



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 10

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OFFICE OF
ENVIRONMENTAL
CLEANUP

DATE: February 13, 2019

SUBJ: Site Investigation Closure Memorandum
Cinnabar Mine
Payette National Forest
Valley County, Idaho

FROM: Brooks Stanfield, On-Scene Coordinator
Spill Prevention and Removal Unit, ECL

THRU: Wally Moon, Manager
Spill Prevention and Removal Unit, ECL

TO: Cinnabar Mine Site File

A handwritten signature in blue ink, likely belonging to Brooks Stanfield, is written over the "FROM:" line.

A handwritten signature in blue ink, likely belonging to Wally Moon, is written over the "THRU:" line.

In accordance with section 300.410 of the National Contingency Plan (NCP), a Removal Site Evaluation (RSE), consisting of a Preliminary Assessment and Site Investigation (PA/SI), has been undertaken at the Cinnabar Mine Site ("Site") near the town of Yellow Pine in Valley County, Idaho. The findings of the Removal Site Evaluation have been evaluated under the criteria set forth in section 300.415 of the NCP, section 104(a) and (b) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. §9605 and the Clean Water Act (CWA) 33 U.S.C. §1321(d) as amended by the Oil Pollution Act of 1990 (OPA). The RSE has led to the determination that a Removal Action **is not** appropriate at this time.

The findings of the RSE are outlined below.

1. The source and nature of the release or threat of release includes the migration of arsenic and mercury from contaminated mine tailings at the Site to surface waters and sediment on site where contamination (1) remains on Site and (2) becomes transported off Site before being deposited throughout the reaches of Cinnabar Creek, Sugar Creek and the East Fork of the South Fork River.
 - a. The RSE consisted of the following actions.
 - i. Review of reports in the EPA Region 10 Records Center documenting previous site activities. These include but are not limited to:

- (1) Ecology and Environment, Inc. (E & E), February 1999, *Cinnabar Mine Site 1998 Removal Action Report*, prepared for US Environmental Protection Agency, Contract 68-W6-0008, Technical Direction Document Number 98-04-0001.
- (2) Ecology and Environment, Inc. (E & E), August 1998, *Removal Report Cinnabar Mine Removal Action Yellow Pine, Idaho August 1998*, prepared for US Environmental Protection Agency.
- (3) Ecology and Environment, Inc. (E & E), October 31, 1996, *Removal Report Cinnabar Mine Removal Action Yellow Pine, Idaho September – October 1996*, prepared for US Environmental Protection Agency, Contract 68-W6-0008, Technical Direction Document Number 98-08-0002.
- (4) Idaho Department of Environmental Quality April 1993, *Site Inspection Prioritization of Cinnabar Mine*.
- (5) Mitchell, Victoria, E, April 2000 *History of the Stibnite Mining Area, Valley County, Idaho*, prepared for Idaho Geological Survey, Staff Report 00-3.
- (6) Roy F. Weston (Weston), September 1994, *Site Inspection Report Cinnabar Mine*, prepared for US Environmental Protection Agency, Contract Number 65-W9-0046, Work Assignment Number 46-23-0JZZ.
- (7) Roy F. Weston (Weston), September 1985, *TAT Activities Report Preliminary Site Assessment, Cinnabar Mine and Mill Site*, prepared for US Environmental Protection Agency, Technical Direction Document 10-8506-09.
- (8) United States Environmental Protection Agency (EPA), August 14, 1996, Request for a Removal Action at Cinnabar Mine, Yellow Pine, Valley County, Idaho.
- (9) United States Environmental Protection Agency (EPA), August 2, 1979, *U. S. Environmental Protection Agency Region X Hazardous Waste Site Survey Record*
- (10) United States Forest Service (USFS), September 26, 1996, *Time Critical Removal Action Memorandum, Cinnabar Mine, Yellow Pine, Valley County, Idaho*.
- (11) United States Forest Service (USFS), August 20, 1992, *Request for a Removal Action at Cinnabar Mine, Cinnabar Creek Valley County, Idaho*.

- ii. Review of analytical results generated by the United State Geological Survey (USGS) including those from Sugar Creek gauging station.
- iii. Review of recent photographs taken by natural resource managers from the Nez Perce Tribe, Midas Gold, and scientists from USGS scientists.

- iv. Review of several public presentations and other peer-reviewed scientific documents including Etheridge 2015¹ and Holloway *et al.* 2017².
 - v. Review of results and presentations from independent experiments conducted by EPA scientists evaluating the effects of soil amendments on the availability and toxicity of mercury.^{3,4}
 - vi. Communications with scientists, regulators, and resource managers from the Nez Perce Tribe, United States Forest Service, National Marine Fisheries Service, United State Fish and Wildlife Service, USGS, Midas Gold, and Idaho Department of Environmental Quality.
 - vii. EPA field investigations on August 22-26, 2016; May 15-16, 2018; and September 24, 2018.
 - viii. Generating two assessment reports by EPA's contractor, titled *Cinnabar Mine Integrated Assessment Report* and *2018 Removal Site Evaluation Summary Report, Cinnabar Mine Site*, respectively.
- b. Based on the information available at this time, the principal hazardous substances or pollutants or contaminants that are being released or for which there is threat of release include but are not necessarily limited to the list below.

Hazardous Substances or Pollutants or Contaminants	Media
Metals [mercury, arsenic]	soil, water, sediment

Summary of RSE Findings:

Mercury and arsenic concentrations in soil sampled from tailings piles at the Cinnabar Mine were spatially variable but consistently elevated confirming that these features remain a significant source of metal contamination to visitors to the site and the nearby environment. Samples from tailings showed concentrations of the two metals significantly greater (upwards of 40 times greater) than EPA Removal Management Levels (RMLs). Concentrations observed in tailings were also considerably higher than background concentrations. No background samples exceeded RMLs for any of the contaminants of concern.

¹Etheridge Occurrence and Transport of Selected Constituents in Streams near the Stibnite Mining Area, Central Idaho, 2012–14. Scientific Investigations Report 2015–5166. US Department of Interior - US Geologic Survey.

²Holloway et al. *Procedia Earth and Planetary Science* 17 (2017) 610-613.

³Eckley 2017, Cinnabar Mercury Mine: Results from recent EPA Field and Laboratory Studies. Presentation at USGS Idaho Water Science Center, Boise, ID. May 17th, 2017.

⁴Eckley et al 2018. Effect of organic matter concentration & characteristics on mercury mobilization & methylmercury production at an abandoned mine site.

Mercury concentrations in surface water flowing in streams on and downstream of Cinnabar Mine were observed to consistently exceed screening levels. Mercury concentrations were upwards of 70 times greater than screening levels and significantly higher than background levels. The vast majority of mercury loading in Cinnabar Creek and Sugar Creek is bound to particles and occurs during periods of peak flow associated with spring snowmelt. While loading is significantly greater during peak flow conditions, concentrations measured by EPA at periods of base flow were also shown to exceed screening levels in every instance. Paradoxically, mercury loading in streams shows dramatic fluctuations as distance from the site increases. Therefore, it is difficult to determine how much of the mercury load at any given time is attributable to active contributions from the mine site versus resuspension of contaminated sediment that was previously deposited in the stream during extreme erosion events in past decades, some of which were observed by EPA during field investigations that preceded work to relocate and armor stream channels at the mine site. Stream sampling conducted in May of 2018 and field observations during the two field events in 2018 were also inconclusive in being able to attribute the downstream mercury load to any specific area or erosive process occurring at the mine.

Methyl mercury (i.e. organic) is of particular concern in this area because of its increased toxicity with ecological receptors, most notably Chinook salmon, steelhead, and bull trout. With the exception of one small wetland area, methyl mercury concentrations were found to be relatively low at the Site. In-stream methyl mercury concentrations were found to increase with increasing distance from the Site suggesting that while the Site serves as the primary source of inorganic mercury in the system, conditions which support the conversion of inorganic to organic mercury are more prevalent downstream.

Increasing vegetative cover to reduce surface erosion from the nearly four acres of tailing piles is seen as one of the few practical removal options available at the Site given its remote location and the limited availability of clean soil and barrow material nearby. Laboratory experiments conducted by EPA scientists found that common soil amendments used to support revegetation efforts could increase the mobilization of mercury from tailings and increase methylation of inorganic mercury. Additional trials would be needed to ensure a revegetation effort would achieve its intended goals and not exacerbate the contributions of contaminants the Site currently has on the local ecosystem.

2. Evaluation of the threat to public health, welfare and the environment

a. Federal Agency for Toxic Substances and Disease Registry:

Threat _____ No Threat _____ Evaluation Not Necessary X

b. Endangerment to the ecosystem:

Threat X _____ No Threat _____ Evaluation Not Necessary _____

3. The Removal Site Evaluation was terminated pursuant to section 300.410(f) of the NCP for the following reason(s).

- ☐ There is no release.
- ☐ The source is neither a "vessel" nor a "facility" as defined in section 300.5 of the NCP.
- ☐ The release involves neither a hazardous substance, nor a pollutant or contaminant that may present an imminent and substantial danger to public health or welfare of the United States.
- ☐ It is subject to the limitations on response specified in 300.400(b)(1) through (3). The release is
 - ☐ of a naturally occurring substance in its unaltered form, or altered solely through naturally occurring processes or phenomena, from a location where it is naturally found.
 - ☐ from products that are part of the structure of, and result in exposure within, residential buildings or businesses or community structures.
 - ☐ into public or private drinking water supplies due to deterioration of the system through ordinary use.
- ☐ The amount, quantity, or concentration released does not warrant a Federal response.
- ☒ A party responsible for the release, or any other person, is providing appropriate response, and on-scene monitoring by EPA is not required.
- ☐ The Removal Site Evaluation is complete.

Although conditions specified in Section 4.a., above, indicate that a Removal Action under section 300.415 of the NCP *could* be warranted, due to the Removal Program's inability to draw definitive conclusions regarding exactly what removal activities would result on a reduction in the loading of metal contaminant in surface waters prevents the program from developing effective cleanup strategies. The Site has been referred to Idaho Department of Environmental Quality for additional planning and study.