
# *Abandoned Mine Lands*
# *Initial Investigation Report*
# *Washington Mine*
# *Metaline Falls, Washington*

***Prepared for***
***Washington State***
***Department of Ecology***

***December 28, 2006***
***17274-00(WA)***

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WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

# *Abandoned Mine Lands Initial Investigation Report*
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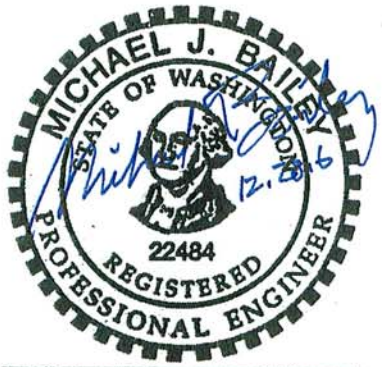
***Prepared for***
***Washington State***
***Department of Ecology***
***Rick Roeder, Project Manager***

***December 28, 2006***
***17274-00(WA)***

Prepared by
**Hart Crowser, Inc.**




EXPIRES 12/03/2007

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## FIELD DOCUMENTATION

# ABANDONED MINE LANDS INITIAL INVESTIGATION REPORT
# WASHINGTON MINE
# METALINE FALLS, WASHINGTON

## 1.0 EXECUTIVE SUMMARY

Information obtained during this assessment is summarized in Table 1.

**Table 1 - Washington Mine Data Summary**

| | |
|---|---|
| Mine Name: | Washington (Washington Rock), alias Gem, Davenport-Troyer |
| Last Known Operation: | Huntting (1956) notes that, in 1936, limonite was mined by the Lehigh Portland Cement Company for use in its Portland cement. Development included a 90-foot-long adit, and several open cuts. Huntting refers to the mine as being on top of Washington Rock. No adits were located on top of the rock; however, one was located at the base of the rock. |
| Location: | 0.25 mile by road north of Metaline Falls<br>Latitude, Longitude: 48.86583, 117.37286<br>Quadrangle Map: Metaline Falls and Metaline<br>TRS: Township 39N, Range 43E, Section 22, NE ¼ |
| Features Observed | One open flooded adit<br>One apparent prospect test pit<br>Ferricrete deposits between open adit and Pend Oreille River<br>Seasonally wet area |
| Results above Criteria | Surface water exceeded freshwater criteria for cadmium and zinc. Sediment exceeded MTCA human health criteria for arsenic, cadmium, iron, lead, thallium, and zinc; and ecological criteria for aluminum, arsenic, cadmium, lead, mercury, thallium, and zinc. |
| Work by Others | No previous site assessment information was identified. |
| Potential Receptors / Degree of Hazard | Human health risks possible for recreational users. Possible releases to Pend Oreille River. Sediment has the potential to fail TCLP lead criteria for dangerous waste. |

## 2.0 INTRODUCTION

This report summarizes the results of the initial limited soil and surface water investigation at the Washington Mine site located near Metaline Falls, Washington (Figures 1 and 2). Hart Crowser performed this initial investigation for the Washington State Department of Ecology (Ecology) under Contract No.

C06254 according to the Ecology Statement of Work (SOW) and project Sampling and Analysis Plan (SAP) prepared by Hart Crowser (Hart Crowser 2006).

The objectives of this initial investigation are to:

- Determine whether the site has released or has a potential to release hazardous substances to the environment at concentrations above Model Toxics Control Act (MTCA) human health or ecological screening levels, to identify sites that may require additional investigation and sampling;

- Identify and document waste source areas including estimates of waste mass and/or volume; and

- Identify and document the presence of potential waste transport pathways and receptors.

For this study, samples were collected of the soil-like fraction of waste rock, mine tailings, and/or natural soils that was potentially affected by mining. Analytical results were compared to the MTCA criteria for soils. Use of terms such as "soils" or "waste rock", etc. are for convenience only and do not indicate potential future designation in accordance with Chapter 173-350 WAC, or Chapter 173-303 WAC, or other regulatory criteria.

Subsurface openings observed for this study may include shafts, adits, prospect pits, collapsed stopes, and/or excavations completed fro other purposes. The terms used in this report are based on visual interpretation in the field and may not fully characterize historic site use.

Prior to the site visit, Hart Crowser performed file reviews; evaluated aerial photographs, U.S. Forest Service and USGS maps; reviewed the Inventory of Washington Minerals; and reviewed county tax assessor records to:

- Identify the location of mines and associated features/structures;
- Identify property owners, mineral claimants, and mine operators; and
- Obtain contact information to gain permission for site access.

Table 2 presents the project team members and their roles and responsibilities for this investigation. A site visit was accomplished on June 16, 2006.

## 3.0 SITE DESCRIPTION, OPERATIONAL HISTORY, AND WASTE CHARACTERISTICS

### *3.1 Site Location*

The Washington Mine site is located on BLM Spokane District and Shoshone Tree Farm Inc. land (Figures 1 and 2). The site has an open adit that is visible from the eastern end of the Highway 31 Bridge where it crosses the Pend Oreille River west of Metaline Falls. The adit is in the rock face north of the bridge, about 20 feet above the river. A potential mining prospect is located at the top of Washington Rock. This prospect may be a part of one of the surrounding mining claims. Directions to the mine are as follows:

- Leave Metaline Falls heading west on Highway 31.
- Cross the bridge to the western abutment.
- Park on the north side of the road.
- Step over the highway railing, and walk up to the base of the talus slope. The trail is through the trees to the north, along the talus above the river. The adit is adjacent to the trail.

The access description provided herein is based on observations at the time the site was visited for this work. References to roads do not reflect property ownership, and does not imply that public access is available.

The Washington Mine is located on Pend Oreille County Tax Parcel No. 43-39-21-50-0001; latitude 48.86583°, longitude 117.37286°, Township 39N, Range 43E, Section 22, NE 1/4; as shown on the USGS Metaline alls and Metaline quadrangle maps.

### *3.2 Site Description*

The Washington Mine is an inactive lead, zinc, silver, and iron mine. A large, open, flooded adit lies at the base of Washington Rock, adjacent to the Pend Oreille River (Photographs 1 and 2). A short trail leads to the adit, which is visible from Highway 31. Iron staining was observed leading from the adit into the river (Photographs 2 and 3). No waste rock is visible, although it may have been washed downstream. A Site Plan and cross section view of the site are shown on Figures 3 and 4, respectively.

Huntting indicates that the Washington Mine is located on top of Washington Rock. An apparent collapsed prospect excavation (adit?) was located on a small hill at the top of Washington Rock (Photograph 4), but this prospect may not be a part of the Washington Mine. The hill sits above a wetland that drains to the east (Photograph 5). No drainage channels were observed exiting from the prospect, and no waste rock was visible near the collapsed feature. The wetland is fed by several small seeps to the south. Plan and cross-sectional views are depicted on Figures 5 and 6.

The Pend Oreille River lies adjacent to the site. It is likely that the adit discharges water to the river during wet periods. No residences can be seen from the site, but Metaline Falls is located directly across the Pend Oreille River, approximately 750 feet to the east.

### *3.3 Site Ownership and Operations History*

The mine is located on parcels owned by BLM and Shoshone Tree Farms. While Pend Oreille Mines and Metals Company was listed as the claim owner in 1943, years of operation are unknown. Table 3 presents the available information concerning the ownership of this mine.

Information on site ownership and operations is based on readily available public information and may not reflect all details of ownership and operations.

**Table 3 – Ownership Timeline**

| Year | Owner | Notes |
|---|---|---|
| Current Land Owner | Bureau of Land Management, Spokane District | Pend Oreille County Assessor's records |
| Current Claim Owner | The Tax Assessor's office did not have a record of a patented claim at this location. | Pend Oreille County Assessor's records |
| 1943 | Pend Oreille Mines & Metals Company | Huntting (1956) |
| 1935-1936 | Lehigh Portland Cement Company | Huntting (1956) |
| 1924-1926 | Lead King Mines Company, Inc. | Huntting (1956) |

## 4.0 SITE INVESTIGATION ACTIVITIES

An initial site investigation was conducted on June 16, 2006. Mine features, photograph locations and directions, GPS waypoints, sample locations, and the likely direction of surface water flows are shown on Figure 3. Sample descriptions are provided in Table 4.

### *4.1 Soil and Waste Pile Sampling*

No soil or waste rock samples were collected since waste rock was not observed on the site.

### *4.2 Surface Water and Seep Sampling*

No seeps were present and no water was discharging from the open adit at the time of the investigation. A surface water sample was collected from the stagnant water within the lower adit.

### *4.3 Sediment Sampling*

Iron deposits and ferricrete have formed on the hillside leading from the open adit to the Pend Oreille River (Photograph 3). A five-point composite sediment sample was collected along the dry drainage path between the adit and the river.

## 5.0 ANALYTICAL RESULTS AND ENVIRONMENTAL HAZARD ASSESSMENT

Sediment and water quality data were compared to regulatory criteria for screening purposes as discussed below. Further analysis, including risk-based analyses may be appropriate in additional future site assessments.

### *5.1 Surface Water and Sediment*

Analytical results for surface water and sediment samples are summarized in Tables 4 and 5, respectively.

The water sample collected from the stagnant water within the adit exceeded the cadmium chronic water quality standard for surface waters. The sample also exceeded both the chronic and the acute water quality criteria for zinc. Hardness dependent metals criteria were calculated based on the hardness of the adit water, not the receiving water at the Pend Oreille River.

The sediment sample analytical results were compared with applicable MTCA Method A cleanup levels, MTCA Method B cleanup levels for soil ingestion, soil ingestion and dermal contact combined, and with criteria for ecological protection of plants, soil biota, and wildlife. The sample exceeded MTCA Method A criteria for arsenic, cadmium, and lead. It should be noted that the Method A criterion for cadmium is based on groundwater protection. The cadmium concentration was below the Method B direct contact criterion. Concentrations of arsenic, iron, thallium, and zinc exceeded the Method B criteria. Sample concentrations exceeded the ecological protection criteria for aluminum, arsenic, cadmium, lead, mercury, thallium, and zinc. While TCLP analysis was not performed, the lead concentration is high enough to potentially fail toxicity characteristic leaching procedure (TCLP) criteria for dangerous waste.

### *5.2 Air*

No contaminated airborne dust was observed during the site visit. Because no waste rock was present near Adit 1 or the potential adit, and because the ferricrete has formed a hardened layer, it is unlikely that contaminated airborne dust will be a concern at this site.

### *5.3 Methodology for Threatened and Endangered Species Information*

We contacted the Washington State Department of Natural Resources (DNR), the Washington State Department of Fish and Wildlife (WDFW), the U.S. Fish and Wildlife Service (USFWS), and the Colville National Forest – USDA Forest Service to obtain information on the presence of state and federal threatened or endangered terrestrial and aquatic species. We determined that the WDFW maintained the most accurate and up-to-date information on species distribution in its Priority Habitats and Species (PHS) Database. We requested maps and narratives identifying documented species presence at the Washington Mine. In addition, we contacted DNR and requested information on rare plants and high quality native wetland and terrestrial ecosystems within the vicinity of the Washington Mine.

Our search ranges included a 4-mile radius for terrestrial species and a 15-mile radius for aquatic species.

We reviewed approximately 86 PHS maps and accompanying narratives to determine whether any threatened or endangered species were documented within our search ranges. We drew 4- and 15-mile radii around the Washington Mine on a Colville National Forest Map. We then examined the PHS maps in relation to the search ranges for our project areas. All state and federal threatened and endangered species and habitats that occurred within our search

ranges were recorded. Species and habitats that occurred on the edge of our search range were considered within the range and recorded.

A summary of the threatened and endangered species within our search ranges is provided in Table 7.

## 6.0 SUMMARY AND CONCLUSIONS

The open adit at the base of Washington Rock has the potential to discharge water containing metals at concentrations above chronic and acute freshwater criteria to the Pend Oreille River. Both the water and sediment samples indicate that the constituents of concern are cadmium and zinc. The sediment sample also had elevated concentrations of aluminum, arsenic, cadmium, iron, lead, mercury, thallium, and zinc. In addition, the sediment sample has the potential to fail the TCLP lead criterion for dangerous waste.

Additional surface water sampling and analysis are recommended when water from the adit is flowing to the river. At the same time, a sample of upgradient river water should be collected for hardness analysis so that the site-specific hardness dependent criteria can be calculated. Lead TCLP analysis of a sediment sample is recommended to determine whether the material might be dangerous waste. Human health risks would most likely be limited to potential recreational users. MTCA Method A and B screening criteria may overestimate risk to recreational users since their exposure duration is less than the duration for a residential scenario. A site-specific terrestrial ecological evaluation (TEE) would be required to evaluate ecological risks.

Potential exposure pathways are shown on Figure 5.

## 7.0 USE OF THIS REPORT

Work for this project was performed, and this report prepared, in accordance with generally accepted professional practices for the nature and conditions of the work completed, in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of the Washington State Department of Ecology for specific application to the referenced property. This report is not meant to represent a legal opinion. No other warranty, express or implied, is made.

The information in this report is intended to be used to determine whether the site has released or has a potential to release hazardous substances to the

environment at concentrations above Model Toxics Control Act (MTCA) human health or ecological screening levels.

## 8.0 REFERENCES


Ecology 1990. Washington Ranking Method Scoring Manual. Ecology Publication 90-14. Revised April 1992.

Ecology 2001a. Model Toxics Control Act Cleanup Levels and Risk Calculations (CLARC II) Update. November 2001.

Ecology 2001b. Adopted Amendments. Model Toxics Control Act Cleanup Regulations. Chapter 173-340-WAC. February 2001.

Hart Crowser 2006. Sampling and Analysis Plan, Abandoned Mine Lands Assessments, Washington State. Prepared for Washington State Department of Ecology. June 9, 2006.

Huntting, Marshall T., 1956. "Inventory of Washington Minerals", Part II Metallic Minerals, 2 volumes. State of Washington Department of Conservation and Development, Bulletin No. 37, Washington State printing office, Olympia, Washington.

Henry Day, "The Records of the Aurum Mining Company" University of Idaho Special Collections, accessed on 6/26/06 by PLR, at http://www.lib.uidaho.edu/special-collections/Manuscripts/dmginv/mg235.htm

Mindat.org website http://www.mindat.org/index.php


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## Table 2 - Project Team Roles and Responsibilities

| Project Role | Personnel Assignment | Roles/Responsibilities |
|---|---|---|
| Ecology Project Manager | Rick Roeder<br>Ecology<br>(509) 454-7837 | Client Project Manager |
| Program Manager | Mike Bailey<br>Hart Crowser<br>(206) 324-9530 | Ensures that all work is carried out in accordance with contractual obligations and the Delivery Order statement of work. Assists the Project Manager as needed with technical decisions and in resolving issues. Final reviewer. |
| Project/Task Manager | Roger McGinnis<br>Hart Crowser<br>(206) 324-9530 | Overall responsibility for execution of the Work Plan. Coordinate with Client, Field Manager and Program Manager as necessary to resolve issues. |
| Corporate Health and Safety Officer (HSO) | Mike Ehlebracht<br>Hart Crowser<br>(206) 324-9530 | Overall responsibility for review and answering questions regarding H&S. |
| Field Manager and Site Safety Coordinators (SSC) | Abby Bazin/Pat Reed<br>Hart Crowser<br>(206) 324-9530 | Ensures that explorations are conducted and samples are collected in accordance with project specifications. Coordinates field activities with Project and Program Managers. |
| Mine Information Research | Pat Reed<br>Mike Swenson<br>Hart Crowser<br>(206) 324-9530 | Determined location of mine, access route, and ownership |
| Project Chemist | Erin Breckel<br>Hart Crowser<br>(206) 324-9530 | Performs laboratory coordination and data quality review to assure analytical methods and data are consistent with project needs and data quality objectives. |
| Laboratory Services | Harvey Jacky<br>Columbia Analytical Services<br>(360) 577-7222 | Analyzes soil, sediment, and water samples. |

## Table 4 - Washington Mine Sample Inventory

| Sample Name | Sample Location | Sample Description |
|---|---|---|
| **Water Sample** | | |
| WA-Adits-W1 | Stagnant water in Adit 2 | pH: 6.86<br>Conductivity: 0.666 mS/cm<br>Turbidity: 200 NTU<br>Dissolved Oxygen: 2.20 mg/L<br>Temperature: 10.7 C<br>Other: Strong $H_2S$ odor. |
| **Sediment Sample** | | |
| Wash-Sed 1 | Five-point composite sample in drainage channel between Adit 2 and the Pend Oreille River | Moist, reddish-brown, silty GRAVEL with sand. |

**Table 5 - Analytical Results for Water Sample - Washington Mine**

| SDG<br>Sample ID<br>Sampling Date | Drinking Water MCL | Chapter 173-201A WAC[a] Acute | Chronic | K0605186<br>WA-Adit 2-W1<br>6/14/2006 |
|---|---|---|---|---|
| **Conventionals in mg/L** | | | | |
| Hardness as CaCO3 | | | | 554 |
| Sulfate | | | | 211 |
| Total Dissolved Solids | | | | 686 J |
| Total Suspended Solids | | | | 8 J |
| Turbidity | | | | 16.3 J |
| **Dissolved Metals in µg/L** | | | | |
| Arsenic | 10 | 360 | 190 | 3.68 |
| Cadmium [b] | 5 | 23.6 | 3.6 | **4.92** |
| Copper [b] | 1300 (at tap) | 85 | 49 | 1.26 |
| Lead [b] | 15 (treatment) | 391 | 15 | 8.34 |
| Zinc [b] | 5000 (secondary) | 488 | 446 | **2670** |
| **Total Metals in µg/L** | | | | |
| Aluminum | | -- | -- | 50 U |
| Iron | | -- | -- | 375 |
| Mercury | 2 | 2.1 | 0.012 | 0.0006 J |

**Notes:**

U = Not detected at the detection limit indicated.

J = Estimated value.

-- Not established or Not applicable.

Bold - Concentration exceeds chronic criterion.

Box - Concentration exceeds acute criterion.

a Chapter 173-201A WAC. Water Quality Standards for Surface Waters of the State of Washington (Last update July 1, 2003).

b Hardness dependent criteria.

**Table 6 - Analytical Results for Sediment Sample - Washington Mine**

| SDG<br>Sample ID<br>Sampling Date | MTCA Method A (a) | MTCA Method B | | Ecological Protection (c) Plant/Soil Biota/Wildlife | K0606045<br>Wash-Sed 1<br>6/16/2006 |
|---|---|---|---|---|---|
| | | Soil Ingestion (b) | Soil Ingestion & Dermal Contact (b) | | |
| **Total Solids in %** | | | | | 83.2 |
| **Total Metals in mg/kg** | | | | | |
| Aluminum | -- | 80,000 | 72,072 | 50 / -- / -- | **967** |
| Antimony | -- | 32 | 29 | 5 / -- / -- | 1.07 |
| Arsenic | 20 | 0.67 | 0.62 | 10[(d)] / 60 / 132 | **44.2** |
| Beryllium | -- | 160 | 144 | 10 / -- / -- | 0.1 |
| Cadmium | 2 | 80 | 74 | 4 / 20 / 14 | **7.33** |
| Chromium | 2,000[e] | 120,000[e] | 44,571[e] | 42 / 42 / 67 | 1.8 |
| Copper | -- | 2,960 | 2,700 | 100 / 50 / 217 | 4.8 U |
| Iron | -- | 24,000 | 21,622 | -- / -- / -- | 198,000 |
| Lead | 250 | -- | -- | 50 / 500 / 118 | **1,740** |
| Manganese | -- | 11,200 | 10,090 | 1,100 / -- / 1,500 | 168 |
| Mercury | 2 | 24 | 18 | 0.3 / 0.1 / 5.5 | **0.57** J |
| Nickel | -- | 1,600 | 1,441 | 30 / 200 / 980 | 10.8 |
| Selenium | -- | 400 | 360 | 1 / 70 / 0.3 | 1.2 U |
| Silver | -- | 400 | 360 | 2 / -- / -- | 1.42 |
| Thallium | -- | 5.6 | 5.0 | 1 / -- / -- | **23.6** |
| Zinc | -- | 24,000 | 22,000 | 86 / 200 / 360 | **52,000** |

**Notes:**

U = Not detected at the detection limit indicated.

J = Estimated value.

-- Not established or Not applicable.

Bold - Concentration exceeds ecological criterion.

Box - Concentration exceeds MTCA Method A or Method B criterion.

(a) WAC 173-340-740(2), WAC 173-340-900 (Table 740-1). Model Toxics Control Act (MTCA) Method A.

(b) WAC 173-340-740(3). MTCA Method B Unrestricted land use soil cleanup standards. For carcinogenic constituents, the value presented is the lower of the non-carcinogenic and carcinogenic level calculated using Equations 740-1 and 740-2 for ingestion only. Equations 740-4 and 740-5 for ingestion and dermal contact. Information from CLARC 3.1 was used unless otherwise noted.

(c) WAC 173-340-740(3)(b)(ii), WAC 173-340-749, WAC 173-340-900 (Table 749-3).

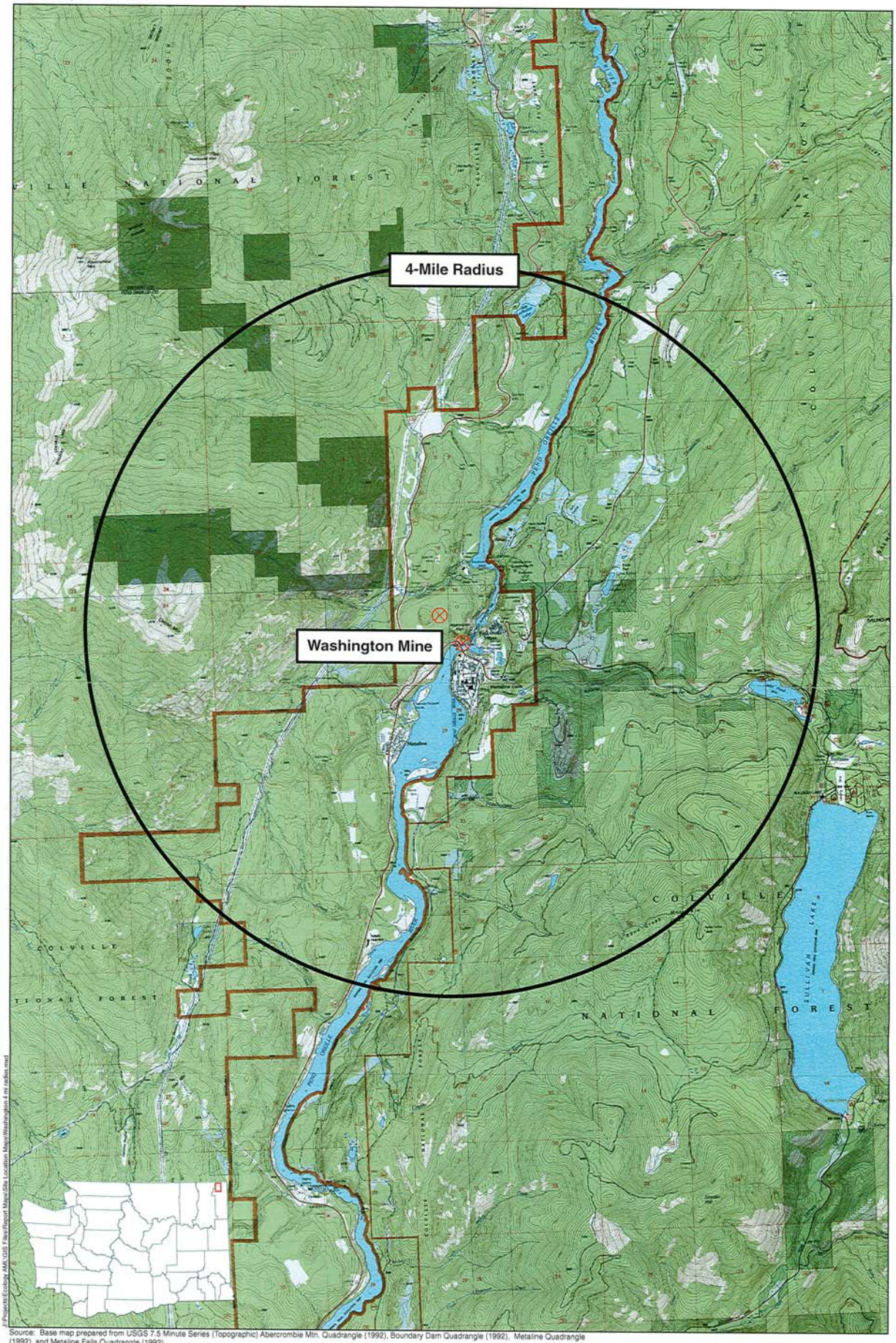
(d) Based on Arsenic V (10 mg/kg)

(e) Based on Chromium III

**Table 7 - Threatened and Endangered Species**

| Species | Federal Status | | State Status | | Narrative |
|---|---|---|---|---|---|
| | T | E | T | E | |
| Lynx (*Lynx canadensis*) | X | | X | | Crowell Mtn |
| Grizzly bear (*Ursus arctos*) | X | | | X | Flume Creek |
| Bull trout (*Salvelinus confluentus*) | X | | | | Pend Oreille River, Slate Creek, South Salmo River and Bench Creek |
| Woodland caribou (*Rangifer trandus*) | | X | | X | Beaver Creek and Slate Creek |
| Fisher (*Martes pennanti*) | | | | X | Slate Creek and north end of Sullivan Lake |
| Bald eagle (*Haliaeetus leucocephalus*) | X | | X | | Pend Oreille River south of Metaline Falls and north end of Sullivan Lake |

## *Site Location Map*
### *Washington Mine*




Source: Base map prepared from USGS 7.5 Minute Series (Topographic) Abercrombie Mtn. Quadrangle (1992), Boundary Dam Quadrangle (1992), Metaline Quadrangle (1992), and Metaline Falls Quadrangle (1992).

0 0.5 1 2
Scale in Miles

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Figure 1

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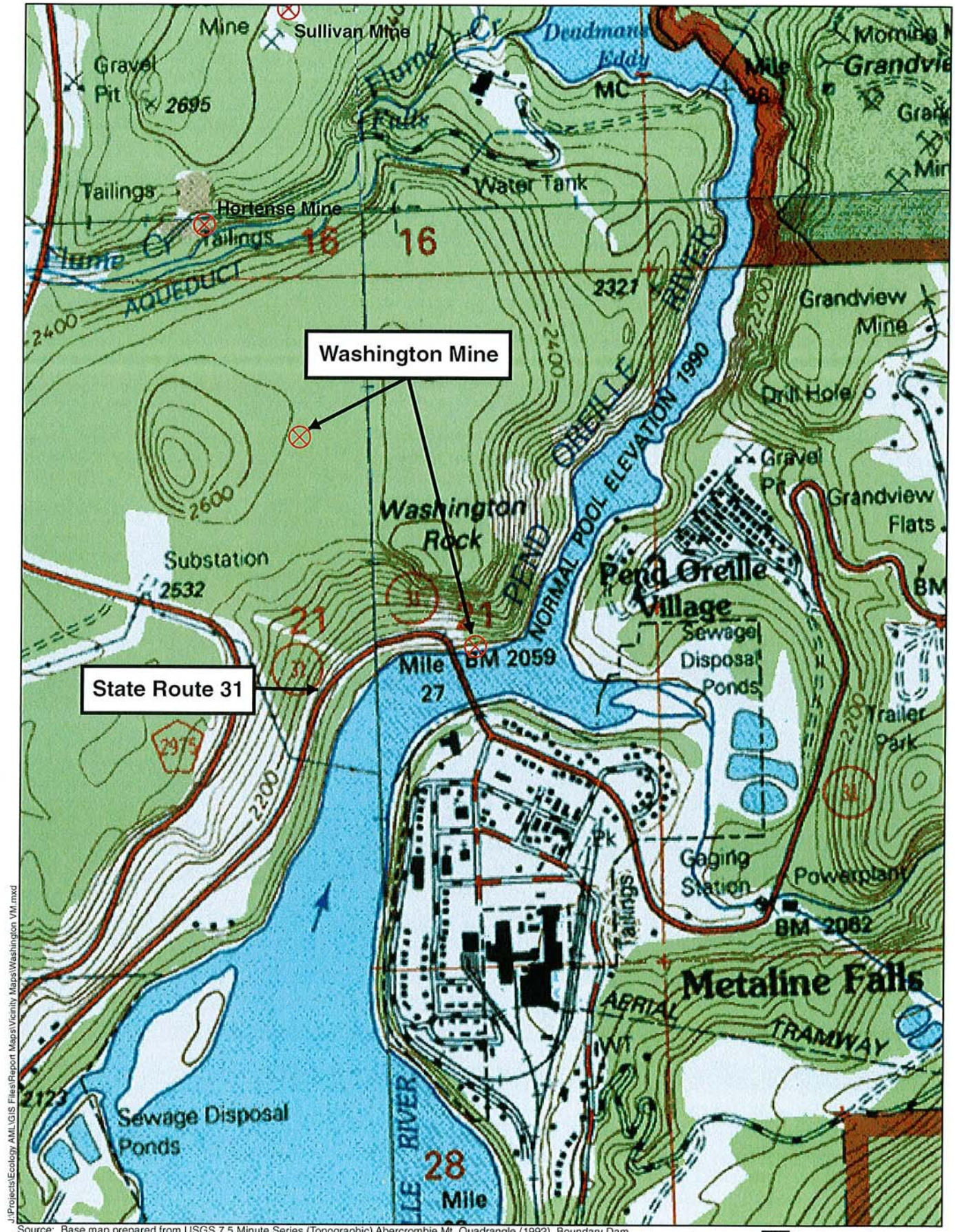
# *Vicinity Map*
## *Washington Mine*

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Source: Base map prepared from USGS 7.5 Minute Series (Topographic) Abercrombie Mt. Quadrangle (1992), Boundary Dam Quadrangle (1992), Metaline Quadrangle (1992), and Metaline Falls Quadrangle (1992).

0 500 1,000

Scale in Feet

⊗ Mine Location Visited in Field

N

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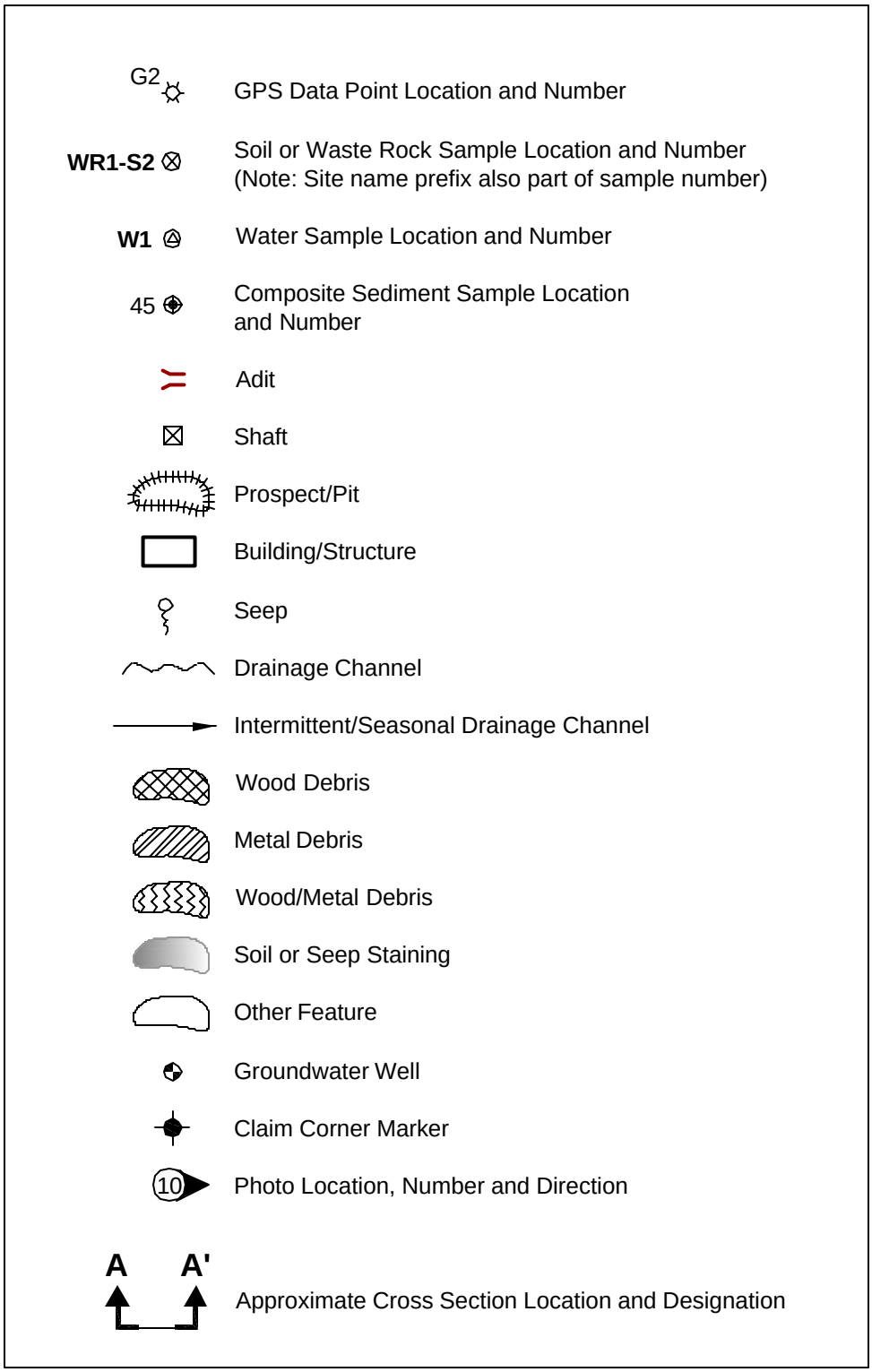
Figure 2

## *Standard Key for Site Plan*
### *Washington Mine*



## *Site Plan*
### *Washington Mine*

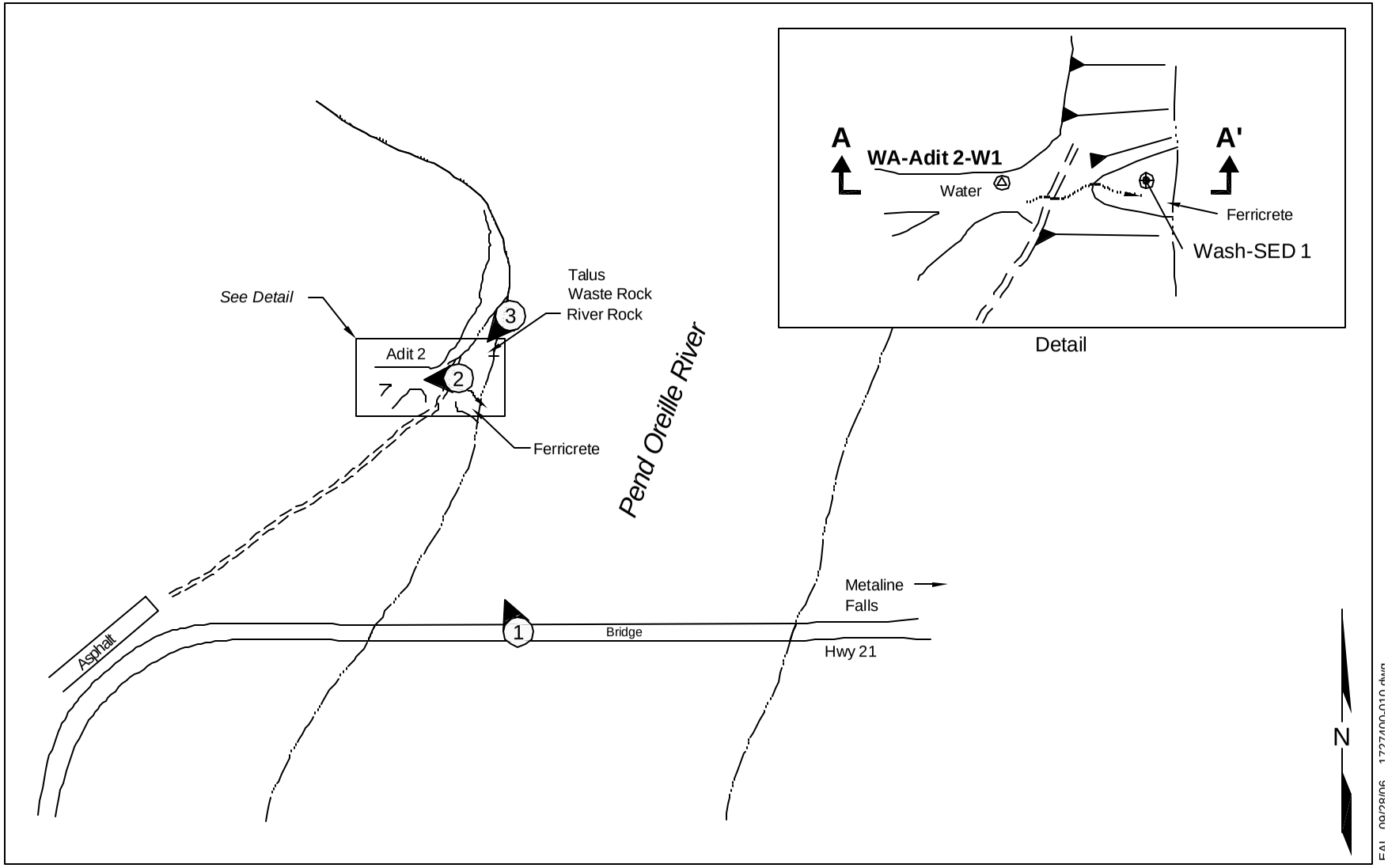



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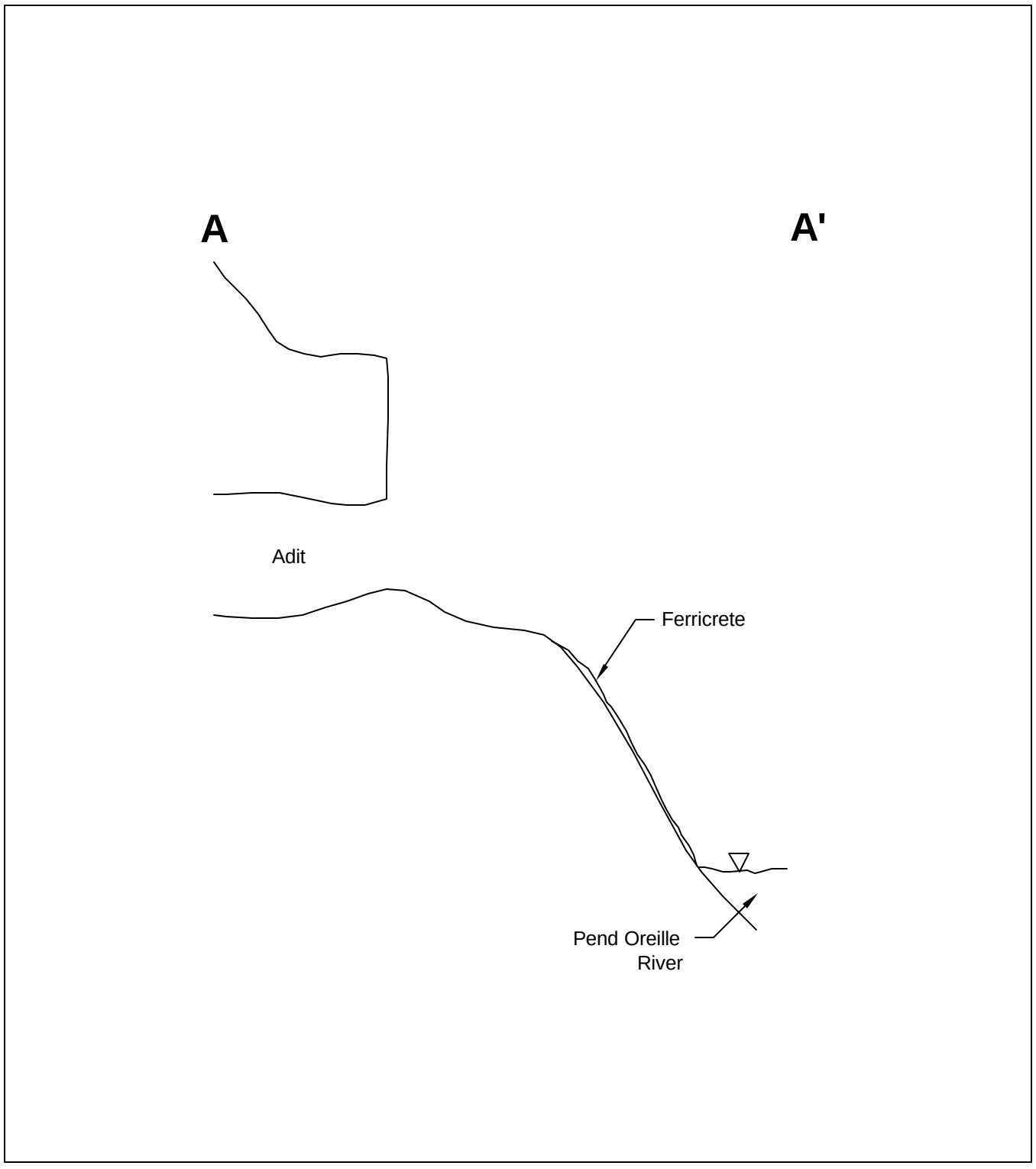
*Figure 3*

## *Cross Section A-A'*
### *Washington Mine*

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0 10 20

Scale in Feet

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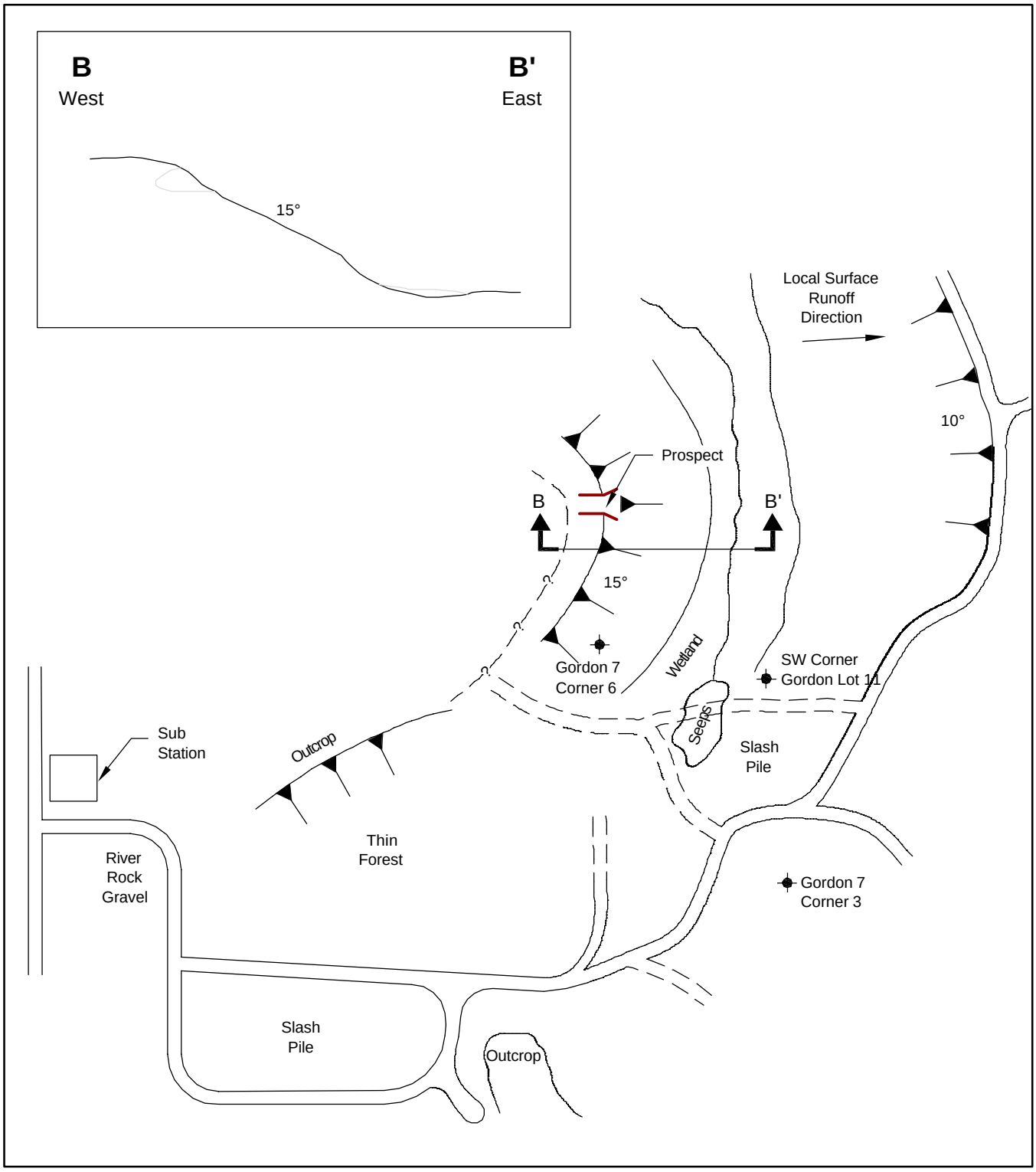
*Figure 4*

## *Site Plan*

### *Top of Washington Rock*




***Source:*** **Base map prepared from field notes 06/16/06**

N

0 120 240

Scale in Feet

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***Figure 5***

## *Mine Waste Rock Conceptual Site Model for Human and Ecological Risk*
### *Washington Mine*

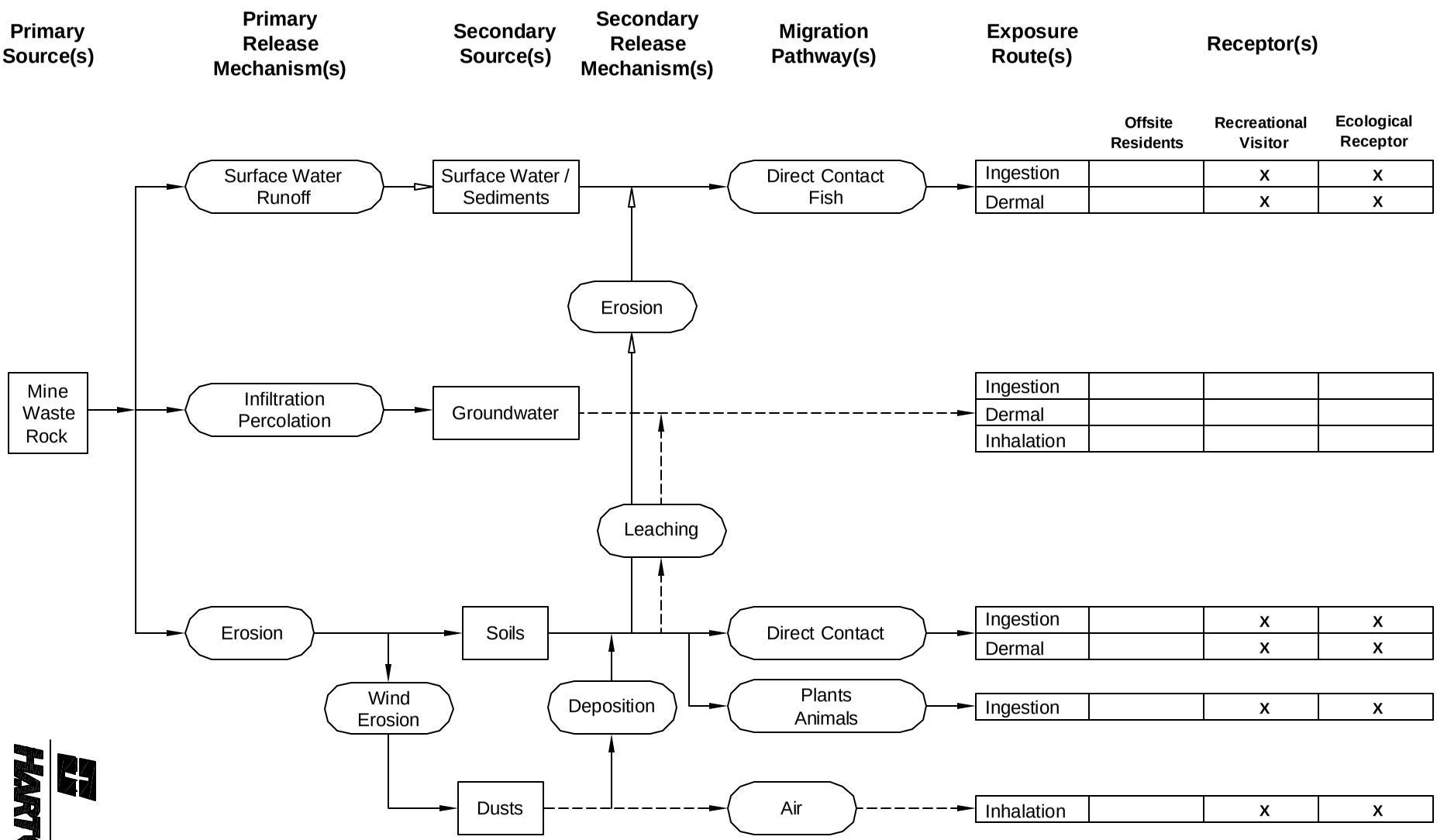


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*Figure 6*

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# APPENDIX A
# FIELD DOCUMENTATION

## AML Feature Inventory



Feature ID: Washington River Site
Surveyor(s):
USGS Quad: Metaline Falls
Survey Date: 6/16/06

**Directions to Site (from a main road or landmark appearing on map)**

Park at west end of bridge at Metaline
Walk north on asphalt, then path north, about 500 ft.

**Terrain Slope (Circle where applicable):** 1. Flat 2. Vertical 3. Sloped (if sloped, report approx slope angle)
slope angle: deg

**Physical Features / Sources**

**Mine Openings:**

| | Count / ID | Condition: (open / closed / collapsed / flooded / other) | Nominal Dimensions in feet | Water Present (Y / N) | Flowrate in GPM | Parameters: pH | Cond in mS | Temp in C | | Animals Present (ie: bats, other) | Photo # (Site-Photo#-Date) | GPS Coord (Report in NAD 83, WA North Zone, State Plane Coordinates, Units of Feet) | | Elevation in feet above MSL* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shaft(s) | | | | | | | | | | | | | | |
| adit(s) | 1 | open | 6X6 | y | NA | | | | | None | | | | |
| pit(s) | | | | | | | | | | | | | | |
| other (explain) | | | | | | | | | | | | | | |

*Elevation Measurement Method: B=barometer, T = Topo Map, O = Other (explain)

**Mining Activity-Related Piles:**

| | Count / ID | Dimensions in ft (LXWXH) | Feature Vol. in yds$^3$ | Seepage Visible? (Y / N) | Seepage: Active / Inactive? | Estimated Particle Gradation (eg. 0.5" - 4") | # of Samples | % Ground Cover | Distressed Vegetation (Y / N) | Recent Human Activity (Y / N) | General Description of Location(s): |
|---|---|---|---|---|---|---|---|---|---|---|---|
| waste rock pile(s) | 1 | 50X20X2 | | y | Inactive | #200 - cobble | | | N | N | Riverbank |
| tailings pile(s) | | | | | | | | | | | |
| ore / leach pile(s) | | | | | | | | | | | |
| debris pile(s) | | | | | | | | | | | |
| other (explain) | | | | | | | | | | | |

**Miscellaneous Notes:**

## AML Feature Inventory

**Feature ID** Washington River Adit

**Surveyor(s)** Pat Reed, Abby Bazin

**Survey Date** 6/16/06

### Physical Features / Sources (Continued)

**Mining Activity-Related Ponds or Liquid Containment Structures:**

| | Count / ID | Dimensions in ft (L X W X H) | Lined (Y / N) | Liquid Present (Y / N) | Feature Vol in yds$^3$ | Liquid Vol in yds$^3$ | Parameters: pH | Cond in mS | Temp in C | | Animals Present (e.g. bats, other) | # of Samples |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| leach pond(s) | Ø | | | | | | | | | | | |
| tailings pond(s) | Ø | | | | | | | | | | | |
| tailings impoundment(s) | Ø | | | | | | | | | | | |
| other (explain) | | | | | | | | | | | | |

**Seep(s), Creek(s), Pond(s), Lake(s)**

| Count / ID | Location | Flowrate in GPM | Parameters: pH | Cond in mS | Temp in C | | Odor, sheen, discoloration? |
|---|---|---|---|---|---|---|---|
| 1 | Pend Oreille River | | | | | | |
| | | | | | | | |
| | | | | | | | |

**Soil or Seep Staining**

| | Count / ID | Location | Color | Distance from Potential Contaminant Source to Receptor | Source & Receptor |
|---|---|---|---|---|---|
| soil | | | | | |
| seep | 1 | Ferricrete below adit | Rusty | 20' | Adit — River |
| other | | | | | |

**Seasonal Flow Paths or Channels**

| Count / ID | Water Present (Y / N) | Flowrate in GPM | Parameters: pH | Cond in mS | Temp in C | | Distance from Potential Contaminant Source to Receptor | Source & Receptor |
|---|---|---|---|---|---|---|---|---|
| 1 | y | NA | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

**Wetlands**

| Count / ID | Flowrate in GPM | Parameters: pH | Cond in mS | Temp in C | | Distance from Potential Contaminant Source to Receptor | Source & Receptor | # of Samples |
|---|---|---|---|---|---|---|---|---|
| Ø | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

## AML Feature Inventory

**Feature ID** Washington River Adit

**Surveyor(s)** Pat Reed, Abby Bazin

**Survey Date** 6/16/06

### Physical Features / Sources (Continued)

#### Water Supply Structures

| | Count / ID | Inner Diameter | Depth | Soil Type | Served | Distance from Potential Contaminant Source | General Location |
|---|---|---|---|---|---|---|---|
| groundwater wells | Ø | | | | | | |
| surface water intakes | Ø | | | | | | |
| pit toilets | Ø | | | | | | |
| other | Ø | | | | | | |

| | Mill Present (Y / N) | Mill Footprint in ft.² | Waste Associated with Mill | Chemicals Assoc with Mill |
|---|---|---|---|---|
| Mill | N | | | |
| | | | | |

#### Buildings / Structures

| | Count / ID | Bldg. Footprint in ft.² | Suspected Bldg. Use | Bldg. Condition | Comments |
|---|---|---|---|---|---|
| Other Buildings | Ø | | | | |
| | | | | | |
| | | | | | |

#### Liquid or Waste Containment Structures

| | Count / ID | Volume in Gal. | Condition | Suspected Contents |
|---|---|---|---|---|
| drums | Ø | | | |
| tanks | | | | |
| other | | | | |

#### Debris / Refuse

| | Number | Size | Description |
|---|---|---|---|
| assay equip & retorts | None | | |
| drums | \| | | |
| scrap lumber | \| | | |
| scrap metal | \| | | |
| machinery | \| | | |
| other | \| | | |

#### Ground Cover, Vegetation, Evidence of Wildlife or Recent Human Activity

| Type / Name | Number | Endangered / Threatened (Y / N) | Comments* |
|---|---|---|---|
| 20% Cover: 10% shrubs | | | |
| 10% grass | | | |
| | | | |

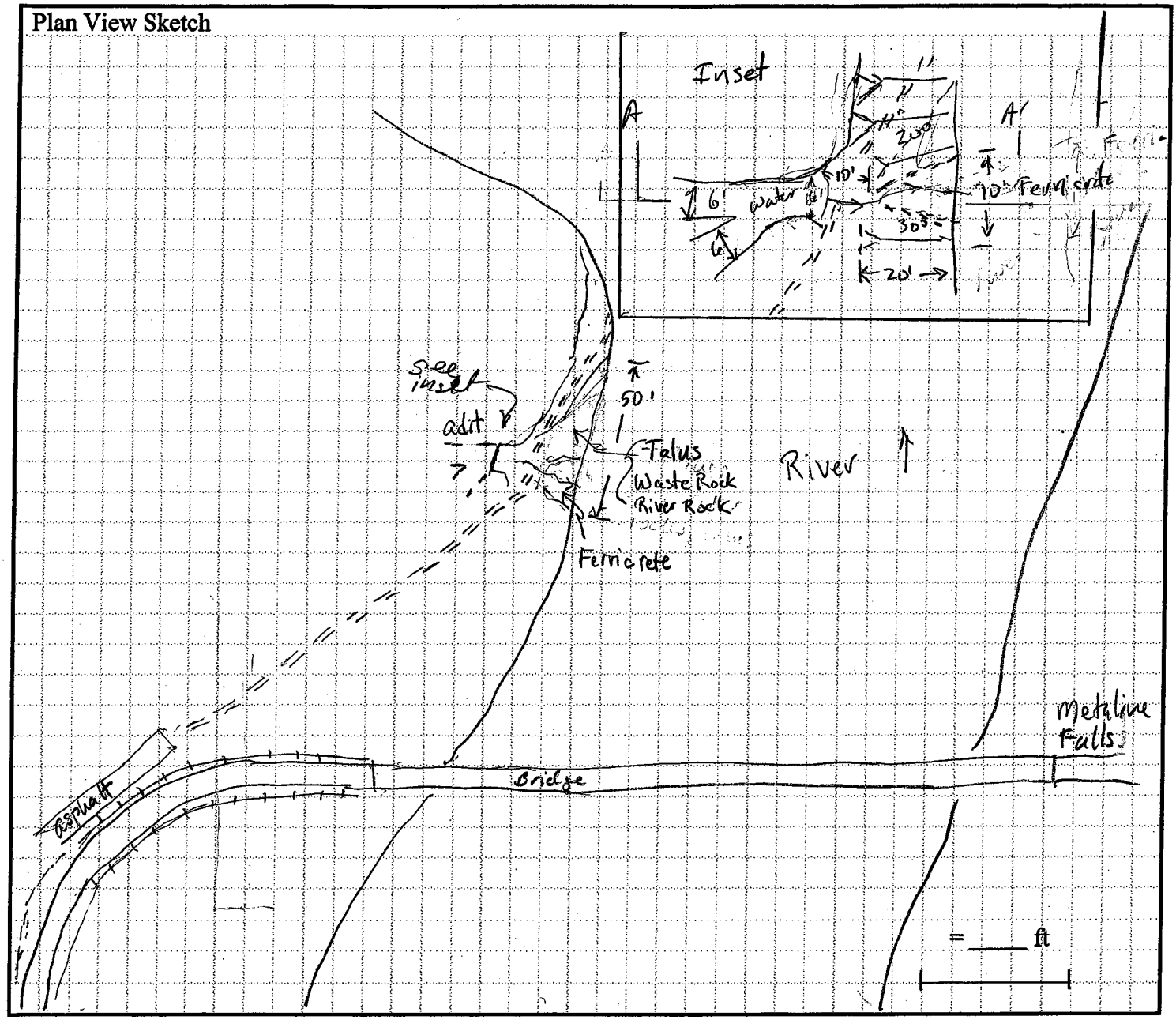
*Note whether vegetation is distressed

# AML FEATURE INVENTORY/MONITORING FIELD FORM

River adit

| | |
|---|---|
| Feature ID | Washington |
| Date | 6/16/06 |
| Weather | Partly Cloudy |

Plan View Sketch




**INCLUDE THE FOLLOWING IN THE FIELD SKETCH FOR:**

North Arrow
Scale Bar
Photo Location(s) and View Direction(s)
Sample Location(s) and ID(s):
- W-# Water
- S-# Soil
- T-# Tailings
- R-# Rock (Waste)
- O-# Ore
- S-# Other (Describe)

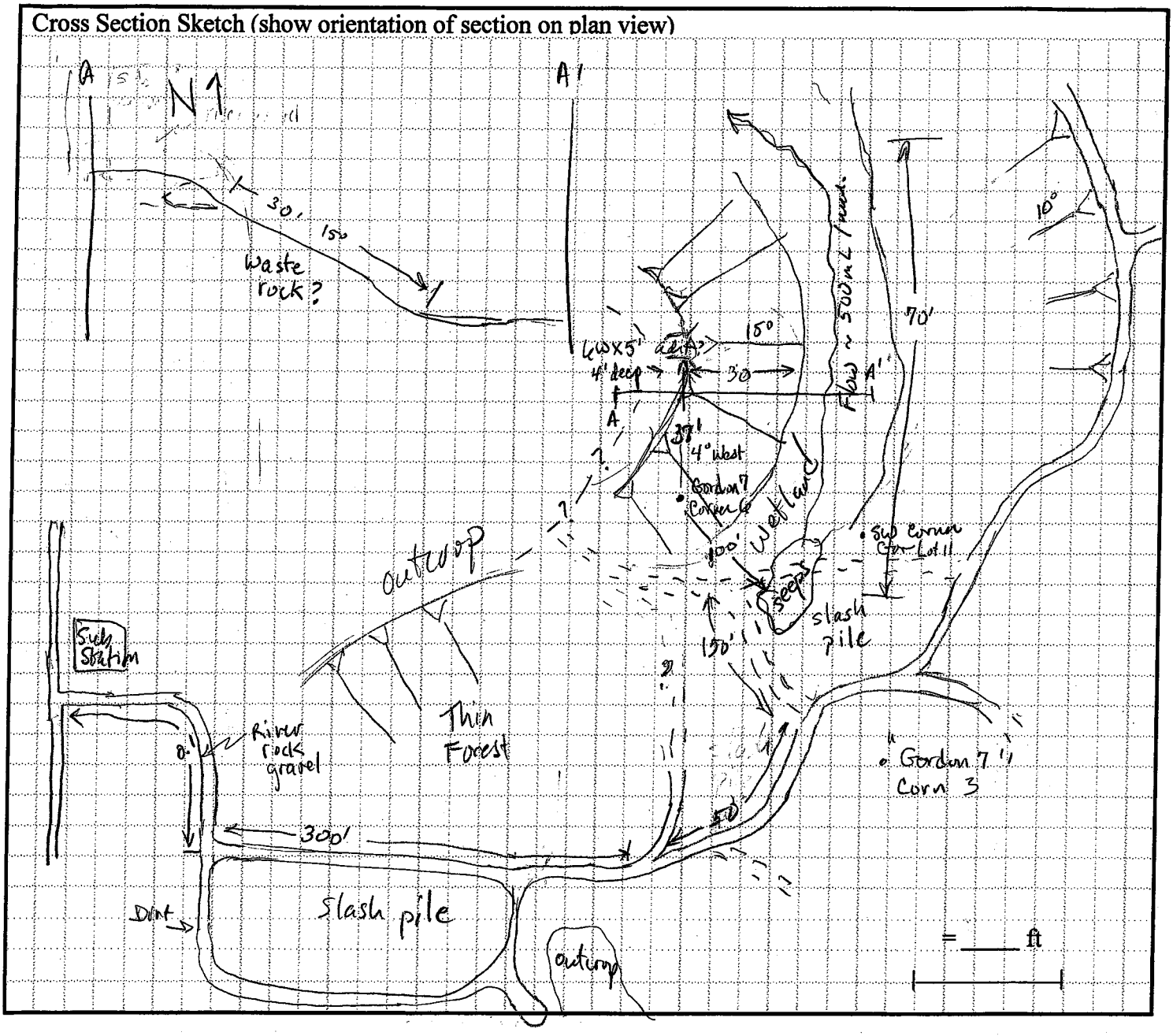
FOOTPRINT(S) OF:
- MILLS
- BUILDINGS
- STRUCTURES
- MINING-RELATED PILES
- OTHER

SURFACE WATER (PONDS, SEEPS, ETC.)
- GPS Collection Location ☼
- Elevation (Topographic Variation)
- Slope Direction

Top of Rock

| | |
|---|---|
| Feature ID | Washington |
| Date | 6/16/06 |
| Weather | |

## Cross Section Sketch (show orientation of section on plan view)




**INCLUDE THE FOLLOWING IN THE FIELD SKETCH FOR:**

X - X' Cross Section Orientation
Scale Bar
Photo Location(s) and View Direction(s)
Sample Location(s) and ID(s):
- W-# Water
- S-# Soil
- T-# Tailings
- R-# Rock (Waste)
- O-# Ore
- S-# Other (Describe)

Seeps ≈ 500 mL/min.

LOCATION(S) OF:
- MILLS
- BUILDINGS
- STRUCTURES
- MINING-RELATED PILES
- OTHER

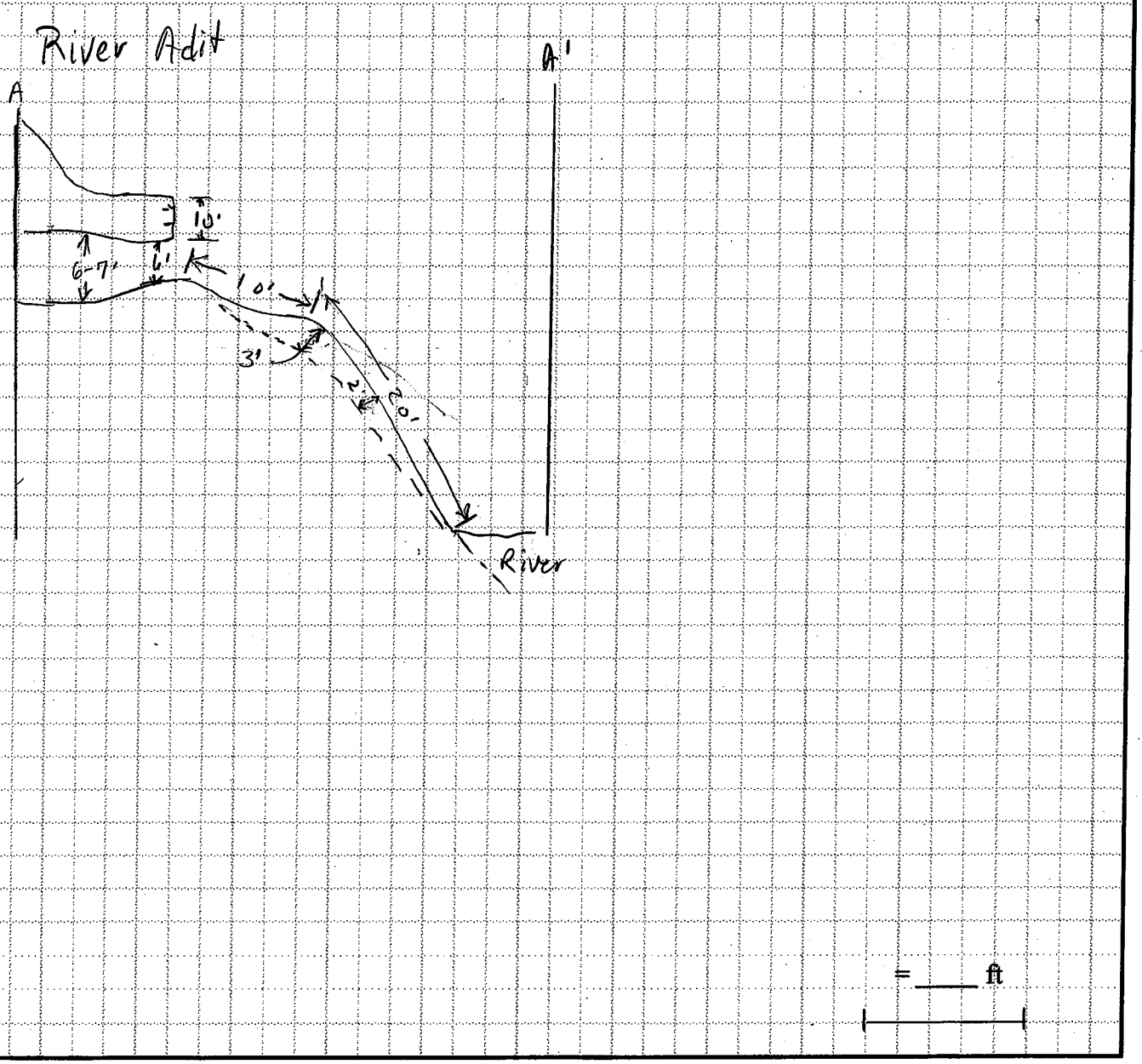
SURFACE WATER (PONDS, SEEPS, ETC.)
GPS Collection Location ☼
Elevation (Topographic Variation)

Vegetation on waste rock(?) pile:
40% cedar 6-10"
30% Mt. Hemlock — Healthy
20% birch
10% moss

Seep Vegetation:
20-30% horsetail
20% herbs
20% grass
20% birch, willow

Feature ID Washington
Date 6/16/06
Weather

Cross Section Sketch (show orientation of section on plan view)




**INCLUDE THE FOLLOWING IN THE FIELD SKETCH FOR:**

X - X' Cross Section Orientation
Scale Bar
Photo Location(s) and View Direction(s)
Sample Location(s) and ID(s):
- W-# Water
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- O-# Ore
- S-# Other (Describe)

LOCATION(S) OF:
- MILLS
- BUILDINGS
- STRUCTURES
- MINING-RELATED PILES
- OTHER

SURFACE WATER (PONDS, SEEPS, ETC.)
GPS Collection Location ☼
Elevation (Topographic Variation)

Photograph 1 - View of Adit 2 above the Pend Oreille River.

Photograph 2 - View of Adit 2.

Photograph 3 - Ferricrete below Adit 2. ←Up

Photograph 4 - View of Washington Rock Prospect.

Photograph 5 - Wetland near Washington Mine Prospect.