# ACTION MEMORANDUM

## Non-Time Critical Removal Action
## Oriole Mine
## Project

Colville National Forest
Pend Oreille County, Washington

September 2008

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## Purpose

The purpose of this Action Memorandum is to document my decision to proceed with the non-time-critical removal action described in the Engineering Evaluation/Cost Analysis (EE/CA) for the Oriole Mine (Site) located in Pend Oreille County, Washington. The EE/CA provides detailed analyses and the basis for the proposed response action and can be reviewed at the Sullivan Lake Office on the Colville National Forest located near Metalline Falls, Washington. The project administrative record, including the EE/CA document, is available from the following Colville National Forest website:

http://www.fs.fed.us/r6/colville/projects/oriole-mine/index.shtml

The selected Response Action will be executed following non-time-critical removal action processes described by:

- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA; 42USC 9604)
- National Oil and Hazardous Substances Pollution Contingency Plan (NCP; 40CFR Part 300)
- US Environmental Protection Agency's (EPA) *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA;* OSWER 9360.0-31, August 1993.

## Site Conditions and Background

### A. Site Description

(The following highlights the site features. For a more detailed description, please see the Site Inspection (SI) located at the website shown above.)

1. **Oriole Mine**
   - Latitude/Longitude: 48° 51' 37" North/117° 24' 50"West
   - Section 19, Township 39 North, Range 43 East of the Willamette Meridian.
   - Access to the Site is from the City of Metaline and State Highway 20 by following Boundary Road to Oriole Road, then following Oriole Road (Forest Road 411) west on Linton Creek across the power line clearing to Forest Road 2740. The remaining ¼-mile access to the Site on Forest Road 2740 is extremely rough and requires a 4-wheel drive vehicle.
   - Site Features:
     - Three main workings, one caved adit and two open (gated) adits;
     - Multiple smaller exploration adits, trenches, and pits.
     - Two large waste rock piles (15,400 bank cubic yards [bcy]), spilled ore material (830 bcy), and several smaller waste rock piles.
     - Dilapidated log ore bin, multiple log- and wood-framed buildings.
   - A small perennial stream, Linton Creek, flows through the Site.
   - Water drains (9 gallons per minute [gpm]) from the lower adit portal and seeps into the ground about 50 feet from Linton Creek.
   - Approximately 3 acres are disturbed

### B. Physical Location

1. Eastern Okanogan Highlands physiographic province of Northeast Washington.
2. Northern Pend Oreille River Valley, Pend Oreille County
3. Oriole Mine is 1.5 miles northwest of Metaline, Washington;

4. Located on the lower southeast flank of Linton Mountain beside a small intermittent stream called Linton Creek.

**C. Site Geology**

1. The mineral deposit consists of lead-, zinc-, copper- and silver-bearing quartz-sulfide lenses in an altered shear zone oriented N65°W 60° NE.
2. Host rock is silicified dolomite of the Late Proterozoic Monk Formation (Windermere Group).
3. Primary ore minerals present include sphalerite, galena, tetrahedrite, chalcopyrite, pyrite, malachite, azurite, smithsonite, cerussite, and bornite.
4. Gangue minerals include quartz, calcite, and dolomite.
5. Ore lenses range up to six feet wide and extended between adit levels.

**D. Site History**

1. Listing of mine ownership:
   - 1907 – Oriole Mining & Milling Co.
   - 1911-1922 – Metaline Oriole Mining Co.
   - 1922-1924 – Metaline Minerals Co.
   - 1935 – Frank Schultz
   - 1942 – W.L. Schultz
   - 1953 – Arthur Betchart and E.O. Dressel, Jr.
2. Production
   - 1911-42, 2,000 tons
   - 1953
3. The Site is currently inactive

**E. Removal Site Evaluation**

1. Summary
   - The following hazardous substances found at the Site greatly exceed the lowest ecological criteria and/or background values:

| | |
|---|---|
| Barium in surface water (LC-SW-02) | 140x |
| Lead in sediment (LC-SS-03) | 53x |
| Antimony in waste rock (OM-WR1) | 230x |
| Cadmium in waste rock (OM-WR1) | 195x |
| Zinc in waste rock (OM-WR1) | 203x background |
| Mercury in waste rock (OM-WR2) | 68x background |

   - Based upon the ecological risk assessment (Oriole Mine EE/CA, Appendix A), unacceptable ecological risks are present at the Site and are attributed to the presence 15 hazardous substances and/or pollutants or contaminants in waste rock and ore materials which exceed both the average background soil concentration and the lowest regulatory comparison standard.
     - Antimony, arsenic (V and total), cadmium, copper, lead, and zinc are the primary metals of concern in the waste rock and ore. Concentrations of antimony, arsenic, cadmium, and lead exceeded the EPA Region 9 Industrial Preliminary Remediation Goals (PRGs; EPA, 2004).
     - Arsenic, cadmium, chromium, lead, and mercury concentrations exceeded the Washington Method A Industrial Soil Cleanup Levels.
     - Aluminum, antimony, arsenic V, barium, cadmium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc are present at concentrations that exceeded the lowest Washington

Ecological Indicator Soil Concentrations, which exist for plants, soil biota, and wildlife receptors.
    - Antimony, arsenic, cadmium, chromium, copper, and zinc concentrations exceed the lowest EPA Ecological Soil Screening Levels developed for plants, invertebrates, birds, and mammals (EPA, 2005).
    - Impacts are to terrestrial plants and animals that live primarily on Site and not to general populations
- Risks are present in stream sediments in Linton Creek down gradient of the Site primarily from cadmium, lead, and zinc, which are substantially elevated and likely originate from erosion of Site features.
    - Concentrations of cadmium, lead and zinc exceed background levels by 8- to 25-times.
    - Elevated metals present the highest potential risks to birds, mammals, and invertebrates.
- Barium and lead exceed the aquatic life ecological risk-based screening concentration for total metals in four surface water sample locations. Copper in Linton Creek near the Site exceeds aquatic life ecological risk-based screening concentration for dissolved metals in surface water.
- The human health risk assessment (Oriole Mine EE/CA, Appendix A) determined that the elevated metal concentrations in potentially contaminated waste rock/soils, surface water, pore water within sediments, and sediment do not pose unacceptable human health risks assuming a typical recreationist receptor.

2. 2002 – US EPA completed a Preliminary Assessment and Site Investigation of the Oriole Mine. Further action under CERCLA was recommended.
3. 2004 to 2007 – Forest Service completed site characterization and an EE/CA with streamlined risk assessment for the Site. The following summarizes the results of this work:
    - **<u>Groundwater Pathway</u>**
        - Groundwater is used for drinking water within 4 miles of the Site from up to three wells located on the west side of the Pend Oreille River downstream of the Site.
        - The only known well that potentially could be impacted by the Site is located approximately 0.5 mile east of the Site and appears to be up gradient from Linton Creek (in the vicinity of the well) and cross-gradient to the Site. Thus, it is highly unlikely that shallow groundwater from the Site would impact the well.
        - Ground water from the lowest adit flows down slope and infiltrates into the ground about 50 feet from Linton Creek. This water and other ground water in the vicinity likely discharges to Linton Creek nearby or down stream.
        - Groundwater that discharges to surface water during gaining stream conditions is addressed in the surface water pathway discussion.
    - **<u>Surface Water Pathway</u>**
        - Based on the data presented, the surface water pathway is complete due to elevated concentrations of metals in stream sediment samples.
        - Sediment in Linton Creek appears to be impacted by the Site; numerous metals (antimony, arsenic, cadmium, lead, mercury, nickel, silver, and zinc) were detected in Linton Creek samples that exceeded several comparison criteria and the concentrations detected in the upstream background and reference stations.

- Wasterock and ore piles at the Site are the most obvious source of metals to Linton Creek sediment. Surface water in Linton Creek does not appear to be impacted by metals from the Site.
- Rainbow trout (a state priority species) have been documented in the lower portions of Linton Creek (below LC-05) and there is the potential that the west slope cutthroat trout (federal species of concern) may be present; however, the fine-grained organic substrate and high gradient would make it unlikely that these fish use Linton Creek for spawning habitat.
- The benthic macro invertebrate enumeration results suggest little or no difference in invertebrate populations between stations upstream, adjacent to, and downstream of the Site.

- **Soil Pathway**
  - The waste piles and ore materials contain elevated concentrations of 15 hazardous substances and/or pollutants or contaminants that exceed both the average background soil concentration and the lowest regulatory comparison standard (both human and ecological).
    - Antimony, arsenic (V and total), cadmium, copper, lead, and zinc appear to be the primary chemicals of concern.
  - Several federal and state rare, threatened and endangered mammals, birds, fish, and herpetiles have potential habitat in the vicinity of the Site.
  - Based on this information, the soil exposure pathway is considered complete for ecological receptors, and a release of hazardous substances has been documented in the SI.
- **Air Pathway**
  - The most likely air pathway is due to inhalation of particulate matter.
  - This pathway is considered complete because antimony-, arsenic- (V and total), cadmium-, copper-, lead- and zinc-impacted soil and waste material is concentrated at the surface where human and ecological receptors could be exposed to particulate matter.
  - Addressing and/or eliminating the soil exposure pathway will likely render the air exposure pathway incomplete.

**F. Release or Threatened Release into the Environment of a Hazardous Substance.**

1. Surface Water
   - Five hazardous substances and/or pollutants or contaminants (aluminum, arsenic, barium, iron and lead) exceed background and the aquatic life ecological risk-based screening concentrations in Linton Creek water. Five metals (barium, cadmium, copper, lead, and zinc) were detected in at least one sample from the Lower Adit discharge at concentrations that exceeded the lowest regulatory comparison standard and background concentrations in Linton Creek.
2. Sediment
   - Antimony, arsenic, cadmium, lead, mercury, nickel, silver, and zinc concentrations exceed ecological regulatory requirements and background concentrations.
3. Wasterock and ore material
   - 15 hazardous substances and/or pollutants or contaminants in waste rock and ore materials exceed both the average background soil concentration and the lowest regulatory comparison standard.

- Antimony, arsenic (V and total), cadmium, copper, lead, and zinc are the primary chemicals of concern.

**G. National Priority List Status**

1. The project site has not been proposed for the National Priority List (NPL), and a Hazard Ranking System (HRS) rating has not been calculated.

**H. Other Actions to Date**

1. Previous Actions
   - 2002 – US EPA completed a Preliminary Assessment and Site Investigation of the Oriole Mine. Further action under CERCLA was recommended.

**I. State and Local Authorities' Role**

1. State and Local Actions to Date
   - Site is not listed on the Washington Department of Ecology's Hazardous Sites List.
2. Potential for Continued State/Local Response
   - None for this Site.

## III. Threats to Public Health or Welfare and the Environment, and Statutory and Regulatory Authorities

**A. Threats to the Environment**

1. There is a threat to the environment as set forth in the NCP [40CFR 300.415(b)(2)].
   - Chemicals of Potential Concern identified by the ERA include antimony, cadmium, copper, lead, selenium, silver and zinc in soil. Risk ratios for these elements are above 10 and are potentially toxic to populations of plants and invertebrates living therein.
   - Cadmium in Litton Creek sediments is a threat to birds and mammals; lead in Litton Creek sediments is a threat to invertebrates; and zinc in Litton Creek sediments is potentially toxic to all three receptor groups.
   - Elevated total barium and lead in the adit seep and dissolved copper in Linton Creek surface water pose potential threats to aquatic organisms therein, but probably not to birds and mammals.
   - Refer to the table above for a summary of analytical results.

**B. Threats to Public Health and Welfare**

1. Chemicals of Potential Concern identified by the HHRA include arsenic and lead in soil (211 & 103,000 mg/kg, respectively), sediment (23.8 & 1,880 mg/kg, respectively) and surface water (1.0 & 8.2 ug/L, respectively).
   - The HHRA determined that no unacceptable carcinogenic or non-carcinogenic risks to recreational Forest users are expected by inhalation or ingestion of arsenic and lead at the Site.
2. Refer to the following table for a summary of analytical results.

## SUMMARY OF ANALYTICAL/DOCUMENTED CONTAMINATION

| Media | Sample Location | Rate of Discharge/Volume (cfs, gpm, or CY) | Contaminant | Highest Concentration | Lowest Criteria Eco – Ecological HH – Human Health | Background Concentration |
|---|---|---|---|---|---|---|
| **Surface Water** | LC-SW-02 | 0.2 cfs | Barium, TR | 28 ug/L | 0.2 ug/L - Eco | <10 ug/L |
| | LC-SW-03 | 0.5 cfs | Copper, TD | 17 ug/L | 2 ug/L – Eco | Not Detected |
| | LC-SW-05 | 2.5 cfs | Lead, TR | 1.1 ug/L | 0.66 ug/L – Eco | <0.1 ug/L |
| **Adit Drainage** | OM-AS-01<br>OM-AS-02 | 0.02 cfs – AS-01<br>0.015 cfs – AS-02 | Barium, TR<br>Chromium VI, total<br>Copper, TR<br>Lead, TR<br>Zinc, TR | 28 ug/L<br>10 ug/L (est)<br>2B ug/L<br>8.2 ug/L<br>120 ug/L | 4 ug/L – Eco<br>2 ug/L – Eco<br>0.2 ug/L – Eco<br>0.66 ug/L – Eco<br>30 ug/L – Eco | 14 ug/L<br>Not Detected<br><1 ug/L<br><0.1 ug/L<br><10 ug/L |
| **Sediment** | LC-SS-02 | 0.2 cfs – surface water | Antimony<br>Cadmium | 1.2 mg/kg<br>1.56 mg/kg | 0.6 mg/kg – Eco<br>0.596 mg/kg – Eco | 0.3B mg/kg<br>0.37 mg/kg |
| | LC-SS-03 | 0.5 cfs – surface water | Antimony<br>Arsenic<br>Cadmium<br>Lead<br>Nickel<br>Zinc | 2.2 mg/kg<br>15 mg/kg<br>2.26 mg/kg<br>1,880 mg/kg<br>28 mg/kg<br>1,880 mg/kg | 0.6 mg/kg – Eco<br>5.9 mg/kg – Eco<br>0.596 mg/kg – Eco<br>35 mg/kg – Eco<br>18 mg/kg – Eco<br>123.1 mg/kg – Eco | 0.3B mg/kg<br>4.8 mg/kg<br>0.37 mg/kg<br>868 mg/kg<br>14.1 mg/kg<br>108 mg/kg |
| | LC-SS-04 | 0.8 cfs – surface water | Cadmium<br>Mercury<br>Zinc | 1.19 mg/kg<br>0.64 mg/kg<br>1,970 mg/kg | 0.596 mg/kg – Eco<br>0.174 mg/kg – Eco<br>123.1 mg/kg – Eco | 0.37 mg/kg<br><0.4 mg/kg<br>108 mg/kg |
| | LC-SS-05 | 2.5 cfs – surface water | Zinc | 265 mg/kg | 123.1 mg/kg – Eco | 108 mg/kg |
| **Waste Rock – WR1** | OM-WR1-1 (2)<br>OM-WR1-3 (2)<br>OM-WR1-4 | 4,400 CY | Antimony<br>Arsenic V<br>Arsenic<br>Cadmium<br>Chromium<br>Copper<br>Lead<br>Mercury<br>Nickel<br>Silver<br>Thallium<br>Zinc | 1,150 mg/kg<br>31 mg/kg<br>211 mg/kg<br>390 mg/kg<br>24 mg/kg<br>2,800 mg/kg<br>103,000 mg/kg<br>3.44 mg/kg<br>50.4 mg/kg<br>330 mg/kg<br>30B mg/kg<br>62,500 mg/kg | 5 mg/kg – Eco<br>10 mg/kg – Eco<br>1.6 mg/kg – HH<br>2 mg/kg – Eco<br>0.4 mg/kg – Eco<br>50 mg/kg – Eco<br>40.5 mg/kg – Eco<br>0.00051 mg/kg – Eco<br>30 mg/kg – Eco<br>2 mg/kg – Eco<br>1 mg/kg – Eco<br>8.5 mg/kg – Eco | 0.50 mg/kg<br>NA<br>4.07 mg/kg<br>2.91 mg/kg<br>12.7 mg/kg<br>27 mg/kg<br>65.8 mg/kg<br>0.02 mg/kg<br>20.2 mg/kg<br>0.43 mg/kg<br>0.18 mg/kg<br>307 mg/kg |

## SUMMARY OF ANALYTICAL/DOCUMENTED CONTAMINATION (cont.)

| Media | Sample Location | Rate of Discharge/Volume (cfs, gpm, or CY) | Contaminant | Highest Concentration | Lowest Criteria Eco – Ecological HH – Human Health | Background Concentration |
|---|---|---|---|---|---|---|
| **Waste Rock – WR2** | OM-WR2-1 | 11,000 CY | Antimony | 145 mg/kg | 5 mg/kg – Eco | 0.50 mg/kg |
| | OM-WR2-2 | | Arsenic V | 10.8 mg/kg | 10 mg/kg – Eco | NA |
| | OM-WR2-3 | | Arsenic | 60.1 mg/kg | 1.6 mg/kg – HH | 4.07 mg/kg |
| | | | Cadmium | 52 mg/kg | 2 mg/kg – Eco | 2.91 mg/kg |
| | | | Chromium | 34 mg/kg | 0.4 mg/kg – Eco | 12.7 mg/kg |
| | | | Cobalt | 37 mg/kg | 20 mg/kg – Eco | 12.3 mg/kg |
| | | | Copper | 900 mg/kg | 50 mg/kg – Eco | 27 mg/kg |
| | | | Lead | 7,790 mg/kg | 40.5 mg/kg – Eco | 65.8 mg/kg |
| | | | Mercury | 1.37 mg/kg | 0.00051 mg/kg – Eco | 0.02 mg/kg |
| | | | Nickel | 47.3 mg/kg | 30 mg/kg – Eco | 20.2 mg/kg |
| | | | Selenium | 7.1 mg/kg | 0.21 mg/kg – Eco | NC |
| | | | Silver | 111 mg/kg | 2 mg/kg – Eco | 0.43 mg/kg |
| | | | Zinc | 14,400 mg/kg | 8.5 mg/kg – Eco | 307 mg/kg |
| **Ore Piles** | OM-OP1-1 | 830 CY | Antimony | 550 mg/kg | 5 mg/kg – Eco | 0.50 mg/kg |
| | OM-OP1-2 | | Arsenic V | 84.1 mg/kg | 10 mg/kg – Eco | NA |
| | OM-OP2-1 | | Arsenic | 173 mg/kg | 1.6 mg/kg – HH | 4.07 mg/kg |
| | OM-OP3-1 | | Cadmium | 430 mg/kg | 2 mg/kg – Eco | 2.91 mg/kg |
| | | | Copper | 2,020 mg/kg | 50 mg/kg – Eco | 27 mg/kg |
| | | | Lead | 42,900 mg/kg | 40.5 mg/kg – Eco | 65.8 mg/kg |
| | | | Mercury | 3.45 mg/kg | 0.00051 mg/kg – Eco | 0.02 mg/kg |
| | | | Selenium | 20 mg/kg | 0.21 mg/kg – Eco | NC |
| | | | Silver | 203 mg/kg | 2 mg/kg – Eco | 0.43 mg/kg |
| | | | Thallium | 10B mg/kg | 1 mg/kg – Eco | 0.18 mg/kg |
| | | | Zinc | 93,000 mg/kg | 8.5 mg/kg – Eco | 307 mg/kg |
| **Exploration Workings Waste Rock** | OM-WR3-1 | 725 CY | Antimony | 90 mg/kg | 5 mg/kg – Eco | 0.50 mg/kg |
| | OM-WR4-1 | | Arsenic V | 11.1 mg/kg | 10 mg/kg – Eco | NA |
| | OM-WR5-1 | | Arsenic | 64.1 mg/kg | 1.6 mg/kg – HH | 4.07 mg/kg |
| | | | Cadmium | 112 mg/kg | 2 mg/kg – Eco | 2.91 mg/kg |
| | | | Cobalt | 55 mg/kg | 20 mg/kg – Eco | 12.3 mg/kg |
| | | | Copper | 1,910 mg/kg | 50 mg/kg – Eco | 27 mg/kg |
| | | | Lead | 15,100 mg/kg | 40.5 mg/kg – Eco | 65.8 mg/kg |
| | | | Mercury | 0.59 mg/kg | 0.00051 mg/kg – Eco | 0.02 mg/kg |
| | | | Selenium | 3 mg/kg | 0.21 mg/kg – Eco | NC |
| | | | Silver | 86 mg/kg | 2 mg/kg – Eco | 0.43 mg/kg |
| | | | Thallium | 4B mg/kg | 1 mg/kg – Eco | 0.18 mg/kg |
| | | | Zinc | 17,300 mg/kg | 8.5 mg/kg – Eco | 307 mg/kg |

**Notes:** Water samples collected in Linton Creek were analyzed for total receoverable and dissolved metals, however, only total recoverable results are presented because they represent the worst case scenario.

This table only lists sample concentrations that are at least 1.5 times higher than the lowest criteria and background concentration. These exceedances are considered the major contaminants of concern (COCs) and not a complete list of all COCs.

Highest background concentration in waters and sediments used since only one sample was collected; background soil concentrations listed are the average of three samples.

TR = Total Recoverable Metals; Diss. = Dissolved Metals; ug/L = micrograms per liter; mg/kg = milligrams per kilogram; B = concentration between the PQL and MDL; est. = chromium V results were estimated using field test kit

## IV. Endangerment Determination

Actual or threatened releases of hazardous substances and/or pollutants or contaminants (antimony, cadmium, copper, iron, lead, selenium, silver, and zinc) from this Site, if not addressed by implementing the response action selected in this Action Memorandum, may present a continuing endangerment to the environment. Antimony, cadmium, copper, iron, lead, selenium, silver and zinc will continue to migrate into the environment without a response action.

## V. Proposed Actions and Estimated Costs

### A. Proposed Actions

1. Proposed Action Description—Onsite Consolidation of Ore and Wasterock
   - The drainage from the Lower Adit will be captured near the portal in a small sump and diverted to an infiltration system. The infiltration system will consist of either a basin filled with washed coarse gravel or a drain field, located as far from Linton Creek as feasible.
   - All metal, wood, equipment, and other miscellaneous nuisance debris that pose a potential physical or chemical hazard to Site users will be removed. To the extent possible, concrete foundations will be left intact. CES estimates that 10 tons of material will be disposed offsite at the Chemwaste Facility near Arlington, Oregon. Note: CES assumes that much of the wood debris will fail TCLP because of association with ore material. However, this will be assessed during the removal design phase.
   - The access road from the powerline corridor to the Site is not passable to haul trucks needed for removal action. The road will be upgraded to a 12-foot width by grading and gravel topping where necessary. Upon completion of the removal action activities, the road and any staging areas constructed during the removal action will be decommissioned and large boulders will be placed to limit unauthorized vehicle access. Decommissioning will consist of recontouring the road for proper drainage, ripping to 6 inches, seeding, and mulching. CES estimates a total of 1,300 lineal feet of road plus 0.5 acre of staging area to be decommissioned.
   - An estimated 130 bcy of ore from and near the collapsed ore bin will be consolidated with the lower wasterock pile followed by reclamation of the two large wasterock piles. Reclamation will involve recontouring and revegetating the material onsite. The road between WP-1 and WP-2 will be minimally improved for equipment access.
   - Wasterock and spillage material will be graded within the existing footprint as closely as possible, but may extend outside the footprint to blend in with surrounding topography. The exact layout and slopes of all areas will be determined in the design phase; the goal will be to reduce slopes of the consolidation areas to less than 33% . The Upper and Lower Adits will be protected from hillside slough with steel sets to maintain accessibility for wildlife use and mine inspection and maintenance, and to mitigate any physical hazards associated with the adits. Existing bat gates will remain intact.
   - The graded wasterock areas will be covered with one foot of cover soil (~ 2,300 cy) to control ecological exposure to the hot spots identified during the ERA and to promote revegetation. The cover soil will be placed in two lifts, one 6-inch equipment-compacted lift and one 6-inch loose lift. If warranted

by data gap evaluation analyses, an engineered soil or impermeable cover will be designed using an appropriate infiltration model such as HELP, HYDRUS, EPACML, or CHEMFLO.

- All disturbed areas (<3 acres) will be graded and revegetated. Revegetation will consist of fertilizing, seeding, and mulching. A certified, weed free straw mulch would be applied to control erosion during plant establishment. The Forest Service will select a seed mix appropriate for the site. Storm water and snowmelt runon will be controlled on the upgradient side of all construction by establishing runon control ditches or berms (~950 lineal feet) that channel the water around the revegetated areas to infiltration basins.

2. Contribution to Remedial Performance
   - Monitoring will determine whether additional removal or remedial actions are necessary.
3. Description of Alternative Technologies
   - The Forest Service considered a wide array of cleanup technologies for the Site. Refer to Table 7 – *Removal Action Technology Screening Summary* located in the table section of the EE/CA.
   - Three feasible alternatives were then developed and evaluated:
     - Alternative 1 - No Action
     - Alternative 2 - Onsite Consolidation of Ore and Wasterock
     - Alternative 3 – Excavation and Off-Site Disposal of Ore and Wasterock
4. Alternative 2 was selected as the proposed alternative because it provides similar environmental protection, effectiveness and feasibility as Alternative 3, complies with relevant state and federal laws and regulations and is more cost effective (See Section 7, EE/CA).. .
5. Engineering Evaluation/Cost Analysis
   - CES, consultants to the Colville National Forest, prepared the EE/CA . The EE/CA is incorporated in this Action Memorandum by reference.
   - The Forest Service released the EE/CA for a thirty-day public comment period to solicit comments and concerns.
     - Comments were received after the 30-day Public Comment Period ended.
     - The comments and letters are part of the Administrative Record for this Site and available at the following website:
       http://www.fs.fed.us/r6/colville/projects/oriole-mine/index.shtml
     - The significant comments (italics) and response are included here and both the comments and responses are located in the Administrative Record.

       1. *The study was quite clear that no public drinking waters were threatened. The study also states that there is very little human traffic to this area. This abandoned mine site is no real threat to anyone or anything.*

       While the risk to the general public and the typical forest service visitors is low, the Site remains a threat to the environment.
       - Antimony, cadmium, copper, lead, selenium, silver and zinc in rock and soils are potentially toxic to populations of plants and invertebrates living therein.

- Cadmium in Litton Creek sediments is a threat to birds and mammals; lead in Litton Creek sediments is a threat to invertebrates; and zinc in Litton Creek sediments is potentially toxic to all three receptor groups.
- Elevated total barium and lead in the adit seep and dissolved copper in Linton Creek surface water pose potential threats to aquatic organisms therein, but probably not to birds and mammals.

2. *I didn't find the data in the EECA study that shows any test samples having been taken above the mine site. It would be beneficial to see if there are natural mineral contaminates not associated with the mine site.*

Soil, surface water, and sediment background samples were collected up gradient of the Oriole mine (See EE/CA Figures 1 and 2 and Tables 1-4).

3. *I became saddened when I read what they proposed for Road Construction and Decommissioning. It offends me to find large rocks blocking roads in our National Forests. I have been to the Oriole Mine site. I probably go there once a year. I consider myself a local history buff. If this project goes through, it'll be the end of another historic site of the early Metalines Mining industry. Many years ago the Forest Service tore down dozens of homesteader and trappers cabins, another piece of our short history removed.*

One of the objectives of the removal is to retain significant historical evidence of mining activities to the extent possible while meeting ecological and health concerns. The only structure that may be affected by the removal is the log ore bin. Other cabins, framed structures and buildings will not be impacted. The mine access road is susceptible to damage caused by snow melt or rain storms, as is evidenced by its current condition. The road would be closed in such a way as to eliminate future maintenance costs and minimize sedimentation during flooding. The mine will still be accessible by a relatively short hike of ¼ mile.

2. Applicable or Relevant and Appropriate Requirements (ARARs)
   - ARARs are listed in Appendix C of the EE/CA. These include both Federal and State ARARs
   - Chemical-specific ARARs establish acceptable amounts or concentrations of chemicals that may be found in or discharged to the ambient environment.
   - Location-specific requirements may determine hazardous substance concentrations or cleanup activities when they occur in specific locations or physical positions.
   - Action-specific requirements do not determine the cleanup alternative but instead define the techniques used to perform the chosen cleanup methods.
3. Project Schedule
   - The removal action is proposed for the spring of 2009 or as soon as funding is available.

**B. Estimated Costs**

1. Estimated removal action cost for the project is;
   - Datagap investigation - $15,000
   - Removal Action - $280,138
   - Forest Service oversight - $12,289
2. A detailed cost breakdown is shown in Appendix D of the EE/CA.

## VI. Expected Change in the Situation Should Action be Delayed or not Taken

Sediment containing high concentrations of antimony, cadmium, copper, iron, lead, selenium, silver and zinc will continue to be eroded and deposited into the Linton Creek during snowmelt and heavy rainstorms. These sediments can further degrade the aquatic environment and surface water quality.

## VII. Outstanding Policy Issues

None

## VIII. Enforcement

No viable responsible parties have been identified for this Site.

## IX. Recommendation

**A. Removal Action Justification**

The NCP states that an appropriate removal action may be conducted at a site when a threat to human health or welfare or the environment is identified. The removal action is undertaken to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or the threat of a release at a site. Section 300.415(b)(2) of the NCP outlines eight factors to be considered when determining the appropriateness of a removal action. The applicable factors are outlined below justify completing the removal action. These factors are assessed against the preferred alternative in Section 8.0 of the EE/CA.

1. "High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate."
   - A release of hazardous substances and/or pollutants or contaminants has been documented in waste rock, ore, surface water and sediment at the Site
   - Surficial wasterock and ore are contaminated and pose a threat to ecological receptors, especially plants and invertebrates, through direct contact, ingestion and inhalation. A release of these contaminates to Linton Creek has occurred and will continue unless action is taken.
2. "Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released."
   - Concentrations of hazardous substances in sediments in Linton Creek near the Site are elevated compared to background and reference concentrations. These elevated concentrations are likely related to high precipitation events during the spring months that transport metals via erosion from the wasterock and ore piles to Linton Creek.
3. "Other situations or factors that may pose threats to public health or welfare of the United States or the environment."
   - The Site is located in the Colville National Forest, approximately 1.5 miles from the City of Metaline and Highway 20, along unmaintained Forest Road 2740 and is accessible to the public. Frequent visitation to the Site by

recreationists such as hikers and hunters is evident from off road and four wheel drive tracks, sawdust from firewood collection, and footprints. This activity is clear evidence of potential risk to exposure.

4. "Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants."
   - Complete exposure pathways to ecological (aquatic and terrestrial) receptors were documented during the risk assessment from exposure to wasterock, ore, soil, and sediment. High concentrations of hazardous substances and/or pollutants or contaminants in the waste rock and ore are toxic to plants and invertebrates living therein. Contaminates in adit and surface water and stream sediment are a threat to birds, mammals and invertebrates using that habitat.
5. "Actual or potential contamination of drinking water supplies or sensitive ecosystems."
   - Sensitive ecosystems (e.g., Linton Creek and adjacent wetlands) were identified within four miles of the Site. Sediment in the Linton Creek is impacted by erosion from contaminated Site wasterock and ore and potentially impacts invertebrates, birds and mammals

This decision document represents the selected removal action for the Oriole site, in Pend Oreille County, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the administrative record for the Site.

Conditions at the site meet the NCP section 300.415(b)(2) criteria for a removal action, as discussed above, and I recommend your approval of the proposed removal action.

Recommended: for Rick Brazell — Date: 9/5/08
Forest Supervisor
Colville National Forest

Approved: Sam Carlson — Date: 9/29/08
Director of Engineering
Pacific Northwest Region