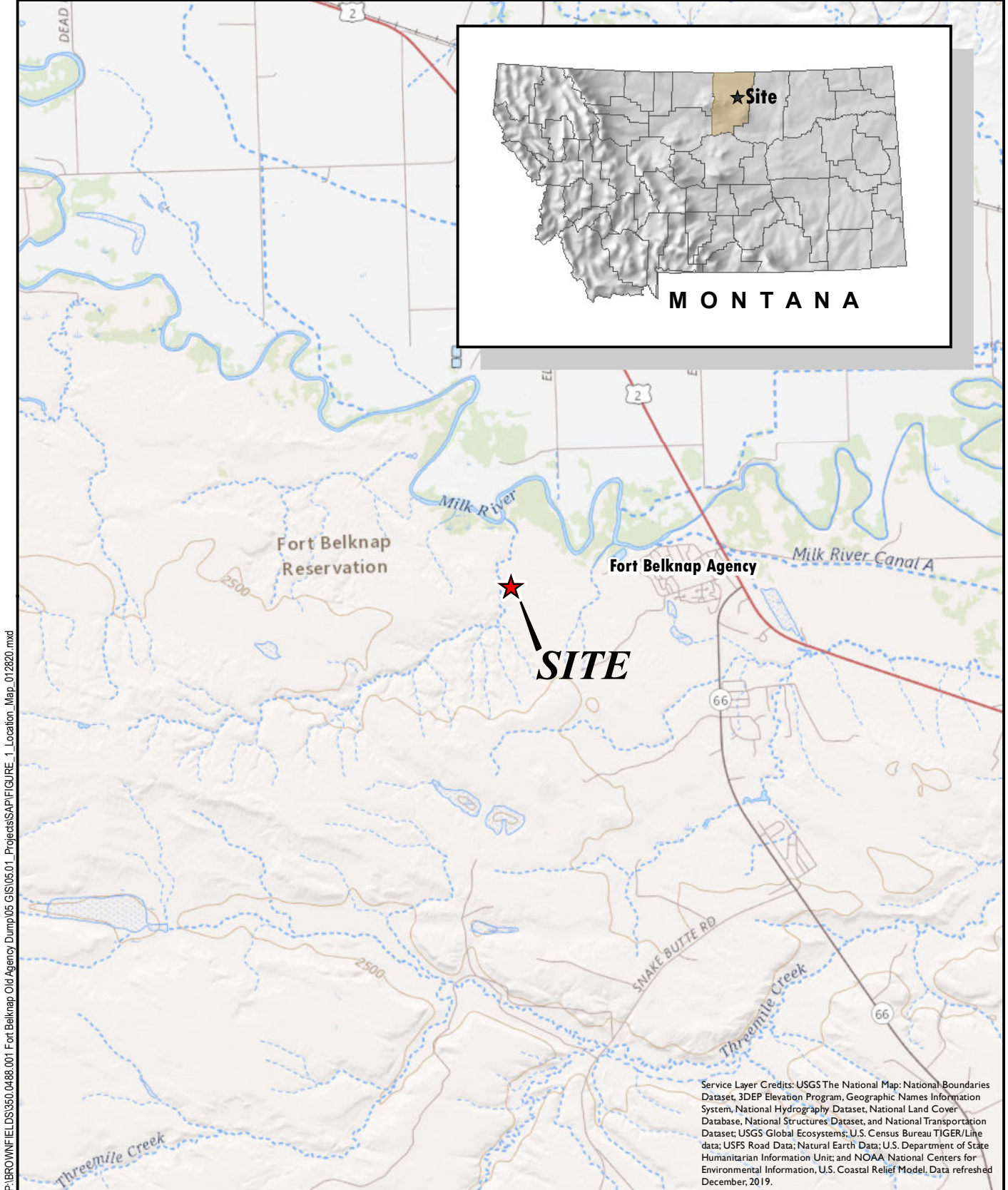
_____, **2021b.** Phase II Environmental Site Assessment Report of Findings. Old Agency Dump Site, Fort Belknap Agency -- Fort Belknap Indian Reservation, Blaine County, Montana. November.

URS Operating Services, Inc. (UOS), 2004. Phase II Environmental Site Assessment Report for Targeted Brownfields Assessment. Agency Dump Site, Fort Belknap Agency, Fort Belknap Indian Reservation, Montana. Technical Direction Document No. 0302-0007. Prepared for the U.S. Environmental Protection Agency. March 5.

United States Environmental Protection Agency (EPA), 1996. Soil Screening Guidance: Fact Sheet. Office of Solid Waste and Emergency Response. Publication 9355.4-14FSA EPA/540/F-95/041 PB96-963501. July.



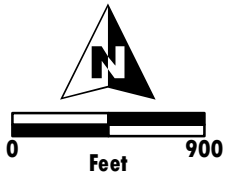
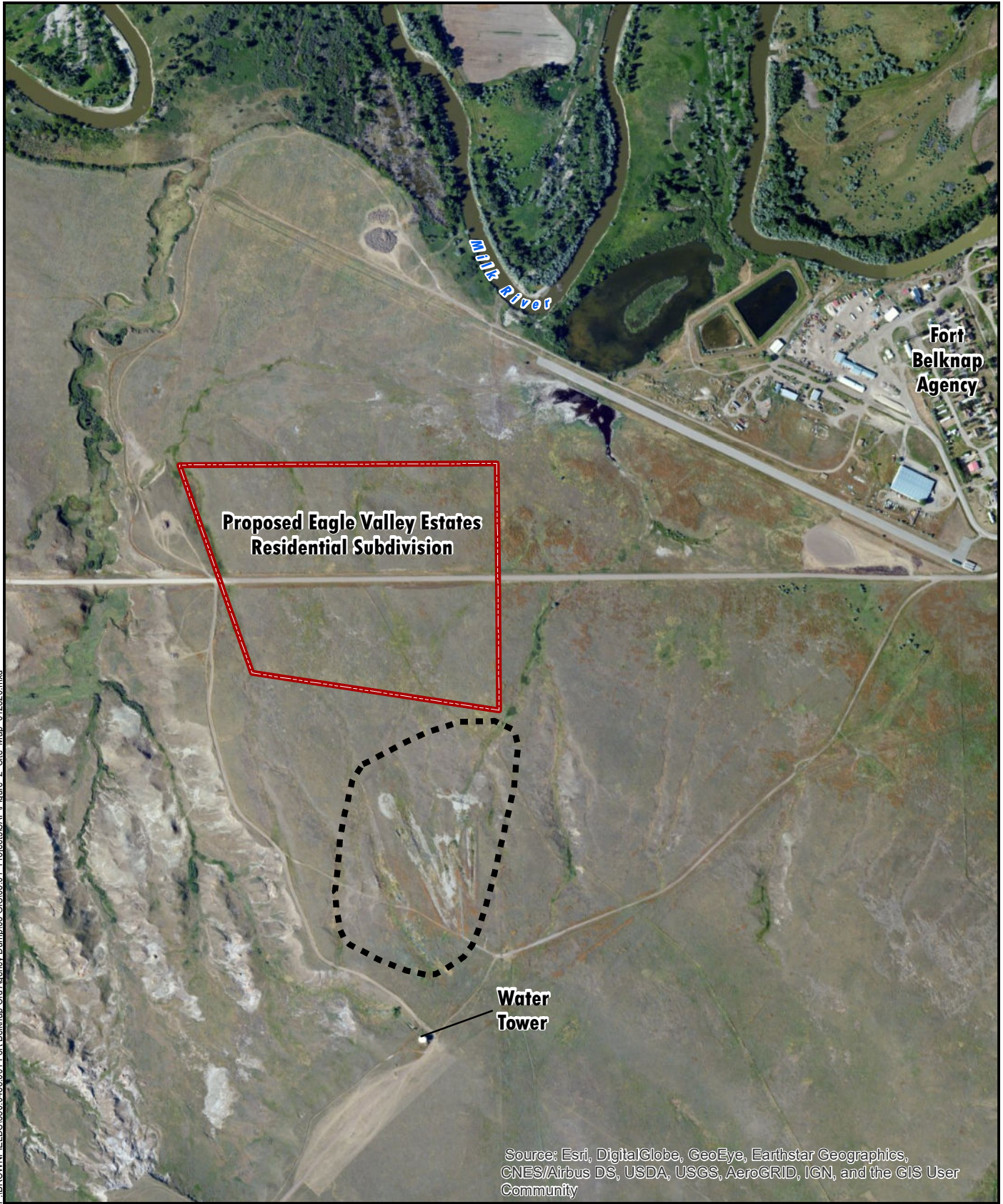
FIGURES





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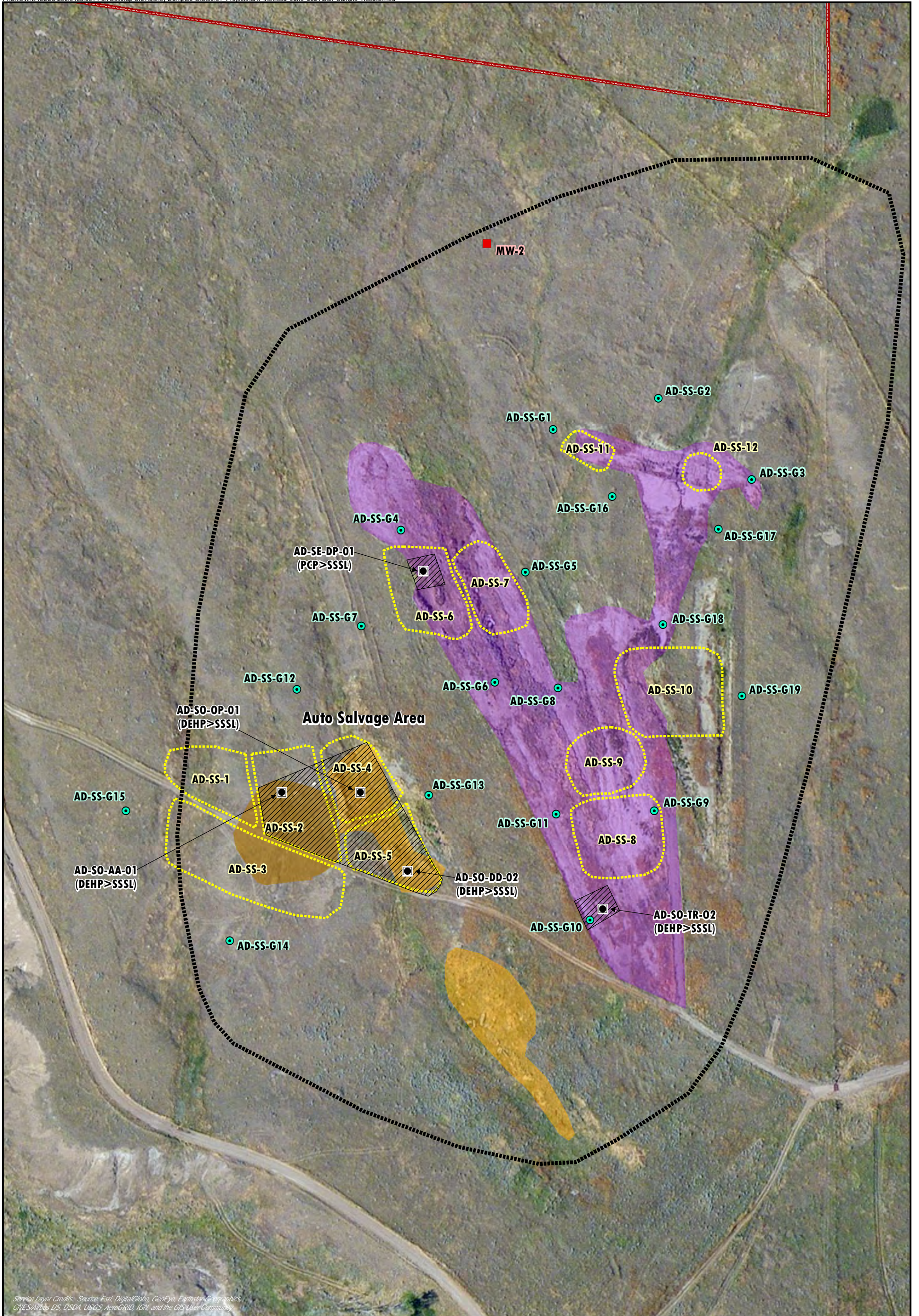


Location Map
 FBIC Old Agency Dump Site
 Fort Belknap Indian Reservation
 Blaine County, MT
 FIGURE 1

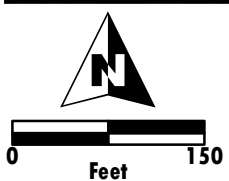


-  Proposed Subdivision
-  Old Agency Dump

Old Agency Dump Site
 and Proposed Residential Subdivision
 FBIC Old Agency Dump Site
 Fort Belknap Indian Reservation
 Blaine County, Montana
FIGURE 2



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar, GeoGraphics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



- Grab Soil Sample
- Borehole
- 2004 Sample (Exceeds SSSL)
- Proposed Subdivision
- Agency Dump Outline
- Approximate Composite Boundary
- Trench Area
- Debris Area
- Auto Salvage Area
- Proposed Excavation Area (Approximate)

Notes:
SSSL - Site Specific Screening Level

Proposed Excavation Areas
FBIC Old Agency Dump Site
Fort Belknap Indian Reservation
Blaine County, Montana
FIGURE 3



TABLES

Table 1
 UOS (2004) Data Compared to Generic and Site-Specific Screening Levels¹
 Old Agency Dump, Fort Belknap Indian Reservation, Montana



		Acetone	Toluene	Carbon Disulfide	Di-n-octylphthalate	Di(2-ethylhexyl)phthalate (DEHP)	Pentachlorophenol (PCP)	Butylbenzylphthalate	Chrysene	4,4'-DDE	4,4'-DDT
Generic Screening Levels	Industrial Soil	67000	4700	350	8200	160	4	1200	290	9.3	8.5
	Construction Worker Soil	25400	1820	72.8	2570	514	18.8	9870	17500	10.2	15.5
	Leaching to Groundwater	29	100	2.4	570	14	0.014	0.15	3500	0.0004	0.001
Site-Specific Screening Levels ²	Industrial Soil	--	--	--	--	400	10	--	--	23.25	21.25
	Construction Worker Soil	--	--	--	--	1285	47	--	--	25.5	38.75
UOS (2004) Analytical Results	AD-SB-GP-01	13	ND	ND	ND	47	ND	ND	ND	ND	ND
	AD-SB-GP-02	20	2	ND	ND	51	ND	ND	ND	ND	ND
	AD-SB-GP-03	16	ND	ND	ND	59	ND	ND	ND	ND	ND
	AD-SE-GP-01	--	--	--	ND	86	84	ND	ND	ND	ND
	AD-SE-DR-01	--	--	--	ND	53	ND	ND	ND	ND	ND
	AD-SE-DR-02	--	--	--	ND	65	ND	ND	ND	ND	ND
	AD-SE-DR-03	22	ND	ND	ND	120	ND	ND	ND	ND	ND
	AD-SE-DR-04	--	--	--	ND	120	ND	ND	ND	ND	ND
	AD-SE-DR-05	--	--	--	ND	38	ND	ND	ND	ND	ND
	AD-SO-DB-01	--	--	--	ND	ND	ND	ND	ND	ND	ND
	AD-SO-DB-02	--	--	--	ND	1200	ND	ND	ND	4.7	7.4
	AD-SS-DM-01	ND	ND	8	ND	ND	ND	ND	ND	ND	ND
	AD-SO-AA-01	--	--	--	ND	570	ND	ND	ND	ND	ND
	AD-SO-OP-01	--	--	--	ND	8900	ND	ND	ND	ND	ND
	AD-SO-OP-02	--	--	--	ND	ND	ND	ND	ND	15	9.1
	AD-SO-OP-03	--	--	--	ND	ND	ND	ND	ND	ND	ND
	AD-SO-OP-04	--	--	--	ND	ND	ND	ND	ND	ND	ND
	AD-SO-TR-02	--	--	--	ND	780	ND	ND	ND	ND	ND
	AD-SO-TR-03	--	--	--	ND	ND	ND	ND	ND	ND	ND
	AD-SO-TR-04	--	--	--	68	130	ND	ND	ND	ND	ND
	AD-SO-TR-05	--	--	--	ND	82	ND	ND	ND	ND	ND
	AD-SO-TR-06	--	--	--	ND	49	ND	ND	ND	ND	ND
AD-SO-TR-07	--	--	--	ND	53	ND	ND	ND	ND	ND	
AD-SO-TR-08	--	--	--	ND	150	ND	ND	ND	ND	ND	
AD-SO-TR-09	--	--	--	ND	ND	ND	ND	ND	ND	ND	
AD-SO-TR-10	--	--	--	ND	ND	ND	ND	ND	ND	ND	
AD-SO-TR-11	--	--	--	ND	ND	ND	ND	ND	ND	ND	

Notes:

- ¹ All units are displayed in milligrams/kilogram (mg/kg)
- ² See Table 2 for calculation of site-specific screening levels
- Not Analyzed
- ND Non Detect
- Bold** Result exceeds generic EPA industrial or construction worker direct contact RSL
- Italic* Result exceeds EPA leaching to groundwater RSL
- Result exceeds site-specific industrial screening level**
- Result exceeds site-specific industrial and construction worker screening levels**

Table 2
 Direct Contact Generic Screening Levels and Site-Specific Screening Levels
 Old Agency Dump, Fort Belknap Indian Reservation, Montana



Contaminant of Potential Concern (COPC)	Cancer-based RSL	Generic Screening Level*			Site-Specific Screening Level (SSSL)		
		Industrial	Construction	Note	Industrial	Construction	Note
Di(2-ethylhexyl)phthalate (DEHP)	Yes	160	514		400	1285	
Pentachlorophenol (PCP)	Yes	4	18.8	²	10	47	³
DDE	Yes	9.3	10.2		23.3	25.5	
DDT	Yes	8.5	15.5	²	21.3	38.8	³

Notes:

¹EPA Regional Screening Level (RSL) from <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>

²Determined in accordance with the Montana DEQ Soil Screening Flowchart, Part 1. Construction RSLs for the flowchart were determined using EPA RSL Online Calculator, with default Particulate Emission Factor (PEF) of 1.36 x 10⁹ m³/kg, per <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>

³Facility-specific adjusted screening level accounting for actual number of COPCs with the same risk endpoint, per Option 3

*Generic RSLs for these COPCs are based on cancer risk



Appendix A - Cost Estimates

Cost Estimate

Alternative 2: Isolated removal of areas with PCP and DEHP to concentrations below the industrial/commercial direct contact SSSLs

Old Agency Dump, Fort Belknap Reservation, MT



Description	Quantity	Units	Hourly Rate	Total
Mobilization and Site Preparation				
Mobilization/Site Preparation	1	lump sum	\$12,000	\$12,000
Mobilization and Site Preparation Subtotal				\$12,000
Soil Excavation				
Excavation and loading of contaminated soil	1,260	ton	\$6	\$7,560
Hauling and disposal of contaminated soil	1,260	ton	\$35	\$44,100
Backfill	1,260	ton	\$13	\$16,380
Backfill placement	1,260	ton	\$3	\$3,780
Seeding	30,000	square feet	\$0.35	\$10,500
Soil Excavation Subtotal				\$82,320
TERO Fees				
Business license fee	2	each	\$200	\$400
Individual worker fee	5	each	\$200	\$1,000
Percentage fee	1	lump sum	4%	\$3,829
TERO Fees Subtotal				\$5,229
Total (All Tasks)				\$99,549
Contingency (15%)				<u>\$14,932</u>
Total Estimated Cost				\$114,481

Alternative 3: Isolated removal of areas with PCP and DEHP to concentrations below the industrial/commercial direct contact SSSLs and the leaching to groundwater RSLs
 Cost Estimate

Old Agency Dump, Fort Belknap Reservation, MT



Description	Quantity	Units	Hourly Rate	Total
Mobilization and Site Preparation				
Mobilization/Site Preparation	1	lump sum	\$12,000	\$12,000
Mobilization and Site Preparation Subtotal				\$12,000
Soil Excavation				
Excavation and loading of contaminated soil	3,080	ton	\$6	\$18,480
Hauling and disposal of contaminated soil	3,080	ton	\$35	\$107,800
Backfill	3,080	ton	\$13	\$40,040
Backfill placement	3,080	ton	\$3	\$9,240
Seeding	45,000	square feet	\$0.35	\$15,750
Soil Excavation Subtotal				\$191,310
TERO Fees				
Business license fee	2	each	\$200	\$400
Individual worker fee	5	each	\$200	\$1,000
Percentage fee	1	lump sum	4%	\$8,188
TERO Fees Subtotal				\$9,588
Total (All Tasks)				\$212,898
Contingency (15%)				<u>\$31,935</u>
Total Estimated Cost				\$244,833