

**BONANZA MINE SITE
ACTION MEMORANDUM CHECKLIST**

COORDINATION	Y/N	CONTACT INFORMATION OR COMMENT
Acct No./CERCLIS NO.	Y	
Admn Record Established	Y	
ATSDR	Y	Including OHA
Community Involvement/Press Coordination	Y	
Contracts (START & ERRS)	Y	
Dept of Agriculture (USFS)	N/A	
Dept of Commerce/National Marine Fisheries	N/A	
Dept of Interior (ESA) issues considered	Y	
Hanford Project Office coordination	N/A	
IGCE completed, if required	Y	
NPL Coordination	Y	
ORC coordination/concurrence	Y	
PRP Search initiated	Y	
PRSC	Y	ODEQ
State	Y	
State Operations Office coordination	Y	
Tribal Office	Y	ECL & OOO
Tribal (cultural & natural resources) issues considered	Y	
104(a) Activity	Y	

Original to: Records Center (Site Admn Record)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10

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OFFICE OF
ENVIRONMENTAL CLEANUP

June 4, 2014

SUBJECT: Action Memorandum and \$2 Million Exemption Request for the Bonanza Mine, Nonpareil, Douglas County, Oregon

FROM: Earl Liverman, Federal On-Scene Coordinator
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THRU: Wally Moon, Unit Manager *WBM*
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TO: Chris D. Field, Manager
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I. PURPOSE

The purpose of this Action Memorandum is to document approval of the time-critical removal action described herein and an exemption to the \$2 million statutory limit for funding of the removal action for the Bonanza Mine Site, Nonpareil, Douglas County, Oregon (Site). The Bonanza Mine is an abandoned historical mercury mine and mill that operated intermittently for approximately 100 years.

The proposed time-critical removal action 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 (CERCLA), as amended.

The scope of the removal action is limited to certain areas at the Site. The action does not include the abandoned 17-mile Red Rock Road, which is being addressed by the Oregon Department of Environmental Quality (ODEQ) as a separate site.

II. SITE CONDITIONS AND BACKGROUND

The CERCLIS ID No. is ORN001001174 and the Site ID is 10NE.

A. Site Description

1. Removal site evaluation

Substantial environmental information exists about the Site. Numerous environmental investigations beginning in the late 1990s 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.

2. Physical location

The Site is located near the small community of Nonpareil, 6 miles east of Sutherlin, Douglas, County, Oregon (Figure 1 - Site Location Map and Figure 2 - Site Vicinity Map). The Site is located in the SW ¼ of Section 16 of Township 25 South, Range 4 West, Willamette Meridian (latitude N43° 23'46", longitude W123°10'54").

Except for one former building used as a residence (i.e., Residence 4), other mine and mill buildings are no longer present, leaving only the mill concrete foundations, calcine (also referred to as tailings in some reports), and waste rock (Figure 3 – Site Layout Map). The mine had 12 adits and more than three miles of subterranean tunnels and shafts. The mine adits have been abandoned and it is likely that they are open.

Five residences are located close to the mine, including two residences within 200 feet of the former mill. Besides roads and driveways leading to the residences, the land is undeveloped. The nearest off-Site residences are located about a half mile away, to the northeast, along Banks Creek Road.

A public water system is not available to the Site. Water for the residences is diverted from a spring west of the Site into an aboveground storage tank located near the entrance to the Site property. A water well is present on the Site and is reportedly used for only agricultural purposes. Foster Creek flows northward through the southwest portion of the Site property and about 1 mile to its confluence with Calapooya Creek. A manmade impoundment has created a small, shallow pond on the Site.

The area surrounding the Site is rural, and the area has a moderate climate characterized by wet, cool winters and dry hot summers. The average annual precipitation is 40.08 inches (mostly rain) and the average annual temperature is 53.2°F.

3. Site characteristics

The Bonanza Mine has an operation history extending from the mid- 1860s through 1960. The main mercury-containing mineral is cinnabar, although metacinnabar and native mercury were also reported in the mine workings. The following is a summary of its history (HC 2000).

Early History (1860s - 1935)

The Bonanza Mine was discovered between 1865 and 1870. In 1870, a small Scott furnace was erected to process the ore. Additional development was done by the Bonanza Quicksilver Mining Co., which was organized in 1878. In 1887, 15 flasks of mercury (1 flask is equivalent to 76 pounds) were produced (this is the first and only record of production before 1937).

In 1916, the Sutherlin Quicksilver Mining, Refining, and Development Company was organized to operate the mine. At that time, they were installing a small mill and retort, and had proposed concentrating ore before retorting. By 1934, the mine had been expanded to five adits, all less than 250 feet long.

Main Production (1935 - 1960)

In 1935, the mine was acquired by H.C. Wilmot, who organized Bonanza Mines, Inc. (renamed Bonanza Oil & Mines Corp. in 1951). Assay results of ore ran from 3 to 9.3 pounds mercury per ton (the highest

mercury concentrations were 14 to 60 pounds per ton). A reduction mill was erected, and operations started in October 1937.

Ore was trammed to an ore bin, with oversize material (>1 inch) going through a roll jaw crusher. Ore was then top-fed into a 50-ton Herreshoff furnace, a vertically-oriented cylindrical furnace with five hearths. Ore was heated by two oil-burners to vaporize mercury from the ore. The calcined ore exited the furnace bottom into a hopper, then into cars which dumped the calcine on the hillside below the mill. Production in 1937 ranged from 36 to 40 tons per day. The mercury vapor was condensed in a series of inclined pipes and U-bends constructed of sheet-iron and tile. The bottom of the condenser system sat in a water-filled concrete trough. Enamel pans were submerged in the trough under each pipe to collect the mercury. When the pans were removed, the water was decanted, and the mercury was warmed to drive off residual water.

In May 1939, the main (north) ore body was discovered. Two 100-ton Gould rotary furnaces were installed, one of which was removed in 1942. These furnaces used a similar system of vaporizing mercury from the ore and condensing it. By the end of 1944, the mine had become Oregon's largest all-time producer of quicksilver. In 1940, the mill produced 5,733 flasks of mercury, the second largest production in the United States. Other than some short closures from 1949 to 1951 and in 1954, the mine operated continuously until October 1960 when minable reserves were exhausted and the mine closed. In the end, the mine had 12 adits with 17,500 feet of tunnels and shafts on 12 levels. Total recorded production was 39,540 flasks (or 3,005,040 pounds).

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

The primary contaminants of concern are mercury and arsenic. These contaminants are a hazardous substance or pollutant or contaminant as defined by sections 101(14) and 101(33) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended 42 U.S.C. § 9601(14) and (33).

The source of metals at the Site is from historic mercury mining, processing, and disposal operations. Elevated metals concentrations are present in calcine, waste rock, and soil at the former mill site, the surrounding hillside, and the valley floor. Because metals cannot degrade, they are continuously mobilized throughout the environment (e.g., erosion and wind) and from one environmental media to another (e.g., advection/dispersion, desorption/adsorption, erosion, leaching, uptake, volatilization, and uptake).

Data regarding the nature and extent of the contaminants of concern found at the Site are summarized below.

1999 – Preliminary Assessment

Ecology and Environment, Inc. (E&E) completed a Preliminary Assessment (PA) of Red Rock Road (Road) for EPA in May 1999 (E&E 1999). The PA evaluated the potential for exposure to public health and the environment from potential metals contamination associated with the Road. The Road is a former railroad grade approximately 17 miles long that was constructed of calcine from the Bonanza Mine (E&E 2008). The amount of material used in construction of the Road is estimated at 316,000 cubic yards (yd³). As a result of the PA, further investigation was recommended.

2000 - Site Inspection

E&E completed a Site Inspection (SI) of Red Rock Road and surrounding watersheds for EPA in May 2000 (E&E 2000). As part of this SI, nine surface soil samples were collected from potential source areas at the Bonanza Mine Site, including the former mill, calcine, waste rock, and an abandoned adit. Mercury concentrations in these areas ranged from 74 to 12,000 milligram per kilogram (mg/kg), arsenic concentrations ranged from 71.3 to 246 mg/kg, and lead concentrations ranged from 6.5 to 1,240 mg/kg. The total on-Site volume of calcine was estimated at 2,080 yd³ and waste rock was estimated at 400 yd³.

2000 – Removal Assessment

In September 2000, Hart Crowser, Inc. (HC) performed a Removal Assessment (RA) at the former mill site for ODEQ to gather additional data to delineate the extent of metals contamination at the Site (HC 2000). As part of this RA, 31 surface and near-surface soil samples were collected from the former mill site and surrounding hillside. Mercury concentrations ranged from 67.7 to 12,000 mg/kg, arsenic concentrations ranged from 20.3 to 314 mg/kg, and lead concentrations were generally below 70 mg/kg. Calcine, waste rock, and roadway soils also had elevated mercury and arsenic concentrations ranging up to 179 mg/kg and 246 mg/kg, respectively.

One sample each of the former mill soil and calcine were analyzed for mercury speciation. Methyl mercury was detected at 0.03765 mg/kg in soil and 0.00246 mg/kg in calcine. Sequential extraction on soil and calcine indicated that most of the mercury was sulfide-bound, primarily in the form of cinnabar or metacinnabar. Volatile mercury was detected at 2,100 and 2,360 microgram per cubic meter ($\mu\text{g}/\text{m}^3$).

Water samples were collected from the on-Site well and water storage tank. Arsenic was detected at 0.0536 milligram per liter (mg/L) in a sample collected from the on-Site well and this concentration exceeds the Federal Maximum Contaminant Level (MCL) of 0.005 mg/L for drinking water. Reportedly, well water is used only for agricultural purposes and not for drinking water. Based on the findings of the removal assessment, the first of two removal actions described in Section II.B.1 was performed by ODEQ in 2000 in certain areas to achieve prompt human health risk reduction. Water samples have been collected from the spring water storage tank and have consistently had no detections of mercury and arsenic using standard drinking water analytical methods.

2003 – Site Visit

HC returned to the Site on behalf of ODEQ in 2003 to assess whether ecological receptors and/or exposure pathways were present or potentially present at or in the Bonanza Mine Site and along Foster Creek (HC 2005). Impacts to the Site and surrounding properties attributable to contaminated environmental media were not observed during the Site visit. Physical impacts from historical mining operations included the waste rock pile, mine access roads, and mine excavation. Based on the results of the Oregon Natural Heritage Information Center data search and information from the Oregon Department of Fish and Wildlife, HC concluded that there is a possibility that rare, threatened, and endangered species may be present at or near the Site.

2005 – Post-Removal Assessment Report

HC compiled and assessed available information for the Bonanza Mine in 2005 to assist in preparation of a forthcoming Remedial Investigation (RI) Work Plan (HC 2005). This report also developed a

preliminary conceptual site model (CSM) for both human and ecological receptors at the Site and identified tasks to be performed during the RI to address data gaps. Volatile mercury was measured in soil from the former mill and calcine. No other environmental media samples were collected as part of this activity. The RI Work Plan has not yet been prepared.

2013 – Soil Assessment

In December 2013, ODEQ screened 118 soil samples using a field portable X-Ray fluorescence spectrometer (FPXRF) to gather additional data to identify those areas where soil concentrations are below a site-specific background concentration for arsenic and a residential risk-based concentration for mercury (ODEQ 2014b). Nine discrete soil samples were also collected and sent off-Site for laboratory analysis. The results of this assessment indicated that arsenic and mercury contamination is more widespread in the northern portion of the property than previously anticipated. The results also showed that arsenic and mercury contamination extends into the southern portion of the Site near two existing residences. Based on the findings of this assessment, the second of two removal actions described in Section II.B.1 was performed by ODEQ in 2014 in certain areas to achieve prompt human health risk reduction.

5. NPL Status

A PA and SI were performed for the Site and nearby Red Rock Road, and at the time these investigations were completed, it was determined that the Site did not warrant proposing for the National Priorities List (NPL).

6. Maps, pictures, and other graphic representations

Figure 1 depicts the Site location, Figure 2 depicts the Site vicinity, Figure 3 depicts the Site layout, and Figure 4 depicts the proposed EPA removal action areas.

B. Other Actions to Date

1. Previous actions

The following removal actions have been undertaken by ODEQ in the past:

2000 – Removal Action

Based on the findings of the 2000 HC RA, HC performed a removal action at the former mill site for ODEQ from 14 through 29 September 2000 (HC 2000). The objective of this action was to provide prompt risk reduction by excavating soil exceeding 230 mg/kg mercury in the mill area, and for arsenic and lead the cleanup goals were 50 mg/kg and 400 mg/kg, respectively. Eight yd³ of soil were excavated from the mill furnace area, and this material was transported off-Site for disposal as hazardous waste. Approximately 240 yd³ of mercury-contaminated soil was excavated from the mill area and placed in a lined and covered temporary storage cell near the base of the waste rock pile. This material was removed from the Site in April 2004 and transported off-Site for disposal (HC 2005). Larger debris such as concrete, firebrick, and a metal furnace were placed in a subsurface vault located at the former mill site. Disturbed areas were restored, as closely as possible, to the original site conditions.

Confirmation soil samples were collected after the removal action. A few samples exceeded the mercury cleanup goal (up to 6,400 mg/kg); however, these sample areas are beneath two to six feet of clean

material. Characterization samples collected from the surrounding hillside, calcine, waste rock pile, roads, driveways, and cell base had mercury concentrations ranging from 1.53 to 220 mg/kg. Four samples with greater than 230 mg/kg mercury were from the mine adit (306 mg/kg), the temporary repository (500 mg/kg), an area south of the former mill (930 mg/kg), and a small area where free mercury was observed (5,100 mg/kg).

2014 – Removal Action

NRC Environmental, with technical support and documentation from APEX, performed a second removal action at the Site for ODEQ in February 2014 (APEX 2014). The objective of this action was to achieve prompt human health risk reduction by removing and capping soil in certain inhabited areas of the Site that were impacted by elevated concentrations of mercury and arsenic. At the time this removal action was performed, the contaminants of concern were mercury and arsenic, and the cleanup goals were 23 mg/kg and 17 mg/kg, respectively.

Prior to implementation of the removal action, FPXRF screening was performed at 118 points scattered across the Site (APEX 2014). Arsenic ranged from non-detect to 471 parts per million (ppm), and mercury concentrations ranged from non-detect to 1,200 ppm. Using this information, six areas (designated as Area 1 through Area 6) were identified that had arsenic or mercury concentrations above the cleanup goals. During conduct of the removal action (12 through 21 February 2014) and follow-up site visit (12 March 2014), 39 additional data points were collected from across the Site with the purpose of better understanding the metals distribution across the Site. Arsenic concentrations in these points ranged from non-detect to 81 ppm, and mercury concentrations ranged from non-detect to 459 ppm. The results indicated that the mine-waste contamination from the mill site area is more widespread than previously anticipated, including contamination encountered near two existing home sites.

The largest areas of contaminated soil (i.e., Areas 1, 2, and 4) encompass about 16 acres, including the original mill site and calcine pile. ODEQ determined that these areas could not be excavated at this time due to resource constraints. Temporary fencing and gates were installed to restrict access to Areas 1 and 2 and the existing blackberry vegetation restricting access to Area 4 was left undisturbed. Approximately 60 yd³ of contaminated soil and firebrick were excavated from the smaller areas, including Areas 3 (15 yd³), 4a (23 yd³), 5, (15 yd³), and 6 (7 yd³), and this material was placed in a temporary cell near the base of the waste rock pile where it remains. Disturbed areas were restored, as closely as possible, to the original site conditions.

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.

C. State and Local Authorities' Roles

1. State and local actions to date

In August 2002, DEQ approved designation of the Bonanza Mine as an Orphan Site (ODEQa 2002). This designation made the State of Oregon Orphan Site Account (Account) available for funding the stabilization and cleanup of the Site once ODEQ determined that the currently identified potentially responsible parties are financially unable and/or unwilling to undertake required cleanup actions. To date,

approximately \$545,000 has been spent from the Account in furtherance of ODEQ assessment and cleanup activities at the Site.

In April 2012, based on discussions between ODEQ and the Oregon Environmental Health Assessment Program (EHAP), a program within the Oregon Health Authority, Public Health Division (OHA-PHD), EHAP prepared a Health Consultation (Consultation) that included a recommendation that no children (especially those less than 6 years of age) be allowed to live in contaminated areas on-Site due to elevated concentrations of mercury and arsenic in soil, and to not use the on-Site well for drinking, cooking or washing food due to high levels of naturally occurring arsenic (ODEQ 2014c). OHA also prepared a fact sheet for the Bonanza Mine property briefly describing the mine and health information about mercury and arsenic. At the time, no action was taken by the residents to move children off-Site.

In November 2013, Oregon Department of Human Services (DHS) contacted EHAP regarding suspected child abuse/neglect of two of the eight children (ages, 5, 6, 9, 9, 10, 12, 12, and 17) at the Site (ODEQ 2014c). ODEQ informed DHS of the EHAP Consultation. Five of the eight children and 2 adults were voluntarily relocated from the Site in November 2013. Subsequent analyses of the children's blood and urine test results for mercury were elevated above reference values for two of the children. In addition, physiologic reactions in two children were suspected of being related to mercury exposure at the Site (OHA and Oregon Poison Control). The temporary relocation is currently scheduled through September 2014, with continued support from ODEQ, pending completion of the removal action described herein.

2. Potential for continued State/local response

ODEQ will provide oversight of implementation of a maintenance, monitoring, and repair (MM&R) plan managed by the property owners, and will ensure that institutional controls are implemented to minimize the potential for human exposure to contamination by limiting resource use (ODEQ 2014d). Additionally, ODEQ will provide temporary housing until such time that the removal action is completed.

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 five tribes with interests that might be affected by the proposed removal action: Confederated Tribes of Coos, Lower Umpqua, and Siuslaw; Confederated Tribes of Grand Ronde; Confederated Tribes of Siletz Indians; Coquille Indian Tribe; and Cow Creek Band of Umpqua Tribe of Indians. Staff-to-staff level coordination has occurred between the EPA and Tribal employees regarding the proposed time-critical removal action, and formal consultation will be offered before actual field work commences.

E. Federal and State Public Health Agency Coordination

The Agency for Toxic Substances and Disease Registry (ATSDR) is the principal public health agency involved with hazardous substance issues. It is responsible for determining, as best as possible, whether people have harmful effects from their exposure to hazardous substances. The Oregon Health Authority Public Health Division (OHA-PHD) provides public health policy and direction to the public health programs within the Division, and ensures that the disparate programs within and outside of the Division create an effective and coherent public health system for the State.

ATSDR reviewed environmental information about the Site and discussed Site conditions with OHA-PHD, and concluded that the Site poses a level of risk to human health and physical injury that supports the proposed removal action described herein (ATSDR 2014). OHA-PHD also supports the proposed removal action described herein (OHA-PHD 2014), and notes that the Site property allows for an extended network of family members to live inexpensively, making it very likely that residents will continue to live on-Site. Here, family members are also raising their children close to other family members. There are female-led households on the Site property, in an area of Oregon where the median earnings for females is 136.8% less than the median earnings for males. This is also a very high unemployment area, at 11.4%, compared to the statewide average of 7.9%. This type of situation leaves children most vulnerable to the environments in which they live.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT

The current conditions at this Site meet the following factors which indicate that the Site may pose an unacceptable risk to the public health or welfare or the environment and a removal action is appropriate under the National Oil and Hazardous Substances Pollution Contingency Plan (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 [300.415(b)(2)(i)]

The data from numerous environmental investigations shows that environmental media are contaminated by elevated concentrations of mercury, arsenic, and other metals, and the source of metals is from historic mercury mining, processing, and disposal operations. Elevated metals concentrations are present in calcine, waste rock, and soil at the former mill site, the surrounding hillside, and valley floor. Mercury vapors were detected above screening levels in 2005 (HC 2005) and again in 2014 (E&E 2014).

Potential human exposure routes include direct contact with and incidental ingestion of contaminated soil and surface water, and inhalation of mercury vapors and windblown dust. Human receptors include on- and off-Site residents. Currently, five residences are located on-Site. Because of transport of mercury downstream in Foster Creek, off-Site residents along Bonanza Mine Road may also be exposed to mercury. Public employees, visitors, and adjacent property owners may be exposed to Site contaminants found in soil, sediment, and air.

Currently, the Site and surrounding area are zoned by Douglas County as Farm-Forest, Timberland Resource, and Exclusive Farm Use-Grazing (HC 2005). Besides roads and driveways leading to the residences, the land is undeveloped. There are no activities associated with the current land use that are likely to be different under an alternate future land use such as commercial or industrial. For example, the established land use trends in the general area and the area immediately surrounding the Site are rural, forest land, and residential in character and there is no reasonable basis to assume that the land use will change in the future.

Ecological receptors can become exposed to Site contaminants through direct contact with the contaminants of concern and with water and sediments contaminated by the contaminants of concern; ingestion of the contaminants of concern and water and sediments contaminated by the contaminants of concern; and through the food chain by consuming animals and plants that have accumulated Site-related contamination.

The effects of exposure to the contaminants of concern on organ systems is influenced by several factors, including dose, duration of exposure, and route of exposure, as well as the age and health of the receptor exposed.

B. 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))

Portions of the mine-waste contaminated soils are not vegetated or are partially vegetated (e.g., calcine pile, waste rock pile, roadways), thus the soils are susceptible to migration within the Site and off-Site because of water- and wind-borne and mechanical influences.

C. 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 described above, because portions of mine-waste contaminated materials and soils are not vegetated, spring time snow melt, rainfall or other forms of run-off inducing events will tend to spread the contaminated materials throughout and further from the Site. The warmer temperatures and dry weather typical in the summer and fall months in and near the Site contribute to wind-borne dispersal of mine-contaminants.

D. The availability of other appropriate federal or state response mechanisms to respond to the release [300.415(b)(2)(vii)]

ODEQ has continuously monitored Site conditions and has performed two limited removal actions - one action in 2000 and another cleanup action in 2014 - to provide prompt risk reduction. However, the scope of these actions was limited due to the availability of data and financial constraints. Thus, ODEQ requested EPA's assistance with addressing the hazardous substances present on-Site and supports the removal action described herein (ODEQe 2014). OHA-PHD also supports efforts to cleanup the Site (OHA-PHD 2014).

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.

In this case, because the Site is not included on the NPL, permanent relocation of the residents may not be an option available to EPA. See generally CERCLA Section 101 (definition of "remedial action" includes "permanent relocation," but definition of "removal" only includes "temporary evacuation and housing").

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from this Site may present an imminent and substantial endangerment to the public health, or welfare, or the environment.

V. EXEMPTION FROM STATUTORY LIMITS

Consistent with Section 104(c) of CERCLA, 42 U.S.C. §9604(c)(1)(A), an exemption from the statutory limit of \$2 million dollars is appropriate based on the following criteria.

A. There is an immediate risk to public health or welfare or the environment

Metals are present throughout the Site in calcine, waste rock, and soil at the former mill site, the surrounding hillside, and the valley floor. Because metals cannot degrade, they are continuously mobilized throughout the environment and from one environmental media to another. Five residences are located on-Site. Three residences are occupied, and two are vacant because the occupants were temporarily relocated in 2013 due to concerns expressed by DHS and EHAP. There is widespread evidence of Site use by children such as toys lying about and foot trails, particularly in the vicinity of the former mill foundation, calcine pile, and waste rock pile. In 2013, children had blood and urine mercury levels associated with exposures at the Site that were a concern. In addition to the three families remaining on-Site, public employees, visitors, and adjacent property owners may be exposed to Site contaminants found in soil, sediment, and air. There are no institutional controls to minimize the potential for human exposure to Site contamination by limiting land or resource use.

B. Continued response actions are immediately required to prevent, limit, or mitigate an emergency

Immediate implementation of the removal action described herein is required to prevent, mitigate, or minimize the actual or potential human health or ecological threats posed by the hazardous substances found at the Site. Portions of the mine-waste contaminated soils are not vegetated (e.g., calcine pile, waste rock pile, roadways), thus the soils are susceptible to migration within the Site and off-Site because of water- and wind-borne and mechanical influences.

C. Assistance will not otherwise be provided on a timely basis.

The current property owner does not have access to or the resources to perform a removal action, and ODEQ does not have the funding or resources to conduct additional removal actions, thus ODEQ requested EPA's assistance with addressing Site contamination (ODEQe 2014). 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 potential human health and ecological risks associated with the hazardous substances described herein.

VI. PROPOSED ACTIONS AND ESTIMATED COSTS

The EPA, along with its Superfund Technical Assessment and Response Team (START) contractor and Emergency and Rapid Response Services (ERRS) contractor and ODEQ staff visited the Site on 23 April 2014 to observe Site conditions and to develop a proposed action for addressing Site contaminants. The proposed removal action described below was developed by EPA and its START and ERRS contractors and in consultation with ODEQ, and in consideration of the short- and long-term aspects of three broad criteria (i.e., effectiveness, implementability, and cost), as well as the following site circumstances:

- **Environmental Justice.** The Site is located in a low income, high unemployment area. The female-led households and other Site residents are exposed to multiple environmental health burdens which negatively affects their well-being. This type of situation leaves children most vulnerable to the environments in which they live. Furthermore, there is no reasonable basis to assume that the current uses of the Site and surrounding area will change in the future.

- **Evaluation of permanent relocation.** An extended network of family members live inexpensively on-Site, and family members are also raising their children close to other family members. There is no reasonable basis to believe that permanently relocating two or more of the five families currently living on-Site would prevent the relocated family members from returning to the Site given the family circumstances. Further, relocating the families would not address the underlying human health and environmental threats associated with the uncontrolled release of hazardous substances into the environment.

- **Request for assistance.** ODEQ and other State agencies have been involved with the Site for about 15 years, and their involvement has included completion of two small removal actions and the temporary relocation of two families with children. However, due to the complexity and size of the Site and the limited availability of funding and other resources, ODEQ requested EPA's assistance with addressing the overall potential human health and ecological risks associated with the hazardous substances remaining on-Site.

- **Sub-dividing and Zoning.** ODEQ worked with the Douglas County Planning Department to evaluate the feasibility of sub-dividing the Site and obtaining zoning variances or waivers to provide residents with an on-Site alternative to the current contaminated housing locations, driveways, and roadways. The administrative feasibility of these alternatives proved not practicable given current Site circumstances. For example, engineering controls (ECs) such as protective barriers and fencing would still be required to protect human health and the environment, and post-removal site controls (PRSC) and institutional controls (ICs) would be required to ensure the long-term protectiveness and durability of the necessary removal action. There is no State support nor administrative and funding mechanisms in-place for this approach. Nor are there assurances that the affected residents (and/or future residents) would maintain PRSCs and/or follow ICs restricting land or resource use.

A. Proposed Actions

The proposed action is intended to mitigate the potential human health and ecological threats posed by exposure to mercury and arsenic, including direct contact, ingestion, and inhalation pathways. The locations of the proposed actions are shown in Figure 4 and described below.

1. Proposed action description

Adits

Two adits are located on the Site. The adits will be closed to prevent human entry. In consultation with federal and state agencies, if it is determined that the adits merits habitat preservation, the closure will be designed to both prevent human entry into the adits and to suit the specific needs of resident wildlife species.

Excavations

Mine-waste contaminated materials exceeding cleanup levels for mercury (i.e., 23 mg/kg) and arsenic (i.e., 17 mg/kg) will be excavated from certain areas and to a depth of 24 inches below ground surface. The limits and depths of the excavation areas will be determined in the field using field screening methods such as a field portable mercury screening instrument, FPXRF, and visual recognition. The excavated materials will be hauled to the vicinity of the waste rock pile using existing on-Site roadways. Disturbed areas will be restored, as closely as possible, to original conditions.

Areas to be excavated include: Area 2 where an estimated $\pm 2,400$ yd³ of mine-waste contaminated material will be excavated, including the roadway and sediment from the intermittent unnamed tributary; Area 4 where an estimated $\pm 3,200$ yd³ of mine-waste contaminated material will be excavated, including the roadway and sediment from the intermittent unnamed tributary; Home Sites 1 and 2 where an estimated $\pm 2,750$ yd³ of mine-waste contaminated material will be excavated, including the road way and driveways; and the mill site where an estimated $\pm 2,000$ yd³ of mine-waste contaminated material will be excavated, including the mill concrete foundations.

Replacement of Property

In accordance with the *EPA Guidance on Compensation for Property Loss in Removal Actions* (EPA 1995), the single-wide trailers used as residences at Home Sites 1 and 2 will be replaced because they cannot be saved and restored. The aged trailers have fallen in disrepair since the families were relocated in late 2013. The trailers are located on pads constructed of calcine.

The trailers must be relocated to enable excavation of the calcine pads. Because of the structural condition of the trailers, they cannot be moved and saved without incurring further damage and then restored to their original condition upon completion of the action. Additionally, contaminated items made of soft, permeable materials such as carpeting, mattresses, and sofas, cannot be decontaminated in an efficient and cost-effective manner. Thus, these items are targeted for disposal and will be replaced with property of similar value.

Temporary Relocation

Five families live on-Site. ODEQ has provided for the temporary relocation of two of these families and is expected to continue to do so pending completion of the removal action described herein. The proposed removal action may also require the relocation of one or more of the remaining three families temporarily to ensure their health and safety or to allow EPA to conduct cleanup activities. Any temporary relocation of these families that EPA carries out will be in accordance with the *EPA Superfund Response Actions: Temporary Relocations Implementation Guidance* (EPA 2002).

Repository

Excavated mine-waste materials, along with other ancillary debris such as the concrete mill foundations, will be consolidated at Area 1, against the calcine and waste rock piles and hillside in the north end of the valley floor. Other materials such the trailers and household furnishings, may be disposed of at the repository or transported off-Site for disposal at an approved disposal facility. Woody debris will be placed elsewhere on-Site. The calcine and waste rock piles will be consolidated to achieve a smaller footprint for

the protective barrier. A protective barrier consisting of an impermeable geomembrane liner and a minimum of 24 inches of clean rock and/or soil imported from off-Site will be placed over the contaminated material.

Best Management Practices

Best Management Practices (BMPs) will be implemented during construction activities to protect workers, the community, and the environment from short-term construction impacts such as erosion, sedimentation, fugitive dust, noise, and other similar potential impacts.

Non-hazardous materials and wastes such as inert construction debris, will be disposed of or recycled in accordance with appropriate solid waste disposal or recycling requirements.

Greener Cleanup Best Management Practices

Appropriate and practicable greener cleanup BMPs will be implemented during cleanup activities, including, but not limited to, minimizing energy consumption, minimizing generation and transport of fugitive dust, minimizing waste generation through reuse and recycling, minimizing impacts to water resources, minimizing areas requiring activity or use limitations, minimizing unnecessary soil and habitat disturbance, and minimizing lighting and noise disturbance.

Long-term Monitoring and Maintenance and Repair

A long-term MM&R program to be performed by the property owner and with assistance and oversight provided by ODEQ will be implemented to ensure the continuing effectiveness of the removal action and to monitor Site conditions (ODEQd 2014). The EPA will prepare the MM&R in concert with ODEQ and the landowner. As part of the monitoring component, annual, semi-annual and/or episodic inspections of the protective barrier integrity and performance and surface water drainage systems will be required, and as part of the maintenance and repair component, the landowner will be required to perform the needed maintenance and repairs.

Engineering and Institutional Controls

Engineering and institutional controls will regulate access to and use of the repository and other certain areas such as hillsides (ODEQd 2014). An enforceable environmental covenant will be developed and put into effect to limit certain activities, thus promoting the long-term durability and protectiveness of the cleanup action. Additionally, ODEQ will ensure that environmental covenants restricting the disturbance of contaminated soil and land or resource use, as appropriate, are provided by the property owners.

2. Contribution to remedial performance

The proposed removal action will not impede future actions based upon available information.

The recommended response action may be the first and only action or one of a series of actions depending on post-removal activities such as those necessary to maintain the protectiveness of the cleanup. If future actions are required, the proposed removal action will likely not impede those actions based upon available information.

3. Engineering Evaluation/Cost Analysis

An Engineering Evaluation/Cost Analysis is not required because this removal action is a time-critical action.

4. Applicable or relevant and appropriate requirements

The NCP requires that removal actions attain Applicable or Relevant and Appropriate Requirements (ARARs) under federal or state environment or facility siting laws, to the extent practicable. (40 CFR § 300.415[j]) In determining whether compliance with ARARs is practicable, the EPA may consider the scope of the removal action and the urgency of the situation. (40 CFR § 415[j]) The scope of the removal action proposed in this Action Memorandum is limited.

Federal

Endangered Species Act [16 U.S.C. §§ 1531 – 1544; 50 CFR Parts 17, 402]. The Endangered Species Act (ESA) protects species of fish, wildlife, and plants that are listed as threatened or endangered with extinction. It also protects designated critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species, including consultation with resource agencies. The requirements of the ESA are potentially applicable to the Site since listed threatened or endangered species habitat areas will or could be impacted by response action. Consistent with ESA Section 7, if any federally designated threatened or endangered species are identified in the vicinity of removal work and the action may affect such species and/or their habitat, the EPA will consult with USFWS to ensure that response actions are conducted in a manner to avoid adverse habitat modification and jeopardy to the continued existence of such species.

Migratory Bird Treaty Act (MBTA). 16 USC § 703 *et seq.* Makes it unlawful to “hunt, take, capture, kill” or take various other actions adversely affecting a broad range of migratory birds, including tundra swans, hawks, falcons, songbirds, without prior approval by the U.S. Fish and Wildlife Service. (See 50 CFR 10.13 for the list of birds protected under the MBTA.) Under the MBTA, permits may be issued for take (e.g., for research) or killing of migratory birds (e.g., hunting licenses). The mortality of migratory birds due to ingestion of contaminated sediment is not a permitted take under the MBTA. Applicable for protecting migratory bird species identified. The selected removal action to be carried out in a manner that avoids the taking or killing of protected migratory bird species, including individual birds or their nests or eggs.

National Historic Preservation Act [16 USC § 470.f; 36 CFR Parts 60, 63, 800]. The National Historic Preservation Act (NHPA) requires federal agencies to consider the possible effects on historic sites or structures of any undertaking proposed for federal funding or approval. Historic sites or structures are those included on or eligible for the National Register of Historic Places (NRHP), generally older than 50 years. If an agency finds a potential adverse effect on historic sites or structures, such agency must evaluate alternatives to “avoid, minimize, or mitigate” the impact, in consultation with the Advisory Council on Historic Preservation (ACHP). The NHPA is potentially applicable to response actions such as demolition of old mine or mill structures on the Site. In consultation with the ACHP unavoidable impacts on historic sites or structures may be mitigated through such means as taking photographs and collecting historic records. Under the NHPA implementing regulations, consultation with the ACHP may effectively be

accomplished through contact with the State Historic Preservation Officer and possibly other interested parties.

Archaeological Resources Protection Act 16 USC § 470.aa et seq.; 43 CFR Part 7. Prohibits the unauthorized disturbance of archaeological resources on public or Indian lands. Archaeological resources are “any material remains of past human life and activities which are of archaeological interest,” including pottery, baskets, tools, and human skeletal remains. 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 archeologist. Applicable for the conduct of any selected response actions that may result in ground disturbance.

American Indian Religious Freedom Act 42 USC § 1996 et seq. The American Indian Religious Freedom Act and implementing regulations are intended to protect Native American religious, ceremonial, and burial sites, and the free practice of religions by Native American groups. The requirements of this Act must be followed if sacred sites graves are discovered in the course of ground-disturbing activities. Potentially applicable to a site where response actions involve disturbance/alteration of the ground and/or site terrain.

Native American Graves Protection and Repatriation Act 25 USC § 3001 et seq 43 CFR Part 10. Intended to protect Native American graves from desecration through the removal and trafficking of human remains and “cultural items” including funerary and sacred objects. The requirements of this Act must be followed when graves are discovered or ground-disturbing activities encounter Native American burial sites. Potentially applicable to a site where response actions involve disturbance/alteration of the ground and/or site terrain.

Resource Conservation and Recovery Act [42 U.S.C. § 6901 et seq], Subtitle C - Hazardous Waste Management [40 C.F.R. Parts 260 to 279]. Federal hazardous waste regulations specify hazardous waste identification, management, and disposal requirements. However, pursuant to the Bevill Amendment, 42 U.S.C. § 6921(b)(3)(A), solid wastes from the extraction, beneficiation, and some processing of ores and minerals are excluded from Resource Conservation and Recovery Act (RCRA) Subtitle C requirements. However, certain of these requirements may be relevant and appropriate to ensure the safe management of some solid wastes. RCRA Subtitle C elements that may be relevant and appropriate may include, for example, selected portions of the requirements for design and operation of a hazardous waste landfill, 40 C.F.R. Part 264, Subpart N. For the management of RCRA hazardous wastes that are not Bevill exempt, applicability of RCRA Subtitle C provisions depend on whether the wastes are managed within an Area of Contamination (AOC). 55 FR 8760 (8 March 1990). Applicable or relevant and appropriate requirements of RCRA Subtitle C (or the state equivalent) may be satisfied by off-Site disposal, consistent with the Off-Site Rule, 40 C.F.R. § 300.440. RCRA Subtitle C also provides treatment standards for debris contaminated with hazardous waste (hazardous debris), 40 CFR § 268.45, although the lead agency may determine that such debris is no longer hazardous, consistent with 40 C.F.R. § 261.3(f)(2), or equivalent state regulations.

Resource Conservation and Recovery Act [42 U.S.C. § 6901 et seq], Subtitle D - Managing Municipal and Solid Waste [40 C.F.R. Parts 257 and 258]. Subtitle D of RCRA establishes a framework for controlling the management of non-hazardous solid waste. Subtitle D is potentially applicable to solid waste generation and management at the Site.

State

To the extent practicable, the performance of the removal action will achieve the standards set forth under **Oregon Administrative Rule (OAR) 340-122-0070 (Removal)** to address potential threats to public health and welfare and the environment from a release or threat of release of hazardous substances. The proposed actions meet the standard for Removal under State rules.

Any discharge to public waters within the State of Oregon will be managed under **OAR 340-041 (Water Pollution)**. The substantive requirements of this rule will be met during the removal action for management of surface water quality by following standard construction standards for stormwater management.

The **Oregon Air Pollution Control Regulations and Oregon Emission Standards for Hazardous Air Pollutants, OAR 340-200 and OAR 340-246**, respectively, are potentially applicable if heavy-metal contaminated dust is generated above regulatory thresholds. Using general industry standards for dust control while working on-Site will satisfy this Rule.

Oregon Hazardous Waste Regulations, OAR 340-100 through 103, may be applicable if liquid mercury waste is found on Site. The substantive requirement of this rule will be met if hazardous wastes are encountered during the removal. The proposed actions addresses the hazardous waste requirements.

Oregon Department of State Land Rules, OAR 141-85 may be applicable if excavation activities are conducted below the seasonal high water line of on-Site creeks or waterways. There rules will be met because there is no expectation of pond/dam removal or creek modifications for this removal action.

5. Project schedule

The removal action activities are expected to start and be completed during the fourth quarter of the Fiscal Year 2014.

B. Estimated Costs

The total project ceiling, if approved, will be \$2,475,000. Of this, as much as \$2,000,000 will be funded from the Regional removal allowance.

Regional Removal Allowance Costs (ERRS)	\$2,000,000
Other Extramural Costs (START)	\$250,000
Contingency (20%)	\$225,000
Total Removal Project Ceiling¹	\$2,475,000

¹ EPA direct and indirect costs, although cost recoverable, do not count toward the Removal Ceiling for this removal action. Liable 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

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 direct contact with and incidental ingestion of contaminated soil, sediment, and surface water, and inhalation of mercury vapors and windblown dust.

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 Bonanza Mine Site located near Nonpariel, Douglas County, Oregon, developed in accordance with CERCLA as amended, and is consistent with the NCP. This decision is based on the administrative record for the Site.

Conditions at the Site meet the NCP section 300.415(b) criteria for a removal action and the CERCLA section 104(c) emergency exemption from the \$2 million limitation, and I request your approval of the proposed removal action and \$2 million exemption. The total project ceiling if approved will be \$2,475,000. Of this, an estimated \$2,225,000 will be funded from the Regional removal allowance.

X. 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: ✓

for 
Chris D. Field, Manager
Emergency Management Program

Disapprove: _____

Chris D. Field, Manager
Emergency Management Program

Effective date of this Decision: June 5, 2014

ATTACHMENTS:

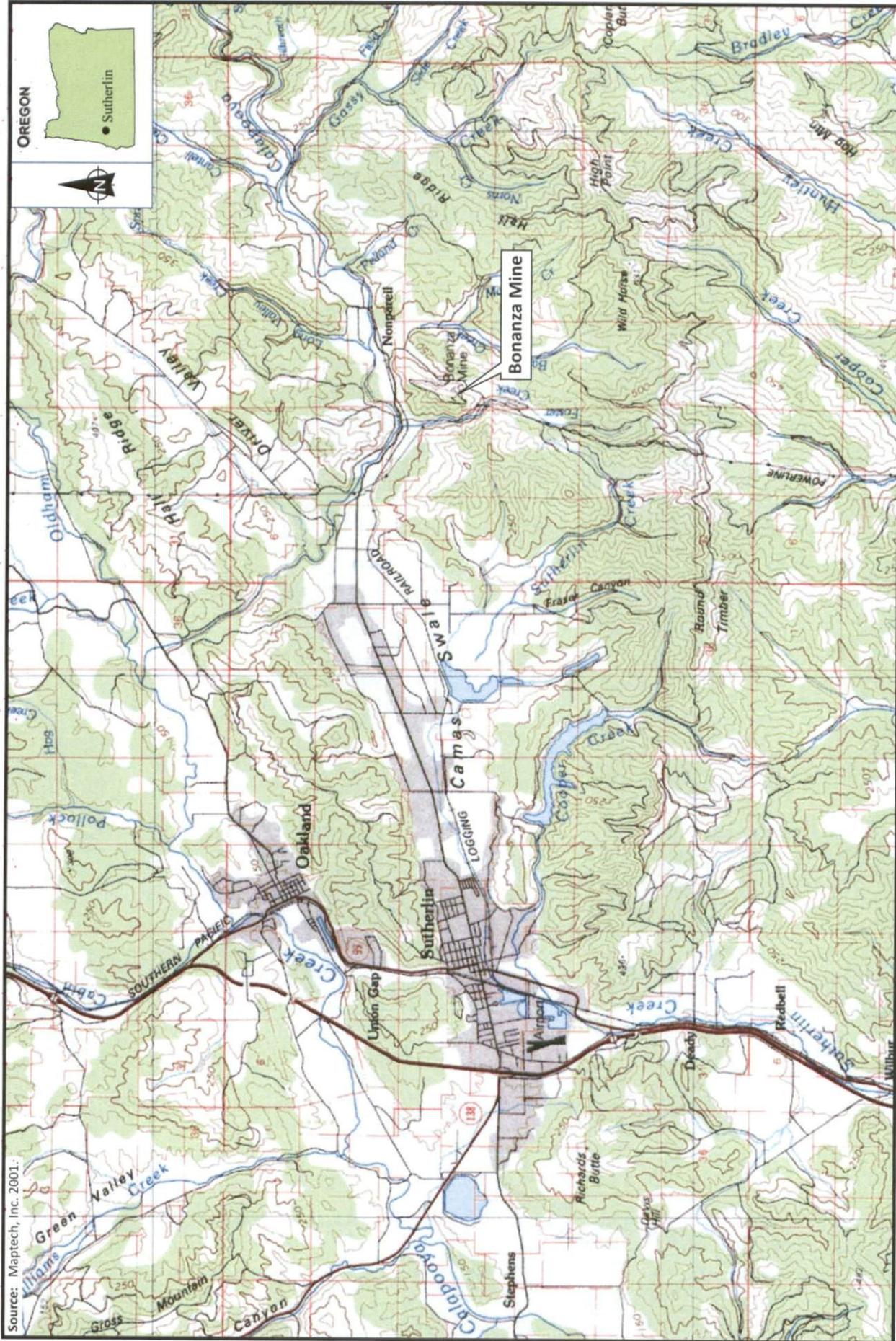
- References
- Figures
- Enforcement Addendum

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ODEQe, 28 May 2014. *Concurrence of Removal Action Memorandum – Bonanza Mine, Douglas County, Oregon CERCLIS #ORN001001174, ECSI #2672.* Letter from Bryn Thoms, through Michael E. Kucinski to Earl Liverman.

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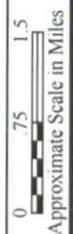


Source: Maptech, Inc. 2001.

Figure 1
SITE LOCATION MAP

BONANZA MINE SITE
Sutherlin, Oregon

ecology and environment, inc.
Global Environmental Specialists
Seattle, Washington



Date: 5/14/14
Drawn by: AES

10-START-IV14030011fig 1

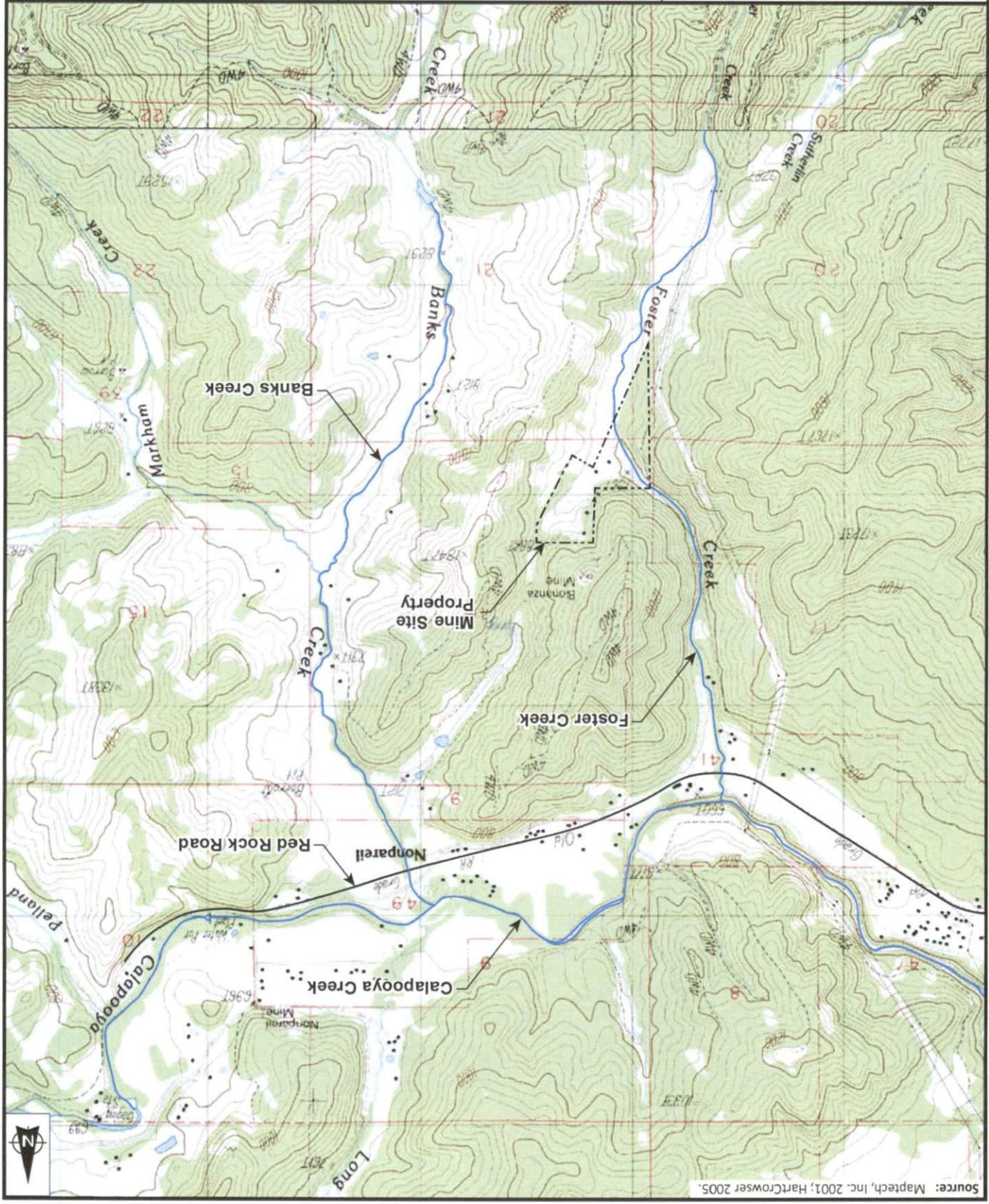
BONANZA MINE SITE
 Sutherlin, Oregon

Approximate Scale in Feet
 0 1000 2000

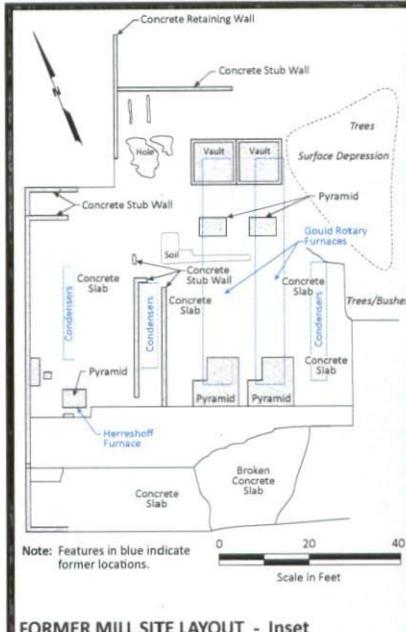
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10:START-1\1\4030011\fig 2

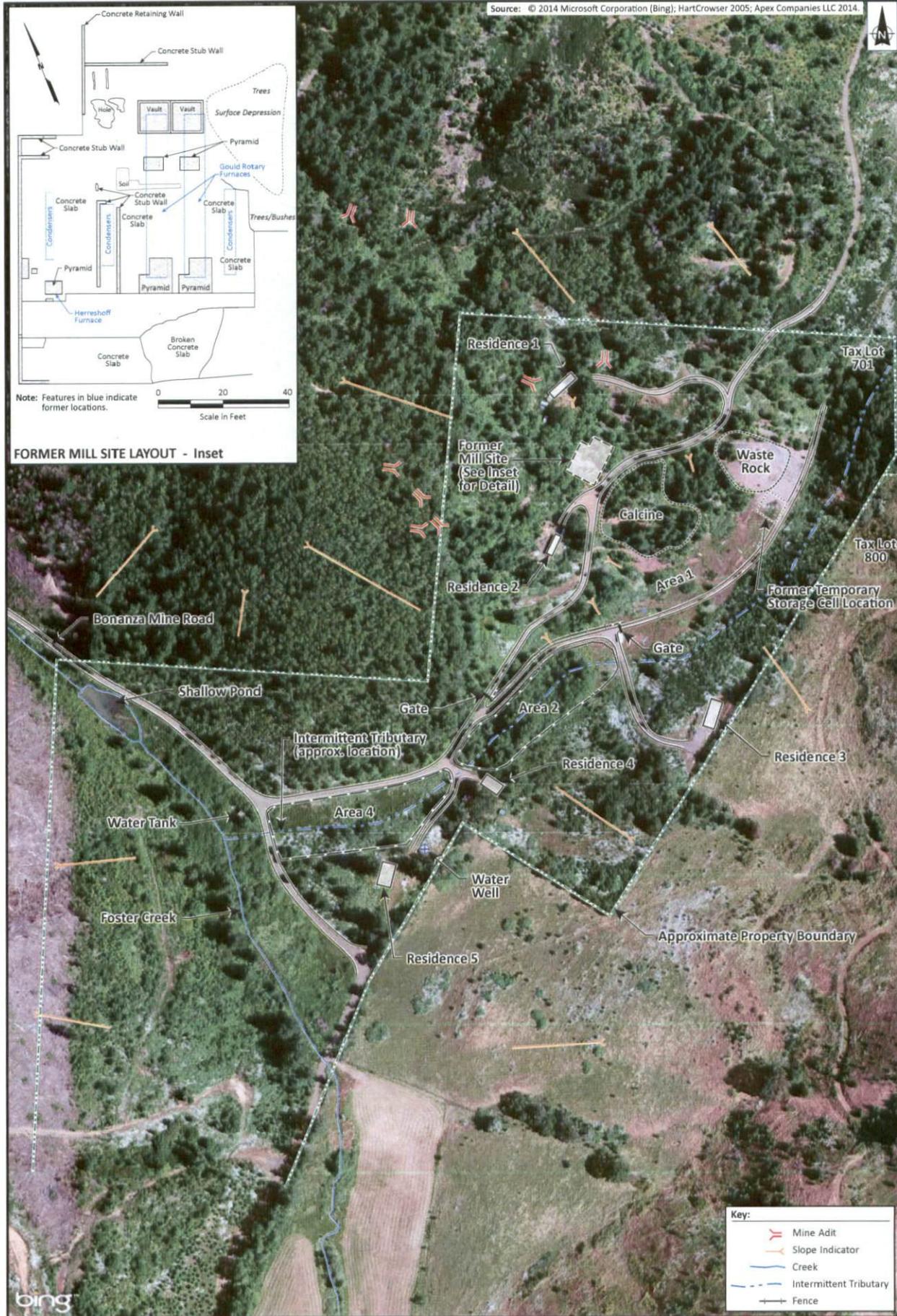
Figure 2
 SITE VICINITY MAP



Source: Maptech, Inc. 2001; Hartcrowser 2005.



FORMER MILL SITE LAYOUT - Inset



Key:

- Mine Adit
- Slope Indicator
- Creek
- Intermittent Tributary
- Fence

BONAZA MINE SITE
Sutherlin, Oregon

0 150 300
Approximate Scale in Feet

Note: Some features are approximate.

Figure 3
SITE LAYOUT MAP

Date: 5/14/14
Drawn by: AES
10-START-IV-14030011/fig 3



bing

Key:

	Mine Adit
	Slope Indicator
	Creek
	Intermittent Tributary
	Fence
	Proposed Repository

ecology and environment, inc.
 Global Remedial Services
 Seattle, Washington

BONANZAMINE SITE
 Sutherlin, Oregon

0 150 300
 Approximate Scale in Feet

Note: Some features are approximate.

Figure 4
REMOVAL ACTION AREAS

Date: 5/14/14
 Drawn by: AES
 10-STARTEV14030011fig-4