

Health Consultation

Use of Material from the Elvins/Rivermines Tailings as Agricultural Lime

ELVINS MINE TAILINGS

ELVINS, ST. FRANCOIS COUNTY, MISSOURI

EPA FACILITY ID: MOD985818244

JANUARY 16, 2004

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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Prepared by:

Missouri Department of Health and Senior Services
Division of Environmental Health and Communicable Disease Prevention
Section for Environmental Public Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Statement of Issues and Background

Statement of Issues

The Missouri Department of Health and Senior Services (DHSS), in cooperation with the federal Agency for Toxic Substances and Disease Registry (ATSDR), has completed this health consultation at the request of the Environmental Protection Agency (EPA) to determine potential health risks related to the removal of fine tailings materials from the Elvins area for use as agricultural lime.

Background

The Elvins/Rivermines Mine Tailings site (referred to hereafter as the site) is one of the six major mine tailings sites in the Park Hills-Desloge-Bonne Terre area of St. Francois County, Missouri. This area is commonly referred to as the “Old Lead Belt.” The site is located between the former towns of Elvins and Rivermines, now part of the City of Park Hills (Figure 1). Mining activities commenced in the Old Lead Belt about 1890, with early operations including mining, milling, roasting, and smelting (1,2). In the early years, milling operations were conducted at numerous locations in the area. Milling operations were consolidated at Elvins around 1909. The Elvins Mill also processed ore from other area mines until it was permanently closed around 1940 (1,2).

The site consists of a chat pile that covers approximately 20 acres and is approximately 170 feet high, and a tailings area covering approximately 130 acres. The tailings area is relatively flat and approximately 50 feet lower than the chat pile. “Chat” is a gravel-like waste product from mining and milling of lead ore, generally larger than 0.25 inches in diameter. “Tailings” are smaller, resulting from a different type of milling process. Tailings are generally less than 0.033 inches in diameter. The tailings area contains a surface water pond located in the northern portion of the area with woods bordering on the north and west of the tailings. A quarry and bituminous mix operation (asphalt plant), operated by Lead Belt Materials Company (LBM Co.), is located on site and uses chat/tailings as part of their asphalt mix. Until recently, LBM Co. sold fine tailings to local farmers for use as agricultural lime (2).

Environmental investigations have been conducted at the Elvins site. Chat and tailings were sampled during these investigations to determine the levels of contamination present. Sampling results are presented in Table 1. Tier 1 Soil Target Concentrations (STARC) values from the Missouri Department of Natural Resources’ (DNR) Cleanup Action Levels for Missouri (CALM) are also presented in Table 1 for comparison as screening values. Tier 1 STARC values are health-based concentrations representing the maximum concentration of a chemical that is acceptable in the soil, regardless of future land use. In general, the concentration of lead detected exceeded the STARC concentrations, indicating potentially unacceptably high levels of lead in chat and tailings from the site. An Engineering Evaluation/Cost Analysis (EE/CA) for the site was prepared to determine the best available options for site remediation (3). The

Table 1			
Contaminants detected in the chat/tailings at the Elvins Mine Tailings Site in Parts per Million (ppm) (2,3,4)			
Contaminants	Range	Mean	Screening Value & Source
Lead ¹ (>90 samples)	851 - 11,600	4,392	260 Tier 1 STARC ³
Lead ² (3 samples)	1,500 - 8,600	5,067	260 Tier 1 STARC ³
Cadmium ¹ (>90 samples)	19.8 - 202	103	110 Tier 1 STARC ³
Cadmium ² (3 samples)	53 - 130	101	110 Tier 1 STARC ³
Zinc ¹ (>90 samples)	108 - 11,900	5,482	38,000 Tier 1 STARC ³
Zinc ² (3 samples)	2,90 - 8,400	6,400	38,000 Tier 1 STARC ³

¹ Wixson B., Gale N., Davies B. A study on the possible use of chat and tailings from the old lead belt of Missouri for agricultural limestone. 1983 December.

² CDM Federal Programs Corp. Site screening inspection report for site assessment activity at Elvins Mine Tailings site, Park Hills, Missouri. 1994 August 24.

³ Missouri Department of Natural Resources, Clean-Up Levels for Missouri (CALM), September 2001.
> = greater than

preferred alternative selected during the EE/CA process included lowering, regrading and capping of the chat pile, regrading and capping the tailings areas (with potential future use as an athletic complex), and removing chat and tailings from the spillway, creek channel and railroad grade (Figure 2). These actions are to be taken to prevent uncontrolled movement of chat and tailings material off-site.

Under the preferred alternative selected during the EE/CA, LBM Co. will be allowed to continue their asphalt operations. However, according to an agreement between the Doe Run Company, LBM Co. and the EPA, the sale of tailings materials for use as agricultural lime ceased on August 1, 2003 (3).

Blood Lead Data

Missouri Department of Health (DOH), now the DHSS, in conjunction with ATSDR, conducted an exposure study in the Old Lead Belt. Children's blood lead levels were examined in relation to concentrations of lead in yard soil, interior dust, paint and water and various measures of exposure. Similar analyses were conducted as a control in an area that did not have lead mining

history. The study concluded that, on average, children living in the Old Lead Belt had higher blood lead levels than children in the control area, and that exposure to mining waste (chat and tailings) was the most reasonable explanation for the difference in blood lead levels (5).

When the exposure study was completed, 17% of the children less than 72 months of age in the Old Lead Belt had blood lead levels greater than or equal to 10 micrograms per deciliter (ug/dL), the level considered to be acceptable by the Centers for Disease Control and Prevention. Several actions have been taken to reduce exposure to lead in the Old Lead Belt. Soil has been replaced in lead-contaminated yards, health education and blood lead testing have been provided and steps have been taken to stabilize the chat and tailings at some of the other large mine tailings sites in the area. Blood lead levels appear to be decreasing in the St. Francois County area according to blood lead surveillance data from DHSS's Systematic Tracking of Elevated Lead Levels and Remediation (STELLAR) database. In 2001, 10 percent of children less than 72 months who were tested in the county had elevated blood lead levels (greater than or equal to 10 ug/dL), and only 9 percent of those tested in 2002 had elevated blood lead levels. While most of the children who are in the STELLAR database are from the cities and towns in St. Francois county, a percentage are from rural areas, and a percentage of those children do have elevated blood lead levels (6).

Discussion

The chat and tailings at the site are contaminated with lead and, to a lesser extent, with cadmium. Tailings from the site have been used as agricultural lime for many years. The particle size and calcium content of the tailings make them ideal for use as agricultural lime. While the tailings material will break down over time, the metals will accumulate in the surface soil. No scientific studies have been done to assess the rate at which metals accumulate under these conditions, or the potential health risk posed by this accumulation.

Although blood lead levels in children in St. Francois County have gradually decreased over the last several years, there is still an unacceptably high percentage of the children tested who have an elevated blood lead level.

At this point, there is no scientific data that shows that use of fine tailings material as an agricultural lime does not pose a risk to public health or the environment. However, there are no controls in place to track the movement of the tailings and assure that the tailings are handled and used properly once they leave the site. Finally, there are no controls for property which has had tailings applied to it as agricultural lime to alert potential future users/purchasers of the property that lead concentrations could be elevated. These reasons combined along with the fact that lead mine/mill tailing materials at the site are hazardous substances as defined by the Comprehensive Environmental Remediation, Compensation, and Liability Act (CERCLA, or Superfund), create several potential exposure pathways that have not been adequately characterized. For example, exposure to the general public during transport, to farmers during reapplication, and future populations with changing land use, are all plausible.

Children's Health

Children are most affected by lead-contaminated materials because their activities involve introducing non-food items into their mouths. They are also more susceptible to the contaminants in the tailings/chat because of their immature and growing systems. Compared to adults, a greater proportion of the amount of lead swallowed will enter the blood of children. While about 99% of the amount of lead taken into the body of an adult will leave as waste within a couple of weeks, only 32% of lead taken into the body of a child will leave as waste (7). This allows for the accumulation of lead in the child's system where a variety of adverse health effects can occur depending on the level of lead to which they are exposed and the duration of exposure.

Regular blood-lead testing before a child is six years old is key to determining if the child has been exposed. Controlling contamination sources, eliminating exposure pathways, practicing good personal hygiene, and eating proper diet can prevent lead poisoning in children. To determine if a child has been exposed, blood-lead testing is available at the St. Francois County Health Department or from private physicians. The emphasis on blood-lead testing should be on children younger than six years old because they are the most susceptible to blood-lead poisoning. The St. Francois County Health Department also provides lead education materials to parents and their children to help them eliminate exposure pathways, promote good personal hygiene, and maintain a healthy diet. If these recommendations are followed, a parent can greatly reduce their child's risk of becoming lead poisoned.

Conclusions

Use of tailings material as agricultural lime has been classified as an Indeterminate Public Health Hazard. A site or situation is classified as an Indeterminate Public Health Hazard when there is insufficient data to draw conclusions about the public health hazard. The Indeterminate classification based on the following information.

1. There are currently no controls in place to monitor and track the use of tailings material once it leaves the Elvins site, making it difficult to characterize the likely exposures.
2. Additionally, there are no controls for property which has had tailings applied to it as agricultural lime which would alert potential future users/purchasers of the property that lead or cadmium concentrations could be elevated.

Recommendations

1. DHSS agrees with the recent decision to suspend the sale of mine tailings for use as agricultural lime. Furthermore, DHSS recommends that the process not resume until it has been determined that it does not pose a health risk or the appropriate controls, including handling, transportation, and application of the material, have been developed and a long-term stewardship plan for the properties has been developed and put into place.

Public Health Action Plan

The Public Health Action Plan (PHAP) for use of tailings materials from the Elvins/Rivermines site as agricultural lime contains a description of actions to be taken by the Missouri Department of Health and Senior Services (DHSS), the Agency for Toxic Substances and Disease Registry (ATSDR), and other involved parties. The purpose of the PHAP is to ensure that this health consultation not only identifies public health hazards, but provides an action plan to mitigate and prevent adverse human health effects resulting from past, present, and future exposures to contamination from the site. Included is a commitment from DHSS and/or ATSDR to follow up on this plan to ensure that it is implemented.

1. DHSS/ATSDR will work with St. Francois County Health Department to target rural portions of the county for blood lead screening.
2. DHSS/ATSDR will be available to review any follow-up or relevant information about the site.
3. DHSS/ATSDR will be available to answer questions and concerns the public may have about the site.
4. DHSS/ATSDR will work with the interested parties to participate in determining if the use of tailings materials as agricultural lime poses a health risk.
5. DHSS/ATSDR will provide input into the development of appropriate controls, including handling, transportation and application of tailings as agricultural lime. Additionally, we will assist in the development of a long-term stewardship plan for the properties that have had tailings applied as agricultural lime.

Preparers of Report:

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1. Fluor Daniel Environmental Services. Initial Remedial Investigation, Big River Mine Tailings Sites, Old Lead Belt, St. Francois County, Missouri, Draft. 1995 April.
2. Barr Engineering Company. Work Plan and Field Sampling Plan for the Engineering Evaluation/Cost Analysis, Elvins/Rivermines Mine tailings Site, Park Hills, Missouri, Rev-1. 2001 February 15.
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5. Agency for Toxic Substances and Disease Registry. Big River Mine Tailings Superfund Site Lead Exposure Study, St. Francois County, Missouri. Atlanta: U. S. Department of Health and Human Services; 1998 August.
6. Missouri Department of Health and Senior Services. Systematic Tracking of Elevated Lead Levels and Remediation (STELLAR) database.
7. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Lead, Update. Atlanta: US Department of Health and Human Services; 1999 July.

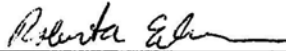
Certification

This Use of Tailings Material from the Elvins/Rivermines Tailings as Agricultural Lime Health Consultation was prepared by the Missouri Department of Health under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved methodology and procedures at the time the health consultation was initiated.



Technical Project Officer, SPS, SSAB, DHAC

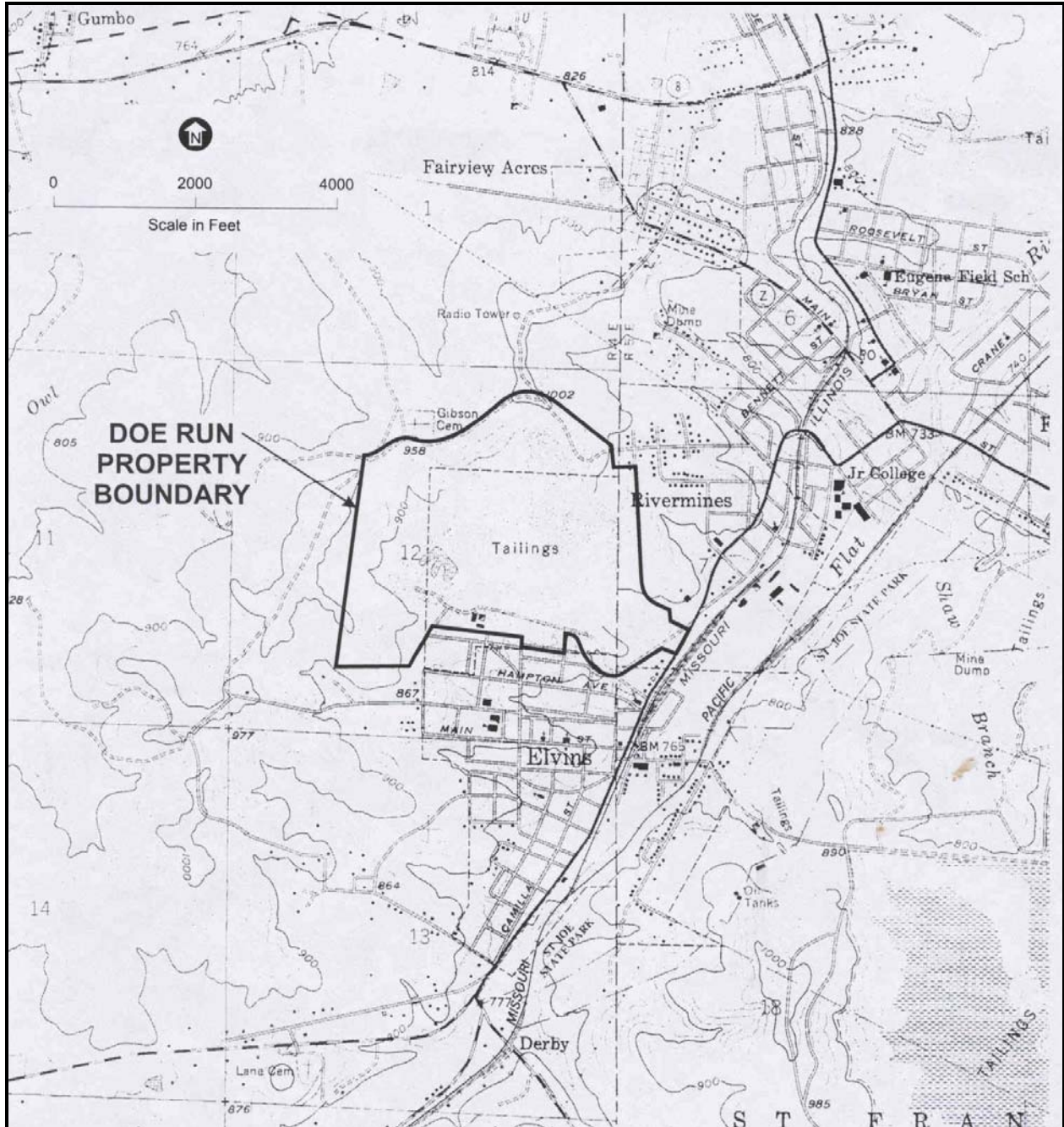
The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.



Section Chief, SPS, DHAC, ATSDR

Figure 1

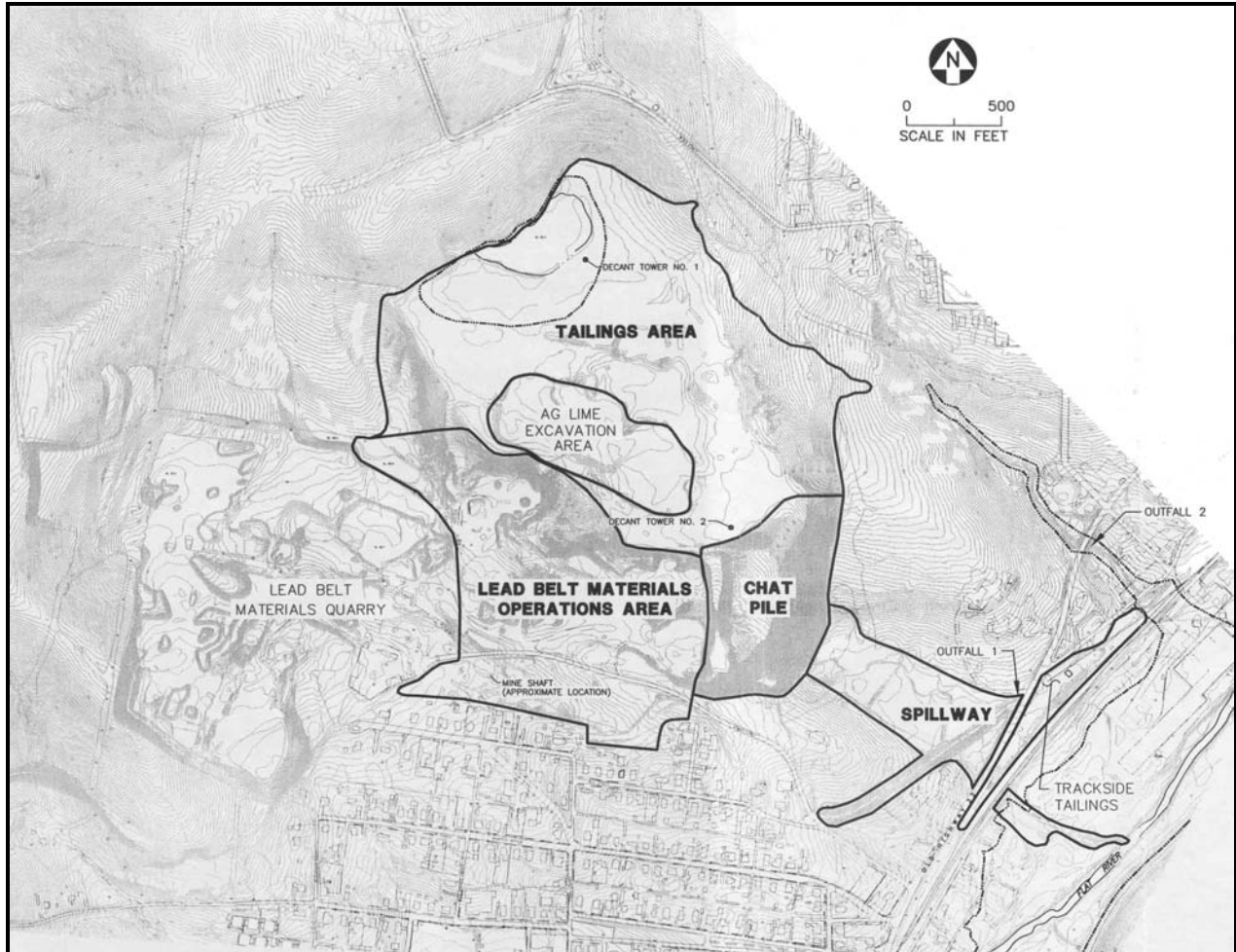
Elvins/Rivermines Mine Tailings Site Location Map



Source: Engineering Evaluation/Cost Analysis Report, Second Edition
Elvins/Rivermines Mine Tailings Site, Park Hills, MO.
Barr Engineering, June 2003

Figure 2

Elvins/Rivermines Mine Tailings Site Material Areas



Source: Engineering Evaluation/Cost Analysis Report, Second Edition
Elvins/Rivermines Mine Tailings Site, Park Hills, MO.
Barr Engineering, June 2003