

Health Consultation

DOE RUN SMELTER – ILLINOIS INVESTIGATION

VALMEYER/HARRISONVILLE, MONROE COUNTY, ILLINOIS

MARCH 7, 2008

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

DOE RUN SMELTER – ILLINOIS INVESTIGATION

VALMEYER/HARRISONVILLE, MONROE COUNTY, ILLINOIS

Prepared By:

Illinois Department of Public Health
Under cooperative agreement with the
Agency for Toxic Substances and Disease Registry

Purpose

The Illinois Environmental Protection Agency (Illinois EPA) requested that the Illinois Department of Public Health (IDPH) conduct a health consultation regarding the investigation of possible contamination near Valmeyer, Illinois from the Doe Run Smelting facility in Herculaneum, Missouri. IDPH reviewed available data to determine whether current conditions pose a public health hazard.

Background and Statement of Issues

Site Description and History

In February 2005, the Illinois EPA was tasked by the U.S. Environmental Protection Agency (USEPA) to initiate a pre-Comprehensive Environmental Response, Compensation and Liability Act Information System (CERCLIS) screening assessment of Illinois properties near the towns of Valmeyer and Harrisonville, Monroe County, Illinois. The investigative area included several residential properties, ponds, farmland, and wetlands that may be impacted by the Doe Run Smelting facility in Herculaneum, Missouri. The Doe Run Smelting Facility is an active lead smelter that has been in operation since 1892. The facility is situated on the Mississippi River in Herculaneum, Missouri, approximately 25 miles south of St. Louis, Missouri and 5 miles west of Valmeyer, Illinois. The smelter processes a lead ore concentrate consisting of approximately 80% lead sulfide. The 52-acre facility consists of a smelter plant, a 24-acre waste slag storage pile, and an onsite sulfuric acid plant [1].

Over the last 20 years, the USEPA and the Missouri Department of Natural Resources have taken repeated action to bring the smelter into compliance for violations of the clean air standards for lead [2]. Environmental sampling in the community of Herculaneum, Missouri indicated there was lead contamination throughout the community. Lead was found in residential yard soils at concentrations as high as 33,100 parts per million (ppm) and in ambient air ranging from non-detectable to 85 micrograms of lead per cubic meter of air ($\mu\text{g}/\text{m}^3$) [1].

In 2001, Doe Run Smelting and USEPA entered into an Administrative Order on Consent (AOC). The AOC resulted in new controls on air emissions and the characterization and cleanup of residential yards and home interiors within a 1.5 mile radius of the facility. This did not include the characterization of properties within Illinois [3]. Approximately 4 miles separates the Doe Run Smelting facility in Herculaneum, Missouri and the eastern bluff of the Mississippi River in Illinois [3]. In 1993, most of the investigative area was covered by flood waters from the Mississippi River.

Throughout the years, Valmeyer experienced periods of flooding in 1910, 1943, and 1944. A new levee system prevented flooding in subsequent years until 1993 when flood waters

submerged the town. As a result of the Flood of 1993, the entire village of Valmeyer was relocated from its original site in the Mississippi River bottom to its current location on a 500-acre tract of land about 2 miles east and 400 feet higher in elevation. A few homes and farms remain in the river bottoms but most have all moved to higher ground. In 1996, the community's new school opened with just over 400 students from Valmeyer and the surrounding rural area [4].

The 2005 Illinois EPA investigation focused on an area encompassing approximately 15 square miles in Monroe County, Illinois. The investigative area included 22 residential properties located in Valmeyer, Harrisonville, and surrounding areas. It also included several wetlands, farmland, and ponded areas. A total of 275 soil and sediment samples were collected from 91 locations throughout the Mississippi River valley [3]. The samples were screened for metals using a portable X-Ray Fluorescence (XRF) Spectrum Analyzer. The portable XRF spectrum analyzer is an effective instrument for screening soil to measure the levels of metals, including lead in surface soil. A large area can be investigated in a timely manner. The scope of the investigation was to determine if shallow surface soil in Illinois has been impacted by particulate fallout from the smelter.

Site Visit

In May 2005, IDPH staff visited the area with the purpose of conducting additional XRF screening at one of the residential properties previously investigated by Illinois EPA. IDPH staff screened several additional soil samples throughout the property in an effort to more fully characterize the surface soil lead levels at the residence.

The investigative area is rural, sparsely populated land consisting mainly of agricultural fields and flood plain.

Discussion

Chemicals of Interest

In preparing this health consultation, IDPH relied on the screening information provided by Illinois EPA and assumed that adequate quality assurance and quality control measures were followed during the sample collection and data reporting.

IDPH compared the concentration of each chemical with appropriate screening comparison values developed by the Agency for Toxic Substances and Disease Registry (ATSDR) and other sources, to select contaminants for further evaluation [5, 6]. A detailed discussion of each of the comparison values used is in Attachment 1. Chemicals exceeding comparison values or chemicals for which no comparison values were available were further evaluated for carcinogenic and non-carcinogenic health effects considering exposure to children and adults.

The chemical of interest for this investigation was lead given the lead smelting activities of the Herculaneum, Missouri facility and its history of violations of the clean air standard for lead.

Exposure Evaluation

The potential for exposed persons to experience adverse health effects depends on these three factors:

- how much of each chemical a person contacts,
- how long a person is exposed, and
- the person's health condition at the time of exposure.

An exposure pathway consists of a source of contamination, environmental media and transport mechanisms, a point of exposure, and a receptor population. Exposure to a contaminant may have occurred in the past, may be occurring now, or may occur in the future. When all these elements linking the contaminant source to an exposed population are known, a completed exposure pathway exists. When one of these elements is missing, but may occur, a potential exposure pathway exists. If a part of a pathway is absent and will never exist, the pathway is incomplete and can be eliminated from further consideration.

The screening results from the Illinois EPA investigation identified lead levels in area soils greater than background conditions suggesting there has been some impact to Illinois soils from the Doe Run Smelting facility. However, their investigation concluded that the levels found did not exceed health-based standards or removal action levels [3].

Child Health Considerations

IDPH recognizes that children are more susceptible to chemicals because their developing systems are more vulnerable, and because they consume more food, drink more water, and breathe more air than adults do on a per weight basis. They also spend much more time at ground level than adults and explore their environment with their hands and mouths, so they may contact and ingest more chemicals in surface soil.

The levels of lead identified in residential yards would not pose a health hazard to children.

Conclusions

Based upon the available information, IDPH concludes that smelting activities at the Doe Run Smelter in Herculaneum, Missouri have not resulted in lead levels in surface soils in Illinois that would pose a public health hazard.

Public Health Action Plan

IDPH has provided each homeowner a letter containing a personal assessment of the soil screening results for their property from the Illinois EPA investigation in 2005.

One property had elevated levels of lead, but the contamination was not site related. The contamination of that property was addressed through a letter and correspondence with the residents.

Should future sampling activities suggest contaminants are affecting populated areas, IDPH will reevaluate potential exposure to the surrounding population and respond accordingly.

Preparer of Report

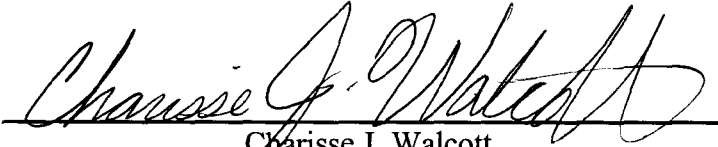
Lynn M. Stone
Environmental Health Specialist
Illinois Department of Public Health

References

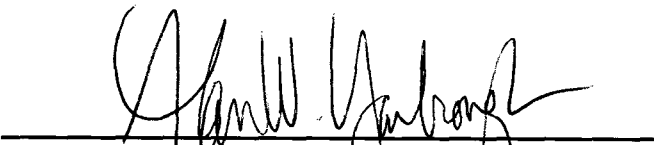
1. Agency for Toxic Substances and Disease Registry. Health Consultation for Herculaneum Lead Smelter Site, Herculaneum, Jefferson County, Missouri. Atlanta: US Department of Health and Human Services; January 2004.
2. Missouri Department of Natural Resources. Overview of Actions for Herculaneum Lead Contamination, Herculaneum, Missouri. Jefferson City, Missouri. June 2005.
3. Illinois Environmental Protection Agency. CERCLA Pre-Cerclis Screening Action Report for Doe Run Smelting, Harrisonville/Valmeyer, Monroe County, Illinois. LPC# 1330255010. Springfield, Illinois. August 2005.
4. Website: www.conradol.com/valmeyer . Valmeyer – A New Beginning. Valmeyer, Monroe County, Illinois. March 2006.
5. Agency for Toxic Substances and Disease Registry. Soil Comparison Values. April 2005.
6. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Lead (Draft for Public Comment). September 2005.

Certification

This Doe Run Smelter-Illinois Investigation public health consultation was prepared by the Illinois Department of Public Health under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodologies and procedures existing at the time the health consultation was initiated. Editorial review was completed by the Cooperative Agreement partner.


Charisse J. Walcott
Technical Project Officer, CAT, CAPEB, DHAC

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


Alan Yarbrough
Team Lead, CAT, CAPEB, DHAC, ATSDR

Comparison Values Used In Screening Contaminants For Further Evaluation

Environmental Media Evaluation Guides (EMEGs) are developed for chemicals based on their toxicity, frequency of occurrence at National Priorities List (NPL) sites, and potential for human exposure. They are not action levels but are comparison values. They are developed without consideration for carcinogenic effects, chemical interactions, multiple route exposure, or exposure through other environmental media. They are very conservative concentration values designed to protect sensitive members of the population.

Reference Dose Media Evaluation Guides (RMEGs) are another type of comparison value. They are developed without consideration for carcinogenic effects, chemical interactions, multiple route exposure, or exposure through other environmental media. They are very conservative concentration values designed to protect sensitive members of the population.

Cancer Risk Evaluation Guides (CREGs) are estimated contaminant concentrations based on a probability of one excess cancer in a million persons exposed to a chemical over a lifetime.

Table 1. Range of Lead Level Detected in Surface Soils
 Valmeyer, Monroe County, IL
 X-Ray Fluorescence (XRF) Screening Results (parts per million)
 Doe Run Smelter – Illinois Investigation (source: Illinois EPA)

Property	Range of Lead Levels Detected In Surface Soil (ppm)
1	49.8 - 51.2
2	65.0 - 93.6
3	86.0 - 147.4
4	92.3 - 103.2
5	87.4 - 186.0
6	91.3 - 187.4
7	117.0 – 2179.2
8	66.8 – 127.6
9	117.2 – 141.6
10	<LOD – 45.7
11	44.4 – 86.1
12	<LOD – 46.2
13	106.2 – 199.4
14	89.5 – 107.5
15	31.4 – 73.4
16	76.1 – 77.6
17	<LOD – 51.3
18	63.7 – 66.2
19	<LOD
20	30.9 – 41.6
21	<LOD – 35.1
22	<LOD – 39.4
23	<LOD – 48.1
24	<LOD – 113.1
25	<LOD – 99.3
26	<LOD – 64.7
27	42.3 – 125.7
28	<LOD
29	<LOD – 363.0*

<LOD = below the level of detection for the instrument

* = IDPH XRF screening data