



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10

1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140
SEP 13 2007

OFFICE OF
ENVIRONMENTAL CLEANUP

SUBJECT: First Amendment to the Action Memorandum, including a Request for Exemption from the 12-Month and \$2 Million Statutory Limits on Removal Actions and an Increase in the Project Cost Ceiling for a Non-Time-Critical Removal Action for the Furnace Creek Area at Operable Unit 1 of the Black Butte Mine Superfund Site, Lane County, Oregon (SEMS ID No. OR0000515759)

FROM: Dave Tomten, Remedial Project Manager
Site Cleanup Unit 2, Idaho Operations Office

THRU: Davis Zhen, Unit Manager
Site Cleanup Unit 2, Office of Environmental Cleanup

Cami Grandinetti, Program Manager
Remedial Cleanup Program, Office of Environmental Cleanup

TO: Sheryl Bilbrey, Director
Office of Environmental Cleanup

I. PURPOSE

The purpose of this First Amendment to the Action Memorandum (AM) is to request and document approval of a non-time-critical removal action (NTCRA) described herein for the Furnace Creek Area at Operable Unit (OU) 1 of the Black Butte Mine (BBM) Superfund Site (Site). This NTCRA involves the excavation of mercury-contaminated sediment/soils within the Furnace Creek drainage and placement of the excavated materials in an onsite repository within OU1. This AM is based on the engineering evaluation/cost analysis (EE/CA) and public comments received pursuant to 40 CFR §300.415(n)(4)(iii) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The initial Action Memorandum was approved on 27 June 2007 to perform a time-critical removal action (TCRA) to mitigate exposure pathways to mine-waste-contaminated soils and sediments and reduce sediment loading in Dennis and Furnace Creek (EPA 2007). The proposed NTCRA documented in this AM is expected to be performed by the U.S. Environmental Protection Agency (EPA) and in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. § 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986, Pub. L. 99-499. Potentially responsible party (PRP) search activities conducted to date have identified no viable PRPs. The 2007 time-critical removal action costs were \$346,519.

A consistency exemption is being requested as part of this AM because the proposed action will exceed the statutory 12-month period and \$2 million ceiling to prevent further unacceptable exposures from the release of hazardous substances, and pollutants and contaminants from the Furnace Creek area of OU1. An increase to the project cost ceiling is also requested. This NTCRA is expected to be consistent with a

future remedial action to ultimately address contamination from OU1 and other sources of mercury contamination to Garoutte Creek and Cottage Grove Lake, and the NTCRA does not foreclose any future remedial action. If the cost ceiling increase is approved, the total removal project cost will change from \$346,519 to \$2,836,519. To complete the proposed work, \$2,490,000 is being requested (which includes a 20% contingency). Since the TCRA took place in 2007, the remaining project budget has been swept and reprogrammed for other projects. Thus, while the overall project ceiling increase is \$1,999,519 (from \$837,000 to \$2,836,519), Region 10 will require the full \$2,490,000 proposed project ceiling funds to implement the proposed NTCRA.

II. SITE CONDITIONS AND BACKGROUND

Site Name: Black Butte Mine Superfund Site
SEMS ID: OR0000515759
Superfund Site ID: 10EK
Site Location: London Road, Cottage Grove, Lane County, OR 97424
NPL Status: NPL Final
Category of Removal: Non-time critical
Name of water body: Furnace Creek (an intermittent or ephemeral stream channel)
Contaminant name: Mercury, other mining-related inorganic contaminants

A. Site Description

The BBM is a historical mercury mining and processing operation that was active from the late 1890s to the late 1960s. The Site also includes waterbodies downstream of the mining area where contaminants from the Site have come to be located. The Site is located in the Coast Fork Willamette (CFW) River Basin. The mine area is on the north face of Black Butte. The mine area is drained by Dennis and Furnace Creeks, which flow into Garoutte Creek, which in turn flows into the CFW River. The U.S. Army Corps of Engineers constructed a dam on the CFW River about 10 miles downstream of the mining area in 1942, creating Cottage Grove Lake. This reservoir is about 1100 acres in size. The Site is comprised of three operable units (OUs), illustrated conceptually in Figure 1, including the mining and processing area (OU1), the Coast Fork Willamette River (OU2), and Cottage Grove Lake (OU3).

The Site is located in a rural area approximately 10 miles south of Cottage Grove in Lane County, Oregon (Figure 2) and the scope of the removal action is limited to the Furnace Creek removal action boundary as shown on Figure 3. The area within the removal action boundary covers 2- to 3- acres, and includes all areas of the Furnace Creek tailings that are inside the Furnace Creek catchment, excluding the portion of the Old Furnace area that was capped during the 2007 TCRA. Furnace Creek is an intermittent or ephemeral stream channel that flows during storm events and periods of wet weather.

The principal site features of OU1 include collapsed and open mine adits, waste rock piles near the adit openings, the Main Tailings Pile located adjacent to Dennis Creek, the Old Furnace Area, the New Furnace Area, and the Furnace Creek Tailings Area. These mine features and nearby waterbodies and landforms are depicted on Figure 2. The mine area has been identified as a significant contributor of mercury to sediment and fish tissue in downstream waterbodies, including the CFW River and the Cottage Grove Lake.

1. Removal site evaluation

Substantial environmental information exists about the Site (CDM Smith 2014a; CDM Smith 2014b; CDM Smith 2016; Curtis and others 2013, Oregon DEQ 2008; Oregon DEQ 2006; EPA 2008; and EPA 2012). Numerous environmental investigations and a time-critical removal action have been completed at or near the Site, and these investigations show that soil and sediment are contaminated by mercury, arsenic, and other metals, and that the source of these metals is from historic mercury mining, processing, and disposal operations. The soil data show high levels of mercury-contaminated soils and tailings present in the Furnace Creek catchment. Water data and subsequent mass flux calculations show that Furnace Creek is a significant contributor to mass loading of mercury to the watershed. These soil and water data are summarized more thoroughly in the EE/CA (CDM Smith 2016), and in Section II.A.4 of this Action Memorandum (below).

2. Physical location

The Site is located in a rural area approximately 10 miles south of Cottage Grove in Lane County, Oregon. The latitude and longitude are 43° 34' 42" north, 123° 3' 58" west. The Site is located in the northwest ¼ of Section 6, Township 23 south, Range 3 west on the U.S Geological Survey (USGS) Harness Mountain 7.5-Minute Topographic Quadrangle, 2011.

The Site is located in an area of rugged topography at the end of London Road on the east side of Garoutte Creek (Figure 2). Elevations in the area range from approximately 1,000 feet North American Vertical Datum of 1988 (NAVD88) adjacent to Garoutte Creek to approximately 2,600 feet NAVD88 at the top of Black Butte. The Site is located within the watersheds of Dennis Creek and Furnace Creek, which are tributaries to Garoutte Creek. Much of the Site and most of the Furnace Creek watershed is covered by thick vegetation, which makes Site access challenging.

The Site is accessible by paved roads and several natural surface roads from Cottage Grove, Oregon. The Site is accessed by traveling approximately 10 miles south to the end of London Road, which leads south from the city of Cottage Grove. The lower Furnace Creek drainage is accessible via an undeveloped foot path from the Weyerhaeuser Road adjacent to the West side of Garoutte Creek or from an overgrown dirt road that runs along the east side of Garoutte Creek. The upper Furnace Creek drainage is accessible through dense vegetation off the south side of the main dirt road that runs adjacent to Furnace Creek through the tailings disposal area.

The climate is marine temperate with mild wet winters and dry summers. The highest precipitation falls between November and April. Precipitation at the Site is evaluated by long-term precipitation data collected at the onsite weather station and historical long-term weather data compiled from four National Oceanographic and Atmospheric Administration (NOAA) weather stations in proximity of the Site. These NOAA stations are the Black Butte, Sutherlin, Cottage Grove Dam, and Eugene weather stations. The Black Butte station, located closest to the Site, shows the highest precipitation of the four weather stations. In 2012, the Black Butte station recorded an annual precipitation of approximately 70 inches, which is higher than the 30-year average of 48.5 inches for annual precipitation between 1960 and 1989.

Surrounding Land Use and Distance to Nearest Populations

The OU1 area of the Site drains into Garoutte Creek, which flows northward approximately one mile to the CFW River, which in turn empties into Cottage Grove Lake. Cottage Grove Lake is used extensively for recreational activities including contact recreation (e.g., swimming, canoeing, and scuba diving) and

fishing. This reservoir is visited by almost a half- million people every year for camping, picnicking, swimming, water skiing, fishing, and boating.

The aquifers in the vicinity of the Site are the Fisher Formation (bedrock aquifer) and the alluvial aquifer along Dennis Creek, Garoutte Creek, and the CFW River. Depth to groundwater and hydraulic conductivity of these aquifers at the Site are not well characterized. Well logs for wells near the Site indicate that the shallowest depth to water-bearing strata in bedrock is 29 feet below ground surface (bgs). Local groundwater gradients are unknown but are likely toward the streams. The nearest spring is London Springs, located approximately 4 miles north of the Site. Its source, use, and quality are unknown.

Vulnerable or Sensitive Populations, Habitats, and Natural Resources

The Site was identified in recent total maximum daily load (TMDL) investigations as a significant contributor of mercury to sediment and fish tissue in Cottage Grove Lake, located approximately 6 miles downstream of Site (ODEQ 2006). Cottage Grove Lake and the main stem of the Willamette River, is the nation's thirteenth largest watershed. The Oregon Health Authority (OHA) has issued health advisories to limit consumption of fish harvested from the Cottage Grove Lake due to elevated mercury concentrations in fish tissue.

3. Site characteristics

The OU1 of the Site encompasses the former new and old furnace mine site areas, including mine portals, distributed tailings, and the receiving surface water streams immediately adjacent to the former mining activity. OU1 is located entirely on private lands. There are no state or federal lands within OU1.

General Site Features

Currently, much of the Site is undeveloped forest, and is managed for timber production. A single-family residence (private residence) is situated within or adjacent to OU1 near the Federal Emergency Management Agency flood Zone A of Garoutte Creek. The home is near the main point of access to OU1. The residence includes a home, several outbuildings, and a hay field. A water system is present, which conveys surface water from an intake in the upper portion of the Furnace Creek catchment, upstream of the removal action boundary, through a system of hoses and tanks used by the residence for a potable water source. This residence is occupied year-round.

Underground Mine Workings

Underground mine workings constructed prior to 1934 were documented by the USGS (Wells and Waters 1934). It is reported that the mine continued to operate on an intermittent basis through the late 1960s, and therefore additional underground workings are certainly present at the Site. The underground workings accessed the mercury ore through several adits (i.e., approximately horizontal tunnels leading from the surface into the mine) and through a series of stopes that provided for extraction of the ore. Generally speaking, the stopes followed the trend of the Black Butte fault, which controlled ore deposition. Several other apparent mine workings were identified based on evaluation of light detection and ranging (LiDAR) imagery, which may be workings constructed after 1934. There are no underground mine workings directly impacting the Furnace Creek watershed.

In addition, while there are extensive underground workings underlying OU1, there are no underground mine workings or impounded waters in the area of the proposed NTCRA that are associated with hydraulic risks. Thus, this action would not trigger headquarters consultation under the March 29, 2016 memorandum "EPA Work Activities at Abandoned Hardrock Mining and Mineral Processing Sites" which requires regions to submit consultation packages for HQ review prior to initiating work at Hardrock Mining and Mineral Processing site with actual, potential or unknown fluid hazards.

Old Furnace Area

A furnace structure, termed the "Old Furnace", was utilized to process mercury ore and produce elemental mercury. This type of furnace operated by placement of a "charge" of ore and fuel into the furnace and burning the fuel to heat the ore. The furnace heated the mercury ore to temperatures above the stability temperature of the mineral cinnabar (HgS), which volatilized the mercury and sulfur (Rytuba 2002). The volatile emissions from the furnace were passed through a condenser system, which collected elemental mercury as it cooled and condensed from mercury vapor into elemental mercury.

Remnants of the Old Furnace are located on the north side of the Furnace Creek catchment as shown on Figure 1. The foundation of the furnace and a group of sub-vertical pipes approximately 12 inches in diameter are present in the area. These vertical pipes are thought to have been a part of the condenser system for the furnace. Miscellaneous steel pipes and other former furnace-related infrastructure are also present in the area of the foundation.

Tailings

After the mercury was recovered from the ore, the tailings were discharged directly downslope from the furnace, which was common operational mine practice in the U.S. prior to approximately 1970. Mercury tailings are also called "calcines" because lime and/or calcium carbonate was added to the ore to assist in desulfurization of the ore (Rytuba 2002). In this Action Memorandum, the more general term "tailings" is used to describe this material. The tailings are relatively coarse in texture and have a characteristic pink-to-red color, resulting from oxidation of iron present in the ore. The texture of the tailings ranges generally from sandy gravel to gravel, which when combined with the color, makes the tailings relatively easy to differentiate from natural materials. Tailings produced by the Old Furnace were disposed of in nearby uplands and in the Furnace Creek catchment. Some of these tailings were later re-processed in the New Furnace. The remaining tailings in the Furnace Creek catchment have been remobilized downstream to some extent and have, in places, buried the channel of Furnace Creek. During the 2007 removal action, tailings produced by the New Furnace (located outside of the Furnace Creek Watershed) containing relatively lower mercury concentrations were used to cover tailings containing relatively higher mercury concentrations in the Old Furnace Area.

4. Release or threatened release into the environment of a hazardous substance or pollutant or contaminant

The contaminant of concern at the Site is mercury. It is a hazardous substance as defined by sections 101(14) of CERCLA, as amended 42 U.S.C. § 9601(14).

Mercury is present in surface water at Furnace Creek and Garoutte Creek primarily as particulate-bound mercury in the suspended load, and significant transport of mercury occurs along Furnace Creek during periods of higher stream flow during and following rainfall events. Sources of mercury within the Furnace

Creek catchment area include mine tailings and mercury furnace wastes at the Furnace Creek Tailings Area and the Old Furnace Area. Dispersion of mercury from these source materials results in contaminating soil and sediment. Erosion and depositional processes result in mobilization of particulate-bound mercury from tailings and comingled mercury-impacted soils/sediment sources into Furnace Creek. During active periods of flow at Furnace Creek, particulate-bound mercury is transported in the suspended load, ultimately discharging to Garoutte Creek. Transport of mercury in the dissolved phase also occurs but to a lesser extent than transport of particulate mercury. The dissolved fraction of mercury in surface water results from leaching of mercury from tailings and comingled mercury-impacted soils/sediment to the creek during rain events and from desorption and dissolution of mercury from sediment in Furnace Creek. Particulate and dissolved mercury concentrations increase during storm events when the greater amounts of sediment are suspended in the water column. (See CDM Smith, 2014a; CDM Smith 2014b); ODEQ, 2006; ODEQ, 2008).

Sources of Mercury – Tailings

Sources of mercury within the Furnace Creek catchment area consist of furnace wastes associated with the Old Furnace and tailings at the Furnace Creek Tailings Area. Both source materials are located on slopes, which are subject to erosion into the channel of Furnace Creek.

Potential sources of mercury associated with the Old Furnace include residual mercury in, around, or beneath the remnant ore-processing equipment. The extent of furnace wastes is expected to be limited to the location of the Old Furnace remnants and immediate downslope area. During the 2007 TCRA, much of the area of the Old Furnace and remnant structures was capped with soil and tailings removed during the regrading of the slope above Dennis Creek.

Spent tailings that had been processed through the Old Furnace were disposed into the Furnace Creek catchment. These tailings have been remobilized downstream to some extent and have, in places, covered the channel of Furnace Creek. The approximate extent of tailings at the Furnace Creek Tailings Area is indicated by the hatched area shown on Figure 1. Information on the thickness of tailings is limited to:

1. Boring for monitoring well MW10, advanced in the upper portion of the Furnace Creek Tailings Area (Figure 1).
2. Borings MP05, MP06, and MP07, which were advanced during the 2005 removal assessment investigation.
3. Four test pits or trenches excavated in the Furnace Creek Tailings Area during the 2007 TCRA, including three test pits to depths exceeding 9 feet and one trench 20-feet long. The exact 2007 TCRA test pit locations are not known.
4. Preliminary mapping of tailings extent using visual inspection and post-holing methods.

Test pit observations indicated that the thickness of tailings ranged from less than 1 foot (MP04 and MP06) to greater than 9 feet in at least one of the 2007 TCRA test pit locations. The thickness of tailings outside of the boring and test pit locations is not known.

Tailings sampled at the location of the Old Furnace by the Oregon Department of Environmental Quality (DEQ) in 2003 had mercury concentrations up to 2,090 milligrams per kilogram (mg/kg); however, the

Old Furnace area was capped during the 2007 TCRA to address this area of high mercury concentrations (Curtis 2004; EPA 2008). Samples collected from other areas of the Furnace Creek Tailings Area during the OU1 remedial investigation (RI) in 2013-2014, indicated that the remaining surface soil in the Furnace Creek Tailings Area had mercury concentrations up to 543 mg/kg (CDM Smith, 2014a). Field XRF data collected from the Furnace Creek Tailings Area during the TCRA indicate that tailings, soil, and sediment in this area may have even higher mercury concentrations (EPA, 2008). The range of mercury concentrations in Furnace Creek Tailings Area is shown on Figure 4.

Sources of Mercury – Comingled Mercury-Impacted Soils/Sediment

Mercury-impacted soils within the Furnace Creek catchment are a source of mercury to surface water and groundwater via erosion of soil particles into surface water and leaching of mercury to groundwater. Surficial soils adjacent to tailings areas are impacted by mercury when erosion and depositional process results in dispersion of the tailings into soil. Analysis of incremental surface soil sample tailings and mine materials that was collected over the Furnace Creek Tailings Area and consisted of soil mixed with tailings indicated an average mercury concentration of 176 mg/kg (CDM Smith 2014a).

Soil underlying the tailings is impacted by mercury when precipitation leaches mercury from tailings and transports it downward into the underlying soil. Based on discrete-depth soil samples collected at the nearby location MW11 (Figure 1) at the Main Tailings Pile, mercury concentrations in soil attenuate rapidly (generally within 10 feet below the tailings/soil contact) in the clay soil that underlies the tailings. Given that clay is present at boring MW11 to depth of greater than 70 feet bgs and at MW10 to a depth of greater than 15 feet bgs (total depth explored), migration of mercury leached from tailings into the underlying soil is not a significant transport pathway.

Alluvium comprising the bed of Furnace Creek is another source of mercury to surface water. This is due to the deposition of and intermixing of tailings/contaminated sediments with the active stream bed of this intermittent stream. Analysis of the one incremental sediment sample collected from the stream bed at the downstream end of the Furnace Creek Tailings Area (sediment sample station FC1) indicated an average mercury concentration in bulk sediment of 136 mg/kg (CDM Smith, 2014b). DEQ collected grab sediment samples from Furnace Creek immediately downstream of the Old Furnace area in 2008, and mercury was detected at concentrations of 70.2 and 173 mg/kg in the primary and duplicate sediment samples collected at this location (DEQ, 2008).

Erosion and Particulate Mercury

The primary transport mechanism of mercury from the Furnace Creek catchment to Garoutte Creek is particulate mercury in surface water (CDM Smith, 2014a). Transport of particulate mercury in surface water occurs via two mechanisms:

1. Erosion of tailings and mercury-impacted soil into the Furnace Creek.
2. Re-suspension of mercury-impacted channel bottom sediments into the water column during periods of flow, such as during and following storm events.

Dissolved Mercury in Surface Water

Mercury in dissolved form is transported in the Furnace Creek catchment to Garoutte Creek, although at much lower concentrations than particulate mercury (CDM Smith, 2014a). Dissolved mercury in surface water at Furnace Creek occurs via two mechanisms:

1. Precipitation infiltrating and leaching mercury from surficial tailings and bank soils to Furnace Creek during storm events.
2. Dissolution of mercury from sediment suspended in the water column during storm events. This occurs during storm events when the amount of suspended sediment increases and particle surface area is at a maximum.

Dissolved Mercury in Groundwater at Furnace Creek

Groundwater occurs within the Site as upland groundwater, alluvial groundwater, and a deep bedrock fracture flow system (CDM Smith, 2014a). Mercury in dissolved form may be transported in the Furnace Creek catchment to Garoutte Creek although at much lower concentrations than particulate mercury. Groundwater occurrence identified within the Furnace Creek catchment area includes:

1. Upland groundwater – groundwater occurring within the clay-rich soil underlying the Furnace Creek Tailings Area.
2. Alluvial groundwater – groundwater occurring within the shallow alluvium directly below the Furnace Creek channel.

Dominant Source of Mercury to the Downstream Watershed

Furnace Creek is ephemeral, flowing for 4 to 6 months of the year (based on the 2012-2015 monitoring period), and contributes approximately 0.2 percent of the total stream flow in Garoutte Creek, downstream of the Site. However, based on preliminary loading calculations (CDM Smith, 2016) for each of the streams monitored during the OU1 RI, Furnace Creek contributes 48 percent of the total annual mercury load to the downstream watershed, representing the largest single contribution of mercury. The 48 percent of the total annual load is a conservative (low) estimate because the loading calculations are based on maximum mercury concentrations measured during the February 2014 storm event, which was a moderate-intensity storm event that had a 2-year reoccurrence interval (2-year storm event).

The high concentrations of particulate mercury in surface water within Furnace Creek are the primary factor for Furnace Creek to contribute such a high percentage of the mercury load at such low annual flow rates. Mercury concentrations in tailings and co-mingled contaminated soils/sediment within downstream Furnace Creek are 15 to 20 times higher than concentrations measured at the upstream Furnace Creek reference location, indicating a significant increase of mercury concentrations in tailings and co-mingled contaminated soils/sediment along Furnace Creek within the Furnace Creek Tailings Area (CDM Smith, 2016).

5. NPL Status

The Site was added to the National Priorities List (NPL) on March 4, 2010. EPA is currently performing an RI and feasibility study (FS) to assess the nature and extent of site contamination, and to determine

appropriate remedial action. EPA is collecting additional data and expects to complete the RI report in early 2018.

6. Maps, pictures, and other graphic representations

Figures 1 and 2 depict the Site location, Figure 3 depicts the Furnace Creek removal action boundary, and Figure 4 depicts the mercury soil concentrations within OU1.

B. Other Actions to Date

1. Previous actions

EPA Site Activities

In July 2004, DEQ asked EPA to conduct a removal assessment.

In September 2005, the EPA and Superfund Technical Assessment and Response Team (START) completed a removal assessment that characterized mining-related impacts. Sampling data was collected from several areas of the Site, including: Main Tailings Pile, New Furnace Area, Old Furnace Area, the three creeks (Dennis Creek, Garoutte Creek, Furnace Creek), and the Dennis Creek Adit and 404 Adit. Results of the removal assessment indicated that the Main Tailings Pile, Old Furnace Area, New Furnace Area, and Furnace Creek) should be addressed due to mercury contamination impacting the watershed or potential for direct human contact.

In May 2006, EPA performed a removal assessment site visit with Emergency and Rapid Response Services (ERRS), START, and DEQ. Removal assessment activities included the removal assessment report (2006), a topographic survey (2006), a cultural resources survey (2006), and design work (2007).

On June 27, the 2007 Action Memorandum was signed by EPA.

From August 20 to September 5, 2007, EPA conducted a time-critical removal action and completed the following tasks: reduced the slopes of the east and west main tailings piles over Dennis Creek and installed sediment controls; capped the contaminated soils around the New Furnace Structure and blocked off the road to the area; removed trees and brush over the Old Furnace Area and capped contaminated soils and mining artifacts; and delineated mercury contamination in Furnace Creek, Dennis Creek and Garoutte Creeks using on-site analysis by x-ray fluorescence (XRF) and Lumex instruments. Because of cost constraints, little construction activity was conducted in the Furnace Creek drainage.

In 2009, EPA completed a Hazard Ranking System (HRS) evaluation for BBM. Based on the results of the overland discharge/flood component of the evaluation, the Site was added to the NPL on March 5, 2010.

In 2012, EPA completed a Site optimization review (EPA 2012), which evaluated conditions and identified optimal approaches for conducting the RI at the Site. In the optimization review, a preliminary site-wide conceptual site model was developed that identified several key areas contributing to transport of mercury from the Site to Cottage Grove Lake, including:

- Black Butte Mine

- CFW River and Garoutte Creek
- Cottage Grove Lake Wetland Exposed Low Pool
- Cottage Grove Lake

Based on these defined areas, three OUs were established as follows:

- OU1: The Black Butte Mine area and vicinity
- OU2: The CFW from Big River confluence to Cottage Grove Lake
- OU3: Cottage Grove Lake

The optimization review (EPA 2012) identified that Furnace Creek may be the largest source of mercury to the downstream watershed. Results of the ongoing OU1 RI, completed between November 2012 and June 2015, document that Furnace Creek is an ongoing and dominant source of mercury from OU1 to the downstream watershed of Garoutte Creek, the CFW (OU2), and Cottage Grove Lake (OU3). Mercury within sediment of Cottage Grove Lake and the associated dissolved fraction is an ongoing source of mercury available for methylation, which results in elevated mercury in fish tissue. These findings prompted EPA to proceed with an NTCRA to address mercury source material at the Furnace Creek Area of OU1.

2. Current actions

There are no government or known private cleanup activities that are currently being performed at the Site that have not been previously described. EPA is currently performing an RI and FS to assess the nature and extent of site contamination, and to determine appropriate remedial action. An EE/CA has been prepared for the Furnace Creek Area to describe the proposed removal action. The proposed removal action is targeted to take place in the dry season of 2018, roughly June through October.

C. State and Local Authorities' Roles

1. State and local actions to date

The State of Oregon, through DEQ and OHA, has had a long history of involvement at the Black Butte Mine Site, dating back to the early 1990s. This work includes assessment activity in all operable units of the Site, issuance of a fish consumption advisory, preparation of a Public Health Assessment, and many site-related reports. DEQ staff continue to be key members of the site team, and participate in the development of plans and reports, milestone meetings, public meetings, and other activities.

2. Potential for continued State/local response

The State of Oregon is unable to obtain funds or lead the lead the response action. Therefore, EPA will lead the response action. DEQ will, however, continue to provide support to EPA under a cooperating agency agreement for technical assistance and advice, and support for public outreach.

In addition, DEQ will conduct operation and maintenance (O&M) following implementation of the non-time-critical removal action in the Furnace Creek Area of the Black Butte Mine Site. DEQ's commitment is based on the understanding that only limited State managed O&M will be necessary following completion of the proposed removal. Further, DEQ anticipates that the Removal Action will become part

of a future Remedial Action which will require State O&M in the future as part of the Superfund State Contract. Prior to the completion of the Superfund State Contract, DEQ will treat the O&M obligation as it would for any site where EPA conducts a Removal and the State provides O&M upon completion of the Removal Action. Further, DEQ expects to be involved with the review and concurrence of the specific remedial design as those documents are generated. These commitments were set forth in a letter from DEQ to the Site RPM (March 2, 2017).

D. Tribal Government Coordination

In accordance with the *EPA Region 10 Tribal Consultation and Coordination Procedures* (EPA, 2012), the EPA Region 10 Oregon Operations Office Tribal Coordinator identified the following three tribes with interests that might be affected by the proposed removal action: Cow Creek Band of Umpqua Tribe of Indians; Confederated Tribes of Grand Ronde; and Confederated Tribes of Siletz Indians. Letters were sent to the Tribal Chair of each Tribe offering government-to-government consultation and coordination. In addition, staff-to-staff level coordination has occurred between the EPA and Tribal staff regarding the proposed non-time-critical removal action. At this point, one of the Tribes, the Grand Ronde Tribes, has accepted our invitation for formal government-to-government consultation.

The EPA Region 10 procedures recognize that “the urgency and dynamics of a Removal Action may affect EPA’s ability to fully implement all four phases of tribal consultation described in EPA policy (identification, notification, input, and follow-up).” Further, for NTCRAs, the EPA Region 10 Procedures state that “... Region 10 generally should fully implement the EPA Region 10 Tribal Consultation Procedures when EPA actions or decisions may affect tribal interests.”

Considering the above, the project team will proceed with consultation, starting with staff-to-staff coordination and seek input. Given the project timeline, EPA expects to complete consultation after issuing the Action Memorandum but prior to implementation of the NTCRA.

E. Federal and State Public Health Agency Coordination

The OHA, Environmental Health Assessment Program (EHAP) prepared a Public Health Assessment for the Black Butte Mine Superfund Site (2013). This Public Health Assessment was prepared under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). An ATSDR Public Health Assessment reviews available information about hazardous substances at a site and evaluates whether exposure to them might cause any harm to people. ATSDR conducts public health assessment activities for every site on or proposed for the National Priorities List.

Following preparation of the Public Health Assessment, the project team has continued to keep EHAP staff apprised of project developments, including sharing the EE/CA. EHAP staff participated in a public meeting in 2016 during the public comment period on the EE/CA and answered questions pertaining to public health. The project team will continue to coordinate with EHAP staff as the project advances.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT

The current conditions at this Site meet the following factors, indicating that the Site may pose an unacceptable risk to public health or welfare or the environment, and a removal action is appropriate under the NCP, 40 C.F.R. § 300.415(b)(2).

A. Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants [40 C.F.R. § 300.415(b)(2)(i)]

Human exposure pathways exist through consumption of fish in down stream water bodies, in particular the Cottage Grove Lake. It is well established that mercury from the BBM is a dominant source of mercury in Cottage Grove Lake (Curtis et al. 2013, Oregon Health Authority [OHA] 2013, DEQ 2006, Curtis 2003). Mercury transport from the BBM to the downstream watershed occurred throughout the life of the mine and continues today. Recent surface water and sediment sampling at the CFW River and Cottage Grove Lake indicate Cottage Grove Lake continues to receive elevated inorganic mercury from upstream sources and that methylmercury concentrations are highest in the top 2 centimeters of sediment of the reservoir (Eckley et al. 2015). Storm event surface water monitoring at BBM conducted from 2013-2014 indicates that Furnace Creek contributes the most significant mercury loading from the BBM to the downstream watershed (CDM Smith, 2014a). Erosion and transport of particulate mercury during storm events is the dominant transport mechanism.

Inorganic mercury in Cottage Grove Lake sediment is converted to methylmercury, which bioaccumulates in fish tissue and subsequently may pose a health hazard for people that take and consume fish. The 2013 Public Health Assessment performed by the OHA determined that levels of methylmercury in the fish in Cottage Grove Lake (excluding rainbow trout) ranged from 0.3 to 1.6 mg/kg in fish tissue sampled between 1974 and 2003, exceeding the national ambient water quality criterion of 0.3 mg/kg and the Oregon standard of 0.03 mg/kg methylmercury in fish tissue.

Methylmercury is a potent neurotoxin that has the potential to cause permanent damage to the brain, kidney, and developing fetus. Effects on brain functioning may cause irritability, shyness, tremors, changes in vision or hearing and memory problems. Children are known to be more sensitive than adults to mercury intoxication. The mercury present in the mother's body may pass to the fetus and accumulate there. It can also pass to a nursing infant through the breast milk. Mercury's harmful effects to children include brain damage, mental retardation, incoordination, blindness, seizures and inability to speak. The primary route of human exposure to mercury is via the consumption of fish or seafood containing elevated levels of mercury. (OHA 2013)

Although no Superfund risk assessment has been conducted at this point, OHA considers methylmercury levels in CGR fish a public health hazard and recommends that EPA take action to address mercury releases to the watershed at the BBM (OHA 2013). An independent review conducted by EPA Region 10 human health risk assessors, using a CGR fish tissue data set from 1993 through 2003, provided supporting conclusions regarding the unacceptable risk due to CGR fish consumption. Hazard quotients ranging from 11 to 18 were calculated for black crappie, bluegill, bullhead, largemouth bass, and cutthroat trout, assuming a fish consumption rate of 175 grams per day.

In addition, human exposure pathways exist at OU1 through exposure to air (inhalation), direct contact (dermal), and soil (ingestion). Nearby residents, recreationists, and/or trespassers could be exposed to the contaminants. The potential for exposure is elevated further because mercury concentrations in the tissue of fish in Cottage Grove Lake are elevated and Cottage Grove Lake is widely used for fishing and recreation. In addition, Site access is not fully restricted (e.g., the site is not fully fenced to prevent foot or vehicular access and there is limited signage warning not to trespass). Finally, the conditions present in the Furnace Creek area of OU1 indicate that highly contaminated source material is present adjacent to Furnace Creek and that this material is unstable and being actively eroded and delivered to Furnace Creek and downstream waterbodies. At this point, direct contact risks to people for this area have not been

quantified, and the objectives of the removal action are to minimize the release of mercury to downstream waters.

Ecological receptors, including avian, mammalian, and plant receptors, could become exposed to elevated contaminants found in soils through direct contact with the contaminated materials and with water and sediments contaminated by the materials; ingestion of soils, water, and sediments contaminated by the materials; and ingestion of contaminated food (e.g., sediment- or soil-dwelling insects, vegetation). At this point, direct contact risks to ecological receptors for this area have not been quantified.

B. Actual or potential contamination of drinking water supplies or sensitive ecosystems (40 C.F.R. § 300.415[b][2][ii])

OU1 is the biggest ongoing source of mercury entering the Cottage Grove Lake watershed. The Site was identified in recent TMDL investigations as a significant contributor of mercury to sediment and fish tissue in Cottage Grove Lake, located approximately six miles downstream of OU1. Cottage Grove Lake and the main stem of the Willamette River, is the nation's thirteenth largest watershed. Excavation of the mine waste contaminated materials is anticipated to have a positive effect on surface water quality and the sensitive aquatic ecosystem of Furnace Creek and downstream areas.

C. High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate (40 C.F.R. § 300.415[b][2][iv])

Sources of mercury within the Furnace Creek catchment area consist of tailings and comingled mercury-impacted soils/sediment within the Furnace Creek. These source materials are located within the Furnace Creek catchment, which are subject to erosion to surface water and groundwater via erosion of soil particles into surface water and leaching of mercury to groundwater.

Surficial soils adjacent to tailings areas are impacted by mercury when erosion and depositional process results in dispersion of the tailings into soil. As mentioned earlier, the primary transport mechanism of mercury from the Furnace Creek catchment to Garoutte Creek is particulate mercury in surface water. Transport of particulate mercury in surface water occurs via two mechanisms:

1. Erosion of tailings and mercury-impacted soil into the Furnace Creek.
2. Re-suspension of mercury-impacted channel bottom sediments into the water column.

D. Minimization or elimination of the effects of weather conditions that may cause hazardous substances, pollutants or contaminants to migrate or to be released (40 C.F.R. § 300.415[b][2][v])

As mentioned above, Furnace Creek is a dominant source of mercury to the downstream watershed. Particulate and dissolved mercury concentrations increase during storm events when the greater amounts of sediment are suspended in the water column. Due to the steep topography within the Furnace Creek catchment area, there is potential for erosion of tailings and soil into the Furnace Creek channel throughout the catchment area.

Water quality monitoring data collected during the OU1 RI indicate that total suspended solids and total mercury concentrations increase as the stream flow rate increases during precipitation events. At Furnace

Creek, total mercury concentrations ranged from a low of 595 nanograms per liter (ng/L) during the baseline measurement of the March 2013 storm event to a high of 93,800 ng/L during the peak of the larger February 2014 storm event. The flow was approximately 1 cubic foot per second (cfs) during the February 2014 storm event. Based on precipitation statistics at the Cottage Grove 1 NNE weather station for the period of 1914 through 2014, the February 2014 storm event has a 2-year reoccurrence interval (2-year storm event). Higher mercury concentrations in Furnace Creek are expected during larger storm events such as the December 2012 storm, when measured flows were 3 cfs.

During storm events, dissolved mercury concentrations in surface water of Furnace Creek follow the same trend as total mercury concentrations.

E. The availability of other appropriate federal or state response mechanisms to respond to the release [40 C.F.R. § 300.415(b)(2)(vii)]

The DEQ does not have the resources to provide the appropriate timely response needed to address actual or potential human health and ecological risks associated with the mine waste contaminants described herein. However, DEQ is assisting EPA, from both from an operational and public information dissemination standpoint, by ensuring that affected local citizens are provided with appropriate information and assistance.

There are no known other appropriate federal or state response mechanisms capable of providing the appropriate resources in the prompt manner needed to address the human health and ecological risks associated with the hazardous substances described herein.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from the Furnace Creek Area of OU1 may present an imminent and substantial endangerment to the public health, or welfare, or the environment.

V. EXEMPTION FROM STATUTORY LIMITS

Site conditions meet the consistency criteria specified in this request for an exemption from the 12-month and \$2 million statutory limit. The proposed action will exceed the statutory 12-month period and \$2 million ceiling to prevent further unacceptable exposures from the release of hazardous substances, and pollutants and contaminants from Furnace Creek.

The proposed action meets the criteria for the consistency exemption. The proposed action is appropriate and consistent with the remedial action to be taken and does not foreclose any future remedial actions at the Site. Conditions present in the Furnace Creek area of OU1 indicate that highly contaminated source material (tailings and comingled mercury-impacted soils/sediment sources) is present adjacent to Furnace Creek and that this material is unstable and being actively eroded and delivered to Furnace Creek and downstream waterbodies. Thus, the proposed action is appropriate to avoid foreseeable threats from further migration of mercury from the Site to the downstream watershed and subsequent adverse impacts to human and ecological receptors as indicated in Section III (*Threats to Public Health or Welfare or the Environment*) of this AM.

A. \$2 Million Exemption

Remaining funds from the authorized amount in the 2007 Action Memorandum would not be sufficient to implement the proposed action at the Site. An exemption to the \$2 million statutory limit for conducting the removal action is warranted for the Site. This proposed action at the Site meets the exemption criteria in Section 104(c)(1)(C) of CERCLA, 42 U.S.C. §9604(c)(1)(C).

B. 12-Month Exemption

Consistent with Section 104(c)(1)(C) of CERCLA, 42 U.S.C. §9604(c)(1)(C), an exemption from the statutory limit requiring performance of a removal action within a 12-month period of time is warranted for the Site.

VI. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

The proposed actions listed below have been developed in coordination with DEQ. The removal action objectives (RAOs) for this action include: (1) Reduce the availability and/or mobility of mercury in soil and sediment within the Furnace Creek catchment to migrate in particulate form to surface water; and (2) Reduce the migration of Furnace Creek mercury to Garoutte Creek. An EE/CA has been prepared that evaluated three removal action alternatives against the short- and long-term aspects of three broad criteria: effectiveness, implementability, and cost, as well their sub-criteria (CDM Smith 2016). The proposed action is to implement Alternative RA3 (*Excavation and Onsite Disposal of Mercury Source Material with Reclamation/Rehabilitation of Excavated Surfaces*), as evaluated in the EE/CA. A removal action work plan, with associated sampling and analysis plan, will be developed to implement the actions described below.

1. Proposed action description

The proposed action description focuses on excavation and onsite disposal of tailings and co-mingled contaminated soils/sediment with reclamation of upland and creek bank areas and rehabilitation of the creek bed along with erosion and sediment control best management practices (BMPs) to manage particulate-bound mercury and thus achieve the RAOs. These approaches would remove mercury source material from the Furnace Creek catchment area, and reduce mobilization of particulate-bound mercury into Furnace Creek and downstream migration to Garoutte Creek. These actions may also be expected to reduce the potential for leaching of mercury into groundwater, and reduce surface water and shallow groundwater interaction with contaminated sediment within the Furnace Creek bed. The concepts for this alternative are illustrated on Figures 5, 6, 7, and 8.

Prior to implementation, the project team will develop an implementation plan and design document. This plan will utilize existing information as well as the results of a refined tailings delineation to be performed in the fall of 2017. The additional data and implementation plan will address uncertainties regarding the coverage and depth of tailings in the removal action area.

Excavation of Mercury Source Material

Under this proposed action, the source of mercury contamination (i.e., tailings and comingled mercury-impacted soils/sediment within the Furnace Creek removal action boundary) would be mechanically and/or pneumatically excavated. To perform excavation and onsite disposal, trees and vegetated debris

would need to be removed for construction equipment to have access to the removal action area. Removed vegetation would be chipped and placed in upland areas.

The purpose of excavation is to remove tailings (and co-mingled contaminated soil/sediment) that is the predominant source of particulate mercury loading to Furnace Creek and thus Garoutte Creek. Initial estimates are that approximately 5800 cubic yards of source material will be excavated. Uncertainty regarding the excavation volume will be addressed through a refined tailings delineation to be conducted in the fall of 2017. Horizontal and vertical delineation of tailings and comingled contaminated soils/sediment would also be required during excavation, and to calculate the excavation volume for disposal and for designing an onsite repository; however, there would not be a specific numerical concentration of mercury targeted for excavation.

Once tailings delineation is completed, excavation would be conducted within the removal action area boundary. Tailings will be excavated to underlying native material to the extent practicable. In some areas, tailings or co-mingled contaminated soil/sediment may be left in place and covered or isolated to minimize erosion and downstream transport. Determination that tailings are removed would be made through monitoring – consisting of intrusive visual inspections and sample collection/analysis) – and is described below. This approach (no numeric PRGs) will create a dynamic decision-making environment allowing the project team to use best professional judgement to achieve RAOs.

Monitoring

Visual Inspection/Confirmation:

1. No visual evidence of tailings is found after tailings have been removed or capped, for removal action alternatives involving excavation or containment.
2. Tailings have relatively coarse texture (sandy gravel to gravel) and a characteristic pink-to-red color, as compared to the underlying native material. Native material will have no evidence of tailings co-mingled with soils and sediments.

Analytical Confirmation:

1. Analytical confirmation can be determined by using field XRF or another reliable tool.
2. During removal design, reliable indicators to identify tailings would be developed such as the identification of inorganic constituents (e.g., arsenic) within soils/sediments.
3. Comparison of pre- and post-removal action annual mercury loading in surface water of Furnace Creek at the confluence with Garoutte Creek.

Onsite Disposal

Excavated surface tailings and co-mingled contaminated soils/sediment will be direct-loaded, as practical, and transported for onsite disposal. The existing tailings repository location will be expanded and used for onsite disposal of excavated surface tailings and co-mingled contaminated soils/sediment. Expansion of the existing repository rather than a new location will reduce future post-removal site controls (PRSC)

requirements. The onsite disposal repository will be contained using a cover specifically designed for the repository conditions. No offsite disposal of tailings or contaminated soil/sediment is planned.

Reclamation of Upland and Creek Bank Areas

The excavated upland and creek bank areas within the Furnace Creek catchment area will be graded and backfilled to provide positive drainage and support vegetation and not to match the surface conditions or grades that previously existed. Growth media (6-inch thickness) will be placed to support the vegetation for reclamation along with erosion control devices such as erosion control blankets or turf reinforcement mats, silt fences, and straw bales. Reclamation may include hydroseeding of upland areas; a variety of bioengineering techniques may be required for creek bank stabilization. Bioengineering techniques may include installation of bank revetments, fascines (bush wattles), vegetated gabions, or crib wall at scour susceptible zones of the banks.

Rehabilitation of Creek Corridor

The creek corridor of the reach of Furnace Creek within the removal action area boundary will be rehabilitated to stabilize the bank slopes and reduce future erosion of remaining mercury-contaminated soil and sediment. Main factors controlling the channel erosion include hydraulic shear stress, velocity, and steep slopes. The creek bed rehabilitation design would depend on the calculated velocity of flow within Furnace Creek, as at a velocity of 5 to 6 feet per second flow becomes erosive to soil and vegetation. Thus, hardened erosion control measures (e.g., river rock) or reinforced vegetation (e.g., vegetated turf reinforcement mats) will be placed where flow velocities are higher. Where flow velocities are lower, natural vegetation along with vegetation revetments could be installed.

Borrow Material

Uncontaminated soil or rock/riprap used for the proposed action (onsite disposal repository cover and reclamation /rehabilitation) will be brought from a borrow source outside of OU1. The borrow source selected will be tested to determine that mercury contamination is not present, as well as tested for other types of contaminants that may exist within borrow sources but are not currently present at OU1.

Ancillary Activities

During implementation of the removal action, unexpected conditions or opportunities may be identified. The refined tailings delineation and development of an implementation plan should partly mitigate for these uncertainties. Subject to the availability of funding, there may be refinements to the scope of the project. For example, if additional contamination is identified in close proximity to the removal action boundary or access routes necessary to access the removal area, then additional material may be excavated. In addition, the road through the residential parcel near the entrance to the site may be replaced if contamination is found at levels of concern to sensitive populations, such as children.

Best Management Practices During Construction and Post-Removal Site Controls

BMPs would be used during construction of the proposed action and during implementation of PRSCs. BMPs would include dust suppression (water-based or chemical-based), dewatering using sediment filters, hydroseeding or placement of erosion control devices such as silt fences, straw bales, rip-rap and erosion control blankets, or turf reinforcement mats.

Access controls (specifically posted warnings) would be implemented to discourage access and warn people of the removal action. Monitoring would be performed during the construction of proposed action and would consist of dust monitoring/control, borrow source testing, and monitoring and maintenance of erosion and sediment control measures.

Health and safety precautions, including establishment of exclusion and contaminant reduction zones, use of personnel protective equipment, and monitoring, would be used during implementation of this proposed action to reduce risks to workers.

Community awareness activities such as informational and educational programs to inform the public about Site risks and activities would be performed. Community awareness activities would be put in place during the implementation of the proposed action and would be part of PRSC.

Annual PRSC would consist of monitoring (inspection) and maintenance as necessary to ensure the continuing effectiveness of the completed proposed action and that erosion control measures continue to prevent the mobilization of particulate-bound mercury from the Furnace Creek catchment area. Monitoring would be performed routinely as part of the annual PRSC. Any contaminated soils/sediments removed during routine PRSC maintenance activity would be placed within the upland areas and stabilized using erosion control measures. Annual PRSC activities would begin following completion of construction activities. Construction activities include earthworks anticipated for summer and fall of 2018, and follow-up in the spring of 2019 to identify and correct any construction deficiencies.

2. Contribution to remedial performance

The proposed action will address the threats discussed in Section III, in accordance with the removal criteria of NCP Section 300.415(b)(2). The removal action contemplated in this AM will, to the extent practicable, contribute to the efficient performance of any long-term remedial actions that could be anticipated at the Site. Also, the proposed action will not impede any future actions based upon available information.

The BBM is a final NPL site. An RI/FS is being prepared and no final remedial action has been selected. At this point, there has been no identification or screening of alternatives. Based on scoping discussions and best professional judgement, however, it is likely that the range of feasible alternatives for upland areas in OU1 will be similar to the range of alternatives considered in the EE/CA. These include capping approaches, in-place stabilization, and excavation and rehabilitation approaches.

The proposed action contemplated in this AM involves excavation of tailings and rehabilitation of the area disturbed. This approach is the most robust and protective of the alternatives considered. It is anticipated that this approach will more fully abate the risks within the removal action boundary, rather than simply stabilizing the situation. Thus, we believe that this proposed action is likely to be consistent with a future long-term remedy.

3. Engineering Evaluation/Cost Analysis (EE/CA)

The EE/CA for the Site is available in the Administrative Record (Doc ID. 100027007) and is available online at <https://cumulis.epa.gov/supercpad/Cursites/csinfo.cfm?id=1001865&msspp=med>. The EE/CA evaluated three alternatives: retention of mercury source material using stormwater detention basins and

erosion control measures; in-place containment of mercury source material using covers; and excavation and onsite disposal of mercury source material with reclamation/rehabilitation of excavated surfaces. The EE/CA was issued for public comment on August 24, 2016. Following a 30-day public comment period, written responses to significant comments on the EE/CA were prepared. The Responsiveness Summary is attached to this AM (Attachment B).

4. Applicable or relevant and appropriate requirements

Pursuant to 40 CFR 300.415(j), removal actions shall attain Applicable or Relevant and Appropriate Requirements (ARARs) under federal or state environment or facility siting laws, to the extent practicable, considering the exigencies of the situation. A list of ARARs is attached to this Action Memorandum (Attachment C).

5. Project schedule

The removal action activities are expected to start during the fourth quarter of fiscal year 2018. Earthworks would be completed during first quarter 2019. A follow-up visit to inspect the site and correct any construction deficiencies will occur in the spring of 2019.

B. Estimated Costs

The proposed removal action project ceiling increase estimate is presented below. The response meets the consistency exemption criteria as presented in Section V (*Exemption from Statutory Limits*) of this AM. The estimated EPA extramural costs to complete the proposed action, as described in this AM, are itemized below:

First Amendment to the Action Memorandum (NTCRA)	
ERRS	\$1,850,000
Technical Contractor Support (START or other)	\$200,000
USCG	\$25,000
Contingency (20%)	\$415,000
Total Removal Action Project Ceiling for This Amendment	\$2,490,000

ERRS: Emergency and Rapid Response Services; START: Superfund Technical Assessment and Response Team; USGC: U.S. Coast Guard

The prior total extramural project ceiling that was approved in the June 27, 2007 Action Memorandum was \$837,000. However, total extramural expenditures to date have only been \$346,519, leaving \$490,481 remaining ceiling available from the original budget. The extramural project ceiling and total extramural expenditures are itemized below:

2007 Action Memorandum (TCRA)	
ERRS	\$587,000
START	\$100,000
USCG	\$10,000
Total Extramural Costs	\$697,000

Project Cost Contingency (20%)	\$140,000
Total 2007 Removal Project Ceiling	\$837,000

Total Extramural Expenditures To Date	
ERRS	\$214,800
START	\$124,219
USCG	\$7,500
Total Extramural Expenditures (2007)	\$346,519

ERRS: Emergency and Rapid Response Services; START: Superfund Technical Assessment and Response Team; USCG: U.S. Coast Guard

The estimated cost to complete the removal action, as described in this AM, is \$2,490,000. Since \$490,481 of project ceiling was remaining from the 2007 TCRA, an increase to the project ceiling of 1,999,519 is required to complete the proposed NTCRA. If this request is approved, the total direct extramural project cost will be \$2,836,519 (Time-Critical Removal Action [\$346,519] + Non-Time-Critical Removal Action [\$2,490,000]). Costs are summarized as follows:

TCRA Action Memo		NTCRA Action Memo	
Project ceiling	\$837,000	Proposed project ceiling	\$2,490,000
Expenditure to date	(\$346,519)	Remaining project ceiling from TCRA Action Memo	(\$490,481)
Remaining project ceiling	\$490,481	Additional project ceiling needed	\$1,999,519

$\\$837,000 + \\$1,999,519 = \\$2,836,519$ (New Proposed Removal Action Project Ceiling)
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Since the TCRA took place in 2007, the remaining project budget has been swept and reprogrammed for other projects. Thus, while the overall project ceiling will be increased by only \$1,999,519, Region 10 will require the full \$2,490,000 proposed project ceiling funds to implement these NTCRA proposed actions.

EPA direct and indirect costs, although cost recoverable, do not count toward the removal ceiling for this removal action. Potential responsible parties may be held financially responsible for costs incurred by the EPA as set forth in Section 107 of CERCLA.

VII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

As mentioned above, Furnace Creek is a dominant source of mercury to the downstream watershed.

- A delay in action or no action at the Site would increase the actual or potential threats to the public health and/or the environment associated with the high concentrations of particulate mercury in surface water and high mercury concentrations in sediment that are discharging from Furnace Creek to the watershed;

- If no action is taken, or if this action is delayed: hazardous substances will remain as potential human health and environmental threats based on ingestion, inhalation, and direct contact pathways; and
- Mercury and other hazardous substances will remain a continuing source of solid and dissolved-phase contaminants to Furnace Creek and downstream waterbodies including Cottage Grove Lake, contributing to or exacerbating conditions that lead to bioaccumulation of mercury in fish tissue in Cottage Grove Lake.

VIII. OUTSTANDING POLICY ISSUES

None.

IX. ENFORCEMENTY ADDENDUM

Refer to attached confidential enforcement addendum.

X. RECOMMENDATION

This decision document represents the selected removal action for the Furnace Creek area at OU1 of the Site located near Cottage Grove in Lane County, Oregon, developed in accordance with CERCLA as amended, and is consistent with the NCP. This decision is based on the administrative record for this action.

Conditions at the Site meet the NCP Section 300.415(b) criteria for a removal action and the CERCLA Section 104(c) consistency exemptions from the 12-month and \$2 million limitations, and I recommend your approval of the proposed removal action and the 12-month and \$2 million exemption with increase in the cost ceiling. The total project ceiling, if approved will be \$2,836,519. Of this, none of the funding will come from the Regional removal allowance as funding will be obtained from the remedial program. The funding request from the remedial program to implement the proposed NTCRA is \$2,490,000.

XI. APPROVAL/DISAPPROVAL

By the approval which appears below, EPA selects the removal action for the Site as set forth in the recommendations contained in this Action Memorandum.

Approve: ✓



Sheryl Bilbrey, Director, Office of Environmental Cleanup

Disapprove: _____

Sheryl Bilbrey, Director, Office of Environmental Cleanup

Effective date of this Decision: _____

ATTACHMENTS:

Attachment A – Figures

Attachment B – Responsiveness Summary

Attachment C – Applicable or Relevant and Appropriate Requirements (ARARs)

REFERENCES

- CDM Federal Programs Corporation (CDM Smith). 2016. Final Engineering Evaluation Cost Analysis (EE/CA), Furnace Creek Area of Operable Unit 1, Black Butte Mine Superfund Site, Cottage Grove, Oregon. July 22, 2016.
- CDM Smith. 2014a. Draft Black Butte OU1 Data Summary Report – Addendum 1. September 5, 2014.
- CDM Smith. 2014b. Final Black Butte OU1 Data Summary Report. July 24, 2014.
- Curtis, L.R., Morgans, D.L., Thoms, B., Villeneuve, D. 2013. Extreme Precipitation Appears a Key Driver of Mercury Transport from the Watershed to Cottage Grove Reservoir, Oregon. Environmental Pollution. 176. 178 -184.
- Curtis, L.R. 2004. Final Report Reconnaissance Soil Sampling at the Black Butte Mine. Department of Environmental and Molecular Toxicology. Oregon State University. Prepared for the Oregon Department of Environmental Quality. August 9, 2004.
- Curtis, L.R. 2003. Final Report Sources and Chronology of Mercury Contamination in Cottage Grove Reservoir. Prepared for the U.S. Army Corps of Engineers, May 20, 2003.
- Oregon Department of Environmental Quality (DEQ). 2008. Black Butte Mine Mercury Loading Assessment Results. August 21, 2008.
- DEQ. 2006. Willamette Basin Total Maximum Daily Load (TMDL) Report. September 29, 2006.
- Eckley, C.S., Luxton, T.P., McKernan, J.L., Goetz, J., Goulet, J. 2015. Influence of Reservoir Water Level Fluctuations on Sediment Methylmercury Concentrations Downstream of the Historical Black Butte Mercury Mine, OR. Applied Geochemistry. 61. 284 -293.
- U.S. Environmental Protection Agency (EPA). 2012. Optimization Review Black Mine Superfund Site Lane County, Oregon. Office of Solid Waste and Emergency Response. EPA-542-R-12-003. July.
- EPA. 2008. Final Removal Action Report for Black Butte Mine, Cottage Grove, Oregon. July 20, 2008.
- EPA. 2007. Request for a Removal Action to be Conducted at the Black Butte Mine, Cottage Grove, Oregon. April 13, 2007.
- Oregon Health Authority (OHA). 2013. Public Health Assessment Final Release Black Butte Mine, Cottage Grove, Oregon EPA Facility ID: OR0000515759. March 13, 2013.
- Rytuba. 2002. Mercury Geoenvironmental Models. U.S. Geological Survey Open File Report OF02-195J.

Attachment A

Figures

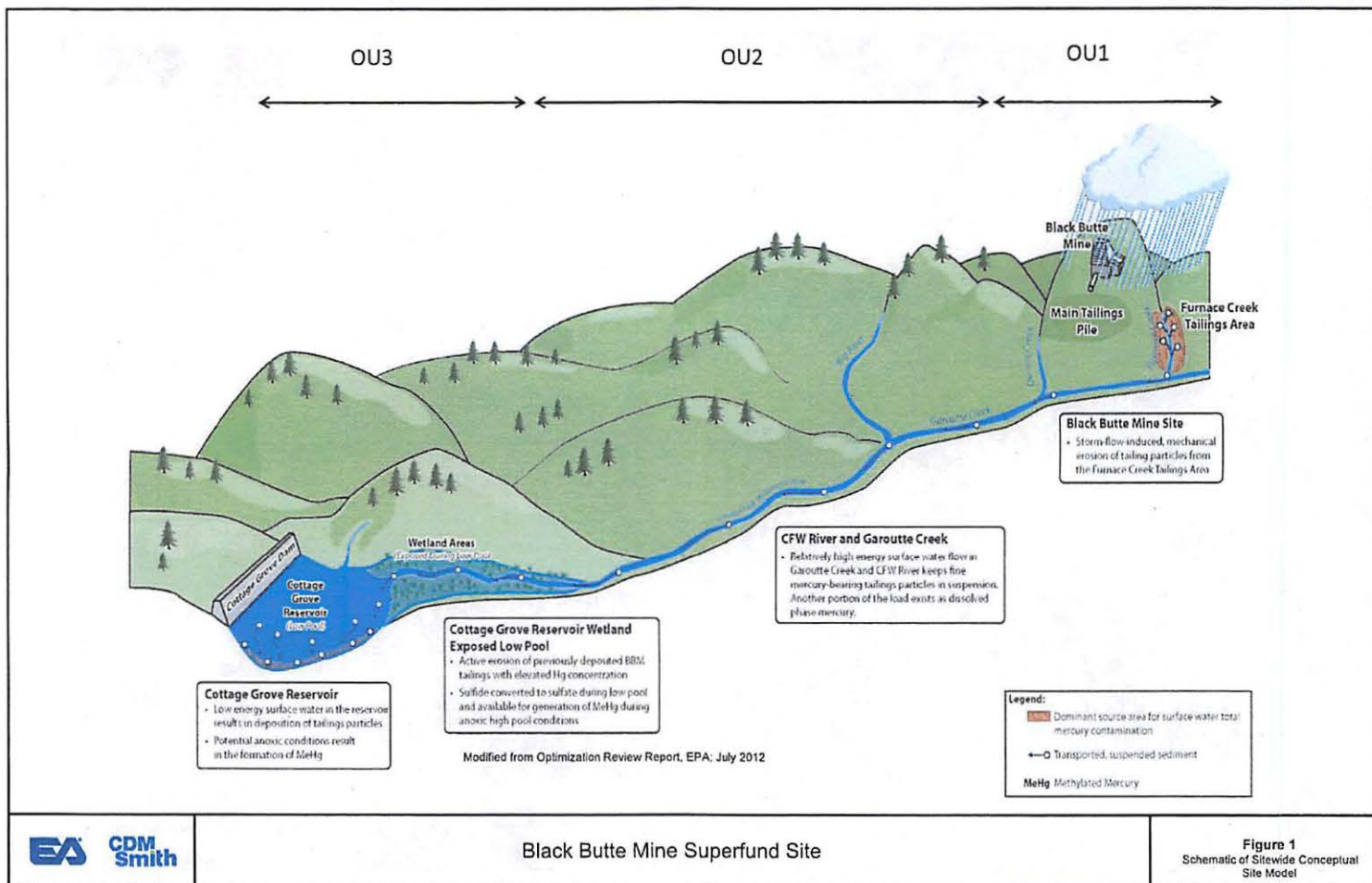


Figure 2

**Black Butte Mine Superfund Site
Operable Unit 1
Site Location Map**

Legend

- Groundwater Monitoring Well (Sonic)
- Groundwater Monitoring Well (Hand Driven)
- Surface Water Monitoring & Sediment Sampling Location
- Surface Water Monitoring Station
- Road
- Creek/Stream/Drainage
- Intermittent Creek/Stream/Drainage
- OU1 Boundary
- Furnace Creek Catchment Boundary
- Approximate Extent of Old Furnace Area Capped During the 2007 Removal Action
- Main Tailings Pile
- Furnace Creek Tailings Area
- Cinnabar Ore Zone
- New Furnace Cap Area
- Adits
- Collapsed Home
- Glory Hole
- New Furnace Structure
- Private Residence
- Dennis Creek Removal Area
- Tailings Repository

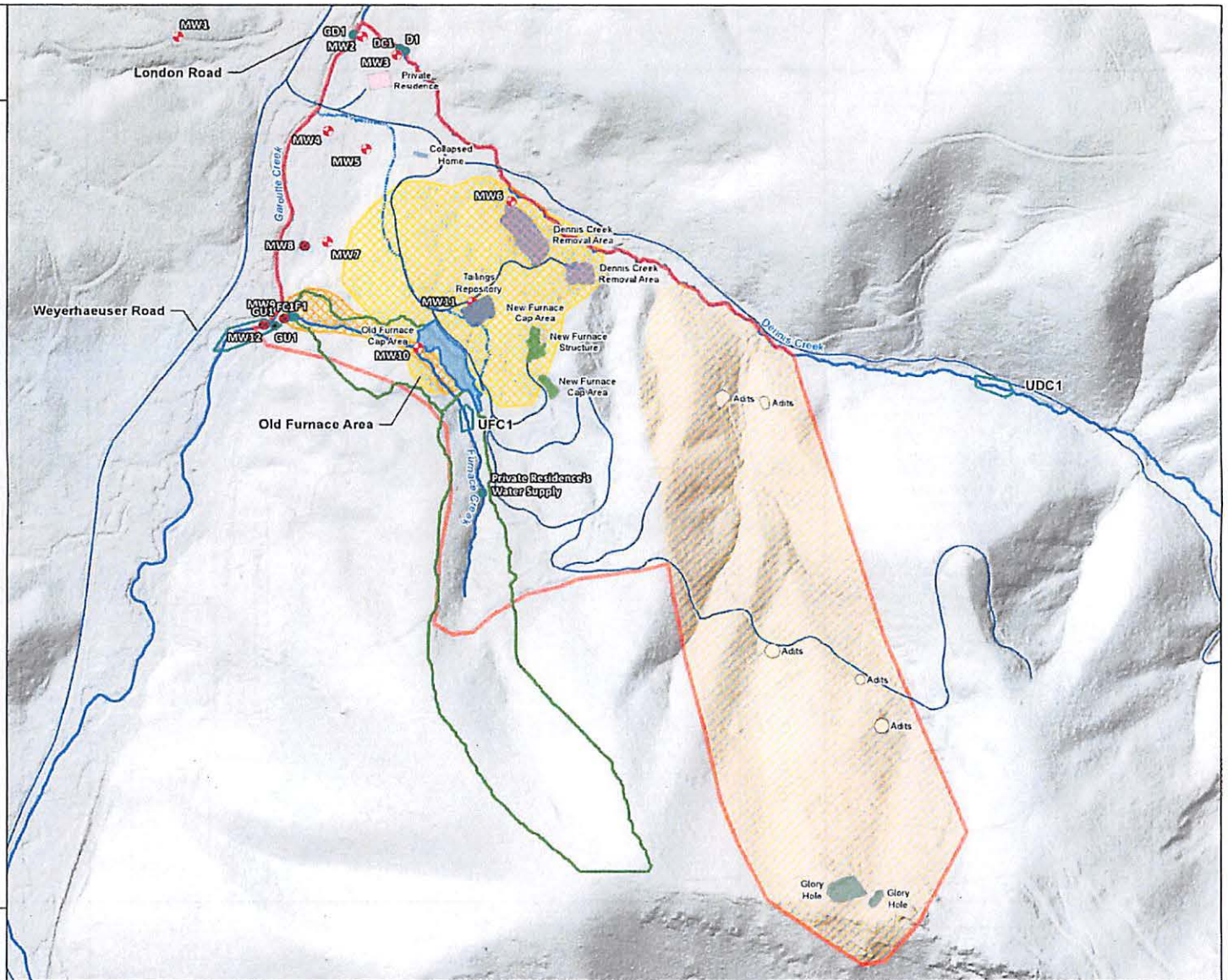
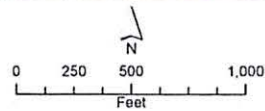


Figure 3
Furnace Creek Removal
Action Boundary

Legend

- △ EPA Monitoring Well
Soil Sample Locations
(2013/2014 Data)
- EPA Soil Sample
Locations (Feb 2014
Event)
- DEQ Soil Sample
Locations (2003)
- Soil Concentrations
for All Samples
Mercury (mg/kg)
 - ≤ 10
 - >10 - 50
 - >50 - 100
 - >100 - 200
 - >200
- Creek/Stream/
Drainage
- Intermittent Creek/
Stream/Drainage
- Location of Old
Furnace Area
Capped During the
2007 Removal
Action
- Proposed Furnace
Creek Removal
Action Boundary
- OU1 Boundary
- Main Tailings Pile
- Furnace Creek
Tailings Area
- Furnace Creek
Catchment Boundary

Note: 2003 DEQ soil sample locations within the footprint of the 2007 removal action capping are no longer exposed at the surface. Furnace Creek removal action and Furnace Creek catchment has overlapping boundaries.

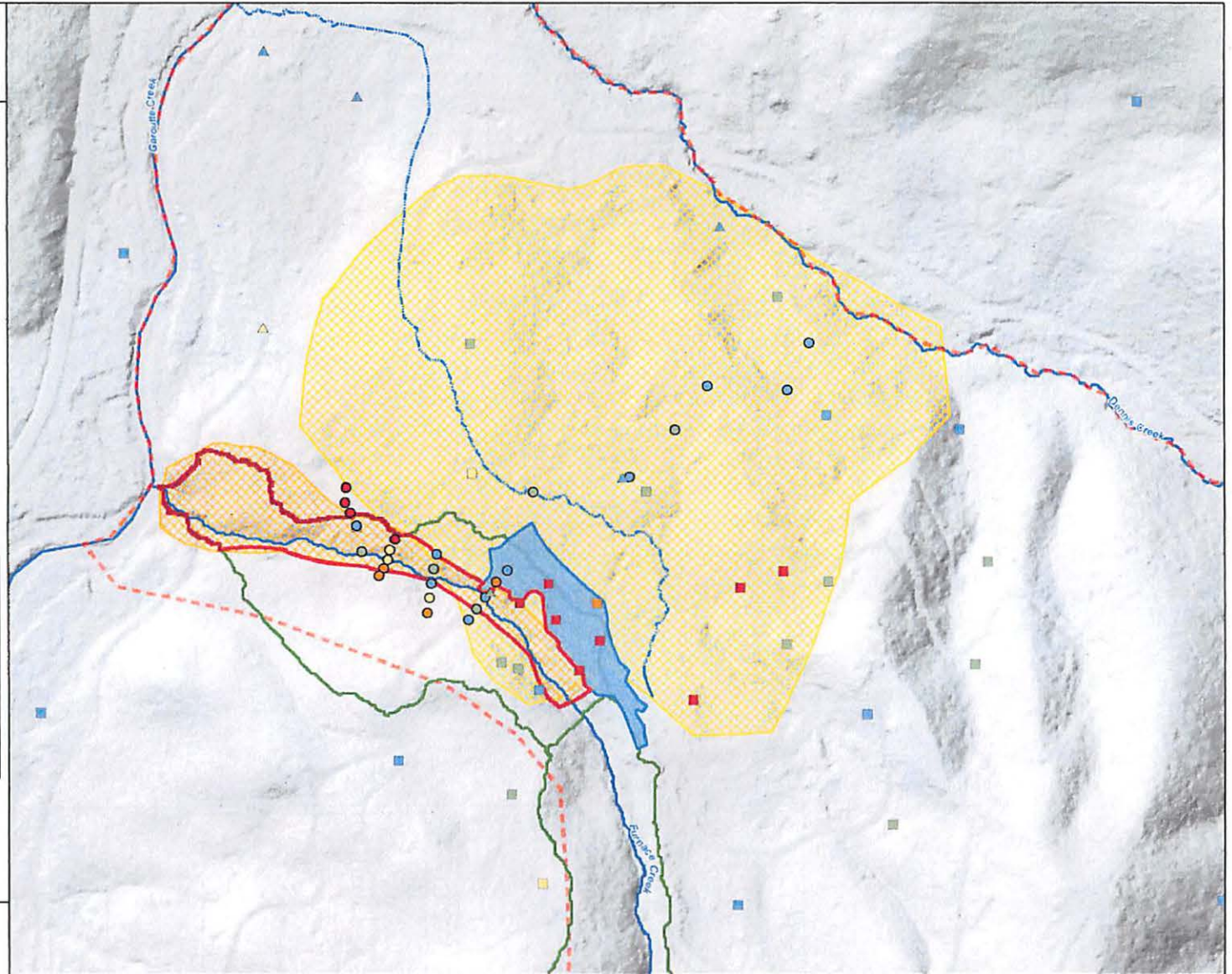
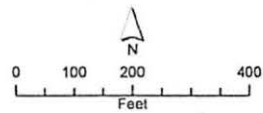


Figure 4

**Black Butte Mine
Operable Unit 1
Soils Sampling Location Map
Mercury Concentrations**

Legend

- ▲ EPA Monitoring Well
- EPA Soil Sample Locations (2012/2014 Data)
- EPA Soil Sample Locations (Feb 2014 Event)
- DEQ Soil Sample Locations (2003)
- Soil Concentrations for All Samples
- Mercury (mg/kg)
 - ≤ 10
 - >10 - 50
 - >50 - 100
 - >100 - 200
 - >200
- Creek/Stream/Drainage
- Intermittent Creek/Stream/Drainage
- CU1 Boundary
- Main Tailings Pile
- Furnace Creek Tailings Area
- Approximate Extent of Old Furnace Area Capped During the 2007 Removal Action
- Historic Ore Processing/Wastewater Handling Area

Note: 2003 DEQ soil sample locations within the footprint of the 2007 removal action capping are no longer exposed at the surface.

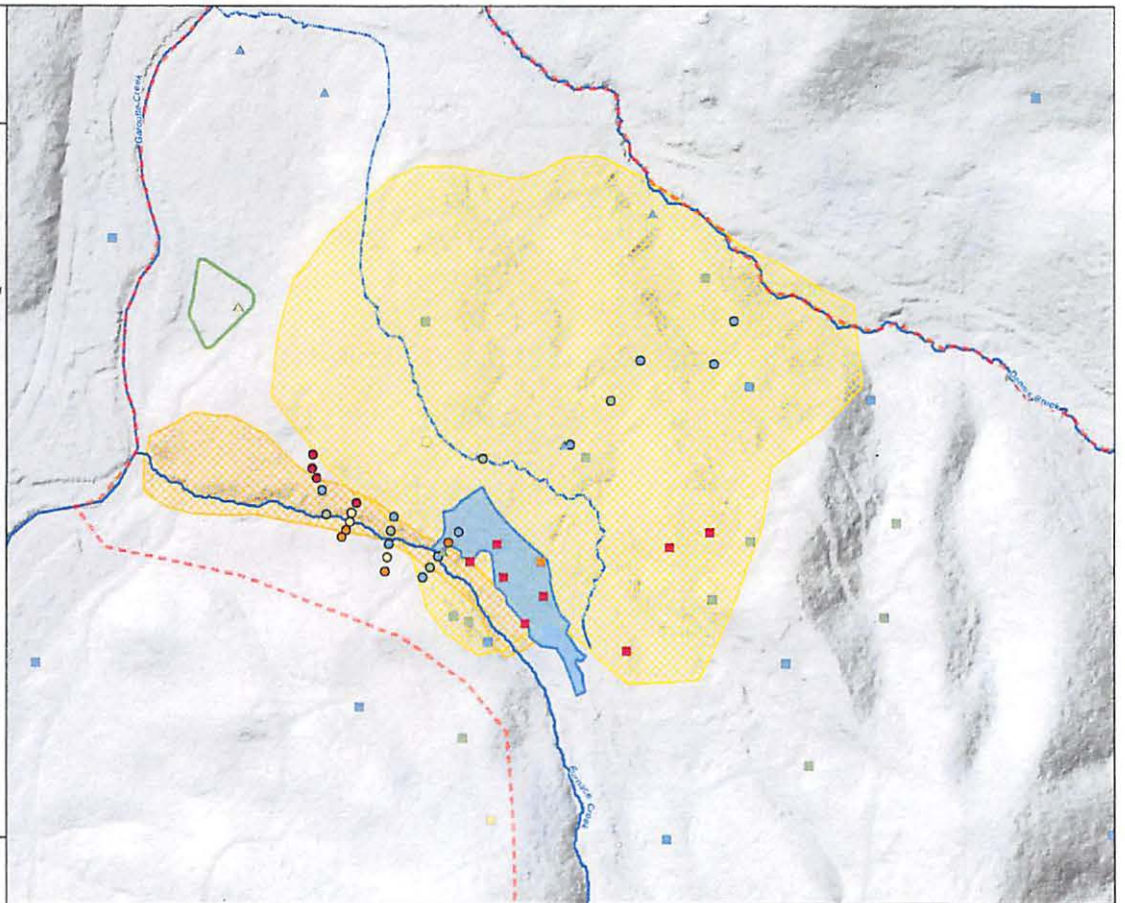
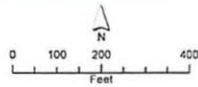


Figure 5
Proposed Action:
Excavation and Onsite Disposal of
Mercury Source Material with Reclamation/
Rehabilitation of Excavated Surfaces

Legend

-  Creek/Stream/Drainage
-  Proposed Furnace Creek Removal Action Boundary
-  OUI Boundary
-  Furnace Creek Catchment Boundary
-  Existing Tailings Repository
-  Extent of Removal
-  Extent of Onsite Disposal Repository

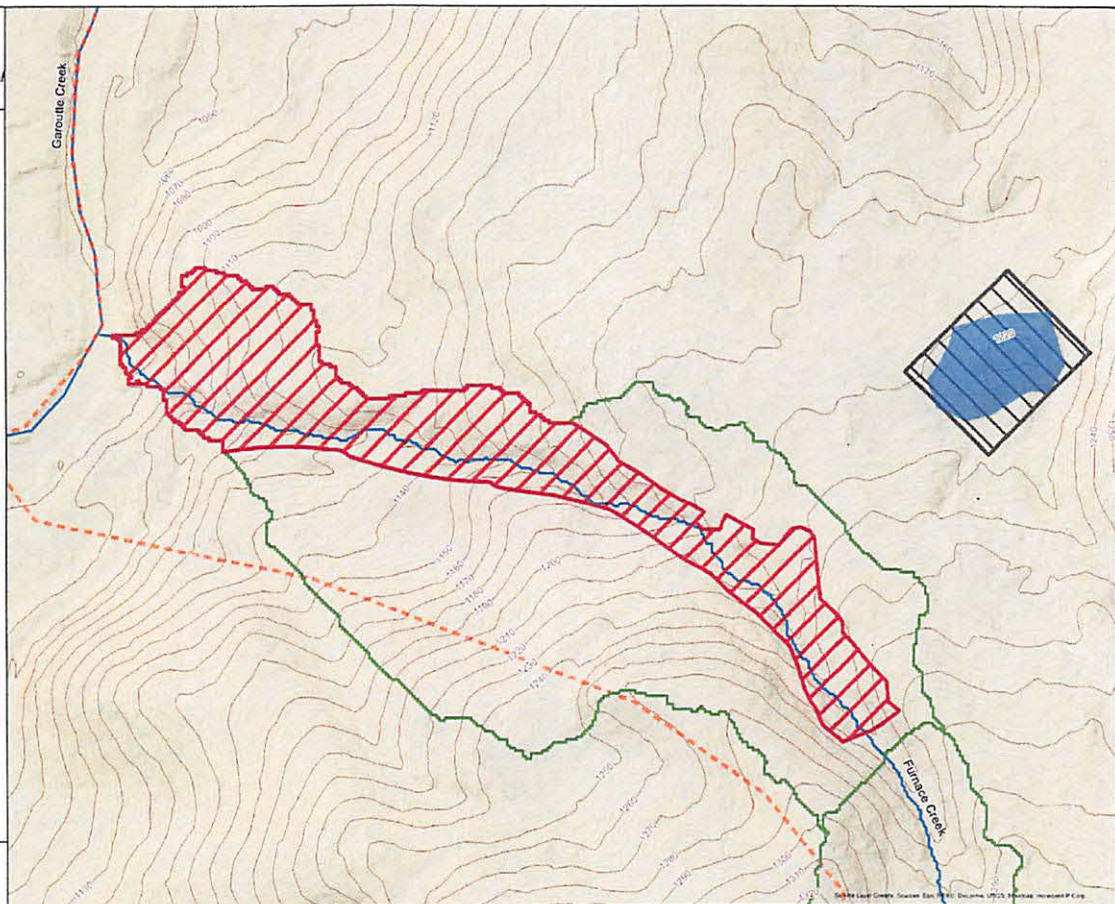
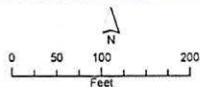


Figure 6
Proposed Action:
Excavation and Onsite Disposal of
Mercury Source Material with Reclamation/
Rehabilitation of Excavated Surfaces

Legend

-  Creek/Stream/ Drainage
-  Proposed Furnace Creek Removal Action Boundary
-  OU1 Boundary
-  Furnace Creek Catchment Boundary
-  Creek Corridor Rehabilitation
-  Upland Area Reclamation
-  Extent of New Repository Cover

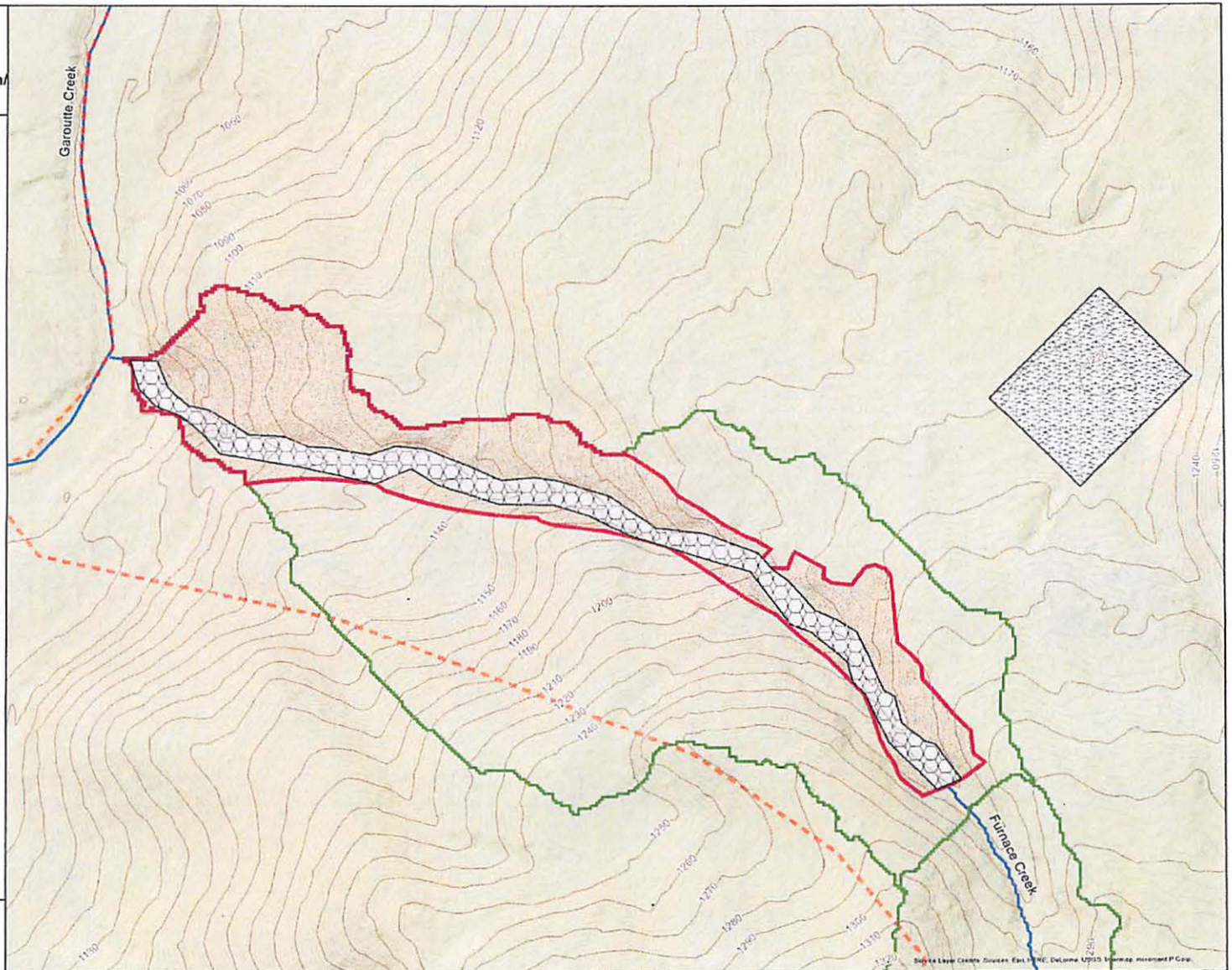
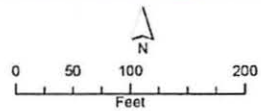






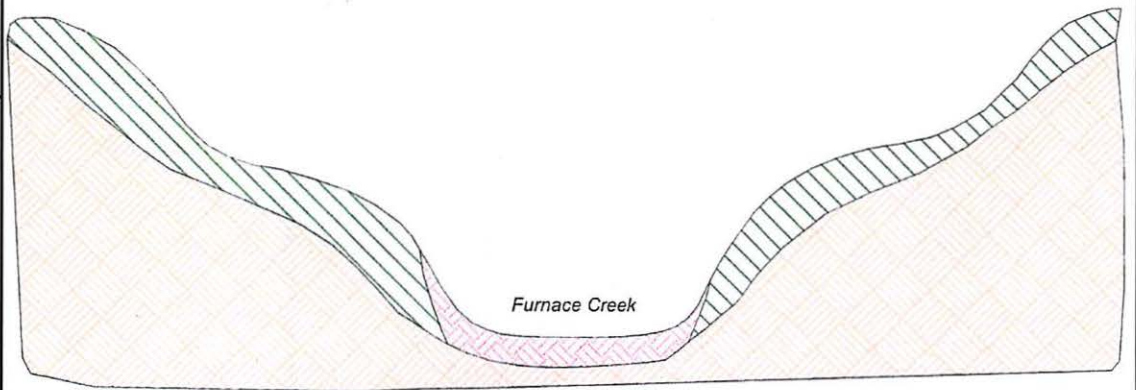


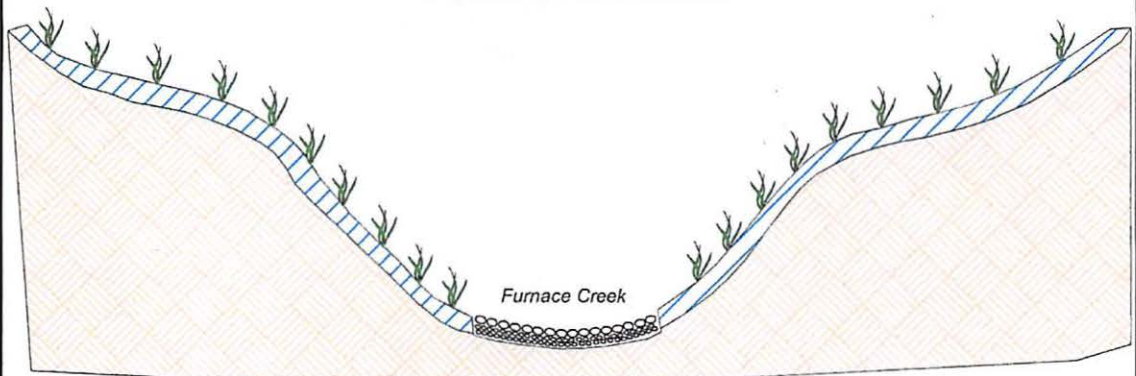
Figure 7
Excavation and
Reclamation/Rehabilitation
Concept for Proposed Action

Legend

-  Tailings/Contaminated Sediment
-  Tailings/Contaminated Soil
-  Upland Area Reclamation and Creek Bank Rehabilitation
-  Underlying Native Material
-  Vegetation
-  Creek Bed Rehabilitation



Excavation of Tailings/Contaminated Soil
and Tailings/Contaminated Sediment



Reclamation and Rehabilitation

NOT TO SCALE

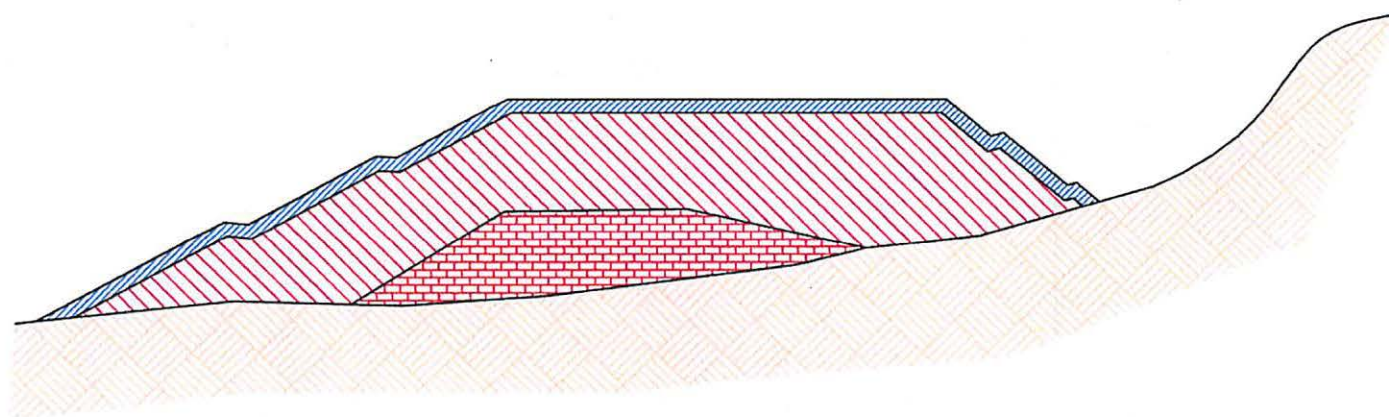


Note: The concept provided in this figure is for illustrative purposes only and does not reflect an earthwork design for a specific location or design requirements. The concept requires additional development that can be initiated during the removal design phase of the project.

Figure 8
Onsite Disposal Concept for
Proposed Action

Legend

-  Existing Tailings Repository
-  New Repository Cover
-  Placed Tailings/Soil/Sediment
-  Existing Topography



Onsite Disposal Repository

NOT TO SCALE

Note: The onsite disposal repository concept provided in this figure is for illustrative purposes only and does not reflect a repository design. The concept requires additional development that can be initiated during the removal design phase of the project.

Attachment B
Responsiveness Summary

Responses to Comments Proposed Non-Time-Critical Removal Action Furnace Creek Area of OU1 Black Butte Mine Superfund Site

Introduction

This document responds to comments received on the proposed cleanup action for OU1 of the Black Butte Mine Superfund Site. The Engineering Evaluation and Cost Analysis was available for public comment from August 24 to September 26, 2016. A public meeting was held at the Cottage Grove Community Center to take spoken and written comments on September 14, 2016. Approximately 17 individuals participated in the public meeting. EPA received a total of six comments during the comment period from individuals and organizations.

Commenters expressed concerns relating to mercury contamination and the proposed cleanup action and made suggestions to add to or modify the proposed cleanup action. Most commenters requested clarification or asked questions on topics including methods of work, use of local resources, schedule. Each substantive comment (or a synopsis of each) is numbered and italicized below, followed by EPA's response.

Responses to Specific Comments

- 1) *Comment: Multiple commenters expressed the desire for local training and job opportunities, including the development of a program for local resourcing.*
 - a. *Commenter A: "I attended the public meeting on Wednesday, September 14, 2016 at the Cottage Grove Community Center. The EPA should follow through on the idea discussed there to encourage local businesses to bid on the work and provide training to help local workers qualify for jobs. Lane County has its share of extreme environmentalists, but I know available and capable equipment operators in Cottage Grove and Springfield and Oakridge. Douglas County was recently in the news for having the highest unemployment rate West of the Cascades. The Riddle Nickel mine found plenty of local workers until it was forced to close for the depressed price of product. Coos County was poised to mount a local workforce to haul 700,000 tons of ore per year until Oregon Resources Corp was also forced to close. Portland and Salem have enjoyed some prosperity. The rest of Oregon is still wanting."*
 - b. *Commenter B: "In terms of our local community needs, we have severe un and under employment in our rural community and we have a good many people with equipment operator skills, mechanic skills, the kind of skill sets that you would need in moving those tailings into a safe repository. So, I would like to see us develop a program to do something about local employment rather than importing people, even though I understand that there may have to be some as far as supervisors and quality control and that. We have people here who need the work now."*
 - c. *Commenter C: "I'd also like training and local jobs to be in this area."*

EPA Response: EPA will encourage use of local materials and labor to the extent allowed through the Federal Acquisition Regulations; however, given the limited duration of the planned removal action, it may not be practicable to use the Superfund Job Training Initiative to train local workers to execute the work for this phase of the project.

2) *Comment: Multiple commenters asked about potential site uses after remediation has been implemented, and expressed the desire to use the land for recreational, educational, and/or other purposes.*

- a. *Commenter A: "In terms of downstream after the repository is safely capped and that, if the site is capped off so we can't use it for anything, well it's kind of like we have a big hole in our world. If there is some beneficial use, some kind of use, if it is say lightly recreation or something. Give some consideration to that, because we are going to have to maintain that site forever. That is a long time! What can we do with it? Right now we just have a big scar on the landscape."*
- b. *Commenter B: "We can make it just like Elkton, [which] has the reputation now as a wonderful place for the Monarch butterflies. They have an education center and talk about the milkweed plants."*
- c. *Commenter C: Reiterated support for Commenter B's suggestion.*

EPA Response: The land is currently privately owned timber land and it is expected that the land use will remain similar after the remediation is complete. After the cleanup action, the land may be used for many purposes, but some land use controls may be required to protect the integrity of the remedy including restricting access to engineered structures and controls such as the on-site repository, covers/caps and other vulnerable elements in the project area. Under Superfund law, EPA's goal is to reduce risks to human health and the environment from exposure to hazardous substances identified as contaminants of concern to target ranges defined in the law and EPA guidance documents. The land is privately owned and EPA does not have the authority to make site improvements specific to recreational or educational uses such as building structures, paths, roads or sites for education, camping or other recreational uses.

3) *Comment: "One of my concerns is keeping the residents safe during the work with the dust; keeping the water source for the home located with the site protected during any work and beyond. I'm concerned about the level of wood product in your capping soil, it's a big difference. I'm concerned about the amount of the capping soils, six inches to a foot is nothing. The wind up there gets high and it's so steep."*

EPA Response: Protection of human and environmental health and safety is the primary focus for EPA both during and after the removal action. Dust control, protection of drinking water, and cover design will all be further developed and addressed in the removal action design.

4) *Comment: Multiple people commented on the types of beneficial vegetation that could be used for site restoration.*

- a. *Commenter A: "I would like the plant selection to be more pollenating plants and ODOT uses a lot of plants that transform things biologically that might be very beneficial."*
- b. *Commenter B: "I think it's a brilliant idea to have a lot of pollenating plants [such as milk weed] for insects and ones that will not only feed the bee population, but also the*

butterflies. I know there is a big drive now to have places for the Monarch butterflies by having milkweed plants available so that the migrating monarchs can have a place to stop at on their trip to Mexico and back again. We can make it just like Elkton has the reputation now as a wonderful place for the Monarch butterflies. They have an education center and talk about the milkweed plants. We too could have something like that for the pollinating insects and maybe the wildflowers, etcetera that are native here. They will be important as climate change happens. This area might become warmer; we might think ahead about what we will be planting."

EPA Response: During removal action design, EPA will develop specifications for revegetation of the project area, including appropriate seed mix and application rates. EPA will consider several factors in developing revegetation specifications, including ability to control erosion in the short term, and consistency with post-removal land uses. EPA will include a preference for native plants, and consider ecosystem function during development of the revegetation specifications. However, the overriding objective is to reduce risk to human health and the environment, so alternate approaches may be required.

- 5) *Comment: "I have major concerns about the safety of the black butte superfund site! In this day and age we must be stewards of the watershed and surrounding lands! This project is needed to protect the biology of the bioregion, the land values in the vicinity, as well as the cultural landscape of the area. We need to show our children as a community we care about their futures and the feasibility of a quality life in this bioregion. If we really love this land we abide in it must be sustained for future generations of people and wildlife! It's a disgrace to the natural beauty of the area to have that federally recognized site spew toxic heavy metals unchecked into our waters!!!! Please take care of it now, before it irreversibly impacts life there."*

EPA Response: EPA recognizes your concerns and support for the project. Implementing this work as a removal action allows EPA to expedite this portion of the cleanup while continuing to collect data to support future site-wide remedial decisions.

- 6) *Comment: The EPA should consider using Molecular Bonding System ® (MBS) technology to stabilize metals in excavated soil. The commenter provided a related treatability study report and presentation on the technology, and estimates that cost for stabilizing and disposing of 5,800 CY would be "significantly" less than \$1,000,000 to leave budget for capping and site restoration.*

EPA Response: Thank you for your product information. EPA and its contractors will consider specific products and technologies during the removal action design.

Attachment C

Applicable or Relevant and Appropriate Requirements (ARARs)

**Summary of Potential Federal Applicable or Relevant
and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)
Furnace Creek Removal Action, Black Butte Mine Superfund Site (OU1)**

Statutes, Regulations, Standards, or Requirements ^a	Citations or References ^a	ARAR Determination	Description	Comment	Chemical Specific	Location Specific	Action Specific
Federal ARARs and TBCs							
National Historic Preservation Act (NHPA)	16 United States Code (U.S.C.) 470	Applicable	This statute and implementing regulations require federal agencies to take into account the effect of this response action upon any district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places (generally, 50 years old or older). Federal agencies required to take into account their undertakings on historic properties and afford the Advisory Council on Historic Preservation or its designees a reasonable time to comment.	A cultural resources survey was performed in 2006. The geographic scope of this survey will be evaluated. If necessary, the survey will be updated or supplemented prior to construction.			
National Register of Historic Places	36 Code of Federal Regulations (CFR) 60			If cultural resources on or eligible for the national register are present, it will be necessary to determine if there will be an adverse effect and, if so, how the effect may be minimized or mitigated, in consultation with the appropriate State Historic Preservation Office.		✓	
Determinations of eligibility for inclusion in the National Register of Historic Places	36 CFR 63,			It is not anticipated that cultural resources eligible for the National Register of Historic Places would be found within the removal action area for Furnace Creek.			
Protection of historic properties	36 CFR 800						
Requirements for environmental information documents and third-party agreements for EPA actions subject to NEPA	40 CFR 6.301(b)						
Archaeological and Historic Preservation Act	16 U.S.C. 469	Potentially Applicable	This statute and implementing regulations establish requirements for the evaluation and preservation of historical and archaeological data, which may be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program. The unauthorized removal of archaeological resources from public or Indian lands is prohibited without a permit and any archaeological investigations at a site must be conducted by a professional archaeologist.	The unauthorized removal of archaeological resources from public or Indian lands is prohibited without a permit and any archaeological investigations at a site must be conducted by a professional archaeologist.			
Requirements for environmental information documents and third-party agreements for EPA actions subject to NEPA	40 CFR 6.301(c)					✓	
Protection of archaeological resources	43 CFR 7						

**Summary of Potential Federal Applicable or Relevant
and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)
Furnace Creek Removal Action, Black Butte Mine Superfund Site (OU1)**

Statutes, Regulations, Standards, or Requirements *	Citations or References *	ARAR Determination	Description	Comment	Chemical Specific	Location Specific	Action Specific
Federal ARARs and TBCs							
Clean Water Act, Section 301 Ore Mining and Dressing Point Source Category-Subpart D- Mercury Ore Subcategory	33 USC § 1311; 40 CFR § 440.40-440.45	Potentially Relevant and Appropriate	Sets standards for discharge of treated effluent waters of the U.S. Provides effluent limitations criteria for mines and mills producing mercury.	The substantive provisions under this Section are relevant and appropriate to this removal action. CWA section 301(b) requires that, at a minimum, all direct discharges meet technology-based limits. Dewatering performed during removal actions may involve incidental and direct discharges of mercury and TSS to Furnace Creek or other surface water bodies. Sediment filtration systems or Geotubes® could be used to filter out sediment during dewatering operations or operation of stormwater detention basins.			✓
Clean Water Act, Section 402 National Pollutant Discharge Elimination System (NPDES)	40 CFR 122.26	Potentially Applicable	Provides comprehensive framework for addressing processing water and stormwater discharges. Requires that point-source discharges not cause the exceedance of surface water quality standards outside the mixing zone. Specifies requirements under 40 CFR 122.26 for point-source discharge of stormwater from construction sites to surface water and provides for Best Management Practices such as erosion control for removal and management of sediment to prevent run-on and runoff.	Dewatering performed during removal actions and may involve direct discharges of mercury and TSS to Furnace Creek or other surface water bodies. An on-site discharge from a CERCLA Site to surface waters must meet the substantive NPDES requirements, but need not obtain an NPDES permit nor comply with the administrative requirements of the permitting process, consistent with CERCLA Section 121(e)(1).			✓

**Summary of Potential Federal Applicable or Relevant
and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)
Furnace Creek Removal Action, Black Butte Mine Superfund Site (OU1)**

Statutes, Regulations, Standards, or Requirements ^a	Citations or References ^a	ARAR Determination	Description	Comment	Chemical Specific	Location Specific	Action Specific
Federal ARARs and TBCs							
Endangered Species Act (ESA)	16 USC § 1531	Potentially Applicable	This statute and implementing regulations provide that federal activities not jeopardize the continued existence of any threatened or endangered species. ESA Section 7 requires consultation with the United States Fish and Wildlife Service (USFWS) to identify the possible presence of protected species and mitigate potential impacts on such species.	If threatened or endangered species are identified within the removal areas, activities must be designed to conserve the species and their habitat. There is a potential for one or more threatened or endangered species to be found within the site; however to date no threatened or endangered species have been identified at OU1.			
Endangered and threatened wildlife and plants	50 CFR 17					✓	
Interagency cooperation-Endangered Species Act of 1973, as amended	50 CFR 402						
Fish and Wildlife Coordination Act	16 USC § 661 et seq.,	Potentially Applicable	This statute and implementing regulations require coordination with federal and state agencies for federally funded projects to ensure that any modification of any stream or other water body affected by any action authorized or funded by the federal agency provides for adequate protection of fish and wildlife resources.	The removal action involves activities that affect wildlife and/or non-game fish, federal agencies must first consult with the USFWS and the relevant state agency with jurisdiction over wildlife resources. The removal action for Furnace Creek would involve a Federally-funded modification of a stream.			
Rules implementing the Fish and Wildlife Conservation Act of 1980	50 CFR 83					✓	✓
Migratory Bird Treaty Act	16 USC § 703, et seq.	Applicable	Makes it unlawful to "hunt, take, capture, kill," or take other various actions adversely affected a broad range of migratory birds, without the prior approval of the Department of the Interior.	There is a potential for migratory birds (i.e. ducks) to be present within the site. The removal action would be carried out in a manner to avoid adversely affecting migratory bird species, including individual birds or their nests			
List of Migratory Birds	50 CFR 10.13					✓	
Executive Order (EO) 11990 - Protection of Wetlands	40 CFR Part 6, Appendix A	Potentially Relevant and Appropriate	40 CFR Part 6, Appendix A contains EPA's regulations for implementing these EOs, which require Federal agencies, wherever possible, to avoid or minimize adverse impacts upon wetlands and floodplains (actions including dredge-and-fill activities).	A portion of Furnace Creek is identified as within the special flood hazard area (Zone A) which indicates floodplain. It is not anticipated that wetlands exist but a wetland delineation study has not been performed. The removal action will be evaluated in light of these requirements and modified, if necessary, to avoid or minimize adverse impacts.			
11988 - Floodplain Management		Potentially Applicable				✓	✓

**Summary of Potential Federal Applicable or Relevant
and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)
Furnace Creek Removal Action, Black Butte Mine Superfund Site (OU1)**

Statutes, Regulations, Standards, or Requirements ^a	Citations or References ^a	ARAR Determination	Description	Comment	Chemical Specific	Location Specific	Action Specific
Federal ARARs and TBCs							
Clean Water Act, Section 404	33 USC § 1251 et seq., 40 CFR 230 and 231	Potentially Relevant and Appropriate	Provides requirements to restore and maintain the chemical, physical, and biological integrity of waters of the United States through the control of discharges of dredged or fill material.	The reconstruction of the creek bank and bed rehabilitation involve discharges of fill material to waters of the U.S. (i.e. Furnace Creek). The substantive provisions under this Section and NWP 38 (Cleanup of Hazardous and Toxic Waste) are applicable to this removal action. Activities undertaken entirely on a CERCLA site by authority of CERCLA as approved or required by EPA, are not required to obtain permits under Section 404 of the CWA or Section 10 of the Rivers and Harbors Act.			✓
Resource Conservation and Recovery Act (RCRA), Subtitle C Exemption for Extraction, Beneficiation and Processing Mining Waste	40 CFR 261.4(b)(7)	Potentially Applicable	EPA exempts mining wastes from the extraction, beneficiation, and some processing of ores and minerals, in accordance with the Bevill amendment to RCRA.	Mercury source material such as tailings and co-mingled contaminated soils/sediment that were not processed through the furnace may meet this exemption. Mercury source material identified as exempt would be addressed as nonhazardous solid waste rather than RCRA hazardous waste. However no delineation/determination of mercury source material that may qualify for this exemption has occurred within the Furnace Creek catchment area.		✓	✓
RCRA, Subtitle C Hazardous Waste Characteristics	40 CFR 261.20	Potentially Applicable	Generators of solid waste must determine whether the waste is hazardous. A solid waste is hazardous if it exhibits the toxicity characteristic (based on extraction procedure Method 1311).	Applicable to solid waste generated during removal action.	✓		

**Summary of Potential Federal Applicable or Relevant
and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)
Furnace Creek Removal Action, Black Butte Mine Superfund Site (OU1)**

Statutes, Regulations, Standards, or Requirements ^a	Citations or References ^a	ARAR Determination	Description	Comment	Chemical Specific	Location Specific	Action Specific
Federal ARARs and TBCs							
RCRA, Subtitle C Hazardous Waste Treatment, Storage, and Disposal Facility	42 USC §6901, et seq 40 CFR 264, Subparts B and N	Potentially Relevant and Appropriate	Provides requirements for the generation, transportation, storage, and disposal of hazardous waste, including design and operating standards for hazardous waste treatment, storage, and disposal units. Specifically Subpart B is pertinent to general facility standards such as location standards and Subpart N is pertinent to landfills such as design requirements.	Involves onsite disposal of mercury source material in an onsite disposal repository. Even though this material could be characterized as RCRA hazardous waste, it would not be placed/disposed for purposes of the RCRA regulations since the materials would be managed within an area of contamination and within the same land-disposal unit. Thus the onsite disposal repository would only need to comply with substantive relevant and appropriate requirements identified from Subparts B and N.			✓
Clean Air Act (CAA) National Primary and Secondary Ambient Air Quality Standards	42 USC §7401, et seq. 40 CFR § 50.4–50.12	Potentially Applicable	National Ambient air quality standards (NAAQS) may be applicable, specifically particle pollution.	The alternatives may involve air emissions related to dust generated during excavation of mercury source material or fill placement activities. The selected removal actions will be carried out in a manner that will comply with NAAQS. The CAA establishes the National Ambient Air Quality Standards (NAAQS) in 40 CFR § 50.4–50.12. NAAQS are not enforceable in and of themselves; they are translated into source-specific emissions limitations by the state (U.S. EPA 1990). Substantive requirements of the (OAR 340, et. seq.) rules that have been approved by U.S. EPA, as part of the SIP under the CAA are potential federal ARARs for air emissions (CAA Section 110).	✓	✓	✓

**Summary of Potential State Applicable or Relevant
and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)
Furnace Creek Removal Action, Black Butte Mine Superfund Site (OU1)**

Statutes, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical Specific	Location Specific	Action Specific
State of Oregon ARARs and TBCs							
Indian Graves and Protected Objects	Oregon Revised Statutes (ORS) 97.740-97.750 Protection of Indian Graves	Potentially Applicable	Governs Oregon Historical Preservation. Analogous to Federal Historic Preservation Act (36 CFR; Parts 60 and 61), and National Historic Preservation Act (NHPA) and Archeological and Historic Preservation Act.	If cultural resources on or eligible for the national register are present, it will be necessary to determine if there will be an adverse effect and, if so, how the effect may be minimized or mitigated, in consultation with the appropriate State Historic Preservation Office.			
Historic Property	ORS 358.475 Policy Special Assessment of Historic Property			It is not anticipated that cultural resources eligible for the National Register of Historic Places would be found within the removal action area for Furnace Creek.			
Historic Preservation Plan	ORS 358.612 Authorities of State Historic Preservation Officer ORS 358.622 (State Advisory Committee on Historic Preservation)			The unauthorized removal of archaeological resources from public or Indian lands is prohibited without a permit and any archaeological investigations at a site must be conducted by a professional archaeologist		✓	✓
Preservation of Property of Historic Significance	ORS 358.635 (Preservation of state-owned historic property)			The Oregon statutes may not be more stringent than the Federal requirements of the NHPA and Archeological and Historic Preservation Act.			
Oregon Property Management Program for Historic Sites and Properties	ORS 358.680-690 (Oregon Property Management Program)						
Archaeological Objects And Sites	ORS 358.905 (General Archaeology)						
Archaeological Sites and Historical Material	ORS 390.235 (Issuance of Archeological Permits)						

**Summary of Potential State Applicable or Relevant
and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)
Furnace Creek Removal Action, Black Butte Mine Superfund Site (OU1)**

Statutes, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical Specific	Location Specific	Action Specific
State of Oregon ARARs and TBCs							
Oregon Threatened or Endangered Wildlife Species	ORS 496.171-192	Potentially Applicable	Sets forth standards for the State Fish and Wildlife Commission to list species as threatened or endangered; authorizes the Commission to enact regulations necessary to ensure survival of listed species, such as protecting habitat; expressly provides that this regulation does not, by itself, require an owner of private land to take action to protect an endangered or threatened species.	If threatened or endangered species are identified within the removal areas, activities must be designed to conserve the species and their habitat. There is a potential for one or more threatened or endangered species to be found within the site; however to date no threatened or endangered species have been identified at OU1. The statute does not contain substantive requirements and is not more stringent than the Federal ESA. The listed species might be different from the federal ESA. Both lists will be checked.		✓	
General Emission Standards and Air Quality ^b	ORS 468A OAR 340-226-0100 Policy and application	Potentially Relevant and Appropriate	Provides general emission standards for fugitive emissions of air contaminants and requires highest and best practicable treatment or control of such emissions. EPA has established national ambient air quality standards (NAAQS) for several pollutants. NAAQS may be applicable for conditions at a site that results in emissions to air of criteria pollutants. If a remedial activity may exceed regulatory criteria, the activity may be subject to preconstruction review in designated attainment areas. The source may qualify for emission exemption under OAR 340-020-0245. Under ORS 465.315, DEQ has statutory authority to waive preconstruction permit, if required.	The removal action may involve air emissions related to dust generated during excavation of mercury source material or fill placement activities. The Black Butte Mine site, in Lane County, is not within a designated non-attainment or air quality maintenance area. Therefore, emission criteria and rules for Special Control Areas (defined in OAR-340-204) are not applicable. OAR 340-226-0100 are potential relevant and appropriate requirements for remedial alternatives being considered because the U.S. EPA delegated them into the State Implementation Plan (SIP) per the Clean Air Act (CAA), 42 USC §7401-7671.	✓	✓	✓

**Summary of Potential State Applicable or Relevant
and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)
Furnace Creek Removal Action, Black Butte Mine Superfund Site (OU1)**

Statutes, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical Specific	Location Specific	Action Specific
State of Oregon ARARs and TBCs							
Visible Emissions and Nuisance Requirements	OAR 340-208-0210 - Fugitive Emission Requirements	Potentially Applicable	Prohibits any handling, transporting, or storage of materials, or use of a road, or any equipment to be operated, without taking reasonable precautions to prevent particulate matter from becoming airborne. These rules include areas other than "special control areas" where fugitive emissions may cause a nuisance and control measures are practicable.	The removal action may involve air emissions related to dust generated during excavation of mercury source material or fill placement activities. Potentially applicable parts pertain to areas and sources outside Special Control Areas defined in OAR-340-204. Substantive provisions of OAR 340-208-0210 are potentially applicable state requirements because they are not included in the SIP.			✓
Noise Control Regulations	OAR 340-035-0035	Potentially Relevant and Appropriate	Sets noise standards for equipment, facilities, operations or activities including the production, storage, handling, sale, purchase, exchange, or maintenance of a product, commodity, or service, including the storage or disposal of waste products.	Potentially relevant and appropriate to removal action activities related to excavation of mercury source material or fill placement activities since they may be similar to the commercial operations indicated in the regulation.			✓
Oregon Hazardous Waste Management Act	ORS 466.005 – 466.225 Hazardous Waste Management Rules; OAR 340-100 <i>et. seq.</i>	Potentially Relevant and Appropriate	Establish a regulatory structure for the generation, transportation, treatment, storage, and disposal of hazardous wastes. OAR Chapter 340, Divisions 100 to 106, 109, 111, 113, 120, 124 and 142 incorporate, by reference, hazardous waste management regulations of the federal program, included in 40 CFR Parts 260 to 266, 268, 270, 273 and Subpart A and Subpart B of Part 124, into Oregon Administrative Rules.	Mercury source material identified as exempt would be addressed as nonhazardous solid waste rather than RCRA hazardous waste. However no delineation/determination of mercury source material that may qualify for this exemption has occurred within the Furnace Creek catchment area. The removal action involves onsite disposal of mercury source material in an onsite disposal repository. Even though this material could be characterized as RCRA hazardous waste, it would not be placement/disposal for purposes of the RCRA regulations since the materials would be managed within an area of contamination and within the same land-disposal unit. Thus the onsite disposal repository would only need to comply	✓		✓

**Summary of Potential State Applicable or Relevant
and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)
Furnace Creek Removal Action, Black Butte Mine Superfund Site (OU1)**

Statutes, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical Specific	Location Specific	Action Specific
State of Oregon ARARs and TBCs							
				with substantive relevant and appropriate requirements identified from Subparts B and N. Substantive requirements may be relevant and appropriate to removal actions that generate listed or characteristic hazardous wastes including environmental media such as mercury source material.			
Solid Waste Management Solid Waste: General Provisions	ORS 459.005 – 459.418 OAR 340-093 - 097	Potentially Relevant and Appropriate	Regulations under this statute establish a regulatory structure for the collection, transportation, treatment, storage, and disposal of solid wastes.	Potentially relevant and appropriate to the on-site management and disposal of Mercury source material that does not contain RCRA hazardous waste.			✓
Water Quality Standards, Division 41	OAR 340-041-0004, -0007, -0032, -0033, and -0036	Potentially Applicable	It set forth Oregon's plans for management of the quality of public waters within the State of Oregon.	Potentially applicable to manage water quality by evaluating discharges and activities during removal action. These are similar to Section 404 requirements of the CWA.	✓		
Administrative Rules Governing the Issuance and Enforcement of Removal-Fill Authorizations within Waters of Oregon Including Wetlands Division 85	OAR 141-085 ORS 196.795-990	Potentially Relevant and Appropriate	The rule regulates removal or fill of material in any waters of the state. Oregon's Removal-Fill Law (ORS 196.795-990) requires people who plan to remove or fill material in waters of the state to obtain a permit from the Department of State Lands.	The removal and rehabilitation within creek bank and bed (RA3) involve removal and discharges of fill material within waters of Oregon (i.e. Furnace Creek). The substantive provisions under this Section will be met. Activities undertaken entirely on a CERCLA site by authority of CERCLA as approved or required by EPA, are not required to obtain permits.			✓

**Summary of Potential State Applicable or Relevant
and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)
Furnace Creek Removal Action, Black Butte Mine Superfund Site (OU1)**

Statutes, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical Specific	Location Specific	Action Specific
State of Oregon ARARs and TBCs							
Hazardous Substance Remedial Action Rules Division 122	OAR 340-122-0115	Potentially ARAR	Standards for degree of cleanup required. Establishes acceptable risk levels for human health at 1E-06 for individual carcinogens, 1E-05 for multiple carcinogens; and Hazard Index of less than or equal to 1.0 for noncarcinogens. Identifies selection of remedial action by balancing factors: effectiveness, implementability, long term reliability, short term implementation risk, and cost reasonableness. Allows waiver of state and local permits so long as substantive requirements are met.	This ARAR was not evaluated in the EE/CA because the substantive requirements are not practicable to be addressed as part of this action due to lack of comprehensive baseline risk assessments to demonstrate pre- and post-removal compliance with risk levels or lack of any media-specific remediation goals. The EE/CA also lacks definitive site-specific background for mercury in the affected media. Thus, it is highly unlikely to be an ARAR at this stage of the project (NTCRA) but, this rule will be included as an ARAR for the final site actions at OU1.	✓		✓

* Statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader. Listing the statutes and policies does not indicate acceptance of the entire statutes or policies as potential ARARs; specific potential ARARs are addressed in the table below each general heading. Only substantive requirements of the specific citations are considered potential ARARs.

^b The preamble to the NCP indicates that state regulations that are components of a federally authorized or delegated state program are generally considered federal requirements and potential federal ARARs for the purposes of ARARs analysis (55 Fed. Reg. 8666, 8742 [1990]). The Oregon DEQ received final authorization for the regulation of hazardous wastes on 15 August 1995 (Federal Register Volume 60, Number 116 (Friday, June 16, 1995) and established rules in OAR 340-100 et. seq. For the Clean Air Act, EPA approved Oregon's State Implementation Plan and the air statutes were promulgated as ORS 468 and 468A.

Pre-Deployment Medical Monitoring/Health and Safety Training Requirements (09/11/2017, Version #4, Updated Final)

This guidance table was created to assist the National and Regional Incident Coordinating Team (NICT/RICT) with personnel deployment rosters for large scale natural disasters. Personnel being considered for deployment should meet these requirements prior to mobilizing. The NICT and RICT should attempt to deploy personnel who are already enrolled in the Occupational Medical Surveillance Program to field locations and/or disaster declared counties where there is a potential exposure to hazardous substances and materials or there will be routine physical demanding work. Contact your Regional Safety, Health and Environmental Program Manager (SHEMP) or Emergency Response Health and Safety Program Contact (HSPC) for additional details.

		Deployed to a Regional Office or Un-impacted Location for Non-Field Work	Deployed to an Impacted Location and/or Declared Counties for Non- Field Work	Deployed for Field Work w/ Respirator Use at a HAZWOPER/CERCLA Regulated Sites	Deployed to Field Work w/o Respirator Use at a HAZWOPER/CERCLA Regulated Sites	Deployed for Field Work w/ Respirator Use, general site work non- HAZWOPER/CERCLA Sites	Deployed for Field Work w/o Respirator Use, general site work, non- HAZWOPER/CERCLA Sites
Medical Requirements	Current Medical Clearance w/ Respirator Clearance			X		X	
	Current Medical Clearance w/o Respirator Clearance				X		X
	Pre/Post-Deployment Medical Screening		X				X*
	Hepatitis A, B**, and Current Tetanus (within 5-10 years) Vaccination or a signed Declination Form		X	X	X	X	X
Health and Safety Training Requirements	24-hour Field Safety Training w/ current 8-hour Refresher		X	X	X	X	X
	40-hour HAZWOPER Training w/ current 8-hour Refresher			X	X		
	Enrolled in a Respirator Protection Program, with Current Fit Test and Respirator Training			X		X	
	Onsite Health and Safety Orientation	X	X	X	X	X	X
Personnel must Deploy with the following Personal Protection Equipment (PPE): Additional PPE may be required			Field Boots***	Field Boots***, Hard Hat, Safety Glasses, Hi-Vis Vest, APR	Field Boots***, Hard Hat, Safety Glasses, Hi-Vis Vest	Field Boots***, Hard Hat, Safety Glasses, Hi-Vis Vest, APR	Field Boots***, Hard Hat, Safety Glasses, Hi-Vis Vest

* Personnel working in the field, but not completing cleanup, assessment, sampling work, etc. may complete the pre/post medical screening. Check with the Regional SHEMP Manager for guidance.

**Federal Occupational Health added the need for the Hepatitis B Vaccination on 9/8/17.

*** Minimum 6" Boot with Steel or Composite Safety Toe meeting ASTM F2413-05 or equivalent. Steel insole inserts are highly recommended for all field work.