



# UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII  
901 NORTH 5TH STREET  
KANSAS CITY, KANSAS 66101

## ACTION MEMORANDUM

SUBJECT: Request for a Removal Action and 12-month Emergency Exemption at the Jefferson County Lead Site, Jefferson County, Missouri

FROM: *for* James O. Silver  
On-Scene Coordinator *[Signature]*

THRU: Scott Hayes, Chief *[Signature]*  
Emergency Response & Removal Branch

TO: Cecilia Tapia, Director  
Superfund Division

CERCLIS ID#	MON000705443
Site ID#	A7D2
Category of Removal	Time Critical
Nationally Significant/Precedent Setting:	No

### I. PURPOSE

The purpose of this Action Memorandum is to request funding and document approval of the proposed removal action and an exemption from the 12-month statutory limit on removals for the Jefferson County Lead Site (site). This Action Memorandum will address the following scenarios. First, where contaminated drinking water at the tap is found to be above the removal action level (RAL) or other established site-specific level, an alternative drinking water source will be provided. Second, EPA will excavate and remove all soils and/or wastes from properties where a composite sample exceeds a concentration of 400 milligrams per kilogram (mg/kg)/parts per million (ppm) for lead and the area is a high-use area for children 84 months of age or younger or the residence of child with an elevated blood lead (EBL) greater than 10 micrograms per deciliter. Third, EPA will excavate and remove soils and/or wastes from properties where a composite sample exceeds a concentration of 1,200 ppm for lead.

The primary objective of this action is to eliminate or reduce potential ingestion exposure due to the presence of lead and other heavy metals in the drinking water and in the soils. This 12-month exemption satisfies the criteria for removal actions under section 300.415(b)(2) of the National Contingency Plan (NCP). This request meets the emergency criteria for exemption of Section 104(c)(1) of Comprehensive Environmental Response, Compensation, and Liability Act

(CERCLA), 42 U.S.C. § 9604(c)(1) from the statutory limits of removal actions, and is necessary because EPA needs to eliminate or reduce potential ingestion exposure due to the presence of lead and other heavy metals in drinking water and in the soils. It is anticipated that the alternate drinking water source will have to be supplied well past a 12-month period of time.

## **II. EXEMPTION FROM STATUTORY LIMITS**

The response actions are immediately required to prevent, limit, or mitigate an emergency. This response action includes excavating contaminated soils in yards and providing alternative drinking water as described in the Action Memorandum, thereby reducing the potential for exposure to lead, cadmium, and arsenic. If funding is not provided, these threats will not be addressed and residents will continue to be exposed to high lead, cadmium, or arsenic concentrations that could lead to adverse health effects.

Assistance will not otherwise be provided on a timely basis. Neither the state of Missouri, the county, nor the local governments have the response authority and/or resources to implement the described actions. The high lead levels found in residential soils and drinking water in this area require an immediate response to address the health risks posed to the residents.

The above conditions satisfy the emergency exemption criteria for a 12-month exemption and should be granted in order to immediately provide emergency response actions.

## **III. SITE CONDITIONS AND BACKGROUND**

### **A. Site Description**

#### **1. Removal site evaluation**

The site consists of high concentrations of lead contamination from mining. The ore would normally be hauled from the mines to the concentrators (also known as mills) where it was formed into lead concentrate. Lead concentrate at the site was/is derived from the physical concentration of lead sulfide ore and is typically 70-80% (700,000 to 800,000 ppm) lead sulfide.

The primary problem areas at this site that require action are lead-contaminated soils in yards and drinking water wells contaminated with metals.

#### **2. Physical location and site characteristics**

Jefferson County is located in southeastern Missouri. It is bordered on the north by St. Louis County and the Meramec River, on the east by the Mississippi River, on the south by St. Genevieve and St. Francis Counties, and on the west by Washington and Franklin Counties. The County encompasses 664 square miles. According to the 2000 census, the population of Jefferson County is 198,099 people. The county seat is located in Hillsboro,

Missouri. Jefferson County was organized in 1818 and named in honor of former President Thomas Jefferson.

Mining activities in Jefferson County began in the early 1800s in southern Jefferson County where the Cambrian dolomite source rock is concentrated along Big River and other major streams. The first production operation was a lead shot tower erected in 1809 in the southern part of Herculaneum. Two mines were in operation as early as 1818. Gray's mine was located on Big River and McKane's mine was located on Dry Creek. Many other mines were opened in the 1830s and 1840s for the production of lead, zinc, and barium (tiff). By 1855, three smelters were operating in Jefferson County, including Valles Mines, Mammoth Mines, and Sandy Mines. Historical records indicate that over three million pounds of lead was shipped out of Jefferson County annually during this time period, making it one of the leading lead producers.

The Inventory of Mines, Operations, and Prospects database lists 253 historical sites associated with mining and production operations in Jefferson County. Of these, 202 of the mining sites were designated for lead, or lead and other commodities, particularly zinc and barium (tiff). Most of the remaining sites were exclusively tiff mines. Past mining operators in Jefferson County included the St. Joe Lead Company (now Doe Run), the Valle Mining Company, the Big River Lead Company, Del Stocking, Magnolia Mining & Milling Company, Sandy Mining Company, National Lead Company, Bennett Lead & Zinc Company, Walther Mining Company, Ed Dixon, Big River Lead Mine, M. Development Company, and Iva Schmitz-Rome & John. Of these operators, Doe Run is the only mining operator currently listed in Jefferson County. Doe Run's smelter was opened in 1892 by its predecessor, the St. Joe Lead Company. In 2003, the Doe Run smelter was producing over 100,000 tons of lead a year. The Valles Mining company is also still in existence, but no longer mines for lead. According to historical records, the company operated the lead mine and smelting operation at Valles Mines from approximately 1824 through the 1930s. The ruins of several ore-milling structures, a former smelter, chat piles, and mill wastes are still present in the vicinity of Valles Mines.

In September 2006, EPA began an integrated site assessment, which included soil and groundwater sampling in the area. During this sampling event, EPA sampled the soil at 353 residences located on or near mining or mine-waste disposal areas. Based on this data, approximately 22% (55) of these residential properties had soils that exceeded 400 ppm, and 6% (22) had soils that exceeded 1,200 ppm for lead. Beginning in September 2006, EPA also sampled approximately 304 private drinking water wells in Jefferson County. Of these 304 wells sampled, 36 (12%) were found with lead levels greater than 15 parts per billion (ppb) and/or cadmium levels greater than 5 ppb.

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

The primary contaminant of concern at this site is lead and lead compounds. EPA has documented total lead concentrations in soil in residential yards at levels exceeding 1,200 ppm. EPA has currently identified 22 residential yards in Jefferson County that exceed 1,200 ppm. In addition, EPA has sampled numerous mining areas and mine-waste disposal areas that had soil concentrations exceeding 1,200 ppm. Drinking water samples

collected by EPA indicate a significant release of heavy metal contaminants, particularly lead, into the groundwater. EPA sampling documented 36 private drinking water wells that exceeded 15 ppb and two wells that exceeded 5 ppb for cadmium.

Lead, lead compounds, arsenic, and cadmium are hazardous substances (as defined by section 101(14) of the CERCLA, and is listed at 40 CFR § 302.4) and have been detected in the groundwater, soils, and mining wastes at the site.

4. NPL status

The site is not currently on or proposed for listing on NPL. The EPA has just completed a removal assessment to identify lead-contaminated residential yards and contaminated wells.

5. Maps, pictures, and other graphic representations

A map depicting the site is attached.

B. Other Actions to Date

There has been no known EPA or MDNR response actions at this site to reduce the risks posed by lead contamination.

C. State and Local Authorities' Roles

EPA is closely coordinating with the Missouri Department of Natural Resources (MDNR), the Missouri Department of Health and Senior Services (MDHSS), and the Jefferson County Health Department. These agencies, EPA, and the Agency for Toxic Substances and Disease Registry (ATSDR) hold monthly conference calls to stay updated and discuss various issues concerning the site.

#### **IV. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT AND STATUTORY AND REGULATORY AUTHORITIES**

A. Threats to Public Health or Welfare

At any release, regardless of whether the site is included on the NPL, where the lead agency makes the determination, based on factors in 40 CFR Part 300.415(b)(2) that there is a threat to public health or welfare or the environment, the lead agency may take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or threat of release. The factors in 40 CFR Part 300.415(b)(2) that apply to this site are:

**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.**

Elevated concentrations (greater than 1,200 ppm) of lead have been found throughout the site. Children playing in and around the contaminated areas have the highest potential to be negatively impacted by exposure. In addition, sampling has determined that numerous private drinking water wells have been contaminated with lead, arsenic, and cadmium.

Lead, arsenic, and cadmium are metals that are listed as hazardous waste (lead/D008, cadmium/D006, and arsenic/D004) in the regulations for the Resource Conservation and Recovery Act (RCRA). Lead is classified by the EPA as a probable human carcinogen and is a cumulative toxicant. Children are more vulnerable to lead poisoning than adults. The early effects of lead poisoning are nonspecific and difficult to distinguish from the symptoms of minor seasonal illnesses. For children, low levels of lead are harmful and are associated with decreased intelligence, impaired neurobehavioral development, decreased stature and growth, and even damage the central nervous system, kidneys, and reproductive system. At higher levels, it can cause comas, convulsions, and death.

In adults, the early effects of lead poisoning are nonspecific and difficult to distinguish from the symptoms of minor seasonal illnesses. Lead exposures to humans can occur by inhalation, ingestion, or dermal contact. Lead poisoning causes decreased physical fitness, fatigue, sleep disturbance, headache, aching bones and muscles, digestive symptoms (particularly constipation), abdominal cramping, nausea, vomiting, and decreased appetite. With increased exposure, symptoms include anemia, pallor, a "lead line" on the gums, and decreased handgrip strength. Alcohol and physical exertion may exacerbate these symptoms. The radial nerve is affected most severely causing weakness in the hands and wrists. Central nervous system effects include severe headaches, convulsions, comas, delirium, and possibly death. The kidneys can also be damaged after long periods of exposure to lead, with loss of kidney function and progressive azotemia. Reproductive effects in women include decreased fertility, increased rates of miscarriage and stillbirth, decreased birth weight, premature rupture of membrane, and/or pre-term delivery. Reproductive effects in men include erectile dysfunction, decreased sperm count, abnormal sperm shape and size, and reduced semen volume. Lead exposure is associated with increases in blood pressure and left ventricular hypertrophy. A significant amount of lead that enters the body is stored in the bone for many years and can be considered an irreversible health effect. Lead is classified as a probable human carcinogen.

High levels of cadmium in drinking water can severely irritate the stomach, leading to vomiting and diarrhea. Long-term exposure to lower levels of cadmium in air, food, or water leads to a buildup of cadmium in the kidneys and possible kidney disease. Other long-term effects are lung damage and fragile bones. The Department of Health and Human Services has determined that cadmium and cadmium compounds may be a carcinogen.

Arsenic ingestion may lead to several kinds of cancer (lung, liver, kidney, and prostate) and also darkening skin, thickening of the skin on palms of hands and the soles of feet, skin cancer, and many small warts or corns.

**300.415(b)(2)(ii) – Actual or potential contamination of drinking water supplies or sensitive ecosystems.**

The EPA sample results showed numerous private drinking water wells were contaminated with lead and/or arsenic and cadmium above federal and state drinking water standards. The RAL for lead at this site is 15 ppb, and EPA has identified 36 wells exceeding the RAL. EPA has also identified two wells that exceed 5 ppb for cadmium.

**300.415(b)(2)(iv) – High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate.**

Lead has been detected in surface soils above the time-critical removal action level of 1,200 ppm. Lead-contaminated soils may migrate via airborne dusts, surface runoff, percolation into groundwater, construction activity, children transporting soils/dusts into their homes after playing in the affected areas, and foot traffic into residences.

**V. ENDANGERMENT DETERMINATION**

The actual release of a hazardous substance at this site, if not addressed by implementing the response action selected in this Action Memorandum, presents an imminent and substantial endangerment to the health of the public that comes in contact with the site and to public welfare and the environment.

**VI. PROPOSED ACTIONS AND ESTIMATED COST**

**A. Proposed Actions**

**1. Proposed action description**

**PROVISION OF ALTERNATIVE DRINKING WATER**

An EPA site specific analysis by the Regional Toxicologist (attached) has determined that the Jefferson County Mining District represents an area of wide-spread lead contamination where young children are exposed to multiple sources of lead. In areas where this determination has been made and EPA suspects that the contaminated drinking water is the result of contaminated groundwater, the drinking water Time-Critical Removal Action Levels (RALs) for lead, cadmium, and arsenic are 15ppb, 5 ppb, and 10 ppb, respectively. Any residence where purged unfiltered tap water data exceeds the RALs, an alternate source of drinking water should be provided as long as the sampling results indicate that the contamination is not from plumbing (CERCLA Section 104(a)(3)(C)) or natural sources (CERCLA Section 104(a)(3)(A)). Both first-run and purged unfiltered tap water and groundwater should be sampled and analyzed in making the determination (Superfund Lead-Contaminated Residential Sites Handbook, (OSWER 9285.7-50, August 2003)). Should the results demonstrate that the groundwater is potentially contaminated but the tap-water is below the RALs, the EPA will notify the local health officials or other appropriate authority for further monitoring and action in accordance with Section 300.415(e)(9) of the NCP.

## SOIL/WASTE EXCAVATION, REMOVAL, AND REPLACEMENT

EPA will not intentionally address naturally occurring lead ores in their undisturbed state as part of this action. Although the site has been heavily mined in the past, it may be possible to encounter naturally occurring lead ores during residential property excavation. Section 104(a)(3)(A) of CERCLA states that removal or remedial actions shall not be provided in response to a release or threat of release of a naturally occurring substance in its unaltered form or altered solely through natural processes in a location where it is naturally found. Naturally occurring lead ores could be found at the bedrock interface and in undisturbed clay soils near the surface. Another indicator of the presences of naturally occurring lead ores could be a high density of galena crystals in soils or unusually high concentrations of lead in excavated soils. When these conditions are encountered, they will be documented, excavation will stop, and backfill initiated.

EPA will excavate and remove all soils and/or wastes from properties where a composite sample exceeds a concentration of 400 ppm for lead and the area is a high-use area for children 84 months of age or younger or the residence of child with an elevated blood lead greater than 10 micrograms per deciliter.

Properties with soil concentrations of lead exceeding the action level of 1,200 ppm will be excavated in site predetermined lifts until levels are below 400 ppm or until 12 inches of soil has been excavated. At 12 inches and if levels are still not below 1,200 ppm and it is determined that lead levels below 1,200 ppm at or above an excavation depth of approximately 24 inches can be achieved, excavation can continue and no warning barrier will be required at the base of the excavation. Should it be determined that lead levels below 1,200 ppm cannot be reached at a excavation depth of about 24 inches, excavation will cease and a warning barrier will be placed to alert homeowners of the existence of high levels of lead.

After removing the soils from the affected area or areas and placing the warning barriers where required, the excavated soils will be replaced with clean soils. Clean soils are soils that have been analyzed for lead and other heavy metals, and results indicate that the lead concentration is below 240 ppm, and all other hazardous substances, pollutants, or contaminants are below residential soil screening levels determined by EPA or by referring to the Region 9 Preliminary Remediation Goal tables found at <http://www.epa.gov/Region9/waste/sfund/prg/index.htm>.

## SOIL TREATMENT AND DISPOSAL

EPA shall collect soil samples from the excavated soils to conduct the Toxicity Characteristic Leaching Procedure (TCLP) analysis according to the requirements of SW-846-Chapter 9 (representative sampling for waste piles). Soils that exceed the TCLP limits for lead and other metals must be properly treated with an appropriate lead stabilization chemical and resampled until the levels are below the TCLP limits for lead. Treatment of soils will not be conducted at the residence.

Transportation, treatment, storage, and disposal of the excavated material shall be in accordance with all applicable local, state, or federal requirements.

### POST REMOVAL SITE CONTROL

It is EPA policy that Post Removal Site Control (PRSC) shall be the responsibility of the State, the potentially responsible party, or the remedial program. At this time it is uncertain what, if any, PRSC will be needed. When that determination is made, the On-Scene Coordinator, working through regional management, will attempt to obtain PRSC agreements as appropriate.

#### 2. Contribution to remedial performance

The fund-lead actions proposed in this Action Memorandum should not impede any future remedial plans or other response. This is consistent with any long-term remedy in that it fully addresses the direct-contact threat posed by lead contamination at this site.

#### 3. Action/cleanup level

Yards with lead-contaminated soils above 1,200 ppm will be excavated, treated if TCLP analysis fails, and disposed of at an acceptable soil repository. Another suitable option is to dispose of excavated soils that meet the definition of a hazardous waste in a RCRA Subtitle C disposal facility. These levels are consistent with the revised interim guidance for lead-contaminated Superfund sites (Office of Solid Waste and Emergency Response (OSWER) Directive 9355.4-12) and have received concurrence by ATSDR.

All site-sampling activities for comparison to the action levels will be conducted in accordance with the approved Quality Assurance Project Plan.

For those residences that exceed the proposed levels for drinking water in VI.A.1. above, an alternate drinking water source will be provided that may include bottled water, a filtration system, or other alternatives. It is anticipated that this action will exceed 12 months.

This Action Memorandum also allows for continued soil and water sampling of residences in this area.

#### 4. Applicable relevant and appropriate requirements (ARARs)

Section 300.415(j) of the NCP provides that fund-financed removal actions under section 104 of and removal actions pursuant to CERCLA section 106 shall, to the extent practicable considering the exigencies of the situation, attain ARARs under federal environmental or state environmental facility siting laws. The following specific ARARs have been identified for this action:

- Subtitle D of the RCRA, section 1008; section 4001, et seq.; 42 U.S.C. §6941, et seq.; State or Regional Solid Waste Plans and implementing federal and state regulations.



- Occupational Safety and Health Act, 29 CFR Part 1910 will be applicable to all actions.
- Subtitle C of RCRA, 42 U.S.C. section 6901, et seq.; 40 CFR Part 260, et seq. and implementing federal and state regulations for contaminated soils that exhibit the characteristic of toxicity and are considered RCRA hazardous waste.

Subtitle C of RCRA is potentially applicable for the removal of soils contaminated with heavy metals from spills of lead concentrate, particularly if these soils exceed the TCLP regulatory threshold. However, soils contaminated with heavy metals from extraction, beneficiation, or processing of ores are exempt from the requirements of RCRA, Subtitle C pursuant to the Bevill amendment, section 3001(b)(3)(A) of RCRA, 42 U.S.C. section 6921(b)(3)(A), and implementing regulations, 40 CFR section 261.4(b)(7).

- 40 CFR Part 122, section 122.26, National Pollution Discharge Elimination System storm water discharge regulations, may be relevant and appropriate for management of storm water runoff from the repository.
- 49 CFR Parts 107 and 171-177, DOT hazardous material transportation regulations, may be relevant and appropriate for transportation of the contaminated soils to the repository.

EPA has requested potential state ARARs for this site. When received, these ARARs will be evaluated per the EPA guidance on consideration of ARARs during removal actions.

Any lead-bearing wastes exceeding the TCLP regulatory threshold will undergo treatment in accordance with the requirements of the RCRA.

## 5. Project schedule

Response activities are anticipated to begin within thirty days of the signing of this Action Memorandum. It is expected that soil excavation will take several months to complete.

While providing a source of clean drinking water will be relatively quick, it is expected that the water will be provided for a lengthy period of time until an alternate source, treatment system, or engineering control is provided, or EPA determines that the contamination to the drinking water source was naturally occurring, at which point EPA would discontinue supplying the alternate drinking water source.

Soil and water sampling will continue in selected locations throughout this area for an undetermined period of time to address other potentially impacted residences.

## B. Estimated Costs

The costs associated with this removal action are estimated as follows:

Extramural Costs:

Removal Costs	\$1,249,824
20% Contingency	<u>249,964</u>
Removal Ceiling	\$1,499,788

EPA direct and indirect costs, although cost recoverable, do not count toward the Removal Ceiling for this removal action. Refer to the enforcement section for a breakout of these costs.

## **VII. ENFORCEMENT**

See attached Confidential Enforcement Addendum for this site. For NCP consistency purposes, it is not a part of this Action Memorandum.

The total EPA costs for this removal action based on full cost-accounting practices are estimated to be \$2,346,483.

Direct Extramural Costs	\$1,499,788
Direct Intramural Costs	40,000
EPA Indirect (52.39% of all costs)	<u>806,695</u>
Total Project Costs	\$2,346,483

Direct costs include direct extramural 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 prejudgment interest, do not take into account other enforcement costs, including Department of Justice costs, and may be adjusted during the course of a 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.

## **VIII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN**

Delayed action will continue to potentially expose residents, particularly children, to the contaminated soils and drinking water exceeding the federal action levels.

## **IX. OUTSTANDING POLICY ISSUES**


None.

## **X. RECOMMENDATION**

This decision document represents the selected removal action for the contaminated soils and drinking water at the site. The removal action was developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision is based on the Administrative Record for the site.

Conditions at the site meet NCP section 300.415(b) criteria for a removal action, and I recommend your approval of this proposed removal action. The removal ceiling, if approved, will be \$1,499,788. This amount comes from the Regional Removal Allowance.

Approved:

  
Cecilia Tapia, Director  
Superfund Division

9-27-07  
Date

Attachments:

Site Map Showing Areas of Contamination

EPA site specific analysis by the Regional Toxicologist

Memorandum on Site-Specific Removal Action Levels for Lead

Southwest Missouri Mining District and Central Mining District