



October 8, 2024

Mr. Scott Stollman  
EPA TBA Project Manager  
U.S. Environmental Protection Agency, Region 9  
75 Hawthorne Street  
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**Subject: Final Analysis of Brownfields Cleanup Alternatives Report  
Chilcoot-El Dorado-Mohawk Mine, Chilcoot, California  
U.S. Environmental Protection Agency (EPA) Region 9, Resource Conservation and  
Recovery Act (RCRA) Enforcement, Permitting, and Assistance (REPA) Contract  
No. 68HERH19D0018, Task Order No. 68HE0922F0038**


Dear Mr. Stollman:

Toeroek Associates, Inc. (Toeroek) and Tetra Tech, Inc. (Tetra Tech) (hereafter "Toeroek Team") submit the attached Final Analysis of Brownfields Cleanup Alternatives Report regarding a Targeted Brownfields Assessment (TBA) at the Chilcoot-El Dorado-Mohawk Mine site.

This deliverable has been revised to reflect U.S. Forest Service, Central Valley Regional Water Quality Control Board, and Feather River Land Trust comments on the draft ABCA Report. Responses to comments are enclosed as a separate attachment. This deliverable has been reviewed internally as part of Tech Tech's quality assurance program, as well as Toeroek's quality assurance program, and is consistent with Toeroek's Quality Management Plan for the REPA contract. Documentation of this review is retained in the Toeroek Team's project files.

If you have any questions or comments, please contact Greg Hanna at (720) 898-4102 or Bill Bass at (916) 853-4571.

Sincerely,



Greg Hanna  
Toeroek Team Program Manager



Bill Bass  
Toeroek Team Project Manager

Enclosure: Response to Comments on Draft Analysis of Brownfields Cleanup Report  
Final Analysis of Brownfields Cleanup Alternatives Report

cc: Jinky Callado, EPA Region 9 Alternate Task Order Contract Officer's Representative (TOCOR)  
Toeroek Team files

# **ANALYSIS OF BROWNFIELDS CLEANUP ALTERNATIVES REPORT**

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## **CHILCOOT-EL DORADO-MOHAWK MINE CHILCOOT, CALIFORNIA TARGETED BROWNFIELDS ASSESSMENT (TBA)**

**RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)  
ENFORCEMENT, PERMITTING, AND ASSISTANCE (REPA)  
CONTRACT**

**CONTRACT NO. 68HERH19D0018; TASK ORDER NO. 68HE0922F0038**

**Prepared for:**

**EPA REGION 9  
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75 HAWTHORNE STREET  
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**October 8, 2024**

Final

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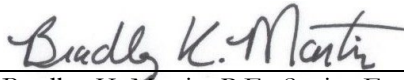
## ANALYSIS OF BROWNFIELDS CLEANUP ALTERNATIVES

### CHILCOOT-EL DORADO-MOHAWK MINE CHILCOOT, CALIFORNIA

CONTRACT NO. 68HERH19D0018;  
TASK ORDER NO. 68HE0922F0038

#### APPROVAL PAGE

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## ACRONYMS AND ABBREVIATIONS

µg/L	Micrograms per liter
ABA	Acid base accounting
ABCA	Analysis of Brownfields Cleanup Alternatives
AMD	Acid mine drainage
Applicant	Feather River Land Trust
ASTM	ASTM International
bgs	Below ground surface
BLM	Bureau of Land Management
CA WET	California waste extraction test
CCR	<i>California Code of Regulations</i>
CDFW	California Department of Fish and Wildlife
CFR	<i>Code of Federal Regulations</i>
COC	Contaminant of concern
CY	Cubic yard
DTSC	California Department of Toxic Substances Control
Eco-SSL	Ecological soil screening level
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
ESL	Environmental screening level
ft	Feet
HAZWOPER	Hazardous Waste Operations and Emergency Response
HHERA	Human health and ecological risk assessment
IC	Institutional control
MCL	Maximum contaminant level
mg/kg	Milligrams per kilogram
NA	Not applicable
NOAA	National Oceanographic and Atmospheric Administration
O&M	Operation and maintenance
OSHA	Occupational Safety and Health Administration
RACER	Remedial Action Cost Engineering Requirements
RCRA	Resource Conservation and Recovery Act
REC	Recognized environmental condition
RSL	Regional screening level
RWQCB	San Francisco Bay Regional Water Quality Control Board



## ACRONYMS AND ABBREVIATIONS (CONTINUED)

SEFA	Spreadsheets for Environmental Footprint Analysis
SF	Square feet
Site	Chilcoot-El Dorado-Mohawk Mine site
SL	Screening level
SMP	Soil management plan
SQuiRTs	Screening quick reference tables
STLC	Soluble threshold limit concentration
TBA	Targeted Brownfields Assessment
TCLP	Toxicity characteristic leaching procedure
TEL	Threshold exposure limit
Toeroek Team	Toeroek Associates, Inc., and its subcontractor, Tetra Tech, Inc.
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey



## EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency (EPA) Region 9 tasked Toeroek Associates, Inc., and its subcontractor, Tetra Tech, Inc., (hereinafter, the Toeroek Team) to develop an Analysis of Brownfields Cleanup Alternatives (ABCA) Report regarding the Chilcoot-El Dorado-Mohawk Mine (the Site) at the intersection of Frenchman Eastshore Road and Plumas National Forest Road 24N88 in Chilcoot, Plumas County, California. (Figure 1 and Figure 2). The Site contains remnants of the abandoned Mohawk Mine and the former Last Chance Sawmill and associated mill pond.

Feather River Land Trust (the owner and Applicant) has interest in selling the property to the U.S. Forest Service (USFS) for incorporation into Plumas National Forest for a proposed recreational use. The purpose of this ABCA Report is to evaluate potential cleanup alternatives to address environmental conditions preventing or impeding the proposed type of Site redevelopment and to do so in a manner protective of human health. The cleanup alternatives considered were evaluated based on effectiveness, implementability, and cost.

In 2024, the Toeroek Team performed a Phase II Environmental Site Assessment (ESA) of the Site. The Toeroek Team conducted soil, sediment, and surface water sampling. Concentrations of metals in soil, sediment, and surface water samples exceeded screening levels (SLs) and background levels on the Site. Mine waste piles pose potential for acid mine drainage (AMD) and are classified as Group B mining waste.

Based on the proposed redevelopment use of the Site, selling the property to USFS for incorporation into Plumas National Forest for recreational use, the following cleanup alternatives were considered for the Site:

- Alternative 1: No Action (Baseline)
- Alternative 2: Detailed Human Health and Ecological Risk Assessment (HHERA), Mining Waste and Sediment Excavation, Off-site Disposal
- Alternative 3: Detailed HHERA, Mining Waste and Sediment Excavation, Off-Site Disposal, Soil Management Plan (SMP), and Institutional Controls (ICs)
- Alternative 4: Detailed HHERA, Mining Waste and Sediment Excavation, On-Site Consolidation, Capping, and ICs.
- Alternative 5: Detailed HHERA, Mining Waste Excavation, On-Site Consolidation, Capping, SMP, and ICs.



Alternative 1 for the Site is included as a baseline for comparison. This alternative would involve no containment, treatment, removal, or monitoring of contaminants, and it would not address potential for exposure to contamination present on the Site.

Alternative 2 for the Site would involve a detailed HHERA, excavation of all contaminated mining waste and sediments, off-site disposal, and backfilling of excavated areas with clean material.

Alternative 3 for the Site would involve a detailed HHERA, excavation of a portion of contaminated mining waste and sediments, off-site disposal, backfilling of excavated areas with clean material, an SMP, and ICs.

Alternative 4 for the Site would involve a detailed HHERA, excavation and consolidation of contaminated mining waste and sediments, on-Site capping of contaminated mining waste and sediments, and ICs.

Alternative 5 for the Site would involve a detailed HHERA, excavation of a portion of contaminated mining waste and consolidation of contaminated soil, on-Site capping of contaminated mining waste , an SMP, and ICs.

[Table ES-1](#) summarizes effectiveness, implementability, and cost for each cleanup alternative evaluated to address risk to human health from contamination that prevents or impedes the proposed type of Site redevelopment. The cost estimates presented in the table are order-of-magnitude estimates intended only for the relative comparison of the alternatives; they should not be used as budget- or design-level estimates.



## 1.0 INTRODUCTION AND BACKGROUND

The U.S. Environmental Protection Agency (EPA) Region 9 tasked Toeroek Associates, Inc., and its subcontractor, Tetra Tech, Inc., (hereinafter, the Toeroek Team) to develop an Analysis of Brownfields Cleanup Alternatives (ABCA) Report regarding the Chilcoot-El Dorado-Mohawk Mine site (the Site) at the intersection of Frenchman Eastshore Road and Plumas National Forest Road 24N88 in Chilcoot, Plumas County, California (Figure 1 and Figure 2). Feather River Land Trust (the Applicant and owner) has interest in selling the property to the U.S. Forest Service (USFS) for incorporation into Plumas National Forest for a proposed recreational use.

This ABCA Report considers cleanup alternatives that would be based on the most conservative of EPA regional screening levels (RSLs) for residential soils (2024), California Department of Toxic Substances Control (DTSC) screening levels (SLs) for residential soils (2022), San Francisco Bay Regional Water Quality Control Board (RWQCB) Tier 1 environmental screening levels (ESLs) (2019), Bureau of Land Management (BLM) recreational SLs (2017), EPA ecological soil screening levels (Eco-SSLs) (2003), or U.S. Geological Survey (USGS) Plumas County background levels (USGS 2024). Currently, the Central Valley Regional Water Quality Control Board uses the RWQCB ESLs for their SLs. Regarding sediment, this ABCA Report considers cleanup alternatives based on the more conservative of RWQCB (2019) ESLs or National Oceanic and Atmospheric Administration (NOAA) screening quick reference tables (SQuiRTs) (2008). Regarding surface water, this ABCA Report considers cleanup alternatives that would be based on the more conservative of RWQCB ESLs (2019) or California maximum contaminant levels (MCLs) (California State Water Resources Control Board 2014). Furthermore, this ABCA Report includes rough order-of-magnitude cost estimates (accuracy range of -25 to +75 percent based on the Project Management Institute's *A Guide to the Project Management Body of Knowledge* [2017]) of evaluated cleanup alternatives intended for comparison purposes only; they should not be used as budget- or design-level estimates.

### 1.1 SITE LOCATION

The Site is at the intersection of Frenchman Eastshore Road and Plumas National Forest Road 24N88 in Chilcoot, Plumas County, California (Figure 1 and Figure 2), and occupies approximately 1,640 acres. The Site includes the remnants of the abandoned Mohawk Mine, and the former Last Chance Sawmill and associated mill pond. Spring Creek flows through the Site (Figure 2).

The Site is surrounded by, but not currently part of, USFS Plumas National Forest.



## 1.2 OWNERSHIP AND PREVIOUS USE

The Site is owned by Feather River Land Trust and consists of three adjoining, irregularly shaped parcels: APN 009-210-007, APN 009-210-008, and APN 009-210-009. The Applicant has owned the Site since approximately 2021. Based on the historical review, the Site was developed for copper mining beginning in 1905, and active mining operations continued until 1915 (Shelton Douthit Consulting 2021). The Last Chance Sawmill opened on the Site in 1918 and operated until 1927 (Lawson 2022). Most recently, the Site was used for seasonal cattle grazing, which ended in 2018 (Shelton Douthit Consulting 2021).

## 1.3 PREVIOUS INVESTIGATIONS

In June 2021, Shelton Douthit Consulting conducted a Phase I Environmental Site Assessment (ESA) and identified the following recognized environmental condition (REC):

- Dead, dying, and stunted trees were observed at the Site near the mining waste piles. Discoloration and staining were observed on the ground at the mine, which suggests oxidation of sulfide ore or waste rock potentially contributing to acid mine drainage (AMD) and likely metals contamination. While no sources of water continually percolate through the mining waste, periodic precipitation and snowmelt may cause metal-rich acidic water to drain from the Site. The possibility of AMD with suspected concomitant metals contamination poses a REC for the Site.

Douthit Consulting (2021) recommended further investigation to examine metals contamination in the leachate of the waste rock and to measure acid generation potential of the material.

In October 2021, Robison Engineering Company conducted a Phase II ESA of the Site (2021) that noted the following:

- A Nevada meteoric water mobility test conducted at the Site demonstrated potential for the mine waste to generate acid. Further, meteoric water percolating through the mine dump could leach metals.
- Analysis of the water in Spring Creek upstream and downstream of the former Mohawk Mine indicated a slightly basic pH, suggesting the mine does not influence the quality of water in Spring Creek.



The Toeroek Team conducted a Phase II ESA in 2024 in accordance with ASTM International (ASTM) Standard E1903-19 for Phase II ESAs and otherwise in compliance with EPA’s “All Appropriate Inquiries” Rule (40 *Code of Federal Regulations* [CFR] Part 312) (ASTM 2019). Purposes of the Phase II ESA were to (1) confirm or eliminate the REC identified during the Phase I ESA (Shelton Douthit Consulting 2021), (2) acquire information regarding the nature of contamination (if present) and risks posed by that contamination, which would support informed business decisions about the property, and (3) where applicable, satisfy the innocent purchaser defense under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (ASTM 2019).

During the Phase II ESA, the Toeroek Team conducted soil, sediment, and surface water sampling. Sample locations are depicted on [Figure 3](#).

Review of analytical data from the Phase II ESA led to the following noteworthy findings summarized below, indicated on [Figure 4](#), [Figure 5](#), and [Figure 6](#), and presented in the Final Phase II ESA Targeted Brownfields Assessment (TBA) report (Toeroek Team 2024).

- **Mine Waste Piles:** The acid base accounting (ABA) and California waste extraction test (CA WET) results documented potential for AMD to result in leaching of high levels of copper exceeding soluble threshold limit concentration (STLC). Soils at sampling locations Soil-5, Soil-9, Soil-10, Soil-11, and Soil-12 are classified as California Group B mine waste. No concentration of a Resource Conservation and Recovery Act (RCRA) metal exceeded a toxicity characteristic leaching procedure (TCLP) limit.
- **Metals Contamination in Soil:** Detected concentrations of antimony, cadmium, cobalt, copper, iron, lead, molybdenum, selenium, silver, thallium, uranium, and vanadium in soil exceeded at least one applicable SL.
- **Metals Contamination in Sediment:** Detected concentrations of arsenic, copper, and vanadium in sediment exceeded at least one applicable SL.
- **Metals Contamination in Surface Water:** Detected concentrations of boron, iron, and mercury in surface water samples exceeded at least one applicable SL.

No other prior environmental investigations have occurred at the Site.





## 1.4 PROJECT GOAL

The overall goal of any brownfields cleanup action is to address environmental conditions preventing or impeding the proposed type of Site redevelopment and to do so in a manner protective of human health. The Applicant has interest in selling the property to USFS for incorporation into Plumas National Forest for a proposed recreational use. This ABCA Report applies assumed cleanup levels based on applicable federal and state screening levels for soil, sediment, and surface water.

- Regarding soil, this ABCA Report applies assumed cleanup levels based on the most conservative of EPA RSLs, DTSC SLs, RWQCB ESLs, BLM SLs, EPA Eco-SSLs, or USGS Plumas County background levels.
- Regarding sediment, this ABCA Report applies assumed cleanup levels based on the more conservative of RWQCB ESLs or NOAA SQuiRTs.
- Regarding surface water, this ABCA Report applies assumed cleanup levels based on the more conservative of RWQCB ESLs or California MCLs.

The Phase II ESA investigation did not include an ecological risk assessment or acquisition of data associated with evaluating ecological risks, as these are outside the scope of work for this TBA. A detailed human health and ecological risk assessment (HHERA) is recommended as a part of all proposed alternatives. If threatened or endangered species are present on the Site, preparation of a biological assessment may be necessary in consultation with the California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS).

This ABCA Report addresses contaminants of concern (COCs) as identified in the Phase II ESA, which are antimony, cadmium, cobalt, copper, iron, lead, mercury, molybdenum, selenium, silver, thallium, uranium, and vanadium in soil; arsenic, copper, and vanadium in sediment; and boron, iron, and mercury in surface water.



## **2.0 APPLICABLE REGULATIONS AND ASSUMED CLEANUP LEVELS**

This section discusses oversight responsibility for cleanup, assumed cleanup levels, and applicable laws and regulations.

### **2.1 CLEANUP OVERSIGHT RESPONSIBILITY**

Any future cleanup and redevelopment of the Site must be completed in compliance with applicable laws and regulations. The Central Valley Regional Water Quality Control Board and DTSC regulate and oversee cleanup of contaminated sites in California. The lead agency for oversight of remedial activities is assumed to be either Central Valley Regional Water Quality Control Board or DTSC. The organization undertaking the cleanup will need to work with the oversight agency to establish site-specific cleanup requirements.

### **2.2 ASSUMED CLEANUP LEVELS FOR MAJOR CONTAMINANTS**

For the purpose of this ABCA Report, screening levels are used as the assumed cleanup levels. The organization undertaking cleanup actions at the Site will need to work with the oversight agency to establish appropriate cleanup levels specific to the Site.

For the purpose of the ABCA Report, assumed cleanup levels for soil, sediment, and surface water are presented in [Table 1](#).

The Toeroek Team screened the analytical data collected during the Phase II ESA against the assumed cleanup levels identified above to determine the areas where remediation would be potentially warranted. The data are presented in the Final Phase II ESA TBA Report (Toeroek Team 2024). [Figure 4](#), [Figure 5](#), and [Figure 6](#) depict exceedances of soil, sediment, and surface water screening criteria.

### **2.3 LAWS AND REGULATIONS APPLICABLE TO THE CLEANUP**

Any future cleanup and redevelopment of the Site must be completed in compliance with applicable cleanup laws and regulations. General environmental laws and regulations that may be applicable to the cleanup activities are identified and briefly summarized below. This section is for informational purposes only. It is the responsibility of the party or parties conducting remedial activities to ensure compliance with all applicable laws and regulations.

Remedial activities should accord with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) standards at 20 CFR 1910.120. HAZWOPER



standards apply to cleanup operations required by federal, state, local, and other governmental bodies involved with hazardous substances.

Activities that generate waste for disposal in California would be subject to the waste management requirements in the *California Code of Regulations* (CCR) Title 22, Division 4.5 or CCR, Title 23, Division 3, both of which regulate hazardous waste, and CCR, Title 27, Division 2, which regulates certain solid wastes. These regulations contain requirements for handling, management, and disposal of waste depending on the determination of whether the waste is hazardous, designated, or non-hazardous solid waste. If waste would be transported to another state, outside of California, that state's laws and regulations would apply to its transportation and disposal.

California Health and Safety Code Division 20, Chapter 6.5; California Civil Code Division 3; and CCR Title 22, Division 4.5, Chapter 39 specify requirements for developing institutional controls (ICs) and land use covenants for a property where hazardous substances remain at levels unacceptable for unrestricted use.



### **3.0 EVALUATION OF BROWNFIELDS CLEANUP ALTERNATIVES**

The evaluation of cleanup alternatives in this ABCA Report is based on the anticipated future use scenario for the Site—selling the property to USFS for incorporation into Plumas National Forest for a proposed recreational use. Because a human health risk assessment of the Site has not been completed, SLs are used as the assumed cleanup levels. The organization undertaking cleanup actions at the Site will need to work with the oversight agency to establish appropriate cleanup levels specific to the Site. For the purpose of this ABCA Report, the assumed cleanup levels for soil are the most conservative of EPA RSLs for Residential Soils (2024), DTSC SLs for Residential Soils (2022), RWQCB ESLs (2019), BLM recreational SLs (2017), or EPA Eco-SSLs (2003). Assumed cleanup levels for sediments are the more conservative of RWQCB ESLs (2019) or NOAA SQUIRTs (2008). Assumed cleanup levels for surface water are the more conservative of RWQCB ESLs (2019) or California MCLs (California State Water Resources Control Board 2014).

#### **3.1 CLEANUP ACTION OBJECTIVES**

The cleanup action objectives for the Site are to mitigate potential human exposure to the contaminants identified in soil, sediment, and surface water at the Site at levels exceeding the assumed cleanup levels presented in [Section 2.2](#). Future redevelopment of the Site is assumed to include the proposed recreational exposure scenarios. No generic SLs or cleanup levels have been established for recreational scenarios. Assumed cleanup levels for soil, sediments, and surface water in this ABCA ([Table 1](#)) are more conservative than necessary for recreational exposure, which is why a site-specific HHERA is recommended in each alternative. The cleanup alternatives and costs presented in this ABCA Report may change if different exposure scenarios are identified, additional data become available, or a HHERA is performed.

#### **3.2 IDENTIFICATION OF CLEANUP ALTERNATIVES**

The cleanup alternatives for evaluation were initially assessed to determine technical feasibility and whether each alternative would be capable of achieving the project goal to address environmental conditions preventing or impeding the proposed type of Site redevelopment in a manner protective of human health. EPA (2020a) provides guidance for the various technologies available to ensure contamination is either removed from a site or treated so it no longer poses a threat to human health.

Those alternatives deemed potentially capable of achieving the overall project goal were further evaluated for effectiveness, implementability, and cost. Effectiveness of each alternative is rated as low, moderate, or high based on ability of the alternative to mitigate potential human exposure to contaminants identified in soil.



Implementability of each alternative is rated as easy, moderate, or difficult based on availability of services and materials needed to implement the alternative, as well as how easily the components of each alternative could be applied. The cost estimates presented in this ABCA Report are rough order-of-magnitude estimates (accuracy range of -25 to +75 percent) and are intended for comparison purposes only; they should not be used as budget- or design-level estimates.

Section 3.2.5, Alternatives Considered and Dismissed, and Table 3 discuss alternatives considered but not further evaluated as a part of the evaluation of cleanup alternatives for the Site.

Based on the proposed redevelopment of the Site, selling the property to USFS for incorporation into Plumas National Forest for recreational use, the following cleanup alternatives were considered.

- Alternative 1: No Action (Baseline)
- Alternative 2: Detailed HHERA, Mining Waste and Sediment Excavation, Off-site Disposal
- Alternative 3: Detailed HHERA, Mining Waste and Sediment Excavation, Off-Site Disposal, Soil Management Plan (SMP), and ICs
- Alternative 4: Detailed HHERA, Mining Waste and Sediment Excavation, On-Site Consolidation, Capping, and ICs.
- Alternative 5: Detailed HHERA, Mining Waste Excavation, SMP, On-Site Consolidation, Capping, SMP, and ICs

Detailed descriptions of each alternative and the results of a comparative analysis of alternatives are presented in the subsections below. Alternative 2 was added based on input from the Applicant during the ABCA Report scoping call held on May 23, 2024. Alternative 5 was added based on comments from the Applicant on the draft ABCA report.

### ***3.2.1 Alternative 1 – No Action (Baseline)***

The no action alternative is included as a baseline for comparison. This alternative would involve no containment, treatment, removal, or monitoring of contaminants. All contaminated soil, sediment, and surface water would be left in place, and no restrictions on future land use would be imposed.

#### Effectiveness

Because the no action alternative would not be protective of human health for the proposed reuse of the Site, it is not considered effective.



### Implementation

Implementation of this alternative would require no effort because no containment, treatment, removal, or monitoring of contaminants would occur.

### Cost

No costs are associated with this alternative because no activities would occur.

### ***3.2.2 Alternative 2 – Detailed HHERA, Mining Waste and Sediment Excavation, Off-Site Disposal***

This alternative would involve a detailed risk assessment to evaluate risks to human and ecological receptors to determine site-specific cleanup levels. This alternative would also include removal of mining waste and sediment containing contaminant concentrations detected above cleanup levels during the Phase II ESA, and transportation of the contaminated mining waste and sediment off Site for disposal. The estimated amount of mining waste and sediment to be removed is 1,000 cubic yards (CY) based upon field observations and the Phase II ESA conducted by Robison Engineering Company (2021). For cost estimation purposes, the conservative assumed cleanup levels described at the beginning of this section are based on residential and ecological remediation scenarios. However, these residential and ecological remediation scenarios are anticipated to be more conservative than site-specific cleanup levels that would be based on a recreational user scenario. Removal of contaminated sediment likely would remove the source of contamination to surface water. Therefore, surface water would not be addressed under this alternative, but management of it would be necessary during cleanup activities.

Following excavation, five-point composite confirmation soil samples would be collected from walls and the floor of each excavation area to ensure contaminant concentrations in remaining soils and sediments are below assumed cleanup levels. If confirmation soil or sediment samples are found to contain contaminant concentrations above assumed cleanup levels, excavations will step out 20 feet from the sampling location in all directions. Confirmation samples will be collected at the 20-foot step out to evaluate if contaminant concentrations are below assumed cleanup levels. Multiple 20-foot step outs may be necessary.

Excavated mining waste and sediment would be stockpiled on the Site for waste profile characterization before off-Site disposal. Following characterization for disposal, excavated mining waste and sediment would be hauled to an off-Site permitted disposal facility for disposal. Depending on hazardous and leaching characteristics, disposal of waste may occur at a Class I, II, or III permitted facility.



To promote better surface water infiltration and reduce runoff, excavated areas then would be backfilled with clean fill material, graded, and seeded as appropriate. This alternative would allow unrestricted reuse of the Site.

For cost estimating purposes, the Toeroek Team assumed the following:

- Soil volumes to be excavated (included in [Table 4](#))
- Required construction of haul roads (2.25 miles)

#### Effectiveness

Alternative 2 rates **high** for effectiveness, as all mining waste and sediment with contaminant concentrations above assumed cleanup levels would be removed from the Site. This would allow unrestricted use of the Site.

#### Implementation

Alternative 2 rates **difficult** for implementation, as haul roads would have to be built, including a stream crossing, for equipment to reach the Site that could transport contaminated sediment and soils off Site. Soil excavation and off-site disposal are common remediation processes, and equipment and contractors are readily available.

#### Cost

Estimated total cost of Alternative 2 in 20214 dollars is \$1,321,000, which includes a capital cost of \$1,321,000. No ICs or operation and maintenance (O&M) costs are associated with this alternative. Costs were estimated by applying selected functions of Remedial Action Cost Engineering Requirements (RACER) Version 11.2.16.0, professional quotes, and professional judgment, and include a 30 percent contingency to account for unknown costs associated with changes in scope that may occur during the design phase and unknown costs associated with the construction and implementation of the alternative. Cost details are presented in [Table 2](#).

### ***3.2.3 Alternative 3 – Detailed HHERA, Mining Waste and Sediment Excavation, Off-Site Disposal, Soil Management Plan, and ICs***

This alternative would include a detailed risk assessment to evaluate risks to human and ecological receptors if contaminated soil, sediment, and surface water are left in place. Based on results of the HHERA conducted as part of this alternative, contaminated mining waste and sediment at the Site would be excavated to depth of 2 feet bgs or a depth determined appropriate for protection of human and ecological health at the Site.



This alternative would involve removal of mining waste and sediment containing contaminant concentrations detected above assumed cleanup levels during the Phase II ESA, and transport of the contaminated mining waste and sediment off Site for disposal. For cost estimation purposes, the conservative assumed cleanup levels described at the beginning of this section are based on residential and ecological remediation scenarios and will be used for calculation of soil and sediment excavation volumes. However, these residential and ecological remediation scenarios are anticipated to be more conservative than site-specific cleanup levels that would be based on a recreational user scenario. Removal of contaminated sediment likely would remove the source of contamination to surface water. Therefore, surface water would not be addressed under this alternative, but management of it would be necessary during cleanup activities.

Excavated areas would be backfilled with clean fill material, graded, and seeded as appropriate. The excavation may be lined with geotextile fabric prior to backfilling to prevent contaminant migration into the clean backfill.

Following excavation, five-point composite confirmation soil samples would be collected from walls and the floor of each excavation area to determine contaminant concentrations in remaining soils and sediment.

Excavated areas would then be backfilled with clean fill material, graded, and seeded as appropriate.

Excavated mining waste and sediment would be stockpiled on the Site for waste profile characterization before off-Site disposal. Following characterization for disposal, excavated mining waste and sediment would be hauled to an off-Site permitted disposal facility for disposal. Depending on hazardous and leaching characteristics, disposal of waste may occur at a Class I, II, or III permitted facility.

This alternative would also include a soil management plan (SMP) to guide proper handling of contaminated soil remaining on the Site below the excavation depth of 2 feet bgs. The SMP would present a tiered approach to soil management, regulatory approval, documentation, and record keeping to minimize administrative requirements. ICs would be necessary to ensure that a SMP is in place to manage contaminated soils, maintain cover (clean material backfill) over these areas, and prevent exposure of future users of the Site to contaminated soils. Recommendation is for long-term O&M to ensure effectiveness and protectiveness of the ICs.

If threatened or endangered species are present on the Site, preparation of a biological assessment may be necessary in consultation with CDFW and USFWS.

This alternative would allow reuse of the Site as planned; however, ICs would be required for as long as soils containing concentrations above assumed cleanup levels remain at the Site.





For cost estimating purposes, the Toeroek Team assumed the following:

- Mining waste volumes to be excavated (included in [Table 4](#))
- Required construction of haul roads (2.25 miles)

#### Effectiveness

Alternative 3 rates **moderate** for effectiveness, as the excavated mining waste would address surface soils protective of plant species; however, contaminated soils would remain on Site, and an SMP and long-term O&M are recommended. ICs also are recommended to prevent exposure of future users of the Site to contaminated soils.

#### Implementation

Alternative 3 rates **difficult to moderate** for implementation, as haul roads, including a stream crossing, would have to be built for equipment to reach the Site in order to transport contaminated sediment and soils off Site. Installation of a clay lined cap/cover (clean material backfill) during the excavation would be necessary to prevent contaminant migration. Soil excavation, capping and off-Site disposal are common remediation processes, and equipment and contractors are readily available.

#### Cost

Estimated total cost of Alternative 3 in 2024 dollars is \$1,753,000, which includes a capital cost of \$1,623,000, \$56,000 for ICs, and \$74,000 for O&M over 30 years. For cost estimating purposes, O&M is assumed to be required for 30 years; however, O&M will be needed in perpetuity for the life of the ICs. Costs were estimated by applying selected functions of RACER Version 11.2.16.0, professional quotes, and professional judgment, and include a 30 percent contingency to account for unknown costs associated with changes in scope that may occur during the design phase and unknown costs associated with the construction and implementation of the alternative. Cost details are presented in [Table 2](#).

#### ***3.2.4 Alternative 4 – Detailed HHERA, Mining Waste and Sediment Excavation, On-Site Consolidation, Capping, and ICs***

This alternative would include a detailed risk assessment to evaluate risks to human and ecological receptors if contaminated soil, sediment, and surface water are left in place. Based on results of the HHERA conducted as part of this alternative, contaminated mining waste and sediment would be excavated, consolidated on Site, and capped with a lined earthen (clay) cap. The estimated amount of mining waste and sediment to be removed is 1,000 cubic yards (CY) based upon field observations and the Phase II ESA conducted by Robison Engineering Company (2021). This alternative would permit retention on Site of mining waste and



sediment contamination above assumed cleanup levels identified in the Phase II ESA, with appropriate action taken to cap remaining contamination. Removal and on-Site consolidation of contaminated sediment likely would remove the source of contamination to surface water. Therefore, surface water would not be addressed under this alternative, but management of it would be necessary during cleanup activities.

Mining waste (soil) and sediment containing contaminant concentrations exceeding assumed cleanup levels would be consolidated in the southern portion of the Site or another area determined to be acceptable.

Following excavation, five-point composite confirmation soil samples would be collected from walls and the floor of each excavation area to ensure contaminant concentrations in remaining soils and sediments are below assumed cleanup levels. If confirmation soil or sediment samples are found to contain contaminant concentrations above assumed cleanup levels, excavations will step out 20 feet from the sampling location in all directions. Confirmation samples will be collected at the 20-foot step out to evaluate if contaminant concentrations are below assumed cleanup levels. Multiple 20-foot step outs may be necessary.

Contaminated soils and sediment would be capped with a lined clay cap to prevent direct contact of future workers, recreational users, and ecological receptors. Fencing around the capped area may also be required to restrict access to the area and protect the cap. The location and design of the consolidated, capped soil and sediment shall comply with all requirements in Title 27 of the *California Code of Regulations* (CCR). In general, the location of the consolidated, capped waste should be located in an area of that site such that the waste is isolated to protect water quality and human health.

To ensure contaminants will not leach from consolidated mining waste and sediment, stabilization of these may be necessary if any samples of them fail the TCLP and CA WET. A bottom liner under soils/sediment in the deposition area also may be required. ICs would be necessary to prevent exposure of recreational users and ecological receptors to contaminated soils and sediment below the cap, and to restrict land use within the area to be capped. In addition, long-term O&M would be required to ensure effectiveness of the cap and protectiveness of ICs.

For cost estimation purposes, the conservative assumed cleanup levels described at the beginning of this section are based on residential and ecological remediation scenarios and will be used for calculation of mining waste and sediment excavation and consolidation volumes. However, these residential and ecological remediation scenarios are anticipated to be more conservative than site-specific cleanup levels that would be based on a recreational user scenario.

If threatened or endangered species are present on the Site, preparation of a biological assessment may be necessary in consultation with CDFW and USFWS.



This alternative would allow reuse of the Site as planned; however, maintenance of the cap and ICs would be required for as long as concentrations of contaminants above assumed cleanup levels remain at the Site.

For cost estimating purposes, the Toeroek Team assumed the following:

- Mining waste volumes to be excavated (included in [Table 4](#)).
- Required construction of haul roads (2.25 miles)

### Effectiveness

Alternative 4 rates **moderate to high** for effectiveness, as all contaminated sediments and mining waste would be excavated and consolidated on site. Contaminated mining waste and sediments would be covered with a cap to prevent inhalation, direct contact, and incidental ingestion by future users of the Site. However, contaminated mining waste and sediment would remain on Site, and long-term O&M would be recommended. ICs would also be recommended to prevent exposure of future users of the Site to contaminated soils below the cap.

### Implementation

Alternative 4 rates **easy to moderate** for implementation, as mining waste and sediment excavation, consolidation, and capping are common remediation practices, and the materials, services, and equipment necessary for implementation are readily available. However, ICs and long-term O&M of the cap would be necessary to ensure its effectiveness. In addition, the design of an effective hazardous waste repository must include extensive quality control. For the purpose of the ABCA Report, O&M is assumed necessary for 30 years. Implementation of ICs would include a restrictive covenant that would be filed with the Register of Deeds.

### Cost

Estimated total cost of Alternative 4 in 2024 dollars is \$1,472,000, which includes a capital cost of \$1,342,000, \$56,000 for ICs, and \$74,000 for O&M over 30 years. For cost estimating purposes, O&M is assumed to be required for 30 years; however, O&M will be needed in perpetuity for the life of the on-site consolidation and capping and ICs. Costs were estimated by applying selected functions of RACER Version 11.2.16.0, professional quotes, and professional judgment, and include a 30 percent contingency to account for unknown costs associated with changes in scope that may occur during the design phase and unknown costs associated with the construction and implementation of the alternative. Cost details are presented in [Table 2](#).



**3.2.5 *Alternative 5 – Detailed HHERA, Mining Waste Excavation, SMP, On-Site Consolidation, Capping, SMP, and ICs.***

This alternative would include a detailed risk assessment to evaluate risks to human and ecological receptors if contaminated soil, sediment, and surface water are left in place. Based on results of the HHERA conducted as part of this alternative, contaminated mining wastes at the Site would be excavated to depth of 2 feet bgs or a depth determined appropriate for protection of human and ecological health at the Site.

This alternative would involve removal of mining waste containing contaminant concentrations detected above assumed cleanup levels during the Phase II ESA, consolidation of these mining wastes on Site, and capping of the mining wastes with a lined clay cap. For cost estimation purposes, the conservative assumed cleanup levels described at the beginning of this section are based on residential and ecological remediation scenarios and will be used for calculation of mining waste excavation volumes. However, these residential and ecological remediation scenarios are anticipated to be more conservative than site-specific cleanup levels that would be based on a recreational user scenario. Removal of contaminated sediment likely would remove the source of contamination from mining wastes to surface water. Therefore, surface water would not be addressed under this alternative, but management of it would be necessary during cleanup activities.

Excavated areas would be backfilled with clean fill material, graded, and seeded as appropriate. The excavation may be lined with geotextile fabric before backfilling to prevent contaminant migration into the clean backfill.

This alternative includes no treatment of sediment in conjunction with upslope treatment of mining waste. This alternative with proposed treatment (consolidation and capping) of contaminated mining waste would improve water and sediment quality in the stream. However, contaminated sediment currently on site will likely move, so the assessment of downstream movement of on-site sediment would need to be considered if this alternative is selected.

Mining waste (soils) containing contaminant concentrations exceeding assumed cleanup levels would be consolidated in the southern portion of the Site or another area determined to be acceptable. Contaminated soils would be capped with a lined clay cap to prevent direct contact of future workers, recreational users, and ecological receptors. Fencing around the capped area may also be required to restrict access to the area and protect the cap. The location and design of the consolidated, capped soil shall comply with all requirements in Title 27 of the *California Code of Regulations* (CCR). In general, the location of the consolidated, capped waste should be located in an area of that site such that the waste is isolated to protect water quality and human health.



To ensure contaminants will not leach from consolidated mining waste, stabilization of these may be necessary if any samples of them fail the TCLP and CA WET. A bottom liner under mining waste in the deposition area also may be required. ICs would be necessary to prevent exposure of recreational users and ecological receptors to contaminated mining waste below the cap, and to restrict land use within the area to be capped. In addition, long-term O&M would be required to ensure effectiveness of the cap and protectiveness of ICs. This alternative would also include an SMP to guide proper handling of contaminated soil remaining on the Site below the excavation depth of 2 feet bgs. The SMP would present a tiered approach to soil management, regulatory approval, documentation, and record keeping to minimize administrative requirements. ICs would be necessary to ensure that a SMP is in place to manage contaminated soils, maintain cover (clean material backfill) over these areas, and prevent exposure of future users of the Site to contaminated soils. Recommendation is for long-term O&M to ensure effectiveness and protectiveness of the ICs.

If threatened or endangered species are present on the Site, preparation of a biological assessment may be necessary in consultation with CDFW and USFWS.

This alternative would allow reuse of the Site as planned; however, ICs would be required for as long as soils containing concentrations above assumed cleanup levels remain at the Site.

#### Effectiveness

Alternative 5 rates **moderate to high** for effectiveness, as contaminated mining waste would be excavated and consolidated on the Site. Contaminated mining waste would be covered with a cap to prevent inhalation, direct contact, and incidental ingestion by future users of the Site. However, contaminated soils and sediments would remain on Site, and long-term O&M would be recommended. ICs would also be recommended to prevent exposure of future users of the Site to contaminated mining waste below the cap.

#### Implementation

Alternative 5 rates **easy to moderate** for implementation, as soil excavation, consolidation, and capping are common remediation practices, and the materials, services, and equipment necessary for implementation are readily available. However, ICs and long-term O&M of the cap would be necessary to ensure its effectiveness. In addition, the design of an effective hazardous waste repository must include extensive quality control. For



the purpose of the ABCA Report, O&M is assumed necessary for 30 years. Implementation of ICs would include a restrictive covenant that would be filed with the Register of Deeds.

#### Cost

Estimated total cost of Alternative 5 in 2024 dollars is \$1,136,000 which includes a capital cost of \$1,006,000, \$56,000 for ICs, and \$74,000 for O&M over 30 years. For cost estimating purposes, O&M is assumed to be required for 30 years; however, O&M will be needed in perpetuity for the life of the on-site consolidation and capping and ICs. Cost were estimated by applying selected functions of RACER Version 11.2.16.0, professional quotes, and professional judgement, and include a 30 percent contingency to account for unknown cost associated with changes in scope that may occur during the design phase and unknown costs associated with the construction and implementation of the alternative. Cost details are presented in [Table 2](#).

- Mining waste volumes to be excavated (included in [Table 4](#)).
- Required construction of haul roads (2.25 miles)

#### ***3.2.6 Alternatives Considered and Dismissed***

A wide variety of alternatives are available for remediation of contaminated soil, sediment, and surface water. [Table 3](#) lists alternatives considered but not further evaluated as a part of alternatives at the Site.

### **3.3 COMPARISON OF ALTERNATIVES**

The Toeroek Team assessed each cleanup alternative evaluated to determine its effectiveness, implementability, and cost in [Section 3.2](#). A comparative analysis of alternatives based on the same criteria is provided in this section.

#### Effectiveness

Alternative 1, the no action alternative, would not be protective of human health and would not meet the project goal for the Site.

Alternative 2 rates high on effectiveness, as all mining waste and sediments with COC concentrations above assumed cleanup goals would be permanently removed from the Site.

Alternative 4 rates moderate to high for effectiveness, while Alternative 3 and Alternative 5 rate lower at moderate effectiveness. Under all three of these alternatives, contaminated soils and sediments would remain on the Site. Long-term O&M and ICs would be necessary to ensure effectiveness of these alternatives.



### Implementability

Alternative 2 is rated difficult for implementation because, although soil and sediment excavation and off-Site disposal are common remediation practices, and materials, services, and equipment are readily available, haul roads would have to be built in order to access the areas of the Site where contaminated soils and sediments are located.

Alternative 3 is rated slightly higher than Alternative 2 with a rating of difficult to moderate because although haul roads would have to be built for this alternative, a smaller amount of soil and sediments would be excavated and hauled off Site. However, ICs and long-term O&M would be necessary. For the purposes of this ABCA Report, O&M is assumed necessary for 30 years. Implementation of ICs would include a restrictive covenant that would be filed with the Register of Deeds.

Alternative 4 and Alternative 5 are rated the highest at easy to moderate for implementation, as soil excavation, consolidation, and capping are common remediation practices. However, ICs and long-term O&M would be necessary. For the purposes of this ABCA Report, O&M is assumed necessary for 30 years. Implementation of ICs would include a restrictive covenant that would be filed with the Register of Deeds.

### Cost

Alternative 3 has the greatest estimated cost of \$1,853,000. Alternative 5 has the lowest estimated cost of \$1,105,000. Alternative 2 has an estimated cost of 1,372,000, while Alternative 4 has an estimated cost of \$1,472,000. Costs of all alternatives would ultimately depend on results of the HHERA.

[Table 5](#) summarizes each alternative based on effectiveness, implementability, and cost.

## **3.4 CONSIDERATION OF CLIMATE CHANGE IMPACTS**

Scientific evidence demonstrates that the climate is continuing to change at an increasingly rapid rate, posing a challenge to EPA in its ability to fulfill its mission to protect human health and the environment. EPA must adapt to climate change to continue to fulfill its statutory, regulatory, and programmatic requirements. In January 2014, EPA (2014a) published a Climate Change Adaptation Plan, which described priority actions for EPA to integrate into its programs, policies, rules, and operations. Additionally, the EPA Climate Smart Brownfields Manual (EPA 2021) provides additional resources for identification of current and potentially changing climate conditions, and greener cleanup options. EPA continues to take new priority actions and steps, beyond this Climate Change Adaptation Plan, to ensure adaptation to climate change is a high priority.



EPA (2014b) Region 9's Climate Change Adaptation Implementation Plan identifies the adverse impacts of climate change as air temperature increases, precipitation decreases, storm intensity increases, ocean acidification and warming increase, and sea levels rise. Vulnerabilities specific to the Montane geographic region, where the Site is located, as defined in the *National Water Program 2012 Strategy: Response to Climate Change* (EPA 2012), include the following eight items:

1. A warmer climate will cause lower-elevation habitats to move into higher zones, encroaching on alpine and sub-alpine habitats.
2. High-elevation plants and animals will lose habitat area as they move higher, with some disappearing off tops of mountains.
3. Rising temperatures will increase the importance of connections between mountain areas.
4. Rising temperatures may cause mountain snow to melt earlier and faster in spring, shifting the timing and distribution of runoff, limiting availability of freshwater, and leading to drier conditions with increased fire frequency and intensity
5. Water supplies will become increasingly scarce, calling for trade-offs and leading to conflicts.
6. Increased frequency and altered timing of flooding will increase risks to people, ecosystems, and infrastructure.
7. Projected increases in temperature, evaporation, and drought frequency add to concerns about the region's declining water resources
8. Climate change is likely to affect native plant and animal species by altering key habitats.

The Site is located within the Montane region of EPA Region 9 and is, therefore, susceptible to several of the vulnerabilities identified above, particularly #2, #4, and #7. The NOAA National Center for Environmental Information State Climate Summary for California (NOAA 2021a) identifies "serious climate hazards" for the State that pertain to the Site—including flooding, sea level rise, and drought. The Site is 200 miles east of the Pacific Ocean coast at an elevation of approximately 6,200 feet above mean sea level. According to the NOAA Sea Level Rise Viewer (NOAA 2021b) and the NOAA Coastal Flood Exposure Mapper (NOAA 2021c), the Site is outside of coastal flood hazard zones and outside of predicted sea level rise through 2100. The cleanup alternatives for the Site will not be affected by predicted drought in the area.





### 3.5 GREEN AND SUSTAINABLE REMEDIATION GUIDANCE

The cleanup of a site can be seen as “green” in that the cleanup improves the environmental and public health conditions of a site. However, these remediation efforts require energy, water, and other material resources to achieve cleanup objectives. Therefore, the process of remediation creates its own environmental footprint. EPA provides guidance on how to optimize environmental performance and implement protective cleanups that are greener. In EPA’s Principles for Greener Cleanups, which serves as the foundation for the greener cleanup policy, EPA (2020b) identifies the following elements of a green cleanup assessment that may assist in selecting and implementing five protective cleanup activities:

- Total energy use and renewable energy use
- Air pollutants and greenhouse gas emissions
- Water use and effects on water resources
- Materials management and waste reduction
- Land management and ecosystem protection.

The Toeroek Team conducted an analysis on the environmental footprints of the removal actions for the Site using the Spreadsheets for Environmental Footprint Analysis (SEFA) (EPA 2019). The analysis looks at the first two elements stated above and determines total energy usage and masses of different emissions generated by different construction activities, including greenhouse gases, nitrogen oxides, sulfur oxides, particulate matter, and listed air pollutants. Results of the SEFA are summarized below and presented in [Appendix A](#).

Impacts under Alternative 2 (Detailed HHERA, Soil and Sediment Excavation, Off-Site Disposal) are rated as medium except for particulate matter emissions, which are rated high. Impacts under Alternative 3 (Detailed HHERA, Soil and Sediment Excavation, Off-Site Disposal, SMP, and ICs) are rated as medium for all emissions categories except for NO<sub>x</sub> and LAP emissions which are rated as low. Impacts under Alternative 4 (Detailed HHERA, Soil and Sediment Excavation, On-Site Consolidation, Capping, and ICs) are rated as medium for all emissions categories except particulate matter emissions, which are rated as low. Impacts under Alternative 5 (Detailed HHERA, Soil Excavation, SMP, On-Site Consolidation, Capping and ICs) are rated as low for all emissions categories. For the purposes of this green remediation analysis, O&M is assumed to continue for a period of 30 years. Alternative 5 would affect the smallest environmental footprint.



### ***3.5.1 Administrative Suggestions***

When selecting remediation professionals, emphasis should be placed on those who follow green remediation best management practices and take into consideration the five cleanup activities identified above.

Redevelopment use of the Site should direct the type of remediation necessary to ensure that efficient and sustainable methods are applied. Renewable energy should be considered for future redevelopment.

Reporting efforts should use digital format as opposed to hard copy when feasible.

### ***3.5.2 Operations Suggestions***

The following operations suggestions should be considered to achieve green and sustainable remediation at the Site:

- Use of non-renewable energy should be minimized to the extent feasible by use of energy-efficient equipment and vehicles, renewable energy supplies, and renewable energy generation systems on the Site.
- Sustainable practices that may reduce use of fossil fuels, such as performing on-Site capping as opposed to off-Site disposal, and native vegetation should be utilized when possible.
- Wastes should be minimized as much as possible by use of recycling and reuse efforts.
- Transport and disposal operations should function as efficiently as possible to reduce the number of trips needed.
- Drilling and excavation activities should include clean fuel and emission controls, such as idle reduction devices, use of ultra-low sulfur diesel and fuel-grade biodiesel, EPA- or California Air Resources Board-verified emission control technology, and routine engine maintenance.

### ***3.5.3 Bioremediation Considerations***

Bioremediation involves use of microorganisms to degrade organic contaminants. The microorganisms break down contaminants by using them as a food source or co-metabolizing them with a food source. Nutrients are added to stimulate and create a favorable environment for microorganisms to grow and use contaminants as a food and energy source. Bioremediation was not considered in this ABCA Report because it is not currently effective for remediation of AMD on a large scale.



#### **4.0 LIMITATIONS AND ADDITIONAL ASSESSMENT NEEDS**

Quantities and areas presented in this ABCA Report are estimates based on available information; actual Site conditions may vary. For instance, extents of soil, sediment, and surface water contamination may not be fully delineated. Therefore, additional excavation may be required beyond the quantities presented in this ABCA Report.

This ABCA Report provides mitigation guidance, but it is not intended to be used as a removal characterization report or design document. This ABCA Report presents only the Site-specific RECs and opinion of the Toeroek Team Environmental Professional who prepared this document. Cost estimates presented are rough order-of-magnitude estimates solely for comparison purposes and should not be used as budget- or design-level estimates. In addition, other technologies may be available for remediation of the Site that were not considered in this ABCA Report.

While the exact areas to be redeveloped for each of the scenarios is undetermined at this time, the alternatives presented in this ABCA Report present options for the proposed recreational land uses. Following completion of a development plan for the Site, alternatives and cost estimates presented in this ABCA Report should be reevaluated and adjusted as appropriate.



## 5.0 REFERENCES

- ASTM International (ASTM). 2019. *Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process*. ASTM E1903-19. October.
- Bureau of Land Management (BLM). 2017. Screening Assessment Approaches for Metals in Soil at BLM HazMat/AML Sites. September.
- California Department of Toxic Substances Control (DTSC). 2022. Updated Human Health Risk Assessment Note 3 – DTSC-Modified Screening Levels. May.  
<https://dtsc.ca.gov/wp-content/uploads/sites/31/2022/02/HHRA-Note-3-June2020-Revised-May2022A.pdf>
- California State Water Resources Control Board. 2014. Maximum Contaminant Levels and Regulation Dates for Drinking Water, USEPA vs. California. Division of Drinking Water. July.
- Lawson, Scott. 2022. History of the Spring Creek Property Last Chance Valley, CA. Scott Lawson Research. February.
- National Oceanic and Atmospheric Administration (NOAA). 2008. Screening Quick Reference Tables (SquiRTs). <https://repository.library.noaa.gov/view/noaa/9327>
- National Oceanic and Atmospheric Administration (NOAA). 2021a. NOAA National Center for Environmental Information State Climate Summary for California.
- National Oceanic and Atmospheric Administration (NOAA). 2021b. NOAA Sea Level Rise Viewer. Accessed August 19, 2021. <https://coast.noaa.gov/slr/>
- National Oceanic and Atmospheric Administration (NOAA). 2021c. NOAA Coastal Flood Exposure Mapper. Accessed August 19, 2021. <https://coast.noaa.gov/floodexposure/#-10575352,4439107,5z>
- Project Management Institute. 2017. *A Guide to the Project Management Body of Knowledge*. Sixth edition. Project Management Institute. Newtown Square, Pennsylvania.
- Robison Engineering Company. 2021. Phase II Environmental Site Assessment of the Environmental Effects of the El Dorado Mine Dump, Plumas County, California. October.
- San Francisco Bay Regional Water Quality Control Board (RWQCB). 2019. Environmental Screening Levels.
- Shelton Douthit Consulting, LLC. 2021. The Spring Creek-Guidici Property Portions of Sections 25, 26, 27, 34, 35 and 36, Township 24 North, Range 16 East, MDM, Plumas County, California. June.
- Toeroek Associates, Inc., and Tetra Tech, Inc. (Toeroek Team). 2024. Phase II Environmental Site Assessment for the Chilcoot-El Dorado-Mohawk Mine Site. July.
- U.S. Environmental Protection Agency (EPA). 2012. *National Water Program 2012 Strategy: Response to Climate Change*. December.



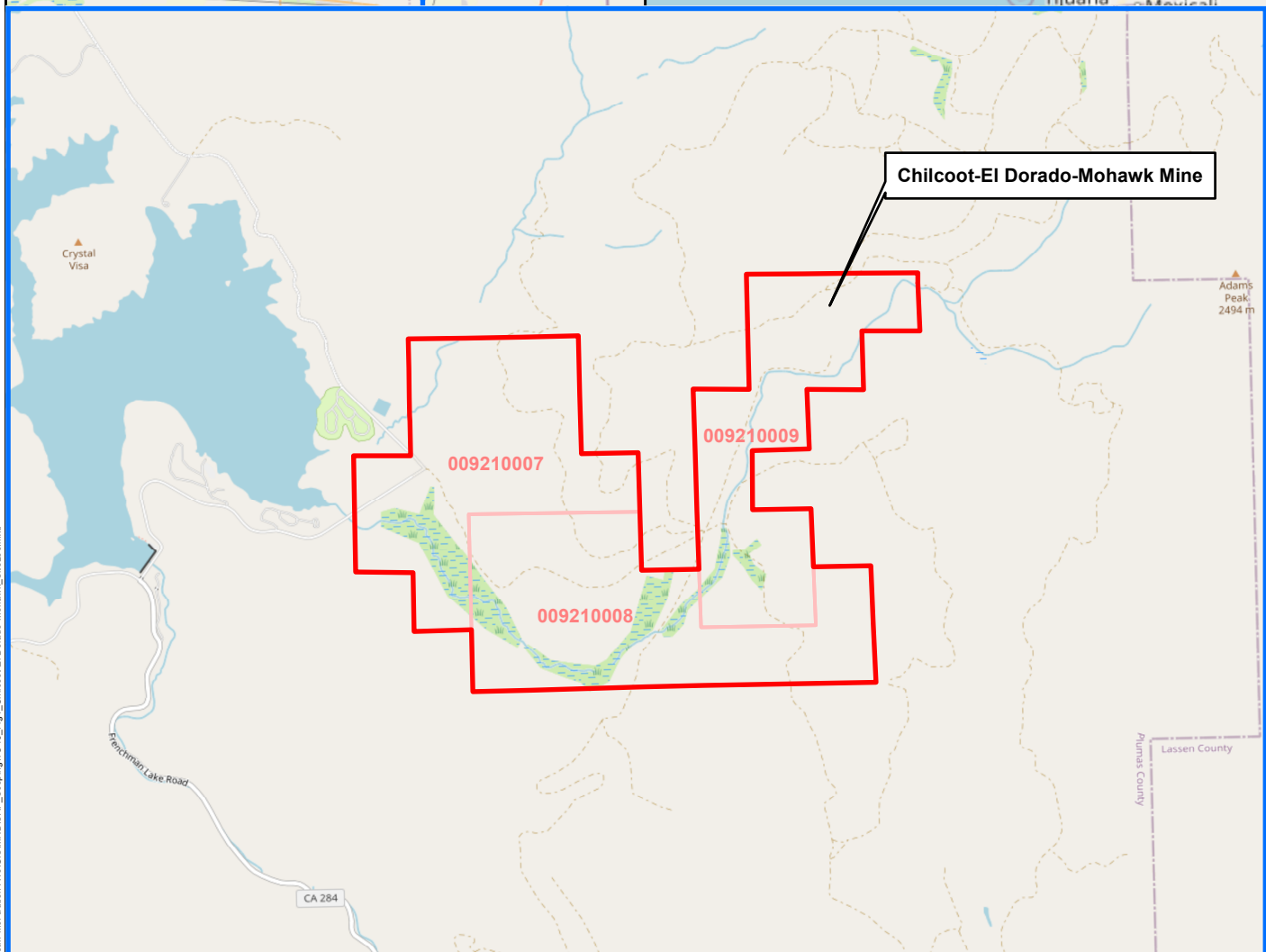
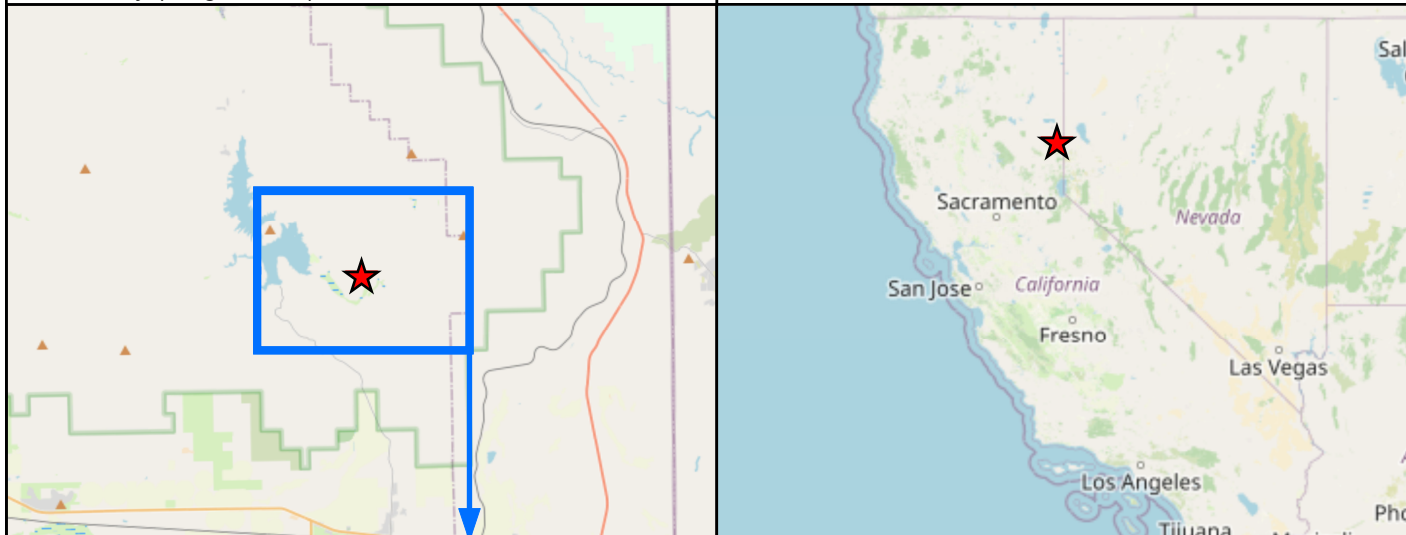
- U.S. Environmental Protection Agency (EPA). 2014a. Climate Change Adaptation Plan. EPA 100-K-14-001. January.
- U.S. Environmental Protection Agency (EPA). 2014b. EPA Region 9 Climate Change Adaptation Implementation Plan. EPA-100-K-14-001P. May.
- U.S. Environmental Protection Agency (EPA). 2019. EPA Spreadsheets for Environmental Footprint Analysis (SEFA). Office of Superfund Remediation and Technology Innovation.  
<https://clu-in.org/greenremediation/SEFA/>
- U.S. Environmental Protection Agency (EPA). 2020a. Technologies for Cleaning Up Contaminated Sites.  
<https://www.epa.gov/remedytech>
- U.S. Environmental Protection Agency (EPA). 2020b. EPA Principles for Greener Cleanups.  
<https://www.epa.gov/greenercleanups/epa-principles-greener-cleanups>
- U.S. Environmental Protection Agency (EPA). 2021. Climate Smart Brownfields Manual. EPA 560-F-21-002. June.
- U.S. Environmental Protection Agency (EPA). 2023. “Interim Ecological Soil Screening Level Documents.” Accessed August 11.  
<https://www.epa.gov/chemical-research/interim-ecological-soil-screening-level-documents>
- U.S. Environmental Protection Agency (EPA). 2024. Regional Screening Levels (RSLs) – Generic Tables. May. <http://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>
- U.S. Geological Survey (USGS). 2024. Average Concentrations of Elements in Plumas County, California. Accessed February 02.  
<https://mrdata.usgs.gov/geochem/county.php?place=f06063&el=As&rf=southwestern>

## FIGURES

Site Vicinity (Large Scale)	Site Vicinity (Small Scale)
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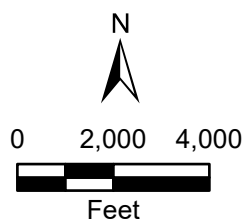
Scale: 1 inch = 5 miles

Scale: 1 inch = 300 miles



### Legend

- ★ Site Location
- Approximate Site Boundary
- Parcel Boundary
- Map Extent



Chilcoat-El Dorado-Mohawk Mine  
Targeted Brownfields Assessment  
Plumas County, CA

**Figure 1**  
Site Location

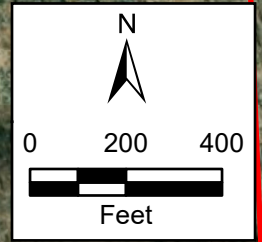
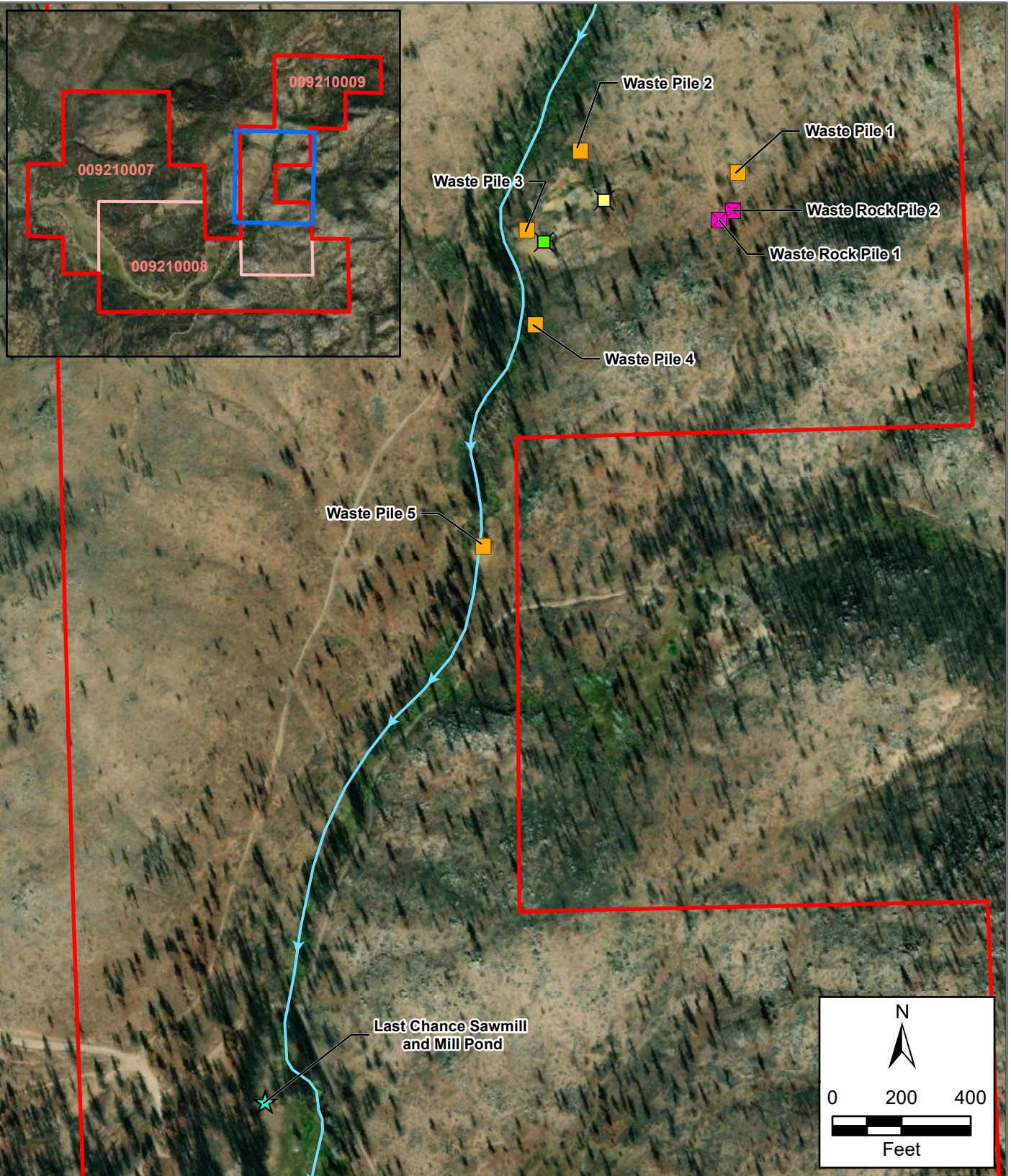


**TETRA TECH**



**TOEROEK  
ASSOCIATES, INC.**





### Legend

- |  |                                   |  |                           |
|--|-----------------------------------|--|---------------------------|
|  | Adit                              |  | Spring Creek              |
|  | Shaft                             |  | Approximate Site Boundary |
|  | Waste Pile                        |  | Parcel Boundary           |
|  | Waste Rock Pile                   |  | Map Extent                |
|  | Last Chance Sawmill and Mill Pond |  |                           |

Chilcoot-El Dorado-Mohawk Mine  
Targeted Brownfields Assessment  
Plumas County, CA

**Figure 2**  
Site Features



**TETRA TECH**



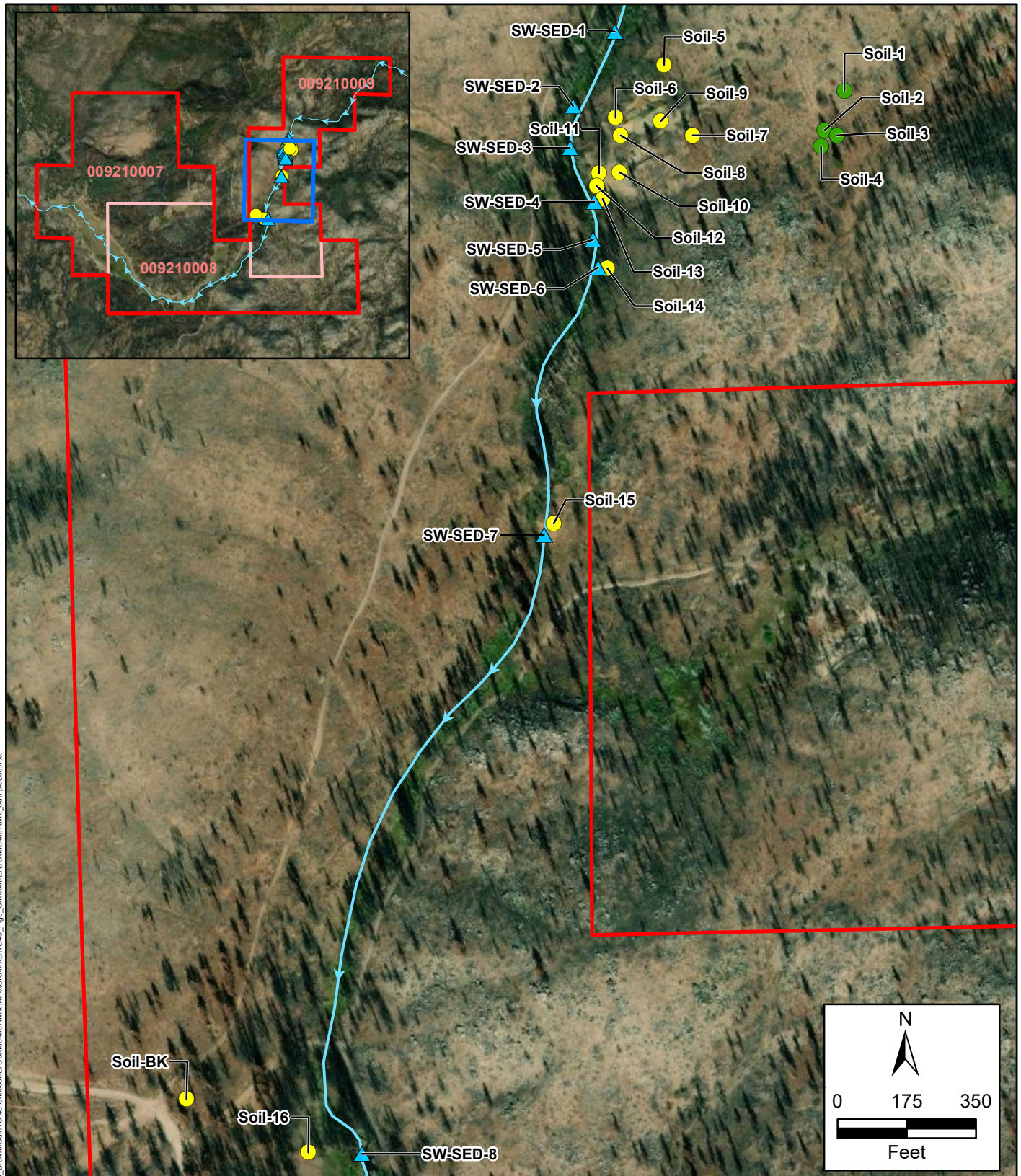
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ASSOCIATES, INC.**

Date: 8/24/2023

Drawn By: Elaia McDonald

Project No: 103265210007AR





### Legend

- Surface and Subsurface Soil Sample
- Surface Soil Sample
- ▲ Surface Water/Sediment Sample
- Spring Creek
- Map Extent
- Approximate Site Boundary
- Parcel Boundary

Chilcoot-El Dorado-Mohawk Mine  
Targeted Brownfields Assessment  
Plumas County, CA

**Figure 3**  
Sample Locations



**TETRA TECH**



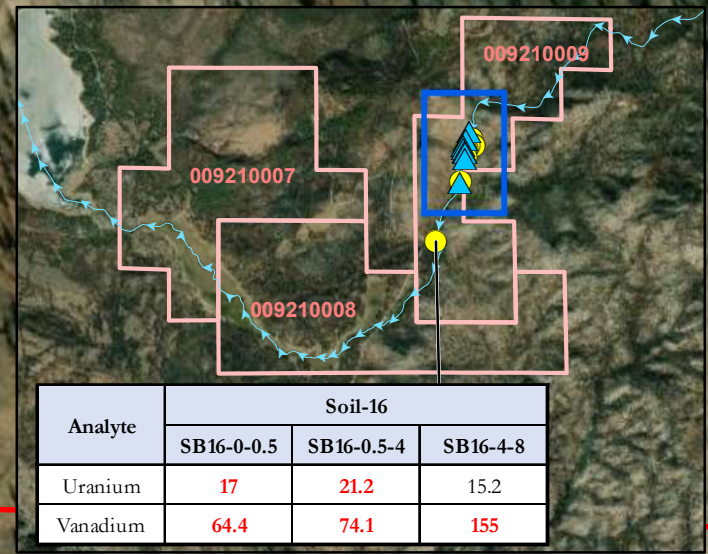
**TOEROEK  
ASSOCIATES, INC.**

Date: 4/8/2024

Drawn By: Elaia McDonald

Project No: 103265210007 AR





Analyte	Soil-6 (Waste Pile 2)		
	SB6-0-0.5	SB6-0.5-4	SB6-4-8
Copper	826	576	701
Vanadium	103	108	109

Analyte	Soil-5		
	SB5-0-0.5	SB5-0.5-4	SB5-4-8
Copper	2260 (2470)	180 (159)	253 J (829 J)
Molybdenum	32.2 (28.6)	1.48 (0.549)	1.09 (31.2 J)
Selenium	1.22 (1.02)	0.0742 (0.0652)	0.066 (0.391)
Vanadium	113 (108)	124 (106)	101 (110)

Analyte	Soil-9 (Waste Pile 2)		
	SB9-0-0.5	SB9-0.5-4	SB9-4-8
Cadmium	0.381 J	0.598	1.01 J
Cobalt	10.3	11.1	35.6
Copper	1790	3910	4240
Iron	27900	35800	57500 J
Molybdenum	40.6	79.1	13.1
Selenium	0.863	2.1	0.0945 J
Thallium	0.331 J	0.361 J	1.05
Uranium	16.8	16	13.8
Vanadium	78.7	94	174
Mercury	1.18	0.933	0.164

Analyte	Soil-8 (Waste Pile 2)		
	SB8-0-0.5	SB8-0.5-4	SB8-4-8
Copper	1260	693	81.1
Vanadium	120	110 J+	94.6

Analyte	Soil-11 (Waste Pile 3)		
	SB11-0-0.5	SB11-0.5-4	SB11-4-8
Antimony	1.240	1.82	0.693
Cadmium	0.89	0.56	0.905 U
Cobalt	18	28	23
Copper	8,300	13,500	5,340
Iron	48,500	59,500	43,900
Lead	50.70	34.90	4.6 J
Molybdenum	101	158	67
Selenium	5.43	4.960	2.37
Silver	5.01	5.53	4.070
Uranium	43	71.7	21.7
Vanadium	139	163	119

Analyte	Soil-12 (Waste Pile 3)		
	SB12-0-0.5	SB12-0.5-4	SB12-4-8
Antimony	1.280	0.799	0.333 J
Cadmium	0.868 J	1.1 U	0.86
Cobalt	26	29	17
Copper	15,000	11,300	5,500
Iron	63,400	53,200	43,500
Lead	20.2	5.5 U	2.82
Molybdenum	258	328	57
Selenium	4.51	5.24	1.5
Silver	9.16	5.5	0.532
Uranium	62.4	49.1	10.9
Vanadium	173	143	127

Analyte	Soil-13 (Waste Pile 3)		
	SB13-0-0.5	SB13-0.5-4	SB13-4-8
Copper	938	680	516
Molybdenum	10	5	8
Vanadium	89	120	129

Analyte	EPA RSL	DTSC SL	RWQCB Tier 1 ESL	BLM SL	Eco-SL
Antimony	31	NC	10.95	782	0.27
Cadmium	7	7.1	1.9	1,780	0.36
Cobalt	23	NC	23.40	586	13
Copper	3,100	NC	180	78,200	28
Iron	55,000	NC	NC	>1,000,000	NC
Lead	200	80	32	800	11
Molybdenum	390	NC	6.9	9,780	NC
Selenium	390	NC	2.4	9,780	0.52
Silver	390	NC	25	9,780	4.2
Thallium	0.78	NC	0.78	19.6	NC
Uranium	16	16	NC	391	NC
Vanadium	390	NC	18	9,850	7.8
Mercury	11	1	12.51	271	NC
TPH-ORO	18	2400	1,600	NC	NC

Analyte	Soil-14 (Waste Pile 4)		
	SB14-0-0.5	SB14-0.5-4	SB14-4-5
Vanadium	84	100	116

Analyte	Soil-7		
	SB7-0-0.5	SB7-0.5-4	SB7-4-8
Copper	562	168	930
Vanadium	118	109	124

Analyte	Soil-10 (Waste Pile 3)		
	SB10-0-0.5	SB10-0.5-4	SB10-4-8
Antimony	4.26 (5.4)	1.03	0.94 (0.319 J)
Cobalt	26.3 (25)	30	54.4 (24.2)
Copper	13700 (13800)	11000	12200 (7810)
Iron	55200 (56500)	61500	61400 (45200)
Lead	61.2 (121)	3.62 J	5.76 U (1.15)
Molybdenum	117(145)	155	6.89 (11.9)
Selenium	4.39 (5.37)	5.87	0.248 J (0.445 J)
Silver	5.65 (5.06)	6.26	1.15 U (0.639)
Thallium	0.857 (0.889)	0.661	0.954 (0.411 J)
Uranium	51.4 (52.7)	41.4	28.6 (14.2)
Vanadium	154 (154)	148	151 (139)

Analyte	Soil-15 (Waste Pile 5)		
	SB15-0-0.5	SB15-0.5-4	SB15-4-8
Cadmium	0.97	0.715	0.599
Uranium	163	96.3	72.7
Vanadium	167	148	155
TPH-ORO	NC	NC	20

Notes:

Bold red text indicate values that exceeded one or more of the project screening levels.

Results highlighted green indicate values that exceeded the ecological SL.

BLM

Bureau of Land Management

DTSC

Department of Toxic Substances Control

Eco

Ecological

EPA

U.S. Environmental Protection Agency

ESL

Environmental Screening Level

RSL

Regional Screening Level

RWQCB

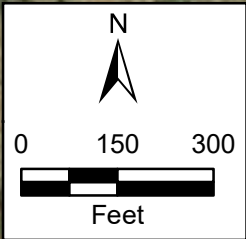
Regional Water Quality Control Board

SL

Screening Level

TPH-ORO

Total petroleum hydrocarbons (oil)



Legend

- Surface and Subsurface Soil Sample

Surface Soil Sample

Spring Creek

Map Extent

Parcel Boundary

Approximate Site Boundary

Chilcoot-El Dorado-Mohawk Mine  
Targeted Brownfields Assessment  
Plumas County, CA

Figure 4  
Soil Sample Exceedances



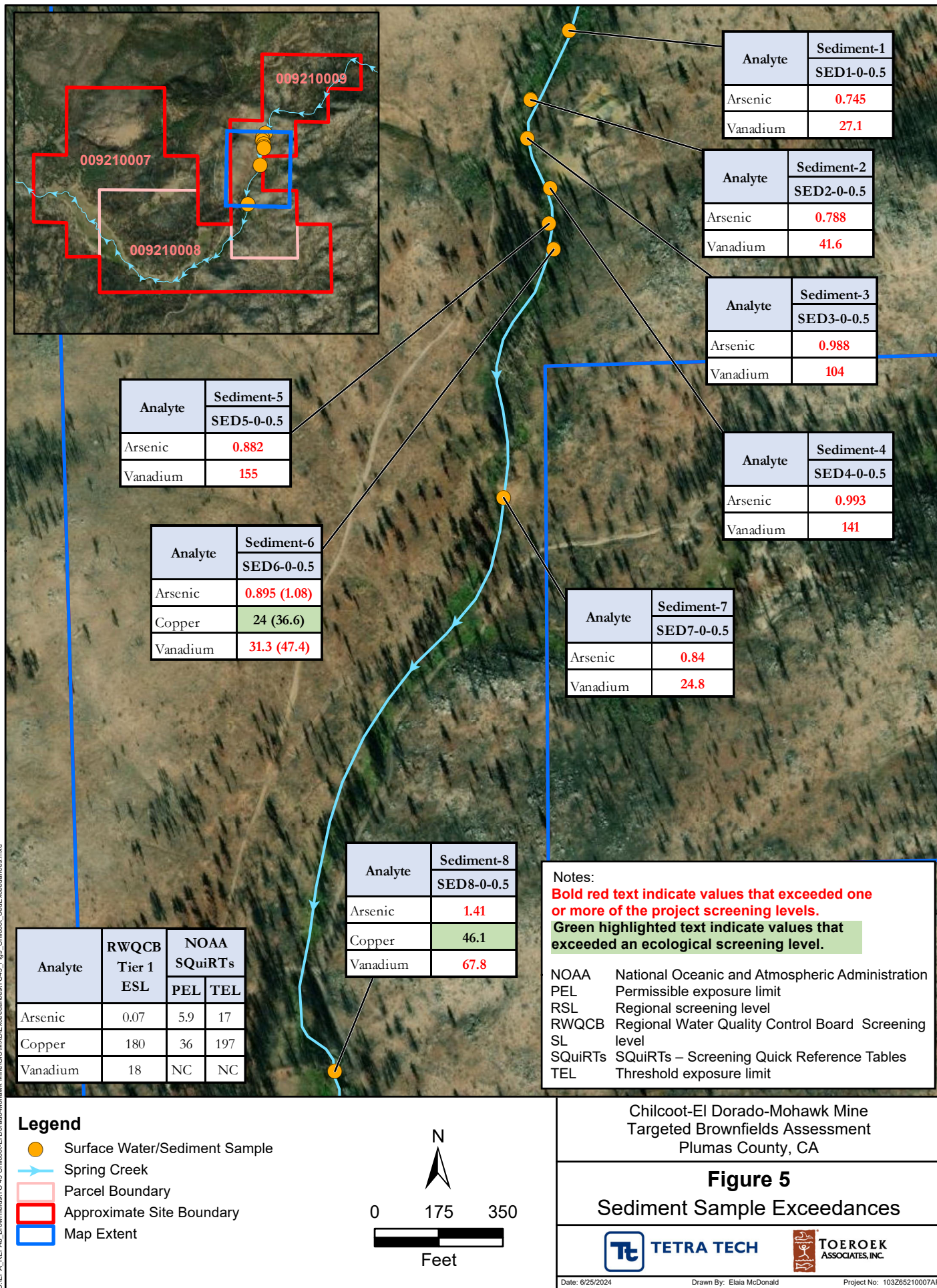
Date: 4/5/2024

Drawn By: Elaia McDonald

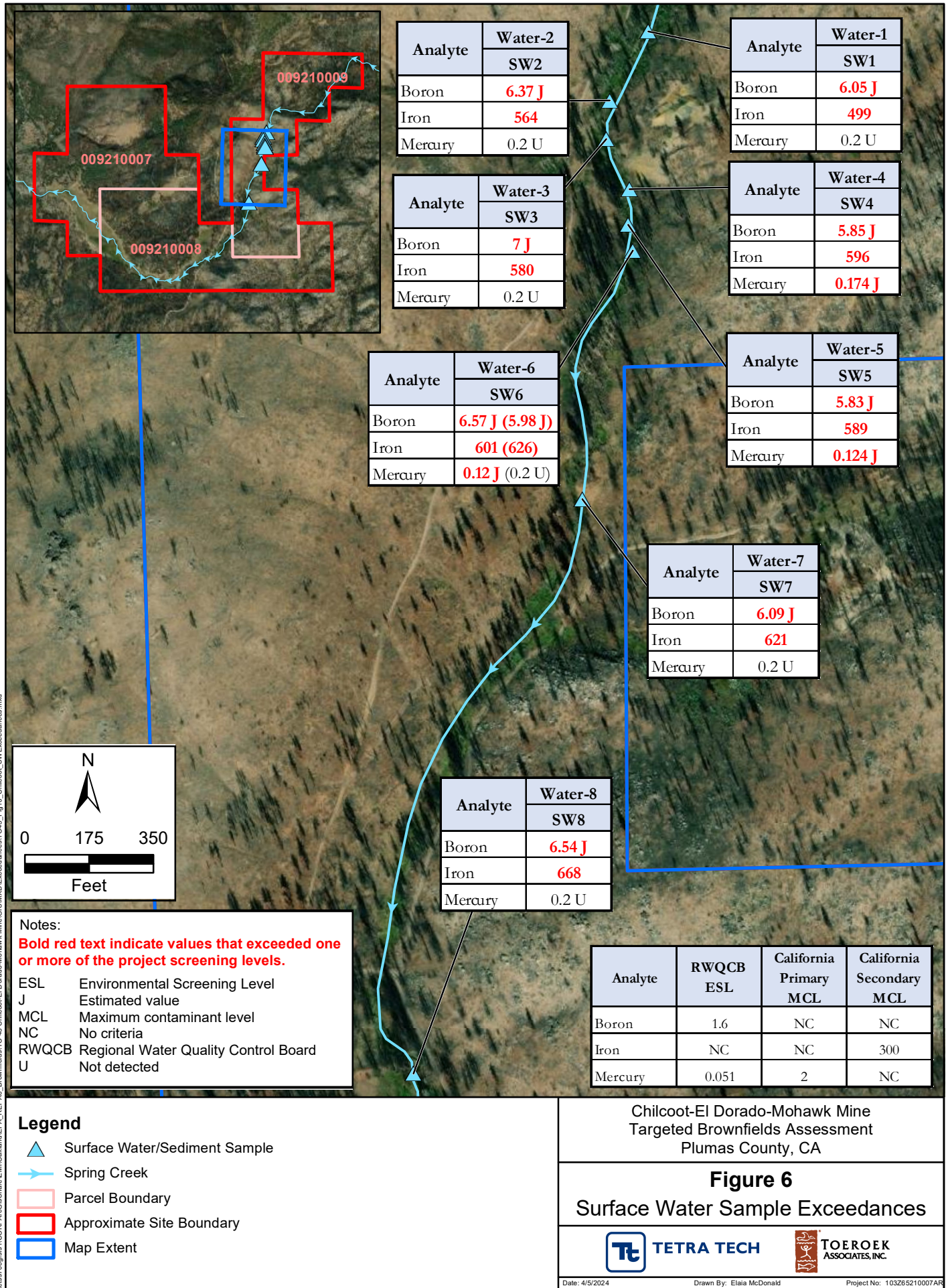
Project No: 103265210007AR



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## TABLES

**Table ES-1**  
**Summary of Cleanup Alternatives**  
**ABCA Report**  
**Chilcoot-El Dorado-Mohawk Mine**

Alternative		Actions	Effectiveness	Implementation	Cost	Considerations
1	No Action	<ul style="list-style-type: none"> <li>None.</li> </ul>	NA	NA	\$0	This alternative would not be protective of human health and would not meet the project goal for the Site.
2	Detailed HHERA, Mining Waste and Sediment Excavation, Off-site Disposal	<ul style="list-style-type: none"> <li>Conduct detailed HHERA</li> <li>Excavate mining waste and sediments with contaminant concentrations above assumed cleanup levels.</li> <li>Following characterization for disposal, haul excavated mining waste and sediment to an off-Site permitted disposal facility for disposal.</li> </ul>	High	Difficult	\$1,321,000	This alternative would allow unrestricted use of the Site.
3	Detailed HHERA, Mining Waste and Sediment Excavation, Off-Site Disposal, SMP, and ICs	<ul style="list-style-type: none"> <li>Conduct detailed HHERA</li> <li>Based upon the results of the HHERA, excavate Site mining waste and sediments with contaminant concentrations above assumed cleanup levels to a depth of 2 feet bgs or greater.</li> <li>Backfill excavation with clean soils and implement a multi-layered SMP.</li> <li>Impose ICs to prevent exposure of future users of the Site to contaminated soils remaining on the Site.</li> </ul>	Moderate	Difficult to Moderate	\$1,753,000	This alternative would allow reuse of the Site as proposed; however, ICs would be needed as long as contaminants remain at the Site at concentrations above assumed cleanup levels.

Notes:

bgs Below ground surface

O&M

Operation and maintenance

Site

Chilcoot-El Dorado-Mohawk Mine site

HHERA Human health and ecological risk assessment

SMP

Soil management plan

IC Institutional control

NA Not applicable

**Table ES-1**  
**Summary of Cleanup Alternatives**  
**ABCA Report**  
**Chilcoot-El Dorado-Mohawk Mine**

Alternative		Actions	Effectiveness	Implementation	Cost	Considerations
4	<b>Detailed HHERA, Mining Waste and Sediment Excavation, On-Site Consolidation, Capping, and ICs</b>	<ul style="list-style-type: none"> <li>• Conduct detailed HHERA</li> <li>• Based upon the results of the HHERA, excavate mining waste and sediments with contaminant concentrations above assumed cleanup levels.</li> <li>• Consolidate excavated hazardous mining waste and sediments on the Site in an area outside of the planned redevelopment area.</li> <li>• Cover excavated mining waste with cap to prevent inhalation, direct contact, and incidental ingestion by future users of the Site.</li> <li>• Impose ICs to prevent exposure of future users of the Site to contaminated soils and sediments below the cap.</li> </ul>	Moderate to High	Easy to Moderate	\$1,472,000	This alternative would allow reuse of the Site as proposed; however, ICs would be needed as long as contaminants remain at the Site at concentrations above assumed cleanup levels.
5	<b>Detailed HHERA, Mining Waste Excavation, On-Site Consolidation, Capping, SMP and ICs</b>	<ul style="list-style-type: none"> <li>• Conduct detailed HHERA</li> <li>• Based upon results of the HHERA, excavate Site mining waste with contaminant concentrations above assumed cleanup levels to depth of 2 feet bgs or greater.</li> <li>• Backfill excavation with clean soils and implement a multi-layered SMP.</li> <li>• Impose ICs to prevent exposure of future users of the Site to</li> </ul>	Moderate to High	Easy to Moderate	\$1,105,000	This alternative would allow reuse of the Site as proposed; however, ICs would be needed as long as contaminants remain at the Site at concentrations above assumed cleanup levels.

Notes:

bgs Below ground surface

O&M

Operation and maintenance

Site

Chilcoot-El Dorado-Mohawk Mine site

HHERA Human health and ecological risk assessment

SMP

Soil management plan

IC Institutional control

NA Not applicable

**Table ES-1  
Summary of Cleanup Alternatives  
ABCA Report  
Chilcoot-El Dorado-Mohawk Mine**

Alternative		Actions	Effectiveness	Implementation	Cost	Considerations
		contaminated soils remaining on the Site.				

Notes:

bgs Below ground surface

HHERA Human health and ecological risk assessment

IC Institutional control

NA Not applicable

O&M

Site

SMP

Operation and maintenance

Chilcoot-El Dorado-Mohawk Mine site

Soil management plan



**Table 1**  
**Summary of Assumed Cleanup Levels**  
**ABCA Report**  
**Chilcoot-El Dorado-Mohawk Mine**

COC	Assumed Cleanup Level	Reference
<b>Soil</b>		
Antimony	10.95 mg/kg	RWQCB ESL (2019)
Cadmium	0.36 mg/kg	EPA Eco-SSL (2023)
Cobalt	13 mg/kg	EPA Eco-SSL (2023)
Copper	28 mg/kg	EPA Eco-SSL (2023)
Iron	55,000 mg/kg	EPA RSL Residential Soil (2024)
Lead	24.918 mg/kg	USGS Plumas County Background (2024)
Molybdenum	6.9 mg/kg	RWQCB ESL (2019)
Selenium	2.4 mg/kg	RWQCB ESL (2019)
Silver	4.2 mg/kg	EPA Eco-SSL (2023)
Thallium	0.78 mg/kg	EPA RSL Residential Soil (2023)/RWQCB ESL (2019)
Uranium	16 mg/kg	EPA RSL Residential Soil (2023)/RWQCB ESL (2019)
Vanadium	140 mg/kg	EPA RSL Residential Soil (2024)
<b>Sediment</b>		
Arsenic	0.07 mg/kg	RWQCB ESL (2019)
Copper	35.7 mg/kg	NOAA SQuiRTs TEL (2008)
Vanadium	18 mg/kg	RWQCB ESL (2019)
<b>Surface Water</b>		
Boron	1.6 µg/L	RWQCB ESL (2019)
Iron	300 µg/L	California Secondary MCL (2014)
Mercury	0.051 µg/L	RWQCB Total Mercury Threshold

Notes:

µg/L      Microgram per liter  
COC      Contaminant of concern  
Eco-SSL   Ecological soil screening level  
EPA      U.S. Environmental Protection Agency  
ESL      Environmental screening level  
MCL      Maximum contaminant level  
mg/kg    Milligram per kilogram  
NOAA    National Oceanic and Atmospheric Administration  
RSL      Regional screening level  
RWQCB   San Francisco Bay Regional Water Quality Control Board  
SQuiRTs   Screening quick reference tables  
TEL      Threshold exposure limit  
USGS    U.S. Geological Survey

**Table 2**  
**Summary of Cost Estimates**  
**ABCA Report**  
**Chilcoot-El Dorado-Mohawk Mine**

Alternative		Action Cost			Total Cost
		Type of Cost	Description	Cost	
1	No Action	Capital Cost	NA	\$0	\$0
		ICs	NA	\$0	
		O&M	NA	\$0	
2	Detailed HHERA, Min and Sediment Excavation, Off-Site Disposal	Capital Cost	HHERA	\$93,000	\$1,321,000
			Soil and Sediment Excavation, Confirmation Sampling, Backfilling, Waste Characterization	\$774,000	
			Haul Road Construction	\$264,000	
			Off-Site Disposal of Soil and Sediment (Class II or III Facility)	\$190,000	
		ICs	Restrictive Covenant	\$0	
		O&M*	Routine Inspections	\$0	

Alternative		Action Cost			Total Cost
		Type of Cost	Description	Cost	
3	Detailed HHERA, Soil and Sediment Excavation, Off-Site Disposal, SMP, and ICs	Capital Cost	HHERA	\$93,000	\$1,753,000
			Soil and Sediment Excavation, Confirmation Sampling, Backfill, and Waste Characterization	\$768,000	
			Haul Road Construction	\$264,000	
			Off-Site Disposal of Soil and Sediment (Class II or II Facility)	\$506,000	
			SMP	\$31,000	
		ICs	Restrictive Covenant	\$56,000	
		O&M*	Routine Inspections, Cap Maintenance	\$35,000	
4	Detailed HHERA, Soil and Sediment Excavation, On-Site Consolidation, Capping, and ICs	Capital Cost	HHERA	\$93,000	\$1,472,000
			Soil and Sediment Excavation, Confirmation Sampling, Backfill, and Waste Characterization	\$700,000	
			Haul Road Construction	\$264,000	
			Consolidating and Capping of Contaminated Soil	\$285,000	
		ICs	Restrictive Covenant	\$56,000	
		O&M*	Routine Inspections, Cap Maintenance	\$74,000	
5	Detailed HHERA, Soil Excavation, On-Site Consolidation, Capping, SMP, and ICs	Capital Cost	HHERA	\$93,000	\$1,105,000
			Soil Excavation, Confirmation Sampling, Backfill, and Waste Characterization	\$433,000	
			Haul Road Construction	\$264,000	
			Consolidating and Capping of Contaminated Soil	\$185,000	
			SMP	\$31,000	
		ICs	Restrictive Covenant	\$56,000	
		O&M*	Routine Inspections, Cap Maintenance	\$74,000	

Notes:

\* Assumes O&M over a 30-year period at a discount rate of 7 percent.

HHERA Human health and environmental risk assessment  
IC Institutional control  
NA Not applicable

O&M Operation and maintenance  
Site Chilcoot-El Dorado-Mohawk Mine site  
SMP Soil management plan

**Table 3**  
**Summary of Alternatives Considered and Dismissed**  
**ABCA Report**  
**Chilcoot-El Dorado-Mohawk Mine**

Alternative	Description	Considerations
Bioremediation	Bioremediation involves use of microorganisms to degrade organic contaminants. The microorganisms break down contaminants by using them as a food source or co-metabolizing, converting them to end products such as methane and carbon dioxide.	Although effective for breakdown of organic contaminants in soil, this alternative is not effective for remediation of the contaminants of concern for the Site.

**Table 4**  
**Summary of Soil and Sediment Excavation Volumes**  
**ABCA Report**  
**Chilcoot-El Dorado-Mohawk Mine**

Location	Excavation Volume (CY)			
	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil	1,000	3,300	1,000	3,300
Sediment	5	5	5	NA

Notes:

CY      Cubic yards  
NA      Not applicable

**Table 5**  
**Summary of Alternatives**  
**ABCA Report**  
**Chilcoot-El Dorado-Mohawk Mine**

Criteria	Alternative 2		Alternative 3		Alternative 4		Alternative 5	
	Detailed HHERA, Soil and Sediment Excavation, Off-Site Disposal		Detailed HHERA, Soil and Sediment Excavation, Off-Site Disposal, SMP, and ICs		Detailed HHERA, Soil and Sediment Excavation, On-Site Consolidation, Capping, and ICs		Detailed HHERA, Soil Excavation, On-Site Consolidation, Capping, SMP, and ICs	
	Rating	Score	Rating	Score	Rating	Score		
Effectiveness	High	5	Moderate	3	Moderate to High	4	Moderate to High	4
Implementation	Difficult	1	Difficult to Moderate	2	Easy to Moderate	4	Easy to Moderate	4
Cost	\$1,321,000	2	\$1,853,000	3	\$1,472,000	2	\$1,105,000	2
Overall Score	8		8		10		10	

Notes:

Effectiveness Ratings:

Low	1
Low to Moderate	2
Moderate	3
Moderate to High	4
High	5

Implementation Ratings:

Difficult	1
Difficult to Moderate	2
Moderate	3
Easy to Moderate	4
Easy	5

Cost Ratings:

1	>\$3 Million
2	\$2.25 to \$3 Million
3	\$1.5 to \$2.25 Million
4	\$750,000 to \$1.5 Million
5	\$0 to \$750,000

HHERA	Human health and ecological risk assessment
IC	Institutional control
SMP	Soil management plan

## **APPENDIX A**

### **ENVIRONMENTAL FOOTPRINT EVALUATION**



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A.3 REFERENCES.....A-7

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Table A-2: Chilcoot-El Dorado-Mohawk Mine Detailed Impact Summary

**LIST OF FIGURES**

Figure A-1: Detailed Impact Charts

Figure A-2: Chilcoot-El Dorado-Mohawk Mine Site Alternative 2 Detailed Impact Charts

Figure A-3: Chilcoot-El Dorado-Mohawk Mine Site Alternative 3 Detailed Impact Charts

Figure A-4: Chilcoot-El Dorado-Mohawk Mine Site Alternative 4 Detailed Impact Charts

Figure A-5: Chilcoot-El Dorado-Mohawk Mine Site Alternative 5 Detailed Impact Charts

**LIST OF ATTACHMENTS**

Attachment A-1: SEFA Inputs





## A.1 GREEN REMEDIATION ANALYSIS

Toeroek Associates, Inc., and its subcontractor, Tetra Tech, Inc., (hereinafter the Toeroek Team), in support of the Analysis of Brownfields Cleanup Alternatives (ABCA) Report regarding the Chilcoot-El Dorado-Mohawk Mine site (the Site), conducted a green remediation analysis to assist in evaluation of potential cleanup alternatives. In the U.S. Environmental Protection Agency's (EPA) Principles for Greener Cleanups, which serves as the foundation for the greener cleanup policy, EPA (2020) identifies the following elements of a green cleanup assessment that may assist in selection and implementation of five protective cleanup activities:

- Total energy use and renewable energy use;
- Air pollutants and greenhouse gas emissions;
- Water use and effects on water resources;
- Materials management and waste reduction; and
- Land management and ecosystem protection.

The Toeroek Team conducted an analysis based on EPA's set of analytical workbooks called the Spreadsheets for Environmental Footprint Analysis (SEFA) tools to identify potential cleanup alternatives for the Site. The SEFA analysis looks at the first two bullets presented above and determines total energy usage and masses of different emissions generated by different construction activities, including greenhouse gases, nitrogen oxides, sulfur oxides, particulate matter, and listed air pollutants. Result summaries of these analyses are in [Table A-1](#) and [Table A-2](#), and on [Figure A-1](#). The SEFA analysis is based on components of each alternative as follows.

Review of analytical data from the Phase II Environmental Site Assessment (ESA) led to the following noteworthy findings:

- **Mine Waste Piles:** The acid base accounting and California waste extraction test (CA WET) results documented potential for acid mine drainage (AMD) to result in leaching of high levels of copper exceeding the soluble threshold limit concentration (STLC). Soils at sampling locations Soil-5, Soil-9, Soil-10, Soil-11, and Soil-12 are classified as California Group B mine waste. No concentration of a Resource Conservation and Recovery Act (RCRA) metal exceeded a toxic characteristic leaching procedure (TCLP) limit.



- **Metals Contamination in Soil:** Detected concentrations of antimony, cadmium, cobalt, copper, iron, lead, molybdenum, selenium, silver, thallium, uranium, and vanadium in soil exceeded at least one applicable screening level (SL).
- **Metals Contamination in Sediment:** Detected concentrations of arsenic, copper, and vanadium in sediment exceeded at least one applicable SL.
- **Metals Contamination in Surface Water:** Detected concentrations of boron, iron, and mercury in surface water samples exceeded at least one applicable SL.

The following cleanup alternatives were considered for the Site:

- Alternative 1: No Action
  - “No Action” is presented as a baseline for comparison. This alternative would involve no containment, treatment, removal, or monitoring of contaminants.
- Alternative 2: Detailed Human Health and Ecological Risk Assessment (HHERA), Mining Waste and Sediment Excavation, Off-site Disposal
  - Conduct a detailed risk assessment to evaluate risks to human and ecological receptors.
  - Excavate mining waste and sediments with contaminant concentrations above assumed cleanup levels based upon results from the Phase II ESA. The estimated amount of mining waste and sediment to be removed is 1,000 cubic yards (CY).
  - Following excavation, conduct five-point composite confirmation soil and sediment sampling of the walls and floor of each excavation area to ensure contaminant concentrations in remaining soils are below assumed cleanup levels.
  - Stockpile excavated mining waste and sediment on the Site for waste profile characterization before off-Site disposal. Following characterization for disposal, haul excavated mining waste and sediment to an off-Site permitted disposal facility for disposal. Depending on hazardous and leaching characteristics, waste disposal may occur at an appropriate non-hazardous or hazardous waste permitted facility.
  - Backfill excavated areas with clean fill material, and grade and seed as appropriate.
  - This alternative would allow unrestricted use of the Site.
- Alternative 3: Detailed HHERA, Mining Waste and Sediment Excavation, Off-site Disposal, Soil Management Plan (SMP), and Institutional Controls (ICs)



- This alternative would involve a detailed risk assessment to evaluate risks to human and ecological receptors if contaminated soil, sediment, and surface water are left in place. Based on results of the HHERA conducted as part of this alternative, contaminated mining waste and sediment at the Site would be excavated to depth of 2 feet below ground surface (bgs) or a depth determined appropriate for protection of human and ecological health at the Site.
- This alternative would involve removal of mining waste and sediment containing contaminant concentrations above assumed cleanup levels detected during the Phase II ESA, and transport of the contaminated mining waste and sediment off Site for disposal.
- Removal of contaminated sediment likely would remove the source of contamination to surface water. Therefore, surface water would not be addressed under this alternative, but management of it would be necessary during cleanup activities.
- If threatened or endangered species are present on the Site, preparation of a biological assessment may be necessary in consultation with the California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS).
- Following excavation, five-point composite confirmation soil and sediment samples would be collected from the walls and the floor of each excavation area to determine contaminant concentrations in remaining soils and sediment.
- Excavated soils and sediment would be hauled to an off-Site permitted disposal facility for disposal. Depending on hazardous and leaching characteristics, disposal of waste may occur at a Class I, II, or III permitted facility.
- This alternative would also include an SMP to guide proper handling of contaminated soil remaining on the Site below the excavation depth of 2 feet bgs. The SMP would present a tiered approach to soil management, regulatory approval, documentation, and record keeping to minimize administrative requirements.
- ICs would be necessary to ensure that an SMP is in place to manage contaminated soils and maintain cover (clean material backfill) over these areas, and prevent exposure of future users of the Site to contaminated soils.
- This alternative would allow for reuse of the Site as proposed; however, ICs would be required for as long as soils containing concentrations above assumed cleanup levels remain at the Site.
- Long-term operation and maintenance (O&M) would be required to ensure effectiveness and protectiveness of the ICs.



- Alternative 4: Detailed HHERA, Mining Waste and Sediment Excavation, On-Site Consolidation, Capping, and ICs
  - This alternative would involve a detailed risk assessment to evaluate risks to human and ecological receptors if contaminated soil, sediment, and surface water are left in place. Based on results of the HHERA conducted as part of this alternative, contaminated mining waste and sediment would be consolidated on Site and capped with a lined earthen cap.
  - This alternative would permit retention on Site of mining waste and sediment contamination above assumed cleanup levels identified in the Phase II ESA, with appropriate action taken to cap remaining contamination.
  - Removal and on-Site consolidation of contaminated sediment likely would remove the source of contamination to surface water. Therefore, surface water would not be addressed under this alternative, but management of it would be necessary during cleanup activities.
  - If threatened or endangered species are present on the Site, preparation of a biological assessment may be necessary in consultation with CDFW and USFWS.
  - Mining waste and sediment containing contaminant concentrations exceeding assumed cleanup levels would be consolidated in the southern portion of the Site or another area determined to be acceptable. Contaminated soils and sediment would be capped with a lined clay cap to prevent direct contact of future workers, recreational users, and ecological receptors. The location and design of the consolidated, capped soil and sediment shall comply with all requirements in Title 27 of the *California Code of Regulations*. In general, the location of the consolidated, capped waste should be located in an area of that site such that the waste is isolated to protect water quality and human health.
  - Fencing around the capped area also may be required to restrict access to the area and protect the cap.
  - To ensure contaminants will not leach from consolidated soil and sediment, stabilization of these may be necessary for samples that fail the TCLP and CA WET. A bottom liner under soils/sediment in the deposition area also may be required.
  - ICs would be necessary to prevent exposure of recreational users and ecological receptors to contaminated soils and sediment below the cap, and to restrict land use within the area to be capped. In addition, long-term O&M would be required to ensure effectiveness of the cap and protectiveness of ICs.



- This alternative would allow reuse of the Site as proposed; however, maintenance of the cap and ICs would be required for as long as concentrations of contaminants above assumed cleanup levels remain at the Site.
- Alternative 5: Detailed HHERA, Mining Waste Excavation, On-Site Consolidation, Capping, SMP, and ICs
  - This alternative would involve a detailed risk assessment to evaluate risks to human and ecological receptors if contaminated soil, sediment, and surface water are left in place. Based on results of the HHERA conducted as part of this alternative, contaminated soils and sediment at the Site would be excavated to depth of 2 feet bgs or a depth determined appropriate for the plant species present at the Site.
  - This alternative would involve removal of mining waste containing contaminant concentrations above assumed cleanup levels detected during the Phase II ESA, and transport of the contaminated soil off Site for disposal.
  - Removal of contaminated soil likely would remove the source of contamination to surface water. Therefore, surface water and sediment would not be addressed under this alternative, but management of it would be necessary during cleanup activities.
  - If threatened or endangered species are present on the Site, preparation of a biological assessment may be necessary in consultation with the CDFW and USFWS.
  - Following excavation, five-point composite confirmation soil and sediment samples would be collected from the walls and the floor of each excavation area to determine contaminant concentrations in remaining soils and sediment.
  - This alternative would also include an SMP to guide proper handling of contaminated soil remaining on the Site below the excavation depth of 2 feet bgs. The SMP would present a tiered approach to soil management, regulatory approval, documentation, and record keeping to minimize administrative requirements.
  - Mining waste containing contaminant concentrations exceeding assumed cleanup levels would be consolidated in the southern portion of the Site or another area determined to be acceptable. Contaminated mining waste would be capped with a lined clay cap to prevent direct contact of future workers, recreational users, and ecological receptors. The location and design of the consolidated, capped mining waste shall comply with all requirements in Title 27 of the *California*



*Code of Regulations.* In general, the location of the consolidated, capped waste should be located in an area of that site such that the waste is isolated to protect water quality and human health.

- Fencing around the capped area also may be required to restrict access to the area and protect the cap.
- To ensure contaminants will not leach from consolidated mining waste, stabilization of these may be necessary for samples that fail the TCLP and CA WET. A bottom liner under mining waste in the deposition area also may be required.
- ICs would be necessary to prevent exposure of recreational users and ecological receptors to contaminated mining waste below the cap, and to restrict land use within the area to be capped. In addition, long-term O&M would be required to ensure effectiveness of the cap and protectiveness of ICs.
- This alternative would allow reuse of the Site as proposed; however, maintenance of the cap and ICs would be required for as long as concentrations of contaminants above assumed cleanup levels remain at the Site.

#### SEFA Analysis

EPA (2019) developed a set of analytical workbooks called the SEFA tools to help decision-makers analyze the environmental footprint of a site cleanup project, determine which cleanup activities drive the footprint, and adjust project parameters to reduce the footprint. Information to be input into the spreadsheets was gathered from the Phase II ESA (Toeroek Team 2024), field records, and other existing resources.

Automated calculations within SEFA generate outputs that quantify 21 metrics corresponding to core elements of a greener cleanup in response to climate change. The Toeroek Team use the SEFA tools to conduct an analysis of each alternative for the Site.

The SEFA tools require input of different equipment types, distances to transport personnel, on-site electricity use, materials use and transportation, waste disposal and transportation, and type of water used. These inputs were required for each component of the cleanup alternative. The Toeroek Team estimated these inputs for the Site. Example components of an alternative include excavation, transportation, and O&M.

SEFA then automatically calculates the energy and emissions derived from the inputs. The different types of energy and emissions include total energy consumed, greenhouse gas emissions, nitrate emissions, sulfate emissions, particulate matter emissions, and listed air pollutants emissions. Methane emissions are not directly calculated by SEFA but are included as part of greenhouse gases emissions. Based on this information, quantification of effects of emitted greenhouse gas emissions on the climate under each alternative is possible.



Results of the SEFA analysis of each potential alternative for the Site are included in [Table A-1](#) and [Table A-2](#) and [Figure A-1](#) through [Figure A-5](#).



## A.2 FINDINGS AND CONCLUSIONS

Summarized results of the green remediation analyses are in [Table A-1](#). Relative impacts listed in this table constitute a qualitative assessment of the relative footprint of each alternative: a rating of “High” for an alternative is assigned if it would affect 50 percent of the maximum footprint, a rating of “Medium” is assigned if it would affect between 20 and 50 percent of the maximum footprint, and a rating of “Low” is assigned if it would affect less than 20 percent of the maximum footprint.

Impacts under Alternative 2 (Detailed HHERA, Soil and Sediment Excavation, Off-Site Disposal) are rated as medium except for particulate matter emissions, which are rated high. Impacts under Alternative 3 (Detailed HHERA, Soil and Sediment Excavation, Off-Site Disposal, SMP, and ICs) are rated as medium for all emissions categories except for NO<sub>x</sub> and LAP emissions which are rated as low. Impacts under Alternative 4 (Detailed HHERA, Soil and Sediment Excavation, On-Site Consolidation, Capping, and ICs) are rated as medium for all emissions categories except particulate matter emissions, which are rated as low. Impacts under Alternative 5 are rated as low for all emissions categories. For the purposes of this green remediation analysis, O&M is assumed to continue for a period of 30 years. Alternative 5 would affect the smallest environmental footprint. [Tables A-1](#), [Table A-2](#), and [Figure A-1](#) summarize impacts of all alternatives. [Figure A-2](#) through [Figure A-5](#) compares impacts of each component in more detail.





### A.3 REFERENCES

- Toeroek Associates, Inc., and its subcontractor, Tetra Tech, Inc. (Toeroek Team). 2024. Final Phase II Environmental Site Assessment Targeted Brownfields Assessment Report, Chilcoot – El Dorado – Mohawk Mine, Chilcoot, California. July.
- U.S. Environmental Protection Agency (EPA). 2019. EPA Spreadsheets for Environmental Footprint Analysis (SEFA). Office of Superfund Remediation and Technology Innovation.  
<https://clu-in.org/greenremediation/SEFA/>
- U.S. Environmental Protection Agency (EPA). 2020. EPA Principles for Greener Cleanups.  
<https://www.epa.gov/greenercleanups/epa-principles-greener-cleanups>

## TABLES

**Table A-1. Chilcoot-EI Dorado-Mohawk Mine Relative Impact of Alternatives**

Removal Alternatives	Total Energy Used	GHG Emmissions	NO <sub>x</sub> Emissions	SO <sub>x</sub> Emissions	PM Emissions	EPA LAP Emissions
	MMBTU	metric ton	lbs	lbs	lbs	lbs
Alternative 1: No Action	0	0	0	0	0	0
Alternative 2: HHERA, Removal of Stockpiled Soil, Soil Excavation, and Off-Site Disposal	14,038	2,213,851	11,431	2,610	9,104	108
Alternative 3: HHERA, Soil and Sediment Excavation, Off-Site Disposal, Capping, SMP, and ICs	11,387	1,350,859	5,607	2,828	2,678	56
Alternative 4: HHERA, Soil and Sediment Excavation, On-Site Consolidation, Capping, and ICs	16,952	2,301,661	10,332	2,366	922	105
Alternative 5: HHERA, Soil Excavation, SMP, On-Site Consolidation, Capping, SMP and Ics	7,122	762,527	2,677	1,167	326	39

Removal Alternatives	Total Energy Used	GHG Emmissions	NO <sub>x</sub> Emissions	SO <sub>x</sub> Emissions	PM Emissions	EPA LAP Emissions
	MMBTU	metric ton	lbs	lbs	lbs	lbs
Alternative 1: No Action	Low	Low	Low	Low	Low	Low
Alternative 2: HHERA, Soil and Sediment Excavation, Soil Excavation, and Off-Site Disposal	Medium	Medium	Medium	Medium	High	Medium
Alternative 3: HHERA, Soil and Sediment Excavation, Off-Site Disposal, SMP, and ICs	Medium	Medium	Low	Medium	Medium	Low
Alternative 4: HHERA, Soil and Sediment Excavation, On-Site Consolidation, Capping, and ICs	Medium	Medium	Medium	Medium	Low	Medium
Alternative 5: HHERA, Soil Excavation, SMP, On-Site Consolidation, Capping, SMP and Ics	Low	Low	Low	Low	Low	Low

Notes:

The relative impact is a qualitative assessment of the relative footprint of each alternative: a rating of "High" for an alternative is assigned if it is 50 percent of the maximum footprint, a rating of "Medium" is assigned if it is between 20 and 50 percent of the maximum footprint, and a rating of "Low" is assigned if it is less than 20 percent of the maximum footprint.

List of LAPs are included in this list: <https://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications>

EPA	U.S. Environmental Protection Agency	MMBTU	Million British thermal unit
GHG	Greenhouse gas	NO <sub>x</sub>	Nitrogen oxide
LAP	Listed air pollutant	PM	Particulate matter
lbs	Pounds	SO <sub>x</sub>	Sulfur oxide

**Table A-2. Chilcoot-El Dorado-Mohawk Mine Detailed Impact Summary**

Phase	Activities	Total Energy Used	GHG Emissions	NO <sub>x</sub> Emissions	SO <sub>x</sub> Emissions	PM Emissions	EPA LAP Emissions
		MMBTU	metric ton	lbs	lbs	lbs	lbs
Alternative 1	On-Site <sup>1</sup>	0	0	0	0	0	0
	Electricity Generation	0	0	0	0	0	0
	Transportation	0	0	0	0	0	0
	Other Off-Site <sup>2</sup>	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Alternative 2	On-Site <sup>1</sup>	5,699	911,832	4,141	5	369	2
	Electricity Generation	0	0	0	0	0	0
	Transportation	2,933	474,881	3,460	108	76	3
	Other Off-Site <sup>2</sup>	5,406	827,138	3,830	2,497	8,659	103
	Total	14,038	2,213,851	11,431	2,610	9,104	108
Alternative 3	On-Site <sup>1</sup>	2,157	345,140	1,568	2	140	1
	Electricity Generation	0	0	0	0	0	0
	Transportation	841	136,169	954	29	23	2
	Other Off-Site <sup>2</sup>	8,389	869,550	3,085	2,797	2,515	53
	Total	11,387	1,350,859	5,607	2,828	2,678	56
Alternative 4	On-Site <sup>1</sup>	6,429	1,028,653	4,672	6	416	2
	Electricity Generation	0	0	0	0	0	0
	Transportation	3,063	495,853	3,575	111	80	4
	Other Off-Site <sup>2</sup>	7,460	777,155	2,085	2,249	426	99
	Total	16,952	2,301,661	10,332	2,366	922	105
Alternative 5	On-Site <sup>1</sup>	1,324	211,792	962	1	86	0
	Electricity Generation	0	0	0	0	0	0
	Transportation	657	106,449	740	23	18	2
	Other Off-Site <sup>2</sup>	5,141	44,286	974	1,143	222	37
	Total	7,122	762,527	2,677	1,167	326	39

Notes:

1. On-Site refers to fuel consumption on Site (i.e., heavy equipment).

2. Other off-Site refers to all other energy uses not covered under on Site, electricity generation, or transportation, such as energy required for producing materials (i.e., polyvinyl chloride, gravel, and granular activated carbon), lab analyses, and production of fuels.

EPA	U.S. Environmental Protection Agency	lbs	Pounds	PM	Particulate matter
GHG	Greenhouse gas	MMBTU	Million British thermal unit	SO <sub>x</sub>	Sulfur oxide
LAP	Listed air pollutant	NO <sub>x</sub>	Nitrogen oxide		

## FIGURES

Figure A-1: Detailed Impact Charts

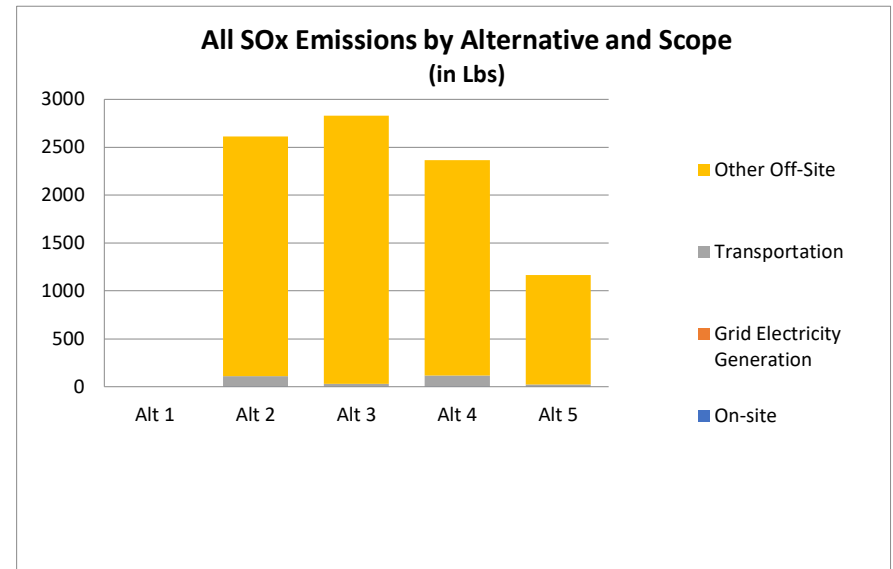
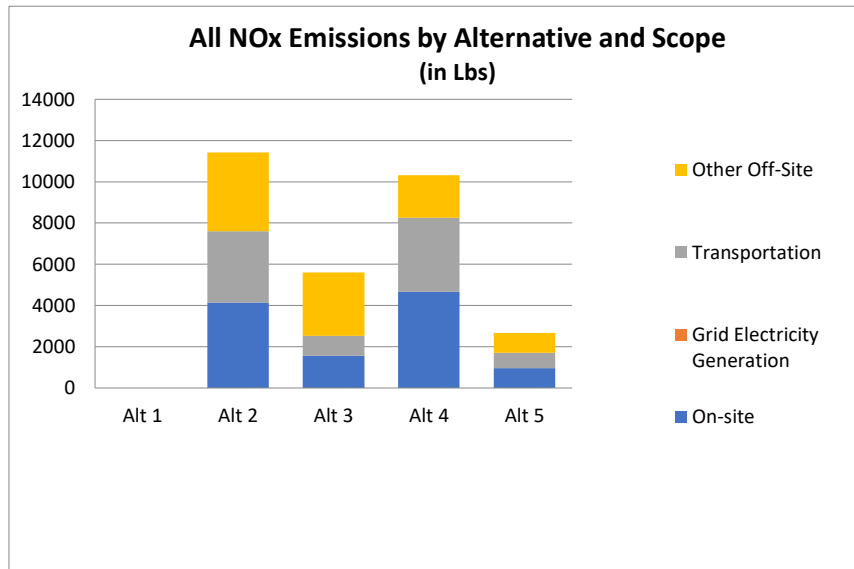
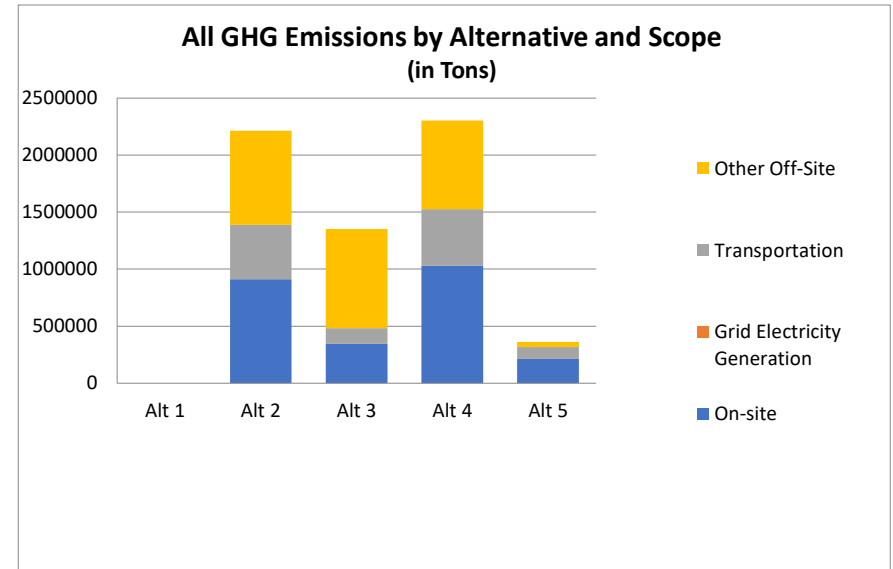
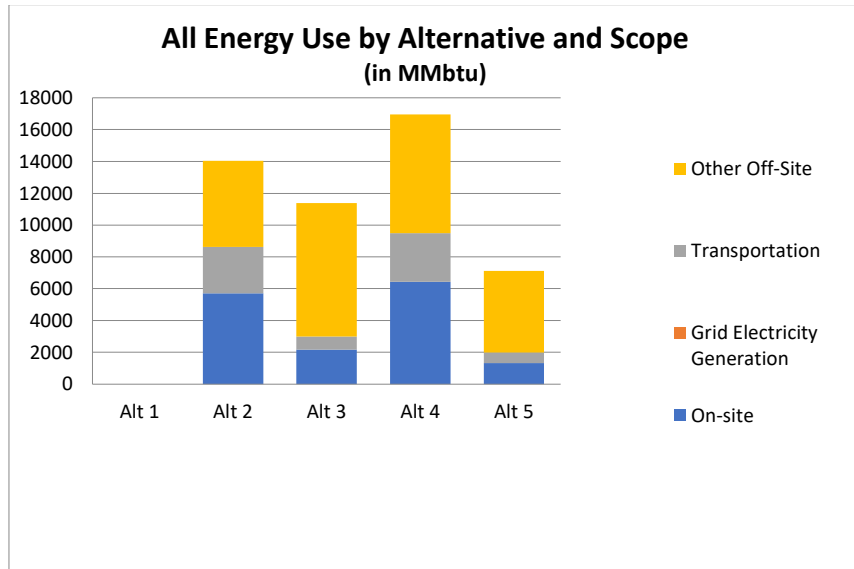
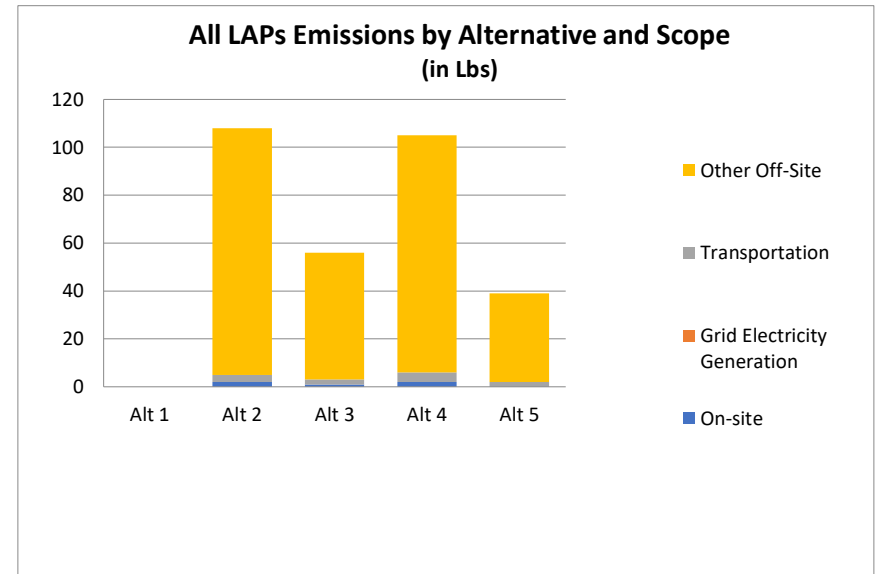
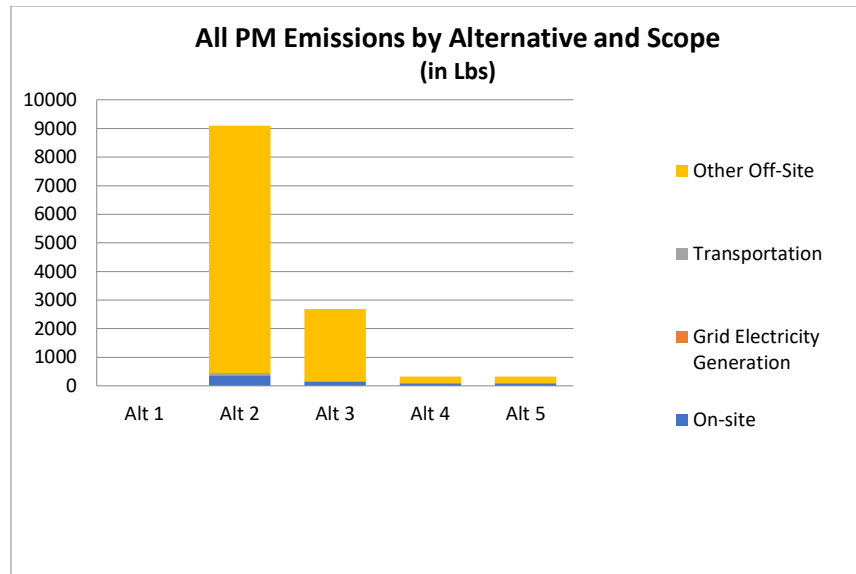


Figure A-1: Detailed Impact Charts

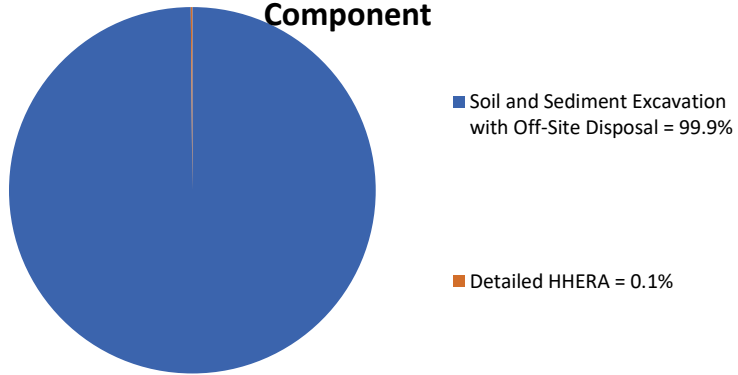


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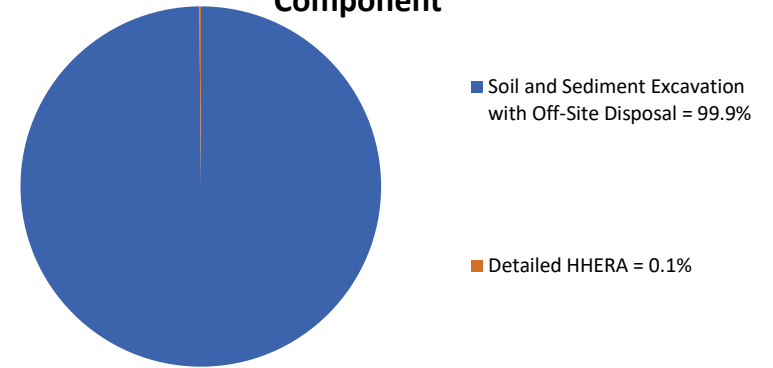
EPA	U.S. Environmental Protection Agency	MMBTU	Million British thermal unit
GHG	Greenhouse gas	NOx	Nitrogen oxide
LAP	Listed air pollutant	PM	Particulate matter
lbs	Pounds	SOx	Sulfur oxide

Figure A-2. Chilcoot-El Dorado-Mohawk Mine Site Alternative 2 Detailed Impact Charts

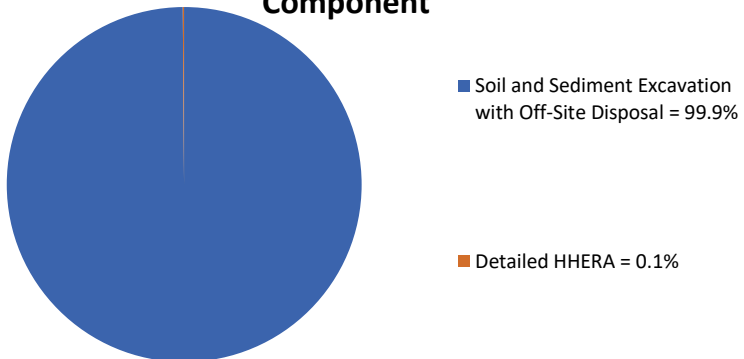
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### Alternative 2 All GHG Emissions by Remedy Component



### Alternative 2 All NOx Emissions by Remedy Component



### Alternative 2 All SOx Emissions by Remedy Component

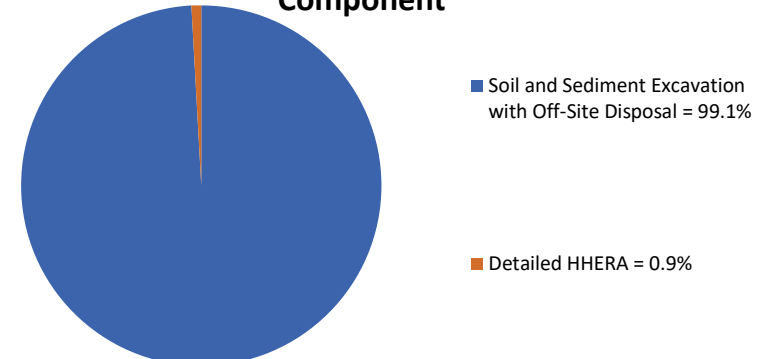
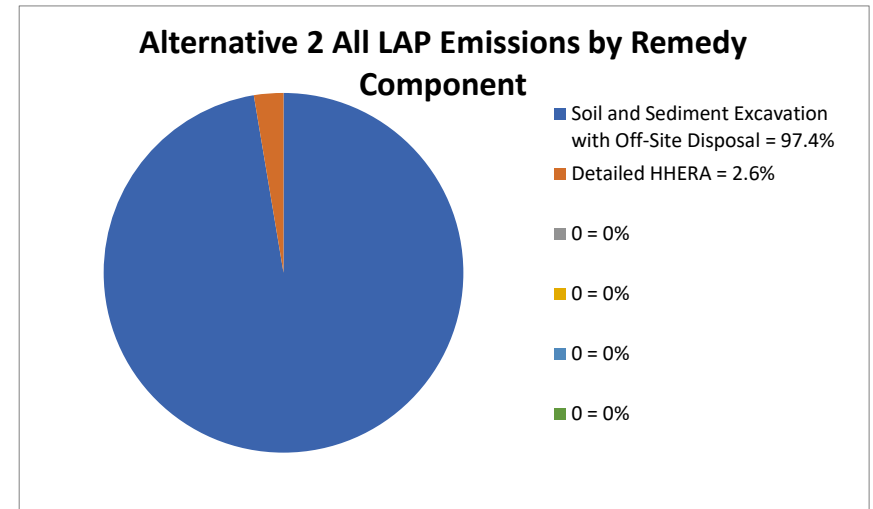
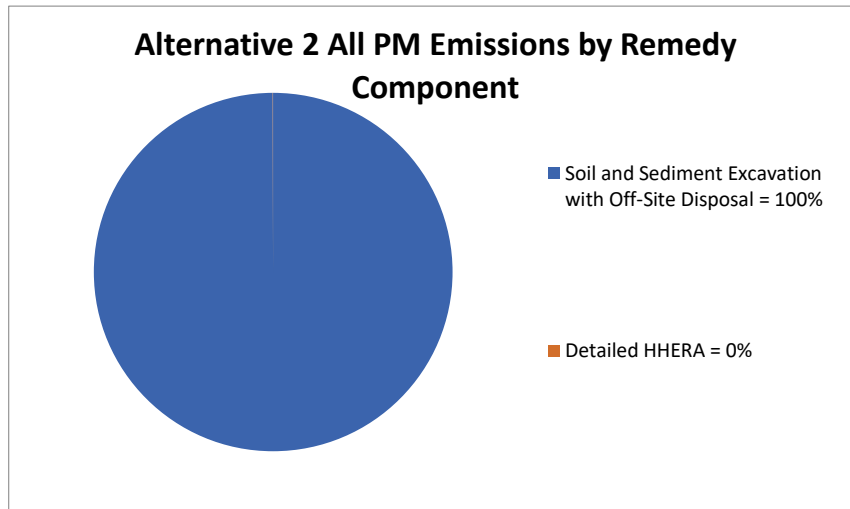




Figure A-2. Chilcoot-El Dorado-Mohawk Mine Site Alternative 2 Detailed Impact Charts

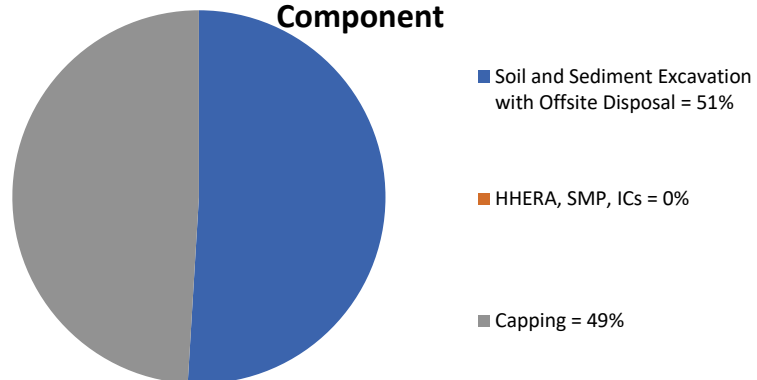


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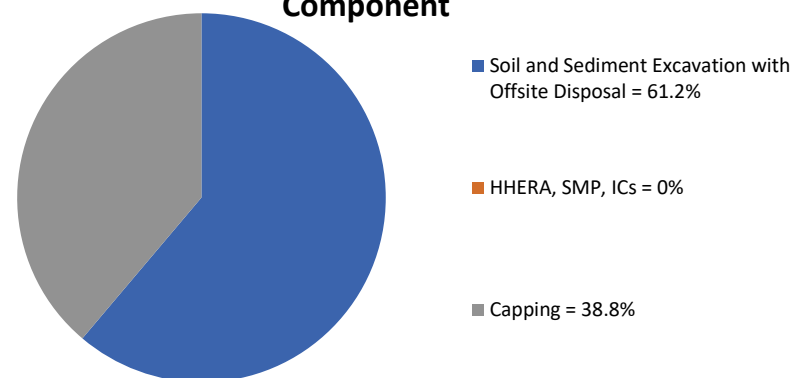
GHG	Greenhouse gas
HHERA	Human health and ecological risk assessment
LAP	Listed air pollutant
NOx	Nitrogen oxide
PM	Particulate matter
SOx	Sulfur oxide

Figure A-3. Chilcoot-El Dorado-Mohawk Mine Site Alternative 3 Detailed Impact Charts

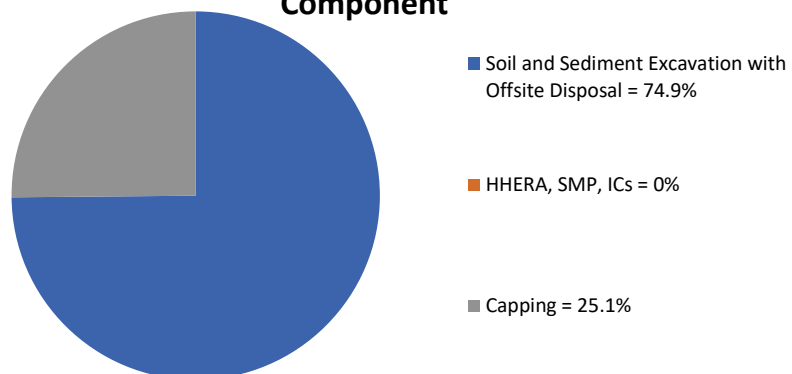
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### Alternative 3 All GHG Emissions by Remedy Component



### Alternative 3 All NOx Emissions by Remedy Component



### Alternative 3 All SOx Emissions by Remedy Component

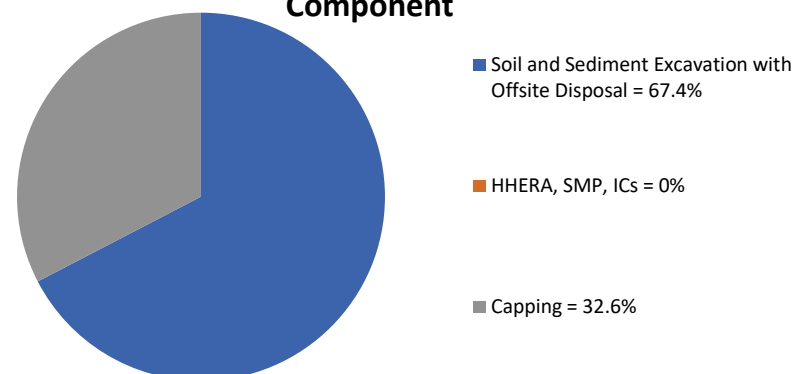
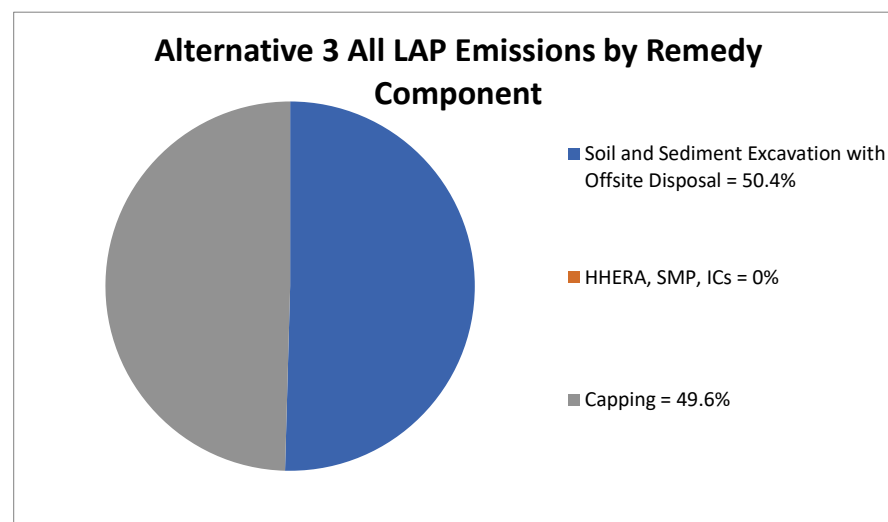
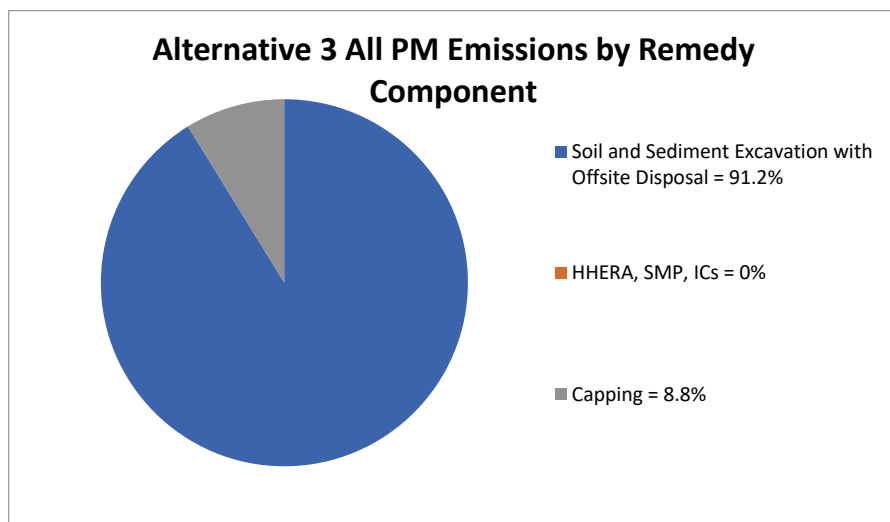


Figure A-3. Chilcoot-EI Dorado-Mohawk Mine Site Alternative 3 Detailed Impact Charts

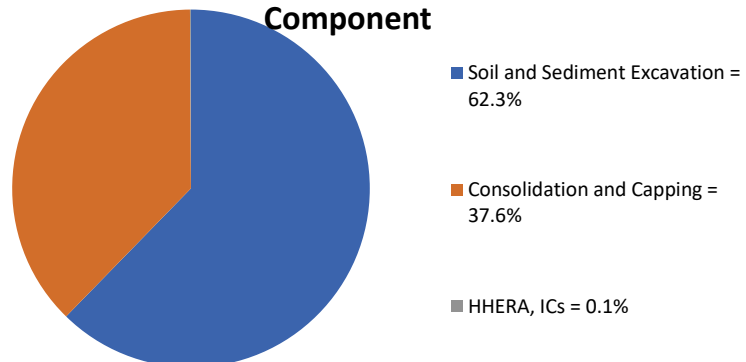


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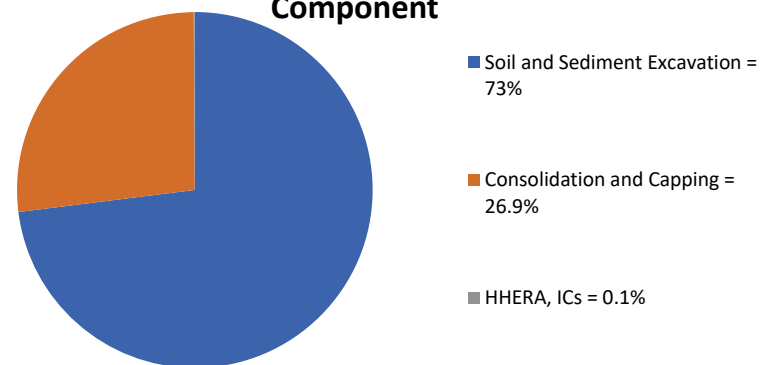
GHG	Greenhouse gas
HHERA	Human health and ecological risk assessment
IC	Institutional control
LAP	Listed air pollutant
NOx	Nitrogen oxide
PM	Particulate matter
SMP	Soil management plan
SOx	Sulfur oxide

Figure A-4. Chilcoot-El Dorado-Mohawk Mine Site Alternative 4 Detailed Impact Charts

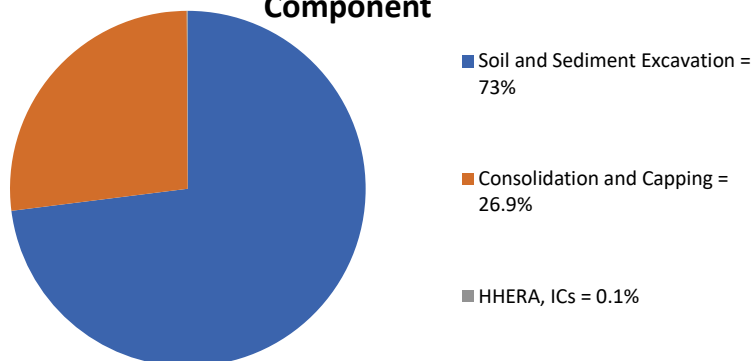
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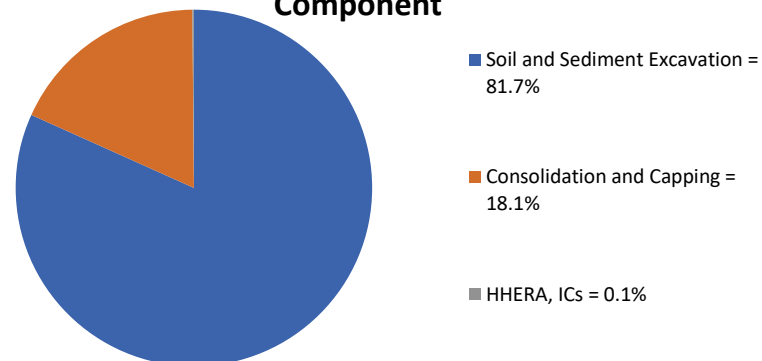
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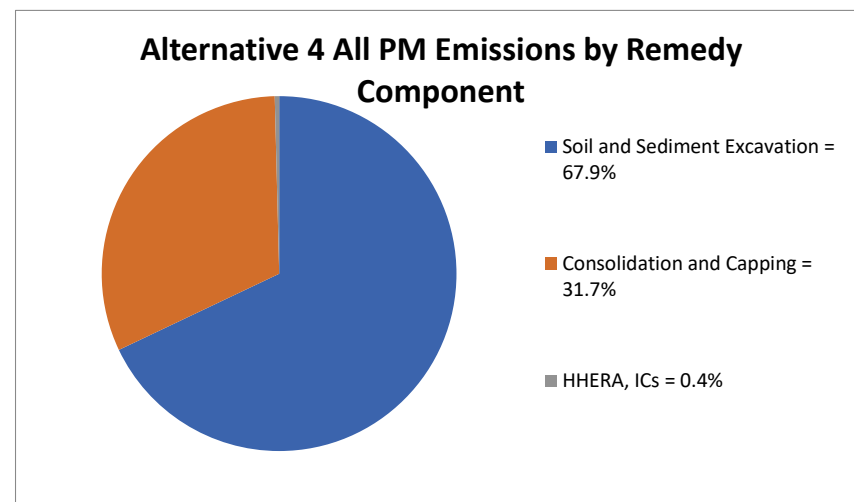
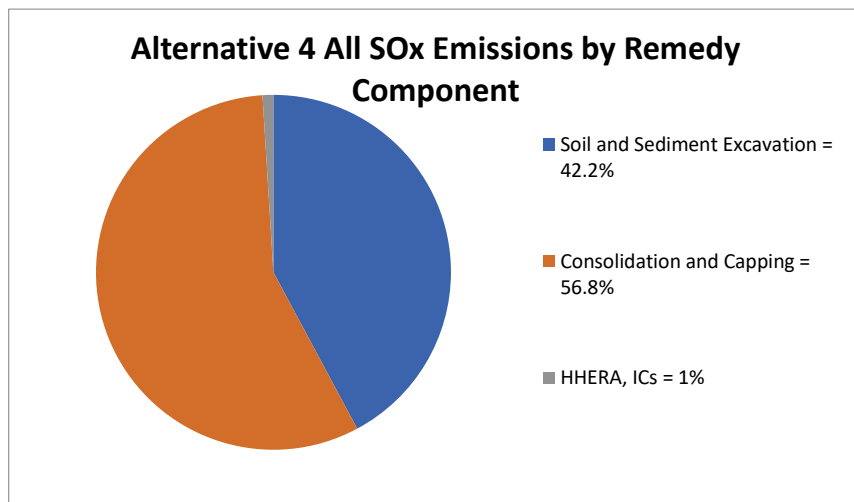
### Alternative 4 All GHG Emissions by Remedy Component



### Alternative 4 All NOx Emissions by Remedy Component



**Figure A-4. Chilcoot-El Dorado-Mohawk Mine Site Alternative 4 Detailed Impact Charts**



**Notes:**

GHG	Greenhouse gas
HHERA	Human health and ecological risk assessment
IC	Institutional control
NOx	Nitrogen oxide
PM	Particulate matter
SOx	Sulfur oxide

Figure A-5. Chilcoot-El Dorado-Mohawk Mine Site Alternative 5 Detailed Impact Charts

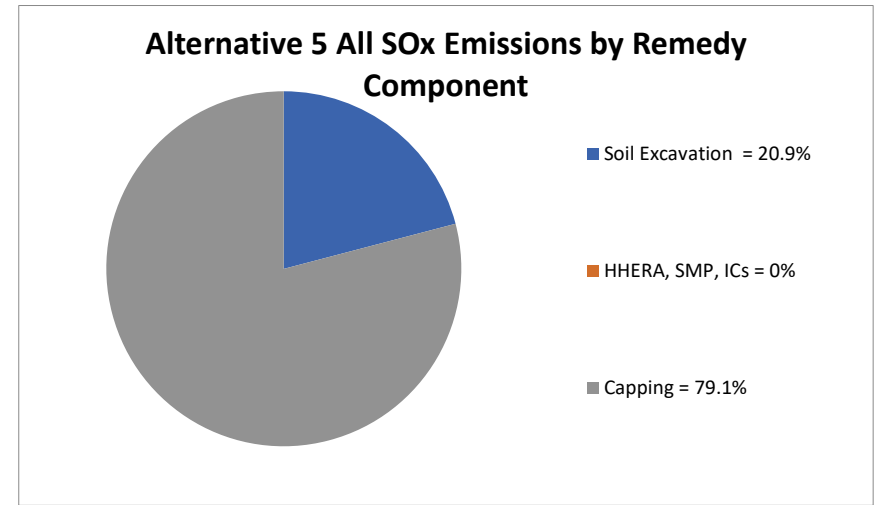
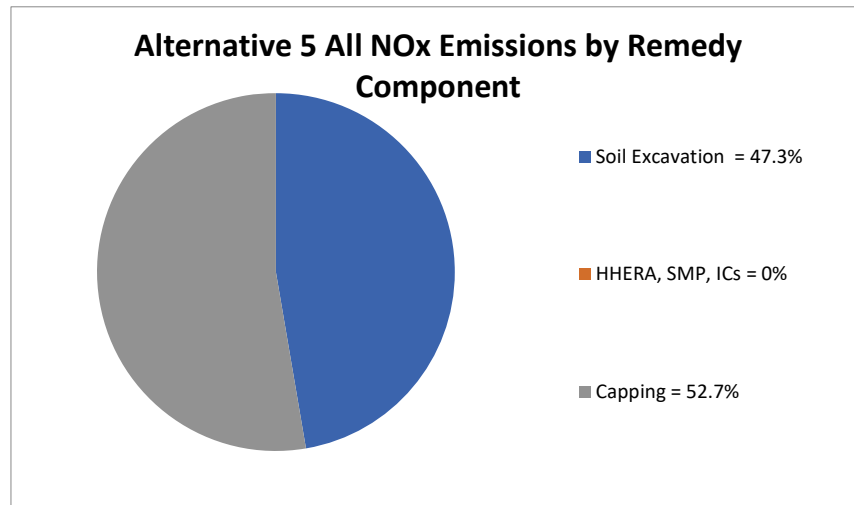
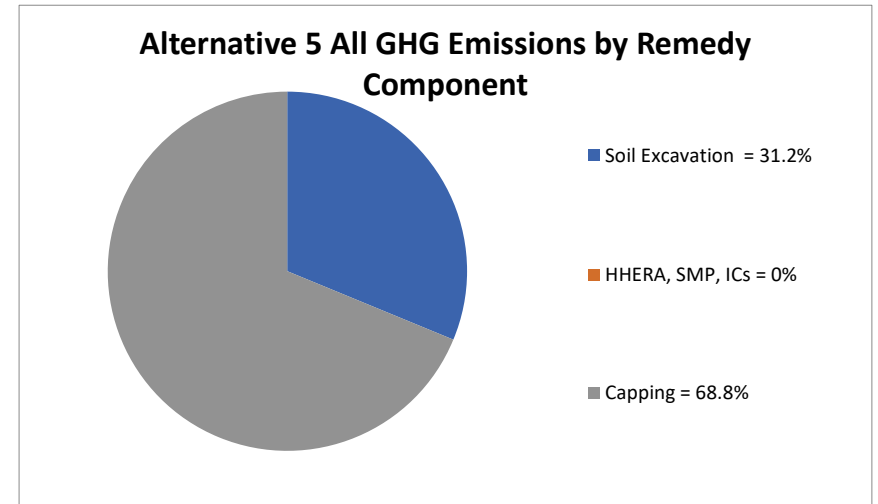
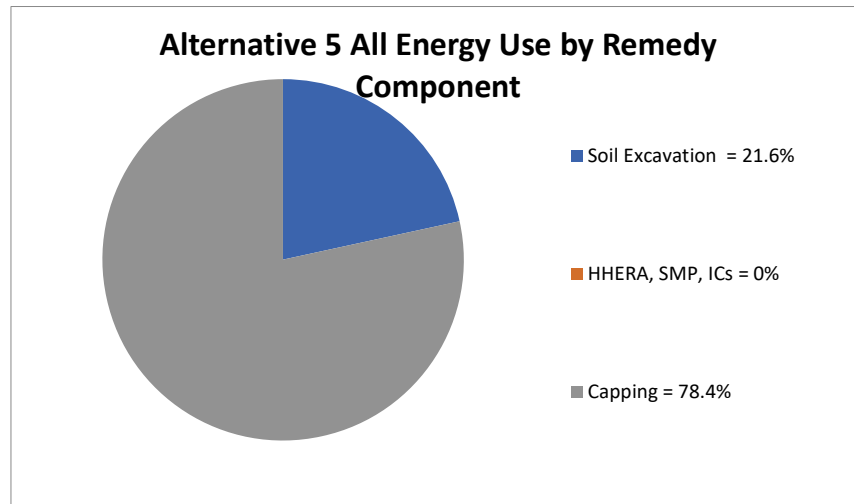
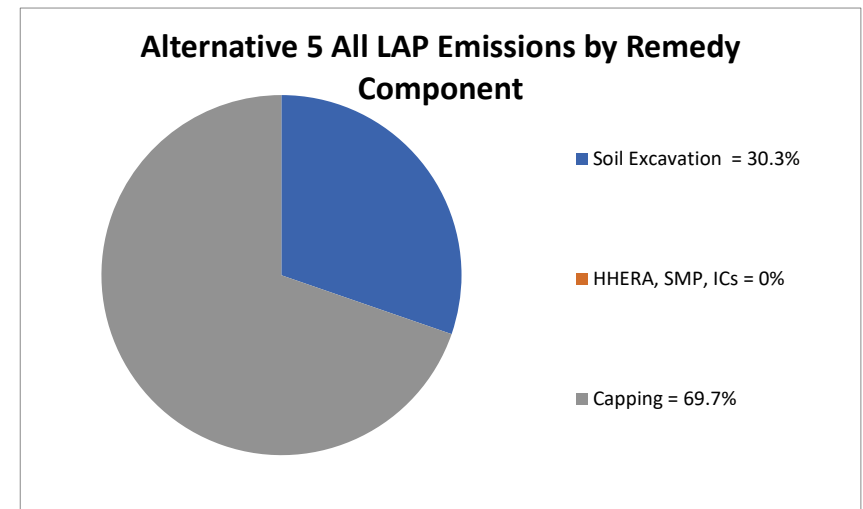
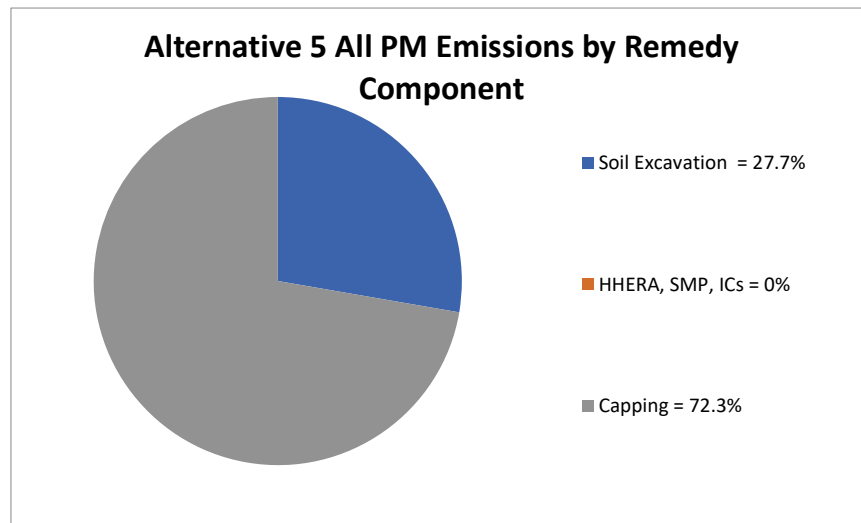


Figure A-5. Chilcoot-El Dorado-Mohawk Mine Site Alternative 5 Detailed Impact Charts



Notes:

GHG	Greenhouse gas
HHERA	Human health and ecological risk assessment
IC	Institutional control
LAP	Listed air pollutant
NOx	Nitrogen oxide
PM	Particulate matter
SOx	Sulfur oxide

**ATTACHMENT A-1**

**SEFA INPUTS**



### Input Worksheet for Excavation

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	Component 1	Soil and Sediment Excavation with Off-Site Disposal
--	-------------	---

### General Scope

Excavate all Site soils and sediment with contaminant concentrations above assumed cleanup levels, based on results from the Phase II ESA. Following excavation, conduct five-point composite confirmation soil and sediment sampling of the walls and the floor of each excavation area to ensure contaminant concentrations in remaining soils and sediments are below assumed cleanup levels. Stockpile excavated soil on the Site for waste profile characterization before off-Site disposal. Follow characterization for disposal, haul excavated soils and sediment to an off-site permitted disposal facility for disposal. Depending on hazardous and leaching characteristics, waste disposal may occur at an appropriate non-hazardous or hazardous waste facility.

#### Example Items Eliminated through Screening Process

Example Items Eliminated through Screening Process
Bioremediation, phytoremediation, thermal treatment, etc.

### Other Notes and References

**Other Notes and References**

### Personnel Transportation

[illegible]

\* See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.

\*\* for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/miles for Fuel Usage Rate; for electricity, units are miles/kWh for Fuel Usage Rate and the kWh (Fuel Used) are added to total grid electricity used (cell G69).

#### On-Site Equipment Use and Transportation

[illegible]

\* HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.

\*\* For biodiesel, B20, diesel, gasoline, and liquified petroleum gas, units are gallons for Fuel Used for On-site Equipment and gallons/hr for Equipment Fuel Usage Rate; for compressed natural gas units are ccf (hundreds of cubic feet) for Fuel Used for On-site Equipment and ccf/hr for Equipment Fuel Usage Rate.

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Remedy Component that this Input worksheet is part of:

Component 1	Soil and Sediment Excavation with Off-Site Disposal
-------------	---

### On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
On-Site Generator, 55 kW							
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<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
Estimated Total Electricity Usage Based on Above						0	
Renewable Electricity Generated On-Site*							
Total Electricity Usage Based on Personnel Transportation						0	
Total Grid Electricity Used						0	

\* Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).

### Materials Use and Transportation

[illegible]

*\* Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.*

**\*\* Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.**

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, O, and Q. Units are gallons for Fuel Used for Materials Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

### On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (cdf)	Notes
					0	
				0		
<b>Totals</b>			0	0	0	

**Landfill Gas Combusted On-Site for Energy Use**

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Used for electricity?	Landfill Gas Methane Used (ccf)	Notes
				0	
				0	
				0	
				0	
			Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

## Input Worksheet for Excavation

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine -

Remedy Component that this Input worksheet is part of:

Component 1	Soil and Sediment Excavation with Off-Site Disposal
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## Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Include Return Trip in Calculations?	Total Distance Transported (miles)	Mode of Transportation**	Transport Fuel Type	Default Transport Fuel Usage Rate (gptm or mpg)	Transport Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
Off-site non-hazardous waste landfill	tons	3802	3802	25	75	1	No	75	Truck (mpg)	Diesel	6		12.5	
Off-site hazardous waste landfill	tons	15800	15800	500	100	1	No	100	Truck (mpg)	Diesel	6		16.7	
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											

\* No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.

\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Type of Water Used

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
Public Water	gal x 1000	650	2710.5				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

\* Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

**Remedy Component that this Input worksheet is part of:**

Component 1	Soil and Sediment Excavation with Off-Site Disposal
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### Other Energy Use and Air Emissions

Item	Units	Quantity	Notes
<u>On-Site</u>			
User-defined on-site conventional energy use #1	*User-Defined TBD		
User-defined on-site conventional energy use #2	*User-Defined TBD		
On-site HAP process emissions**	lbs		
On-site GHG emissions**	lbs CO2e		
On-site carbon storage**	lbs CO2e		
Landfill gas flared on-site	ccf CH4		
Other on-site NOx emissions or reductions**	lbs		
Other on-site SOx emissions or reductions**	lbs		
Other on-site PM emissions or reductions**	lbs		
<u>Transportation</u>			
	Units	Quantity	Notes
User-defined conventional energy transportation #1	*User-Defined TBD	10	
User-defined conventional energy transportation #2	*User-Defined TBD		

\* Enter units and conversion factors on "User Defined Factors" tab

\*\* Enter a positive number for emissions and a negative number for reductions, avoidances, or storage

See the "Detailed Notes and Explanations" tab for use of this table.

#### Other Voluntary Renewable Energy Use

Item	Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD	
User-defined on-site renewable energy use #2	*User-Defined	TBD	
User-defined renewable energy transportation #1	*User-Defined	TBD	
User-defined renewable energy transportation #2	*User-Defined	TBD	
Voluntary purchase of renewable electricity**	MWh		
Voluntary purchase of RECs**	MWh		

\* Enter units and conversion factors on "User Defined Factors" tab

**\*\* Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases.**

See the "Detailed Notes and Explanations" tab for use of this table

### Off-Site Laboratory Analysis

<b>Parameter and Notes</b>	<b>Number of Samples</b>	<b>Comments</b>
Off-site Laboratory Analysis - Metals	15	
<b>Totals</b>	<b>15</b>	

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	

## Input Worksheet for HHERA

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine -

Please specify which Remedy Component this input worksheet is part of: (Select "Off" to exclude this input worksheet from calculations and results)	Component 2	Detailed HHERA
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## General Scope

Excavate all Site soils and sediment with contaminant concentrations above assumed cleanup levels, based on results from the Phase II ESA. Following excavation, conduct five-point composite confirmation soil and sediment sampling of the walls and the floor of each excavation area to ensure contaminant concentrations in remaining soils and sediments are below assumed cleanup levels. Stockpile excavated soil on the Site for waste profile characterization before off-Site disposal. Follow characterization for disposal, haul excavated soils and sediment to an off-site permitted disposal facility for disposal. Depending on hazardous and leaching characteristics, waste disposal may occur at an appropriate non-hazardous or hazardous waste

## Example Items Eliminated through Screening Process

NO SMP or ICS

## Other Notes and References

## Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes
Environmental Scientist	5	300	Light-Duty/Passenger Truck	Diesel	1500	15.1		99.3	

\* See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.

\*\* For biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/miles for Fuel Usage Rate; for electricity, units are miles/kWh for Fuel Usage Rate and the kWh (Fuel Used) are added to total grid electricity used (cell G69).

## On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type**	Equipment Fuel Usage Rate	Equipment Hours Operated	Fuel Used for On-site Equipment	Equipment weight (tons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Mode of Transportation	Transport Fuel Type***	Default Transport Fuel Usage Rate (gpm or mpg)	Transport Fuel Usage Rate Override (gpm or mpg)	Fuel Used for Equipment Transport (gallons)	Activity or Notes

\* HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.

\*\* For biodiesel, B20, diesel, gasoline, and liquefied petroleum gas, units are gallons for Fuel Used for On-site Equipment and gallons/hr for Equipment Fuel Usage Rate; for compressed natural gas units are ccf (hundreds of cubic feet) for Fuel Used for On-site Equipment and ccf/hr for Equipment Fuel Usage Rate.

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Component 2	Detailed HHERA
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Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
On-Site Generator, 55 kW							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
Estimated Total Electricity Usage Based on Above						0	
Renewable Electricity Generated On-Site*							
Total Electricity Usage Based on Personnel Transportation						0	
Total Grid Electricity Used						0	

\* Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).

[illegible]

*\* Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.*

**\*\* Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.**

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, N, O, and Q. Units are gallons for Fuel Used for Materials Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
Totals			0	0	0	

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Used for electricity?	Landfill Gas Methane Used (ccf)	Notes
				0	
				0	
				0	
				0	
			Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

## Input Worksheet for HHERA

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine -

Remedy Component that this Input worksheet is part of:	Component 2	Detailed HHERA
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## Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Include Return Trip in Calculations?	Total Distance Transported (miles)	Mode of Transportation **	Transport Fuel Type	Default Transport Fuel Usage Rate (gptm or mpg)	Transport Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											

\* No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.

\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Type of Water Used

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

\* Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

### Detailed HHERA

See the "Detailed Notes and Explanations" tab for use of this table

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	



Bioremediation, phytoremediation, thermal treatment, etc.
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[illegible][illegible]

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Remedy Component that this Input worksheet is part of:

Component 1	Soil and Sediment Excavation with Offsite Disposal
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### On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
On-Site Generator, 55 kW							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
Estimated Total Electricity Usage Based on Above						0	
Renewable Electricity Generated On-Site*						0	
Total Electricity Usage Based on Personnel Transportation						0	
Total Grid Electricity Used						0	

\* Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).

### Materials Use and Transportation

[illegible]

*\* Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.*

**\*\* Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.**

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, O, and Q. Units are gallons for Fuel Used for Materials Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

### On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (cdf)	Notes
					0	
				0		
<b>Totals</b>			0	0	0	

**Landfill Gas Combusted On-Site for Energy Use**

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Used for electricity?	Landfill Gas Methane Used (ccf)	Notes
				0	
				0	
				0	
				0	
			Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

## Input Worksheet for Excavation

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019

Chilcoat-El Dorado-Mohawk Mine -

Remedy Component that this Input worksheet is part of:

Component 1	Soil and Sediment Excavation with Offsite Disposal
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## Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Include Return Trip in Calculations?	Total Distance Transported (miles)	Mode of Transportation**	Transport Fuel Type	Default Transport Fuel Usage Rate (gptm or mpg)	Transport Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
Off-site non-hazardous waste landfill	tons	950	950	25	75	1	No	75	Truck (mpg)	Diesel	6		12.5	
Off-site hazardous waste landfill	tons	3950	3950	500	100	1	No	100	Truck (mpg)	Diesel	6		16.7	
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											

\* No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.

\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Type of Water Used

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
Public Water	gal x 1000	163	679.71				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

\* Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

See the "Detailed Notes and Explanations" tab for use of this table

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	Component 3	Capping
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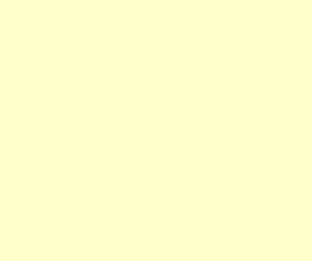
### General Scope

Excavate all Site soils and sediment with contaminant concentrations above assumed cleanup levels, based on results from the Phase II ESA. Following excavation, conduct five-point composite confirmation soil and sediment sampling of the walls and the floor of each excavation area to ensure contaminant concentrations in remaining soils and sediments are below assumed cleanup levels. Stockpile excavated soil on the Site for waste profile characterization before off-Site disposal. Follow characterization for disposal, haul excavated soils and sediment to an off-site permitted disposal facility for disposal. Depending on hazardous and leaching characteristics, waste disposal may occur at an appropriate non-hazardous or hazardous waste

#### Example Items Eliminated through Screening Process

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### Other Notes and References



### Personnel Transportation

[illegible]

\* See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.

\*\* for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/miles for Fuel Usage Rate; for electricity, units are miles/kWh for Fuel Usage Rate and the kWh (Fuel Used) are added to total grid electricity used (cell G69).

### **On-Site Equipment Use and Transportation**

[illegible]

\* HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.

\*\* For biodiesel, B20, diesel, gasoline, and liquified petroleum gas, units are gallons for Fuel Used for On-site Equipment and gallons/hr for Equipment Fuel Usage Rate; for compressed natural gas units are ccf (hundreds of cubic feet) for Fuel Used for On-site Equipment and ccf/hr for Equipment Fuel Usage Rate.

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Remedy Component that this Input worksheet is part of:

Component 3	Capping
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### On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
On-Site Generator, 55 kW							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
Estimated Total Electricity Usage Based on Above						0	
Renewable Electricity Generated On-Site*							
Total Electricity Usage Based on Personnel Transportation						0	
Total Grid Electricity Used						0	

\* Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).

### Materials Use and Transportation

[illegible]

*\* Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.*

**\*\* Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.**

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, N, O, and Q. Units are gallons for Fuel Used for Materials Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

### On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (cfd)	Notes
					0	
				0		
<b>Totals</b>			0	0	0	

Landfill Gas Combusted On-Site for Energy Use

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Used for electricity?	Landfill Gas Methane Used (ccf)	Notes
				0	
				0	
				0	
				0	
			Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

## Input Worksheet for Capping

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine -

Remedy Component that this Input worksheet is part of: **Component 3** **Capping**

## Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Include Return Trip in Calculations?	Total Distance Transported (miles)	Mode of Transportation **	Transport Fuel Type	Default Transport Fuel Usage Rate (gptm or mpg)	Transport Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											

\* No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.

\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Type of Water Used

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

\* Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Remedy Component that this Input worksheet is part of:

Component 3	Capping
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### Other Energy Use and Air Emissions

On-Site Energy Use and Emissions		Units	Quantity	Notes
<u>On-Site</u>				
User-defined on-site conventional energy use #1	*User-Defined	TBD		
User-defined on-site conventional energy use #2	*User-Defined	TBD		
On-site HAP process emissions**		lbs		
On-site GHG emissions**		lbs CO2e		
On-site carbon storage**		lbs CO2e		
Landfill gas flared on-site		ccf CH4		
Other on-site NOx emissions or reductions**		lbs		
Other on-site SOx emissions or reductions**		lbs		
Other on-site PM emissions or reductions**		lbs		
<u>Transportation</u>		Units	Quantity	Notes
User-defined conventional energy transportation #1	*User-Defined	TBD	10	
User-defined conventional energy transportation #2	*User-Defined	TBD		

\* Enter units and conversion factors on "User Defined Factors" tab

**\*\* Enter a positive number for emissions and a negative number for reductions, avoidances, or storage**  
See the "Detailed Notes and Explanations" tab for use of this table.

#### Other Voluntary Renewable Energy Use

Other Voluntary Renewable Energy Use		Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD		
User-defined on-site renewable energy use #2	*User-Defined	TBD		
User-defined renewable energy transportation #1	*User-Defined	TBD		
User-defined renewable energy transportation #2	*User-Defined	TBD		
Voluntary purchase of renewable electricity**		MWh		
Voluntary purchase of RECs**		MWh		

\* Enter units and conversion factors on "User Defined Factors" tab

**\*\* Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases. See the "Detailed Notes and Explanations" tab for use of this table**

### Off-Site Laboratory Analysis

Parameter and Notes	Number of Samples	Comments
Totals	0	

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	



## Input Worksheet for HHERA, SMP, ICs

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine -

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this input worksheet from calculations and results)	Component 2	HHERA, SMP, ICs
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## General Scope

Excavate Site soils and sediment with contaminant concentrations above assumed cleanup levels, to 2 feet bgs, based on results from the HHERA. Following excavation, conduct five-point composite confirmation soil and sediment sampling of the walls and the floor of each excavation area to ensure contaminant concentrations in remaining soils and sediments are below assumed cleanup levels. Stockpile excavated soil on the Site for waste profile characterization before off-Site disposal. Follow characterization for disposal, haul excavated soils and sediment to an off-site permitted disposal facility for disposal. Depending on hazardous and leaching characteristics, waste disposal may occur at an appropriate non-hazardous or hazardous waste

## Example Items Eliminated through Screening Process

## Other Notes and References

## Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes
Environmental Scientist	5	300	Light-Duty/Passenger Truck	Gasoline	1500	18.9		79.4	
1 Inspector/Repair Person/Sampler	2	75	Light-Duty/Passenger Truck	Gasoline	150	18.9		7.9	

\* See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.

\*\* For biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/miles for Fuel Usage Rate; for electricity, units are miles/kWh for Fuel Usage Rate and the kWh (Fuel Used) are added to total grid electricity used (cell G69).

## On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type**	Equipment Fuel Usage Rate	Equipment Hours Operated	Fuel Used for On-site Equipment	Equipment weight (tons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Mode of Transportation	Transport Fuel Type***	Default Transport Fuel Usage Rate (gpm or mpg)	Transport Fuel Usage Rate Override (gpm or mpg)	Fuel Used for Equipment Transport (gallons)	Activity or Notes

\* HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.

\*\* For biodiesel, B20, diesel, gasoline, and liquefied petroleum gas, units are gallons for Fuel Used for On-site Equipment and gallons/hr for Equipment Fuel Usage Rate; for compressed natural gas units are ccf (hundreds of cubic feet) for Fuel Used for On-site Equipment and ccf/hr for Equipment Fuel Usage Rate.

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Component 2	HHERA, SMP, ICs
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Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
On-Site Generator, 55 kW							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
Estimated Total Electricity Usage Based on Above						0	
Renewable Electricity Generated On-Site*							
Total Electricity Usage Based on Personnel Transportation						0	
Total Grid Electricity Used						0	

\* Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).

[illegible]

*\* Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.*

**\*\* Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.**

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, O, and Q. Units are gallons for Fuel Used for Materials Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
<b>Totals:</b>			0	0	0	

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Used for electricity?	Landfill Gas Methane Used (cf)	Notes
				0	
				0	
				0	
				0	
Total				0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

## Input Worksheet for HHERA, SMP, ICS

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine -

Remedy Component that this Input worksheet is part of: 

Component 2	HHERA, SMP, ICS
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## Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Include Return Trip in Calculations?	Total Distance Transported (miles)	Mode of Transportation **	Transport Fuel Type	Default Transport Fuel Usage Rate (gptm or mpg)	Transport Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											

\* No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.

\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Type of Water Used

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

\* Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	

[illegible][illegible]

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

### On-Site Electricity Use

\* Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).

[illegible]

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, O, and Q. Units are gallons for Fuel Used for Materials Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Input Worksheet for Excavation

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine - Alternative 4

Remedy Component that this Input worksheet is part of:

Component 1	Soil and Sediment Excavation
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## Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Include Return Trip in Calculations?	Total Distance Transported (miles)	Mode of Transportation **	Transport Fuel Type	Default Transport Fuel Usage Rate (gptm or mpg)	Transport Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											

\* No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.

\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Type of Water Used

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
Public Water	gal x 1000	650	2710.5				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

\* Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Item	Units	Quantity	Notes
<u>On-Site</u>			
User-defined on-site conventional energy use #1	*User-Defined	TBD	
User-defined on-site conventional energy use #2	*User-Defined	TBD	
On-site HAP process emissions**	lbs		
On-site GHG emissions**	lbs CO2e		
On-site carbon storage**	lbs CO2e		
Landfill gas flared on-site	ccf CH4		
Other on-site NOx emissions or reductions**	lbs		
Other on-site SOx emissions or reductions**	lbs		
Other on-site PM emissions or reductions**	lbs		
<u>Transportation</u>	Units	Quantity	Notes
User-defined conventional energy transportation #1	*User-Defined	10	
User-defined conventional energy transportation #2	*User-Defined	TBD	

Item	Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD	
User-defined on-site renewable energy use #2	*User-Defined	TBD	
User-defined renewable energy transportation #1	*User-Defined	TBD	
User-defined renewable energy transportation #2	*User-Defined	TBD	
Voluntary purchase of renewable electricity**	MWh		
Voluntary purchase of RECs**	MWh		

Parameter and Notes	Number of Samples	Comments
Off-site Laboratory Analysis - Metals	15	
Totals	15	

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	



Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	Component 2	Consolidation and Capping
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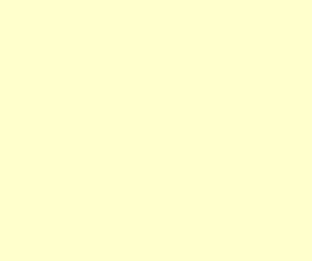
### General Scope

Excavate all Site soils and sediment with contaminant concentrations above assumed cleanup levels, based on results from the Phase II ESA. Following excavation, conduct five-point composite confirmation soil and sediment sampling of the walls and the floor of each excavation area to ensure contaminant concentrations in remaining soils and sediments are below assumed cleanup levels. Consolidated excavated soil on the Site with a lined earthen cap. Backfill excavated areas with clean fill material, and grade and seed as needed. Implement ICs.

### Example Items Eliminated through Screening Process

[illegible]

### Other Notes and References



### Personnel Transportation

[illegible]

\* See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.

\*\* for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/miles for Fuel Usage Rate; for electricity, units are miles/kWh for Fuel Usage Rate and the kWh (Fuel Used) are added to total grid electricity used (cell G69).

### **On-Site Equipment Use and Transportation**

[illegible]

\* HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.

\*\* For biodiesel, B20, diesel, gasoline, and liquefied petroleum gas, units are gallons for Fuel Used for On-site Equipment and gallons/hr for Equipment Fuel Usage Rate; for compressed natural gas units are ccf (hundreds of cubic feet) for Fuel Used for On-site Equipment and ccf/hr for Equipment Fuel Usage Rate.

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Remedy Component that this Input worksheet is part of:

Component 2	Consolidation and Capping
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### On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
On-Site Generator, 55 kW							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
Estimated Total Electricity Usage Based on Above						0	
Renewable Electricity Generated On-Site*						0	
Total Electricity Usage Based on Personnel Transportation						0	
Total Grid Electricity Used						0	

\* Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).

### Materials Use and Transportation

[illegible]

\* Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.

**\*\* Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.**

### On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
Totals			0	0	0	

**Landfill Gas Combusted On-Site for Energy Use**

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Used for electricity?	Landfill Gas Methane Used (ccf)	Notes
				0	
				0	
				0	
			Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

## Input Worksheet for Consolidation and Capping

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine - Alternative 4

Remedy Component that this Input worksheet is part of:

Component 2	Consolidation and Capping
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## Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Include Return Trip in Calculations?	Total Distance Transported (miles)	Mode of Transportation **	Transport Fuel Type	Default Transport Fuel Usage Rate (gptm or mpg)	Transport Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											

\* No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.

\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Type of Water Used

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

\* Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Item	Units	Quantity	Notes
<u>On-Site</u>			
User-defined on-site conventional energy use #1	*User-Defined TBD		
User-defined on-site conventional energy use #2	*User-Defined TBD		
On-site HAP process emissions**	lbs		
On-site GHG emissions**	lbs CO2e		
On-site carbon storage**	lbs CO2e		
Landfill gas flared on-site	cfd CH4		
Other on-site NOx emissions or reductions**	lbs		
Other on-site SOx emissions or reductions**	lbs		
Other on-site PM emissions or reductions**	lbs		
<u>Transportation</u>	Units	Quantity	Notes
User-defined conventional energy transportation #1	*User-Defined TBD	10	
User-defined conventional energy transportation #2	*User-Defined TBD		

Item	Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD	
User-defined on-site renewable energy use #2	*User-Defined	TBD	
User-defined renewable energy transportation #1	*User-Defined	TBD	
User-defined renewable energy transportation #2	*User-Defined	TBD	
Voluntary purchase of renewable electricity**	MWh		
Voluntary purchase of RECs**	MWh		

Parameter and Notes	Number of Samples	Comments
Totals	0	

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	

## Input Worksheet for HHERA and ICs

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine - Alternative 4

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this input worksheet from calculations and results)	Component 3	HHERA, ICs
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## General Scope

Excavate all Site soils and sediment with contaminant concentrations above assumed cleanup levels, based on results from the Phase II ESA. Following excavation, conduct five-point composite confirmation soil and sediment sampling of the walls and the floor of each excavation area to ensure contaminant concentrations in remaining soils and sediments are below assumed cleanup levels. Consolidated excavated soil on the Site with a lined earthen cap. Backfill excavated areas with clean fill material, and grade and seed as needed. Implement ICs.

## Example Items Eliminated through Screening Process

## Other Notes and References

## Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes
Environmental Scientist	5	300	Light-Duty/Passenger Truck	Gasoline	1500	18.9		79.4	
1 Inspector/Repair Person/Sampler	2	75	Light-Duty/Passenger Truck	Gasoline	150	18.9		7.9	

\* See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.

\*\* For biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/miles for Fuel Usage Rate; for electricity, units are miles/kWh for Fuel Usage Rate and the kWh (Fuel Used) are added to total grid electricity used (cell G69).

## On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type**	Equipment Fuel Usage Rate	Equipment Hours Operated	Fuel Used for On-site Equipment	Equipment weight (tons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Mode of Transportation	Transport Fuel Type***	Default Transport Fuel Usage Rate (gpm or mpg)	Transport Fuel Usage Rate Override (gpm or mpg)	Fuel Used for Equipment Transport (gallons)	Activity or Notes

\* HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.

\*\* For biodiesel, B20, diesel, gasoline, and liquefied petroleum gas, units are gallons for Fuel Used for On-site Equipment and gallons/hr for Equipment Fuel Usage Rate; for compressed natural gas units are ccf (hundreds of cubic feet) for Fuel Used for On-site Equipment and ccf/hr for Equipment Fuel Usage Rate.

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Remedy Component that this Input worksheet is part of:

Component 3	HHERA, ICs
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### On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
On-Site Generator, 55 kW							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
Estimated Total Electricity Usage Based on Above						0	
Renewable Electricity Generated On-Site*							
Total Electricity Usage Based on Personnel Transportation						0	
Total Grid Electricity Used						0	

\* Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).

### Materials Use and Transportation

[illegible]

*\* Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.*

**\*\* Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.**

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, O, and Q. Units are gallons for Fuel Used for Materials Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

### On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (cfd)	Notes
					0	
				0		
<b>Totals</b>			0	0	0	

**Landfill Gas Combusted On-Site for Energy Use**

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Used for electricity?	Landfill Gas Methane Used (ccf)	Notes
				0	
				0	
				0	
				0	
			Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

## Input Worksheet for HHERA and ICs

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine - Alternative 4

Remedy Component that this Input worksheet is part of: 

Component 3	HHERA, ICs
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## Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Include Return Trip in Calculations?	Total Distance Transported (miles)	Mode of Transportation **	Transport Fuel Type	Default Transport Fuel Usage Rate (gptm or mpg)	Transport Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											

\* No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.

\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Type of Water Used

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

\* Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	



## Input Worksheet for Excavation

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine -

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	Component 1	Soil Excavation
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## General Scope

Excavate Site soils and sediment with contaminant concentrations above assumed cleanup levels, to 2 feet bgs, based on results from the HHERA. Following excavation, conduct five-point composite confirmation soil and sediment sampling of the walls and the floor of each excavation area to ensure contaminant concentrations in remaining soils and sediments are below assumed cleanup levels. Stockpile excavated soil on the Site for waste profile characterization before off-Site disposal. Follow characterization for disposal, haul excavated soils and sediment to an off-site permitted disposal facility for disposal. Depending on hazardous and leaching characteristics, waste disposal may occur at an appropriate non-hazardous or hazardous waste permitted facility. Cap

## Example Items Eliminated through Screening Process

Bioremediation, phytoremediation, thermal treatment, etc.

## Other Notes and References

## Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes
Equipment Operator	20	75	Light-Duty/Passenger Truck	Diesel	1500	15.1		99.3	
Laborer	15	75	Light-Duty/Passenger Truck	Diesel	1125	15.1		74.5	
Truck Driver	100	75	Heavy-Duty Truck	Diesel	7500	7.55		993.4	
Water Truck Driver	20	75	Heavy-Duty Truck	Diesel	1500	7.55		198.7	

\* See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options. \*\* For biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/miles for Fuel Usage Rate; for electricity, units are miles/kWh for Fuel Usage Rate and the kWh (Fuel Used) are added to total grid electricity used (cell G69).

## On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type**	Equipment Fuel Usage Rate	Equipment Hours Operated	Fuel Used for On-site Equipment	Equipment weight (tons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Mode of Transportation	Transport Fuel Type***	Default Transport Fuel Usage Rate (gpm or mpg)	Transport Fuel Usage Rate Override (gpm or mpg)	Fuel Used for Equipment Transport (gallons)	Activity or Notes
Excavator - medium (175 HP)	175	75%	Diesel between 75 and 750 hp	7.211538462	35	252.4038462	57	1	75	75	Truck (mpg)	Diesel	6		12.5	
Dump truck (400 HP)	400	75%	Diesel between 75 and 750 hp	16.48351648	100	1648.351648	28	184	75	13800	Truck (mpg)	Diesel	6		2300	
Dozer - large (200 HP)	200	75%	Diesel between 75 and 750 hp	8.241758242	15	123.6263736	125	1	75	75	Truck (mpg)	Diesel	6		12.5	
Grader (175 HP)	175	75%	Diesel between 75 and 750 hp	7.211538462	20	144.2307692	18	1	75	75	Truck (mpg)	Diesel	6		12.5	
Backhoe (100 HP)	100	75%	Diesel between 75 and 750 hp	4.120879121	10	41.20879121	15	1	75	75	Truck (mpg)	Diesel	6		12.5	
Loader (200 HP)	200	75%	Diesel between 75 and 750 hp	8.241758242	100	824.1758242	25	1	75	75	Truck (mpg)	Diesel	6		12.5	
Water truck (400 HP)	200	75%	Diesel between 75 and 750 hp	8.241758242	150	1236.263736	3	1	75	75	Truck (mpg)	Diesel	6		12.5	

\* HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.

\*\* For biodiesel, B20, diesel, gasoline, and liquefied petroleum gas, units are gallons for Fuel Used for On-site Equipment and gallons/hr for Equipment Fuel Usage Rate; for compressed natural gas units are ccf (hundreds of cubic feet) for Fuel Used for On-site Equipment and ccf/hr for Equipment Fuel Usage Rate.

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
On-Site Generator, 55 kW							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
Estimated Total Electricity Usage Based on Above						0	
Renewable Electricity Generated On-Site*							
Total Electricity Usage Based on Personnel Transportation						0	
Total Grid Electricity Used						0	

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
Totals			0	0	0	

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Used for electricity?	Landfill Gas Methane Used (ccf)	Notes
				0	
				0	
				0	
Total				0	

[illegible]

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, O, and Q. Units are gallons for Fuel Used for Materials Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Input Worksheet for Excavation

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine -

Remedy Component that this Input worksheet is part of:	Component 1	Soil Excavation
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## Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Include Return Trip in Calculations?	Total Distance Transported (miles)	Mode of Transportation **	Transport Fuel Type	Default Transport Fuel Usage Rate (gptm or mpg)	Transport Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0				No			Diesel				
			0				No			Diesel				
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											

\* No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.

\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Type of Water Used

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
Public Water	gal x 1000	81.5	339.855				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

\* Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	

## Input Worksheet for HHERA, SMP, ICs

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine -

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	Component 2	HHERA, SMP, ICs
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## General Scope

Excavate all Site soils and sediment with contaminant concentrations above assumed cleanup levels, based on results from the Phase II ESA. Following excavation, conduct five-point composite confirmation soil and sediment sampling of the walls and the floor of each excavation area to ensure contaminant concentrations in remaining soils and sediments are below assumed cleanup levels. Stockpile excavated soil on the Site for waste profile characterization before off-Site disposal. Follow characterization for disposal, haul excavated soils and sediment to an off-site permitted disposal facility for disposal. Depending on hazardous and leaching characteristics, waste disposal may occur at an appropriate non-hazardous or hazardous waste permitted facility.

## Example Items Eliminated through Screening Process

## Other Notes and References

## Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes
Environmental Scientist	5	300	Light-Duty/Passenger Truck	Gasoline	1500	18.9		79.4	
1 Inspector/Repair Person/Sampler	2	75	Light-Duty/Passenger Truck	Gasoline	150	18.9		7.9	

\* See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options. \*\* For biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/miles for Fuel Usage Rate; for electricity, units are miles/kWh for Fuel Usage Rate and the kWh (Fuel Used) are added to total grid electricity used (cell G69).

## On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)	Equipment Fuel Type**	Equipment Fuel Usage Rate	Equipment Hours Operated	Fuel Used for On-site Equipment	Equipment weight (tons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Mode of Transportation	Transport Fuel Type***	Default Transport Fuel Usage Rate (gpm or mpg)	Transport Fuel Usage Rate Override (gpm or mpg)	Fuel Used for Equipment Transport (gallons)	Activity or Notes

\* HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.

\*\* For biodiesel, B20, diesel, gasoline, and liquefied petroleum gas, units are gallons for Fuel Used for On-site Equipment and gallons/hr for Equipment Fuel Usage Rate; for compressed natural gas units are ccf (hundreds of cubic feet) for Fuel Used for On-site Equipment and ccf/hr for Equipment Fuel Usage Rate.

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
On-Site Generator, 55 kW							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
Estimated Total Electricity Usage Based on Above						0	
Renewable Electricity Generated On-Site*						0	
Total Electricity Usage Based on Personnel Transportation						0	
Total Grid Electricity Used						0	

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
Totals			0	0	0	

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Used for electricity?	Landfill Gas Methane Used (ccf)	Notes
				0	
				0	
				0	
Total				0	

[illegible]

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, O, and Q. Units are gallons for Fuel Used for Materials Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Input Worksheet for HHERA, SMP, ICs

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine -

Remedy Component that this Input worksheet is part of:	Component 2	HHERA, SMP, ICs
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## Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Include Return Trip in Calculations?	Total Distance Transported (miles)	Mode of Transportation **	Transport Fuel Type	Default Transport Fuel Usage Rate (gptm or mpg)	Transport Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											

\* No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.

\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Type of Water Used

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

\* Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	



## Input Worksheet for Capping

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine -

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	Component 3	Capping
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## General Scope

Excavate all Site soils and sediment with contaminant concentrations above assumed cleanup levels, based on results from the Phase II ESA. Following excavation, conduct five-point composite confirmation soil and sediment sampling of the walls and the floor of each excavation area to ensure contaminant concentrations in remaining soils and sediments are below assumed cleanup levels. Stockpile excavated soil on the Site for waste profile characterization before off-Site disposal. Follow characterization for disposal, haul excavated soils and sediment to an off-site permitted disposal facility for disposal. Depending on hazardous and leaching characteristics, waste disposal may occur at an appropriate non-hazardous or hazardous waste permitted facility.

## Example Items Eliminated through Screening Process

## Other Notes and References

## Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes
Truck Driver	25	75	Heavy-Duty Truck	Diesel	1875	7.55		248.3	
Equipment Operator	15	75	Light-Duty/Passenger Truck	Diesel	1125	15.1		74.5	
Laborer	40	75	Light-Duty/Passenger Truck	Diesel	3000	15.1		198.7	
Laborer (Foreman)	25	75	Light-Duty/Passenger Truck	Diesel	1875	15.1		124.2	

\* See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options. \*\* For biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/miles for Fuel Usage Rate; for electricity, units are miles/kWh for Fuel Usage Rate and the kWh (Fuel Used) are added to total grid electricity used (cell G69).

## On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type**	Equipment Fuel Usage Rate	Equipment Hours Operated	Fuel Used for On-site Equipment	Equipment weight (tons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Mode of Transportation	Transport Fuel Type***	Default Transport Fuel Usage Rate (gpm or mpg)	Transport Fuel Usage Rate Override (gpm or mpg)	Fuel Used for Equipment Transport (gallons)	Activity or Notes
Dump truck (400 HP)	400	75%	Diesel between 75 and 750 hp	16.48351648	250	4120.879121	28	22	75	1650	Truck (mpg)	Diesel	6		275	
Dozer - large (200 HP)	200	75%	Diesel between 75 and 750 hp	8.241758242	18	148.3516484	125	1	75	75	Truck (mpg)	Diesel	6		12.5	
Excavator - large (250 HP)	250	75%	Diesel between 75 and 750 hp	10.3021978	20	206.043956	57	1	75	75	Truck (mpg)	Diesel	6		12.5	
Grader (175 HP)	175	75%	Diesel between 75 and 750 hp	7.211538462	16	115.3846154	18	1	75	75	Truck (mpg)	Diesel	6		12.5	
Loader (200 HP)	200	75%	Diesel between 75 and 750 hp	8.241758242	80	659.3406593	25	1	75	75	Truck (mpg)	Diesel	6		12.5	
Hydroseeder (20 HP)	20	75%	Diesel less than 75 hp	0.917431193	3	2.752293578	0.5	1	75	75	Truck (mpg)	Diesel	6		12.5	

\* HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.

\*\* For biodiesel, B20, diesel, gasoline, and liquefied petroleum gas, units are gallons for Fuel Used for On-site Equipment and gallons/hr for Equipment Fuel Usage Rate; for compressed natural gas units are ccf (hundreds of cubic feet) for Fuel Used for On-site Equipment and ccf/hr for Equipment Fuel Usage Rate.

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Input Worksheet for Capping

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine -

Remedy Component that this Input worksheet is part of:	Component 3	Capping
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## On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
<Equip. with HP, Efficiency, and Hours>							
On-Site Generator, 55 kW							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known kW rating>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
<Equip. with known total Energy Used>							
Estimated Total Electricity Usage Based on Above						0	
Renewable Electricity Generated On-Site*							
Total Electricity Usage Based on Personnel Transportation						0	
Total Grid Electricity Used						0	

\* Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).

## On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
				0	0	
Totals			0		0	

## Landfill Gas Combusted On-Site for Energy Use

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Used for electricity?	Landfill Gas Methane Used (ccf)	Notes
				0	
				0	
				0	
Total				0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

## Materials Use and Transportation

Material Type*	Unit	Quantity	Tons	Is the Material Refined or Unrefined?*	Material Source: Virgin, Recycled, or Reused?*	Calculate Item Footprint?*	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Include Return Trip in Calculations?	Total Distance Transported (miles)	Mode of Transportation*	Transport Fuel Type	Default Transport Fuel Usage Rate (gptm or mpg)	Transport Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Materials Transport (gallons)	Notes and Description of Materials
Gravel/sand/clay	lb	6276204	3138.102	Refined	Virgin	Yes	25	35	1	No	35	Truck (mpg)					
HDPE	lb	85228	42.614	Refined	Virgin	Yes	500	35	1	No	35	Truck (mpg)					
Other refined construction materials	lb	85228	42.614	Refined	Virgin	Yes	500	35	1	No	35	Truck (mpg)					
			0														
			0														
			0														
			0														
			0														
			0														
			0														
			0														
			0														
			0														
			0														
			0														
			0														
			0														

\* Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.

\*\* Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.

\*\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, O, and Q. Units are gallons for Fuel Used for Materials Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Input Worksheet for Capping

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019  
Chilcoat-El Dorado-Mohawk Mine -

Remedy Component that this Input worksheet is part of:	Component 3	Capping
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## Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Include Return Trip in Calculations?	Total Distance Transported (miles)	Mode of Transportation **	Transport Fuel Type	Default Transport Fuel Usage Rate (gptm or mpg)	Transport Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											
			0											

\* No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.

\*\* Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

## Type of Water Used

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

\* Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Remedy Component that this Input worksheet is part of:

Component 3	Capping
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### Other Energy Use and Air Emissions

Other energy use and emissions		Units	Quantity	Notes
<u>On-Site</u>				
User-defined on-site conventional energy use #1	*User-Defined	TBD		
User-defined on-site conventional energy use #2	*User-Defined	TBD		
On-site HAP process emissions**		lbs		
On-site GHG emissions**		lbs CO2e		
On-site carbon storage**		lbs CO2e		
Landfill gas flared on-site		ccf CH4		
Other on-site NOx emissions or reductions**		lbs		
Other on-site SOx emissions or reductions**		lbs		
Other on-site PM emissions or reductions**		lbs		
<u>Transportation</u>		Units	Quantity	Notes
User-defined conventional energy transportation #1	*User-Defined	TBD	10	
User-defined conventional energy transportation #2	*User-Defined	TBD		

\* Enter units and conversion factors on "User Defined Factors" tab

**\*\* Enter a positive number for emissions and a negative number for reductions, avoidances, or storage**

See the "Detailed Notes and Explanations" tab for use of this table.

### Other Voluntary Renewable Energy Use

Item	Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD	
User-defined on-site renewable energy use #2	*User-Defined	TBD	
User-defined renewable energy transportation #1	*User-Defined	TBD	
User-defined renewable energy transportation #2	*User-Defined	TBD	
Voluntary purchase of renewable electricity**	MWh		
Voluntary purchase of RECs**	MWh		

\* Enter units and conversion factors on "User Defined Factors" tab

**\*\* Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases.**

See the "Detailed Notes and Explanations" tab for use of this table

### Off-Site Laboratory Analysis

Parameter and Notes	Number of Samples	Comments
Totals	0	

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	