STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Eastern Region Office
4601 North Monroe St., Spokane, WA 99205-1295 • 509-329-3400

November 25, 2024

Bruce Howard
Teck Washington, Inc.
PO Box 7
Metaline Falls, WA 99153
bruce.howard@teck.com

Re: Technical Assistance for the Following Contaminated Site:

Site Name: Pend Oreille Mine Historic Debris Field
Site Address: 1382 Pend Oreille Mine Road
Facility/Site No.: 15428546
Cleanup Site No.: 16669
VCP Project No.: EA0369

Dear Bruce Howard:

The Washington State Department of Ecology (Ecology) received your request for technical consultation pursuant to WAC 173-340-515(5) on your additional characterization and proposed cleanup of the Pend Oreille Mine Historic Debris Field facility (Site) under the Voluntary Cleanup Program (VCP)[1]. This letter provides our technical assistance and guidance. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA), Chapter 70A.305[2] RCW.

Issues Presented and Opinion

Ecology has determined that while your characterization is sufficient to establish cleanup standards and select a cleanup action for the Site, the cleanup action proposed in your draft Feasibility Study (FS) does not meet the cleanup standards established for the Site.

This opinion is based on an analysis of whether the remedial action meets the substantive requirements of MTCA, Chapter 70A.305 RCW, and its implementing regulations, Chapter 173-340 WAC (collectively "substantive requirements of MTCA").

[1] https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Voluntary-Cleanup-Program
[2] https://app.leg.wa.gov/RCW/default.aspx?cite=70A.305

The analysis is provided below.

Site Description

This opinion applies only to the Site described as follows. The Site is defined by the nature and extent of contamination associated with the following releases:

- Cyanide into the soil.
- Heavy metals into the soil.
- Oil-range petroleum hydrocarbons (ORPH) into the soil.
- Organochlorine (OC) pesticides into the soil.
- Polychlorinated biphenyls (PCBs) into the soil.
- Trichloroethene (TCE) into the soil.
- Volatile organic compounds (VOCs) into the soil.

Enclosure A includes the description, history, and diagram of the Site, as currently known to Ecology.

Please note a parcel of real property can be affected by multiple sites. At this time, we have no information that the Property is affected by other sites.

Basis for the Opinion

This opinion is based on the information contained in the following documents:

1. Haley & Aldrich, Inc., Pend Oreille Mine Historic Debris Field, Draft Data Gap Assessment and Feasibility Study, September 2024.

2. Teck Washington, Inc., Pend Oreille Mine (POM) Closure- Historic Debris Field Data Gap Assessment and Feasibility Study Work Plan, February 21, 2023.

3. Teck Washington Inc., POM Present State Analysis- Historic Debris Field, June 22, 2022.

4. URS, Reclamation Plan Report, Teck American Incorporated Pend Oreille Mine, September 25, 2009.

5. GeoEngineers, Solid Waste Deposit Assessment, Pend Oreille Mine, July 28, 2006.

You can request these documents by filing a records request.[3] For help making a

[3] https://ecology.wa.gov/About-us/Accountability-transparency/Public-records-requests

request, contact the Public Records Officer at publicrecordsofficer@ecy.wa.gov or call (360) 407-6040. Before making a request, check whether the documents are available on the Site webpage[4].

This opinion is void if any of the information contained in those documents is materially false or misleading.

Analysis and Technical Assistance

Ecology has determined that, upon completion of your proposed cleanup, **further remedial action** will be necessary to clean up contamination at the Site. That conclusion is based on the following analysis:

Characterizing the Site.

Ecology has determined that your characterization is sufficient to establish cleanup standards and select a cleanup action for the Site. The Site is described above and in **Enclosure A**.

The Site consists of a solid waste debris field that extends laterally approximately 1.5 acres and varies in vertical extent from the surface to approximately 10 feet below ground surface (bgs). In 2005, three test pit samples collected from 0-2 and 4-5.5 feet bgs contained TCE above the MTCA Method A cleanup level and benzene, cyanide, MTBE, organochlorine pesticides, ORPH, and PCBs at concentrations below their respective cleanup levels. Benzene, MTBE, and the pesticide endosulfan were also detected in a seepage water sample below the corresponding MTCA groundwater cleanup levels.

In 2023, 37 hand auger borings were completed in the debris field, with 49 soil samples collected along with samples of the seep water and granular material found in an onsite drum. Analyses indicated the presence of arsenic, cadmium, chromium, and lead exceeding MTCA Method A cleanup levels in 16 soil borings, and TCE exceeding the Method A cleanup level in five soil borings. The concentration of TCE appeared to decrease with depth to a maximum sampling depth of 7 feet bgs. The drum material also contained heavy metals exceeding the MTCA Method A cleanup levels and were likely mine tailings. The seep water sample did not contain any analytes including heavy metals and TCE exceeding the corresponding cleanup levels.

A geophysical survey noted evidence of a past slope failure within the middle slope of the debris layer between field stations 20 and 21 (see Enclosure A for a diagram with field station locations). There is no evidence of failure within the underlying native soil. Cone penetrometer tests (CPTs) conducted in 2023 indicated that the slope is stable, but may require stormwater controls upgradient of the debris field to prevent further erosion.

[4] https://apps.ecology.wa.gov/gsp/CleanupSiteDocuments.aspx?csid=16669

Establishing cleanup standards.

Ecology has determined the cleanup levels and points of compliance you established for the Site meet the substantive requirements of MTCA, with the addition of the heavy metals in the table below.

For soil, the cleanup levels were established using MTCA Methods A and B and are based on direct contact, protection of groundwater for drinking water use, and preventing the accumulation of free product on groundwater. The land use is classified as unrestricted. The point of compliance for soils is throughout the lateral and vertical extent of the Site. This is the standard point of compliance. The cleanup levels are as follows.

Contaminant	**Cleanup Level (mg/kg)**
Benzene	0.03
Beta-BHC	0.56*
Cyanide	50*
DDD	2.4*
DDE	2.9*
DDT	3.0
Endosulfan	480*
ORPH	2000
PCBs	1.0
TCE	0.03
Arsenic	20
Cadmium	2
Chromium (VI/III)	19/2000
Lead	250

mg/kg = milligrams per kilogram
"*" indicates a Method B cleanup level

Selecting the cleanup action.

Ecology has determined the cleanup action you selected for the Site does not meet the substantive requirements of MTCA.

- The draft Conceptual Site Model (CSM), Terrestrial Ecological Evaluation (TEE), and FS focus on TCE as the primary contaminant, but does not address heavy metals in soil reported in the draft Data Gap Assessment (DSA) when discussing fate and transport, ecological receptors, and exposure pathways, or evaluating and selecting remedial alternatives appropriate for the Site.
- The three remedial alternatives evaluated in the draft FS included passive and

active soil vapor extraction (SVE), removal and offsite disposal, and no action. The preferred alternative, active SVE, would likely reduce TCE concentrations in soil within a reasonable restoration time frame, but would not remove or remediate non-volatile contaminants including heavy metals. The no action alternative may preserve the existing ecosystem, but further evaluation would be required to determine if it is protective of terrestrial ecological receptors. The no action alternative also does not propose using institutional controls or long-term monitoring to ensure the effectiveness of the remedy. The final remedial alternative or alternatives selected should address all contaminants at the Site and provide overall protectiveness of human health and the environment.

- The Site boundary illustrated in Figure 3 of the DGA includes only the extent of TCE in soil. MTCA defines the Site as any area where a hazardous substance has come to be located. Ecology considers the Site to extend to all locations where heavy metals were present exceeding MTCA Method A soil cleanup levels, including the property owned by Seattle City Light. Any cleanup alternatives evaluated need to address contamination throughout the entire extent of the Site.
- The TEE determined the Site was exempt from further evaluation based on the selected remedy (SVE) remediating all contaminants to the established point of compliance. Since the selected remedy will not remove or remediate heavy metals in soil, further evaluation will be required under WAC 173-340-7493 to assess the risk to all terrestrial ecological receptors.

Additional recommendations.

Ecology is recommending additional evaluation of remedial alternatives at the Site while considering the following substantive requirements of MTCA and other applicable or relevant and appropriate requirements (ARARs).

- According to the 2005 Solid Waste Deposit Assessment, the debris field contains solid waste including drums, wood, and scrap metal. During the DGA, material analyzed from a drum within the debris field contained heavy metals exceeding MTCA Method A soil cleanup levels and potentially exceeding Washington State dangerous waste criteria. These larger, visible waste fractions may provide a continued source of contaminants to soil and should be removed from the Site and designated for offsite disposal using the procedures detailed in WAC 173-303-070.[5]
- For properties considered natural areas that have potentially valuable terrestrial ecological habitat, Ecology may determine that active remediation would negatively impact habitat, and it is overall more protective of the environment if the property is left undisturbed. To make this determination, a Net Environmental Benefit Analysis (NEBA) is required to document soil biota, plants, and wildlife species, assess whether residual contaminants in soil are having adverse effects

[5] https://app.leg.wa.gov/WAC/default.aspx?cite=173-303-070

on these populations, and evaluate if the property can be designated as an Especially Valuable Habitat (EVH). See Chapter 10 in Ecology's Tacoma Smelter Plume Model Remedies Guidance[6] (Publication Number 19-09-101) for more information on the NEBA process. Please note that the NEBA would need to be evaluated under a disproportionate cost analysis (DCA), and institutional controls may still be required if the property designates as an EVH.

- Engineering controls including, but not limited to stormwater controls and permanent survey points may be required to limit stormwater infiltration and saturation through the debris field and provide for continued erosion monitoring of the slope.
- Institutional controls including, but not limited to signage, fencing, and an environmental covenant may be required to restrict land use and protect and monitor any engineering controls implemented as part of the remedial actions. If institutional controls are proposed, they must address contamination throughout the entire extent of the Site including property owned by Seattle City Light. Please refer to WAC 173-340-440[7] for more information on institutional controls.

Limitations of the Opinion

Opinion does not settle liability with the state

Liable persons are strictly liable, jointly and severally, for all remedial action costs and for all natural resource damages resulting from the release or releases of hazardous substances at the Site. This opinion **does not**:

- Change the boundaries of the Site.
- Resolve or alter a person's liability to the state.
- Protect liable persons from contribution claims by third parties.

To settle liability with the state and obtain protection from contribution claims, a person must enter into a consent decree with Ecology under RCW 70A.305.040(4).

Opinion does not constitute a determination of substantial equivalence

To recover remedial action costs from other liable persons under MTCA, one must demonstrate that the action is the substantial equivalent of an Ecology-conducted or Ecology-supervised action. This opinion does not determine whether the action you proposed will be substantially equivalent. Courts make that determination. *See* RCW 70A.305.080 and WAC 173-340-545.

[6] https://apps.ecology.wa.gov/publications/documents/1909101.pdf
[7] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-340-440

Opinion is limited to proposed cleanup

This letter does not provide an opinion on whether further remedial action will actually be necessary at the Property upon completion of your proposed cleanup. To obtain such an opinion, you must submit a report to Ecology upon completion of your cleanup and request an opinion under the VCP.

State is immune from liability

The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this opinion. *See* RCW 70A.305.170.

Contact Information

Thank you for choosing to clean up your Property under the Voluntary Cleanup Program (VCP). As you conduct your cleanup, please do not hesitate to request additional services. We look forward to working with you.

For more information about the VCP and the cleanup process, please visit our web site: www. ecy.wa.gov/programs/tcp/vcp/vcpmain.htm. If you have any questions about this opinion, please contact me by phone at 509-342-5564 or by e-mail at ted.uecker@ecy.wa.gov.

Sincerely,

Ted M. Uecker
ERO Toxics Cleanup Program

tmu:hg

Enclosures (1): A – Description, History, and Diagram of the Site

cc: Frank Wimberley, Teck
John Haney, Haley & Aldrich
Nicholas Acklam, Ecology
Jeff Wirtz, Ecology

Enclosure A

Site Description, History, and Diagrams

Site Description

The Pend Oreille Mine Historic Debris Field (HDF) is located approximately 80 feet west of the Pend Oreille Mine (POM) near Metaline Falls in Pend Oreille County. The POM is a lead-zinc mine that was operated from the mid-1950s until 2019. The HDF site (Site) extends downslope in a heavily wooded, steep area to approximately 20-30 feet from the Pend Oreille River. The upslope portion of the Site is owned by Teck Cominco American Incorporated (TCAI), while the downslope portion is owned by Seattle City Light (SCL).

The HDF consists of metal drums, vehicle parts, machine parts, cables, hoses, sheet metal, and wood debris disposed between the early 1950s up to 1977 allegedly using a launder chute system meant to discharge mine tailings from the mill to the river. The approximate extent of contaminated soil and waste materials within the HDF is 1.5 acres (200 x 300 feet) and 5.5-20 feet thick. The approximate volume of the waste materials within the HDF is 6,500 cubic yards assuming a uniform 5.5 foot thickness, which increases if the true thickness is closer to 20 feet. The HDF extends downslope (NW-SE) with an elevation range of approximately 115 feet.

The HDF is separated into three areas based on topography; the upper slope ranges from 30-35 percent grade, the middle slope ranges from 70-90 percent grade, and the lower slope ranges from 18-20 percent grade. The native slope is inclined between 45-80 percent. There is evidence of a prior slope failure within the middle slope of the debris layer approximately 45-60 feet long perpendicular to elevation contour. This failure is not observed in the underlying native material. The Site is underlain by glaciolacustrine laminated clay, silt, and sands, while locally there are also thin deposits of gravel and sand present. Regional bedrock consists of the Ledbetter Slate and the Metaline Limestone formations.

Groundwater was not encountered in any test pits, but a seep was observed at the base of the slope discharging approximately 10 gallons per minute. The HDF is bounded by drainages to the northeast and southwest.

Site History

The Site was discovered in April 2005 during a U.S. EPA inspection of the mine property. An environmental assessment conducted between June and August 2005 included a site reconnaissance to identify waste products, five hand auger borings ranging from 1-2 feet below ground surface (bgs), four hand-shoveled test pits to depths of 2.5-5.5 feet bgs, photoionization detector (PID) screening for volatiles in soil, seep water sampling, a geophysical survey to evaluate the extent of the debris field using a portable magnetometer and ground penetrating radar (GPR), and a geologic evaluation of slope stability.

The soil and seepage water samples were analyzed for VOCs, diesel- and oil-range petroleum hydrocarbons, total cyanide, pH, PCBs, and chlorinated pesticides.

Trichloroethene (TCE) concentrations in soil within the HDF exceed the MTCA Method A cleanup level of 0.03 mg/kg, while oil-range petroleum hydrocarbons (ORPH), benzene, methyl tertiary butyl ether (MTBE), polychlorinated biphenyls (PCBs), cyanide, and organochlorine pesticides including beta-BHC, endosulfan I, DDD, DDE, and DDT were detected below their respective cleanup levels. No TCE degradation products including the three dichloroethene isomers or vinyl chloride were present in the soil samples. No analytes exceeded MTCA cleanup levels in the seepage water sample, but benzene, MTBE, and endosulfan were detected at 2.84, 1.8, and 0.0226 ug/L, respectively. No metals analyses were conducted on soil or seepage water samples.

A reclamation plan completed in 2009 identified the HDF as one of several areas to be addressed during mine closure. Potential closure activities concerning the HDF include selectively clearing vegetation, characterizing and removing dangerous and extremely hazardous wastes according to applicable regulations, and regrading and revegetating the area to stabilize the slope. This analysis also states the HDF area as 1.2 acres and approximates the waste volume as 9,960 cubic yards.

Field observations in 2022 indicated that mine tailings and other COCs may extend to the south/southwest of the known HDF boundary. Also noted that the timber launder running through the HDF was used to dispose of mill tailings to the PO River during a time when cyanide was used to process ore.

In February 2023, a data gap assessment and feasibility study work plan was submitted to assess the extent of TCE and RCRA 8 metals in soil and seepage water using hand-auger borings to collect 23 surficial soil samples up to 6 ft bgs. The purpose of the assessment was to:

- Further define the volume of debris within the HDF using hand auger borings
- Conduct additional seepage water sampling
- Conduct a terrestrial ecological evaluation (TEE)
- Conduct a slope survey using map/photo review and field reconnaissance to assess stability and evaluate risks to workers during remedial actions
- Draft and submit a feasibility study to Ecology

From June through December 2023, Haley & Aldrich completed a Data Gap Assessment consisting of 37 hand augur borings within and near the debris field and primarily focused near TC-6, TC-7, and TC-9 where TCE concentrations previously exceeded cleanup levels. Samples were collected between 1-7 feet bgs from the borings at 1 foot intervals. A total of 49 samples were collected, along with one seep water sample and a sample of granular, tailings-like material observed in a metal drum within the debris field. The soil samples were analyzed for RCRA 8 metals, DRPH and ORPH, pesticides, VOCs, PCBs, and cyanide. The seep water sample was analyzed for RCRA 8 metals and VOCs, while the drum material sample was analyzed for RCRA 8 metals.

Soil samples results indicated arsenic, cadmium, chromium, and/or lead exceeded

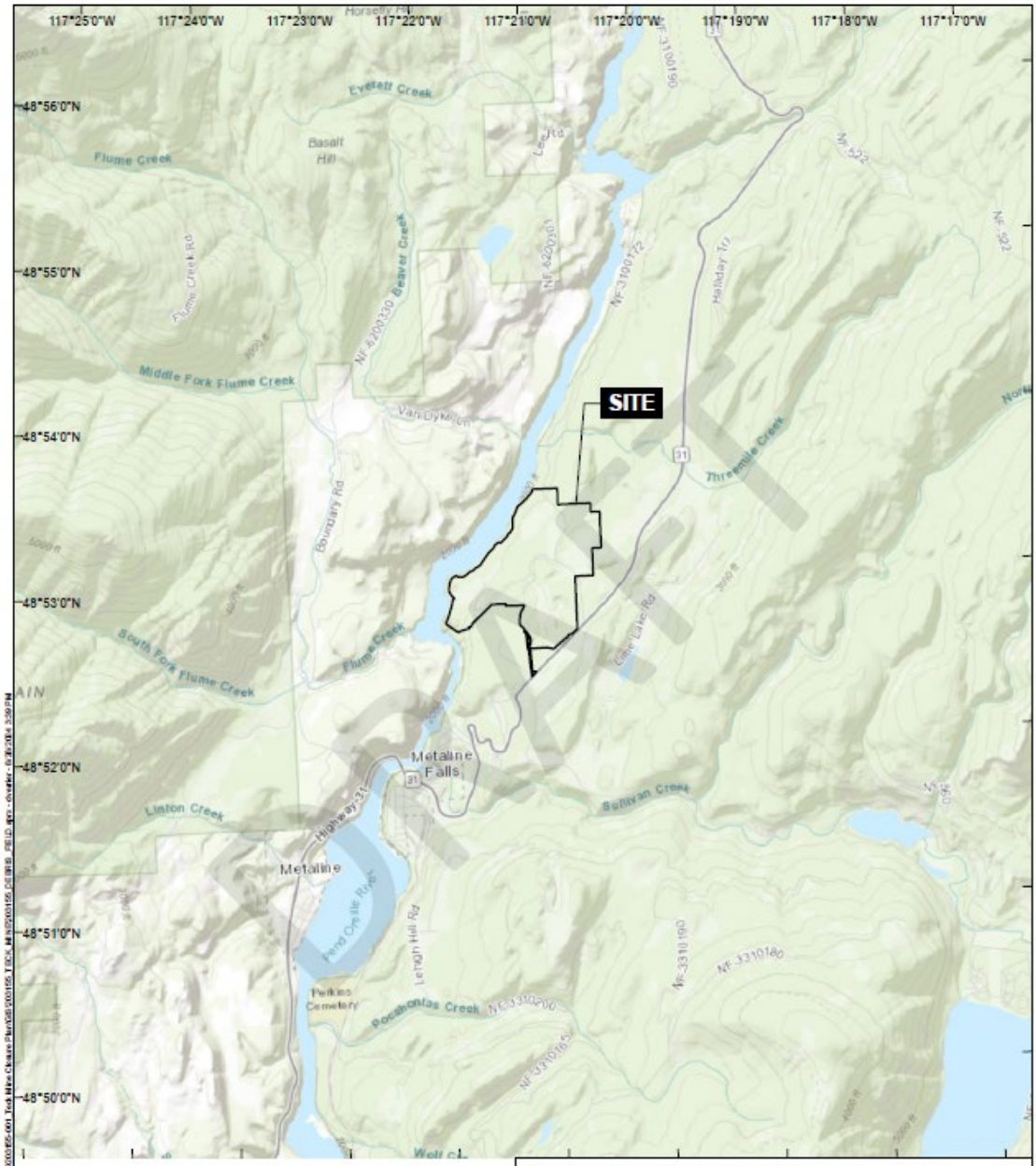
cleanup levels in samples collected from 16 soil borings. Lead was present in nearly all the samples and exceeded the MTCA Method A cleanup level in 31 samples with a maximum concentration of 20,000 mg/kg. Benzene was detected in one sample exceeding the MTCA Method A cleanup level at 0.032 mg/kg. TCE was detected in 16 samples from 5 borings exceeding the cleanup level with a maximum concentration of 5.7 mg/kg. The extent of TCE contamination near TC-6 and TC-7 appeared to be limited, while 16 of the samples collected around TC-9 contained TCE exceeding the cleanup level. TCE was observed extending to 7 feet bgs in these locations and could not be fully assessed due to the steep slope. TCE concentrations appeared to increase from 0-4 ft bgs and decrease from 4-7 ft bgs. DRPH, ORPH, and the VOCs p-isopropyltoluene, naphthalene, n-butylbenzene, toluene, and xylenes detected at concentrations exceeding the method reporting limits (MRLs). Arsenic, barium, cadmium, chromium, lead, selenium, and silver were detected above the MRLs in the seep water sample, but no analytes exceeded cleanup levels. The drum material contained arsenic, cadmium, chromium, lead, and zinc all exceeding MTCA Method A cleanup levels at concentrations of 500, 370, 500, 74,000, and 64,000 mg/kg. Further analyses would be required to determine whether trivalent or hexavalent chromium were present, and whether any samples would designate as a WA State Dangerous Waste based on toxicity criteria.

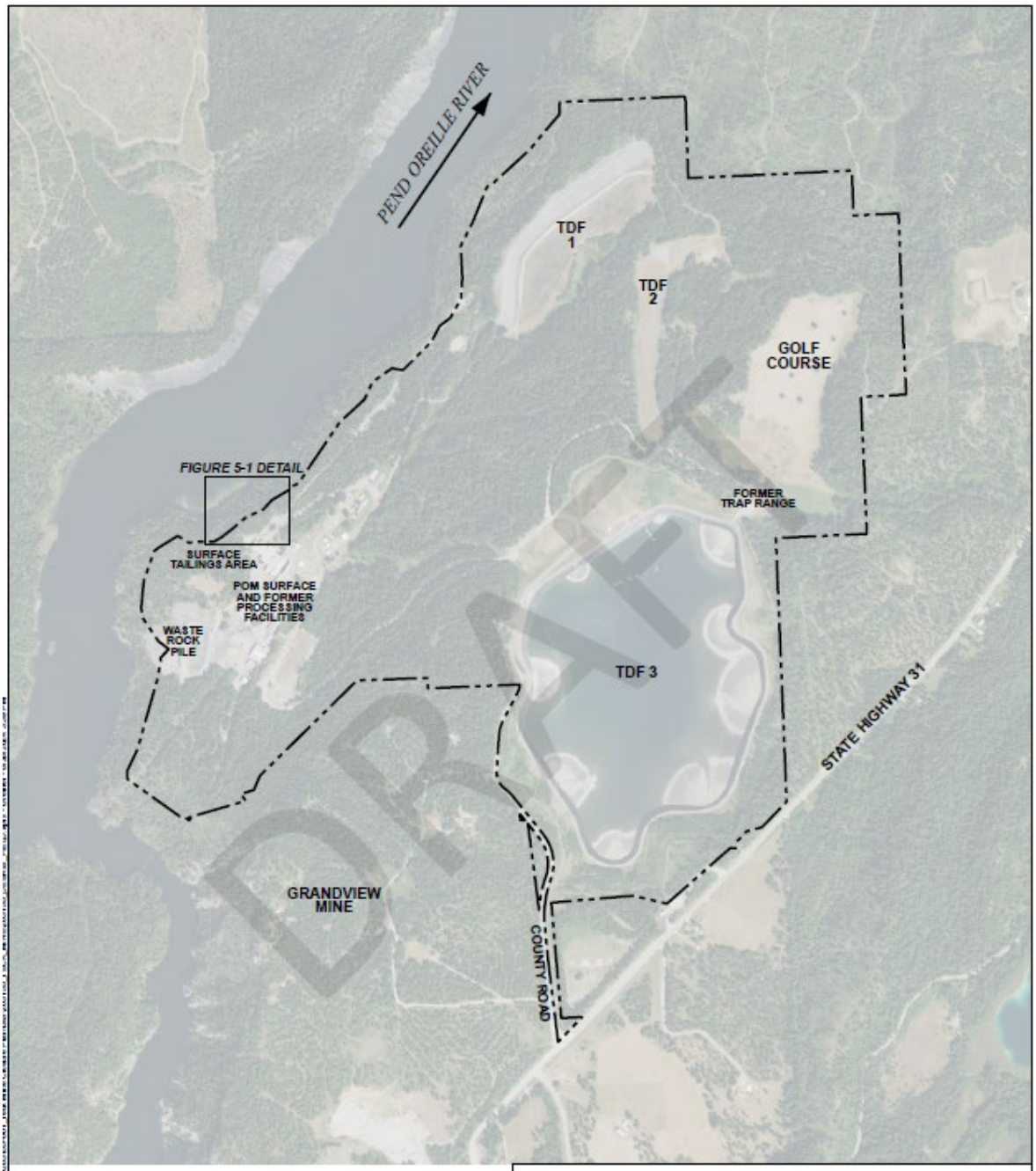
The Data Gap Assessment also included a slope stability assessment consisting of hand-driven cone penetrometer tests (CPTs) at five locations in the debris field to evaluate relative competency as well as visual observations and inclination measurements. The field observations indicated the debris field area is 123 feet long by 155 feet wide (0.25 acres), smaller than previously estimated. The updated estimated volume of material is 875 cubic yards. Results of the CPT tests showed N values ranging from 20 to 51 blows per foot (average 33) and an internal friction angle of 40 degrees, indicating relative stability in the debris field. Stormwater controls at the slope head were recommended to limit saturation and erosion of material.

A Feasibility Study (FS) submitted in 2024 evaluated five remedial alternatives including thermal remediation using electrical resistance, passive and active soil vapor extraction (SVE), in situ capping, removal and disposal, and no action. Passive SVE was selected as the most protective and permanent remedial alternative that would meet cleanup standards within a reasonable restoration time frame.

Sources: GeoEngineers, 2006; URS, 2009; Teck, 2022; Haley & Aldrich, 2024

Site Diagrams


117°25'0"W
117°24'0"W
117°23'0"W
117°22'0"W
117°21'0"W
117°20'0"W
117°19'0"W
117°18'0"W
117°17'0"W
48°56'0"N
48°55'0"N
48°54'0"N
48°53'0"N
48°52'0"N
48°51'0"N
48°50'0"N
SITE
Eveteff Creek
Flume Creek
Basalt Hill
Beaver Creek
Middle Fork Flume Creek
South Fork Flume Creek
Boundary Rd
Van Dyke Rd
Threemile Creek
Cedar Cave Rd
Metaline Falls
Sullivan Creek
Liston Creek
Highway 31
Metaline
Pend Oreille River
Lehigh Hill Rd
Perkins Cemetery
Pocahontas Creek
WA
MAP SOURCE: ESRI
SITE COORDINATES: 48°53'00"N, 117°21'00"W
HALEY ALDRICH
TECK WASHINGTON, INC.,
PEND OREILLE MINE
METALINE FALLS, WASHINGTON
VICINITY MAP
APPROXIMATE SCALE: 1 IN = 5000 FT
SEPTEMBER 2024
FIGURE 1



LEGEND

RIVER FLOW DIRECTION

SITE BOUNDARY

N

0 500 1,000

SCALE IN FEET

AERIAL IMAGERY SOURCE: UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP), 2019

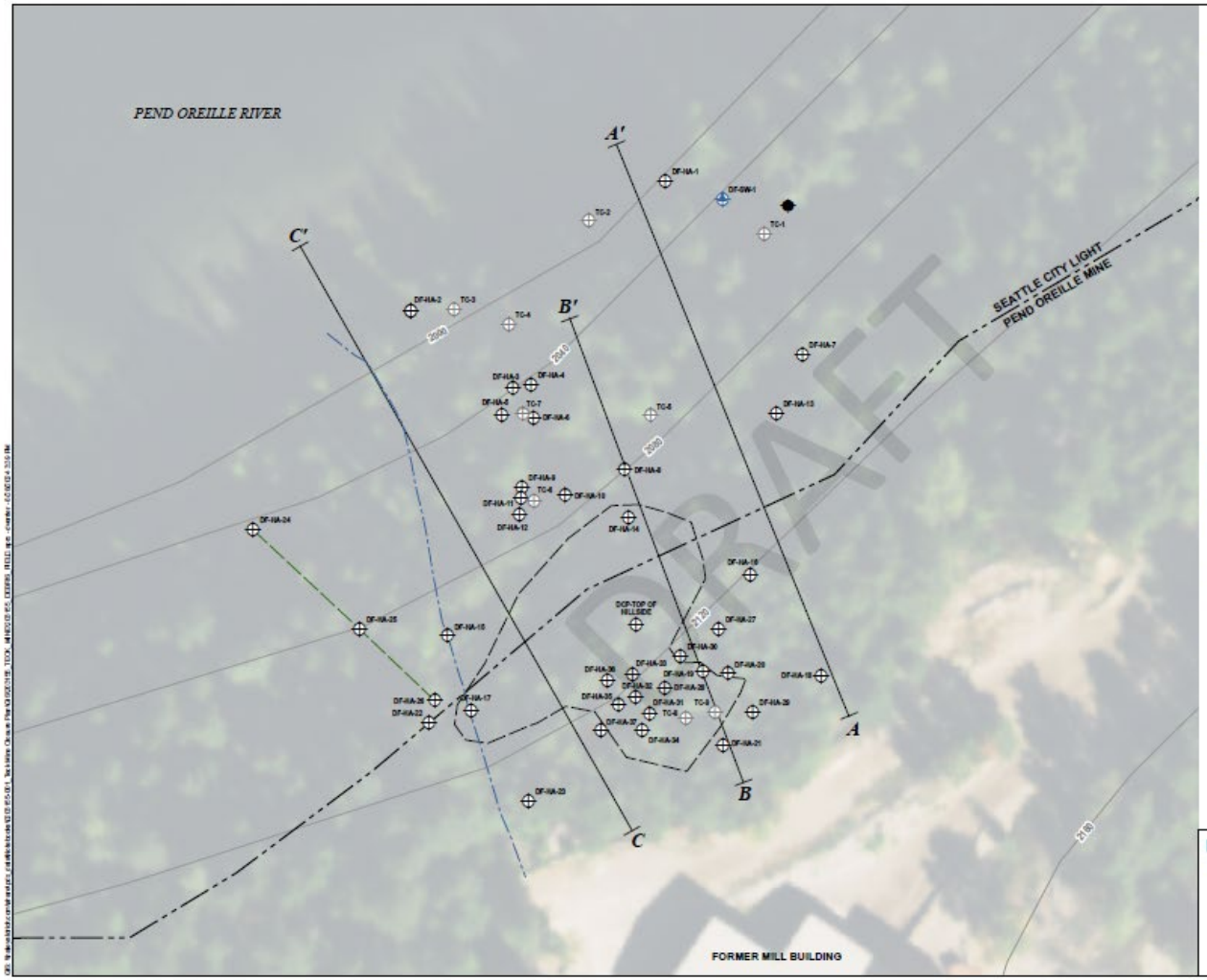
HALEY ALDRICH

TECK WASHINGTON, INC.,
PEND OREILLE MINE
METALINE FALLS, WASHINGTON

SITE PLAN

SEPTEMBER 2024

FIGURE 2



LEGEND

- 2005 HAND AUGER BORING
- 2023 HAND AUGER
- WATER SAMPLE
- SEEP
- DEBRIS FIELD EXTENT
- DRAINAGE CHANNEL
- ESTIMATED 2023 DEBRIS EXTENT
- TRANSECT
- TOPOGRAPHIC ELEVATION CONTOUR, 40-FT INTERVAL (NAVD 88)
- SITE BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. HISTORICAL DEBRIS FIELD SAMPLE LOCATIONS AND SITE FEATURES ARE BASED ON 2005 ASSESSMENT.
3. NAVD88 = NORTH AMERICAN VERTICAL DATUM OF 1988
4. TOPOGRAPHIC CONTOURS SOURCE: UNITED STATES GEOLOGICAL SURVEY (USGS)
5. AERIAL IMAGERY SOURCE: UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP), 2019

0 50 100
SCALE IN FEET

HALEY ALDRICH

TECK WASHINGTON, INC.,
PEND OREILLE MINE
METALINE FALLS, WASHINGTON

DEBRIS FIELD

SEPTEMBER 2024

FIGURE 3