



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
SAM NUNN
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA GEORGIA 30303-8960

JUL 12 2010

ACTION MEMORANDUM

SUBJECT: Request for a Change of Scope and Removal Action Ceiling Increase at Ore Knob Mine Site, Ore Knob, Ashe County, North Carolina

FROM: Terrence A. Byrd, On-Scene Coordinator *TAB*
Emergency Response and Removal Branch

THRU: Shane Hitchcock, Chief *SH*
Emergency Response and Removal Branch

TO: Franklin E. Hill, Director
Superfund Division

SITE ID# A4ND

I. PURPOSE

The purpose of this Action Memorandum is to request and document approval of the proposed removal action change in scope and ceiling increase for Ore Knob Mine (the Site) located in Ore Knob, Ashe County, North Carolina. An emergency exemption to the 12-month and \$2 million statutory limit was approved on September 15, 2008 (attached). The Site continues to pose a threat to public health and the environment that meets the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) section 300.415(b) criteria for removal actions and the criteria for an Emergency as well as Consistency Exemption from Statutory Limits.

This request is based on the assessment of the tailings dam and communication with the Remedial program. A Change in Scope of Response is necessary to address the sediment pond at the Site in order to abate the release or threat of release of hazardous substances from the Site into the environment.

As the result of the Site conditions, immediate removal actions conducted pursuant to Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) are needed at the Site to address hazardous substances present at the sediment pond and adjacent tailings dam. The new total project ceiling, if approved, will be \$7,782,500 of which, \$6,550,000 will be funded from the Regional Removal Allowance.

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID number: NCN000409895

Type: Time-Critical Removal

A. Site Description

1. Removal Site Evaluation

The Site contains areas affected by mining, including three principal areas that were directly affected by mining along with other areas, primarily downstream, where hazardous substances have come to be located. The three principal areas include the 1950s Mine and Mill Area, the 19th Century Operations Area and a Main Tailings Impoundment.

The 1950's Mine and Mill Area comprises 15 acres and is located northwest of the intersection of Ore Knob Road and Little Peak Creek Road, just north of Highway 88. This area contains derelict ore bins, concrete mill foundations, a transformer building, other ruins, a small sawmill currently in operation, two acres with about 60,000 cubic yards of tailings - now mostly covered with stumps, and a two acre former pond where process water was stored. Acidic water found in groundwater plumes and open mine shafts throughout the Site are believed to be the primary factors contributing to residential wells containing several metals that exceed EPA Maximum Contaminant Levels (MCLs). Surface water percolating through the tailings is a major contributor to the acid mine drainage in Little Peak Creek. Little Peak Creek begins just upstream of the former pond, flows through the former pond, and discharges into Peak Creek 2.5 miles downstream.

The 19th Century Operations Area and the Main Tailings Impoundment are located across Little Peak Creek Road, at the end of Ore Knob Mine Road. The 19th Century Operations Area includes a series of barren and nearly barren stretches of land (totaling about 5 acres) near the top of Ore Knob that contain waste rock dumps from at least 11 mine shafts, 5 mine adits, as well as locations where ore was roasted to drive off sulfur and smelted to recover copper.

The Main Tailings Impoundment Area is located about 0.3 miles northeast of the 19th Century Operations, covers about 20 acres, and is estimated to contain 720,000 cubic yards of tailings. Tailings are the waste material left over after minerals have been extracted from ore mined at the Site. The tailings are strongly acid-generating (with pH ranging from 1.08 to 4.78) and the average sample is characterized by high concentrations of numerous metals, including copper, zinc, iron, arsenic, and mercury.

The tailings dam at the end of the impoundment is approximately 70 feet high and 700 feet wide. The dam has been subjected to severe erosion and water emanates from the dam in several places. The face of the dam is deeply incised and erodes directly into Ore Knob Branch.

Seeps emanating from the face of the tailings dam have extremely high concentrations of several metals, acidity, sulfate, and total dissolved solids. All of the seeps on the dam face exceeded surface water quality criteria applicable to Ore Knob Branch by factors of five or more for aluminum, copper, iron, manganese, silver, zinc, and sulfate when sampled recently. Sampling has also shown impacts from the tailings impoundment to other downstream receiving waters. Surface water samples collected from ponds atop the tailings impoundment exceed water quality criteria for several metals and pH. Soil samples collected adjacent to the tailings impoundment also contain elevated concentrations of various metals.

2. Physical Location

The Ore Knob Mine Site (latitude 36.403807 N, longitude -81.33367 W) is located in Ashe County, North Carolina, approximately 12 miles south of the Virginia state line, 45 miles southeast of Bristol, Tennessee, and 8 miles east of the town of Jefferson, North Carolina. Ore Knob Branch is located on the Site. The region is primarily rural, with agriculture and tourism as major sources of employment. The dam is located in the Blue Ridge Mountains, a highly popular year-round vacation destination.

3. Site Characteristics

Most of the area composing the 1950's Mine and Mill Site has been used as an unlicensed stump dump. The waste ore bins are rusted and near collapse. The tailings pond is filled to capacity and is partially covered with tree stumps.

The tailings dam is currently void of vegetation. Other portions of the Site are currently being used by a hunting club. Most of the land is unfit for any type of use due to heavy metal contamination and low pH sediments.

The State of North Carolina has designated the receiving waters of Peak Creek and Little Peak Creek as trout waters, and South Fork New River as outstanding resource waters. The New River was the first River in the United States to receive a "National Wild and Scenic River" designation and has also been designated as an American Heritage River.

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

The 1950's Mine and Mill Site is the major source of contamination in Little Peak Creek. Surface water and ground water percolates through the tailings pond, lowering the pH as it flows. Acid mine drainage created in this area could be contributing to drinking water contamination to homes in the area.

The main tailings dam at the Site is hydrologically deficient. There is no spillway and the tailings structure contains a pond of water at its head. The upstream runoff and storm water have caused significant erosion to the face of the tailings dam. The dam has

a concrete decant pipe that was designed to divert excess water through the dam and exit just above the toe. The pipe capacity has diminished due to the buildup of iron oxide, logs, rocks and other debris throughout the length of the pipe. Water continuously flows throughout seeps and crevices at the face of the dam. The constant water flow further incises the face, releasing mine tailings and acid mine drainage into Ore Knob Branch.

Failure of the dam will result in thousands of tons of tailings to be released to the environment causing a catastrophic and probable irreversible damage to one of North Carolina's most used fisheries. Also, the tailings are strongly acid-generating (with pH ranging from 1.08 to 4.78) and carry extremely high concentrations of hazardous substances as defined by section 101(14) of CERCLA include: arsenic (150ppm), iron (90,000ppm), zinc (250ppm) and copper (12,000ppm). These constituents would be deposited along the floodplain and in residential farmlands along the river.

5. NPL Status

The Site is on the National Priority List (NPL). The Site was proposed to the NPL on April 09, 2009 and finalized on the NPL on September 23, 2009.

6. Maps, pictures and other graphic representations

All removal file information, including maps and aerial photos of the Site, will be maintained by the OSC and released to the EPA record center for inclusion in the Site file.

B. Other Actions to Date

1. Previous Actions

The U.S. Army Corps of Engineers has completed a study and has approval to construct a project for reducing the amount and severity of acid mine drainage (AMD) to the receiving streams to improve their aquatic habitat. The project is under authority provided by Section 206 of the Water Resources Development Act of 1996 (PL 104-303). The Detailed Project Report and Environmental Assessment (USACE – DENR, 2004) evaluated several approaches to improve conditions at the dam and assessed their environmental impacts. The program was neither fully funded nor implemented.

2. Current Actions

Approximately 20,000 cubic yards of tailings and sediments have been excavated from the sediment pond at the main tailings impoundment. Freeboard has been adequately restored and the pond is acting as a clarifier as water empties into Ore Knob Branch. The diversion channel designed to reroute surface water around the tailings dam is completed. The diversion channel is just under a half mile long, 20 feet wide at the bottom base and 40 feet deep in some areas. The side slopes vary from 0 to 3:1 depending on location. Over 10,000 cubic yards of rock have been blasted and removed from the mountainside to create the channel. Approximately 200 gallons per minute of

water now flows into the diversion channel instead of onto the tailings impoundment, significantly reducing the amount of water being acidified and released downstream. All excavated soil, sediment and rock is being recycled for re-use throughout the site. An official accounting of the cost savings using this recycled material will be compiled at the end of the project.

The United States Bureau of Reclamation (USBR) completed a geotechnical stability analysis and a slope stability analysis for the tailings dam face as mentioned in the previous Action Memoranda. A detailed, systematic, step-wise process to re-slope the tailings dam face was determined. The toe of the dam has been reinforced by a 30-foot high, 30-foot wide, 600-foot long shear key built with various size rocks and includes a sand filter to ensure water flow will not be impeded. Four standing water ponds throughout the Site have been filled and re-sloped so that water will now flow into the diversion channel.

C. State and Local Authorities' Role

1. State and Local Actions to Date

In addition to actions referenced in the initial Action Memo, ERRB has met with North Carolina DENR, Dam Safety, Water and Soil and Erosion Control to discuss actions taken at Ore Knob. The State has deferred the lead role to ERRB, but continues to monitor the Site's progress and remains actively involved throughout the remediation.

ERRB has held multiple community meetings and made a presentation to a local civic group about the conditions at the Site. ERRB will continue to coordinate with city/county public service agencies to distribute and disseminate relevant information regarding site activities to the public, as needed.

2. Potential for Continued State and Local Response

It is not anticipated that the NCDENR will perform any response activities at the Site, although they will take the lead on securing any future use restrictions deemed necessary at the Site. NCDENR has referred this Site to EPA because they do not have a funding process to implement this time-critical removal action. ERRB will continue to coordinate with the state and local agencies in order to keep the community informed of future removal Site activities.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

The conditions remaining at the Ore Knob Mine Site present a substantial threat to the public health or welfare, and the environment, and meet the criteria for a time-critical removal action as provided for in the National Contingency Plan (NCP), Section 300.415(b)(2). These criteria include, but are not limited to, the following:

- Section 300.415(b) (2) (i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants:

The entire length of Ore Knob Branch, as well as a three mile section of Peak Creek to the South Fork of the New River is sterile. Fishing in these waterways is now impossible. Animals are potentially exposed to the highly acidic stream water. The state has listed two species of fish, two species of mussels and an aquatic snail as either threatened, endangered or a species of concern.

- Section 300.415(b) (2) (iv) High levels of hazardous substances or pollutants or contaminants to migrate or be released:

Chemical reactions caused by the interaction with storm water, oxygen and iron sulfide present in pyrite and pyrrhotite deposits result in an acid mine drainage that is migrating off-site. The hydrogen sulfide gas released during the chemical reaction is a direct exposure threat to nearby hunters ATV riders and others that may be on the property. The acidic gas then attacks other minerals in the rock and releases elevated concentrations of iron, copper, arsenic and zinc. Residential groundwater wells in the vicinity have levels of manganese up to 10,000 ppm. It is believed that low pH water is flocculating throughout the mine area groundwater, dissolving these metals and migrating throughout the area.

- Section 300.415(b)(2)(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released:

Weather conditions such as wind, rainfall runoff and erosion have already contributed to the dispersion of iron, copper and arsenic laden tailings off-site and into nearby streams, creeks and rivers. A heavy, lingering rain storm could be the catalyst to undermine the integrity of the tailings dam causing slope failure. The failure of the dam would release thousands of tons of mine tailings off-site, causing catastrophic damage to property and threatening lives of those in the vicinity.

- Section 300.415(b)(2)(vii) The (lack of) availability of other appropriate federal or state mechanisms to respond to the release:

No other local, state, or federal agency is in the position or currently has the resources to independently oversee an effective response action to address the ongoing threats presented at the Site. U.S. EPA will conduct its actions in cooperation with state and local authorities to the extent practicable. The State of North Carolina has referred the Site to the U.S. EPA due to lack of funding.

IV. ENDANGERMENT DETERMINATION

Given the Site conditions, the nature of the known and suspected hazardous substances, pollutants and contaminants on Site, and the potential exposure pathways

described in Sections II and III above, actual or threatened releases of hazardous substances, pollutants and contaminants from this Site, if not addressed by implementing the response actions selected in this Action Memorandum, may present an imminent and substantial endangerment to public health or welfare, or the environment.

V. EXEMPTION FROM STATUTORY LIMITS

Both the 12-month exemption and \$2 million exemption were approved in the September 15, 2008 Action Memorandum. Site conditions continue to meet the emergency exemption in CERCLA 104 (c). Conditions at the Site meet the criteria for a consistency exemption. This Site presents a threat to public health, and welfare to the environment which can currently only be mitigated by the completion of this removal action which is consistent and appropriate with preliminary removal measures.

Excavation and capping of the tailings in the sediment pond will greatly reduce the amount of acidic and metallic-laden groundwater and surface water around Ore Knob. Weather conditions such as wind, rainfall runoff and erosion have already contributed to the dispersion of iron, copper and arsenic laden tailings off-site and into nearby streams, creeks and rivers. This water is believed to be a contributing source of unsafe drinking water for residents in the vicinity. The Superfund Remedial and Site Evaluation Branch (SRSEB) has agreed that addressing these issues immediately will have an immediate beneficial environmental impact as well as be vastly more cost effective than prolonging these actions for a period of years. Neither the State nor local government has the funding or resources to adequately address the threats at the Site.

VI. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

The proposed actions listed below have been developed in coordination with SRSEB. These actions are designed to promote public safety and provide a permanent remedy consistent with long-term cleanup activities of the remedial program. Due to the inherent uncertainties associated with SRESB actions, the OSC, in a manner consistent with the NCP, may need to modify removal procedures as conditions warrant.

1. Proposed Action Description

Proposed Actions required for continuation of the response action include all those outlined in the previous Action Memo as well as the following:

- a) Excavate tailings pond at the 1950's Mine and Mill Site.
- b) Excavate tailings from Ore Knob Branch to the extent practicable.
- c) Cap the tailings impoundment and add vegetation throughout the Site.

d) Decommission ore bins at the 1950's Mine and Mill Site.

2. Contribution to Remedial Performance

The proposed removal action will address the threats discussed in Section III, which meet the NCP Section 300.415(b)(2) removal criteria. The removal action contemplated in this Action Memorandum is consistent and has been developed with the cooperation of the SRSEB with the intent of contributing to efficient performance of any long term remedial action. The actions proposed have been agreed upon by both ERRB and SRSEB to be appropriate and will ensure an orderly transition from removal to remedial response as provided in the NCP Section 300.415 (g).

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

This proposed action is a time-critical removal and does not require an EE/CA.

4. Applicable or Relevant and Appropriate Requirements (ARARs)

On-Site removal actions conducted under CERCLA are required to attain ARAR to the extent practicable, considering the exigencies of the situation.

North Carolina Department of Dam Safety has stated that all spillways on a high hazard dam must comply with a spillway flood design of 1/3 to 1/2 Probable Maximum Precipitation (PMP). This rule is for a dam capable of impounding 10 acre-ft or more of water. Where loss of life is not likely, a smaller flood event can be selected. If the Ore Knob Tailings Dam were to fail in response to a flood event, it is unlikely that there would be loss of life. The expected failure consequences would be degradation of an already contaminated downstream environment. For this reason, a lower design event can be selected for sizing the channel.

The Ore Knob dam is impounding mine tailings and the practicality of building such a structure would be outside of the realm of ERRB. Providing a large flow channel at this Site is hampered by several limitations including the site topography, proximity to property lines, and availability and cost of construction materials. ERRB and USBR have sized the diversion channel to adequately handle a 100-year storm event. The additional spillway capacity has been discussed with NC Dam Safety and can be addressed if needed. All wastes transferred off-site will comply with U.S. EPA's Off-Site Rule (40 CFR 300.440).

5. Project Schedule

Response actions at the Site will be implemented upon approval of this Action Memorandum and access to the Site. Removal activities are expected not to exceed 12 months from the date of approval of this document.

B. Estimated Costs

	<u>Previous Ceiling(\$)</u>	<u>Change(\$)</u>	<u>New Ceiling(\$)</u>
ERRS	4,550,000	2,000,000	6,550,000
USBR	250,000	0	250,000
USCG Strike Team	120,000	100,000	220,000
START	300,000	0	300,000
Subtotal Extramural Costs	5,220,000	2,100,000	7,320,000
Contingency (20%)	42,500	420,000	462,500
Totals	5,262,500	2,520,000	7,782,500

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

The tailings carry extremely high concentrations of arsenic (150 ppm), iron (90,000 ppm), zinc (250 ppm) and copper (12,000 ppm). The low pH of the water in the area is believed to be a major contributor to the high levels of manganese (10,000 ppm) found in residential wells in the area. As a result, many residences in the area do not have a reliable source of potable water. The constituents within the tailings would also be deposited along the floodplain and in residential farmlands along the river, threatening the designated receiving waters of Peak Creek and Little Peak Creek as trout waters, and South Fork New River as outstanding resource waters, making the ability to grow crops, raise livestock and recreational river activity in these areas extremely difficult if not impossible.

VIII. OUTSTANDING POLICY ISSUES

There are no outstanding policy issues.

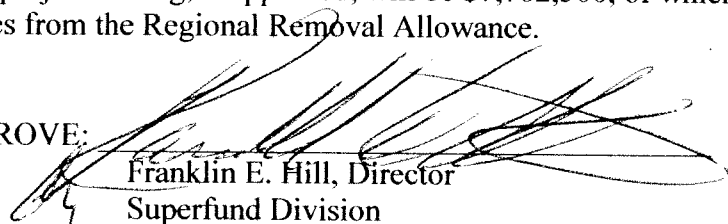
IX. ENFORCEMENT

U.S. EPA issued a Notice Letter and to Responsible Parties on August 12, 2008. The potentially responsible parties' ability to pay is unlikely, and the parties have stated that they do not have the means to mitigate the threats on the Site. For additional information, refer to the enforcement addendum attached to the original action memo. The total EPA costs for this removal action based on full-cost accounting practices that will be eligible for cost recovery are estimated to be \$11,096,216¹.
[(\$7,782,500 + \$40,000) + (41.85% * \$7,782,500)]

X. RECOMMENDATION

This decision document represents the selected removal action for the Ore Knob Mine Site located in Ore Knob, Ashe County, North Carolina. These response actions have been developed in accordance with CERCLA as amended, and are not inconsistent with the NCP. This decision is based upon the Administrative Record for the Site. Conditions at the Site continue to meet the NCP Section 300.415(b)(2) criteria for a removal action, and I recommend your approval of the proposed removal action. The total project ceiling, if approved, will be \$7,782,500, of which, an estimated \$6,550,000 comes from the Regional Removal Allowance.

APPROVE:



Franklin E. Hill, Director
Superfund Division

DATE:

7/12/10

DISAPPROVE:

DATE:

Franklin E. Hill, Director
Superfund Division

Attachment

1. Administrative Record Index
2. Action Memorandum Dated September 15, 2008
3. Change of Scope Action Memorandum Dated April 28, 2009

¹Direct costs include direct extramural costs and direct intramural costs. Indirect costs are calculated based on an estimated indirect cost rate expressed as a percentage of site-specific direct costs, consistent with the full cost accounting methodology effective October 2, 2000. These estimates do not include pre-judgment interest, do not take into account other enforcement costs, including Department of Justice costs, and may be adjusted during the course of the removal action. The estimates are for illustrative purposes only and their use is not intended to create any rights for responsible parties. Neither the lack of a total cost estimate nor deviation of actual total costs from this estimate will affect the United States' right to cost recovery.