



CONTAMINATION OF THE HISTORIC AREA:
DEPTH OF THE LEAD ISSUE -
A RECENT HISTORY

The Depth of the Lead Issue

A Community Aware

A thorough and constructive master plan for the City of Herculaneum requires an accurate and complete awareness of the impact of lead contamination on the health of its residents. Other essential ingredients of a constructive master plan include an awareness of the efforts to reduce the contamination and the results of those efforts and the perception of Herculaneum by people within and outside the City. In an attempt to look at this important aspect of the City in an objective manner, the CAG (Community Awareness Group), who contributed this part of the Master Plan, focused on research based facts that have been presented by government agencies such as the United States Environmental Protection Agency (EPA) and the Missouri Department of Natural Resources (MDNR).



The Doe Run Plant in Herculaneum

Historical Background Summary

The Doe Run Lead Smelter in Herculaneum, Missouri is the only smelter of its kind in the United States. The Doe Run Lead Smelter facility is located at 881 Main Street in Herculaneum, Jefferson County, Missouri (approximately 30 miles south of St. Louis, MO). It abuts residential neighborhoods on the north, west, and south, with the Mississippi River on the east. It began operations in 1892 as part of the St. Joseph Lead Company. In 1986, it became part of the newly formed Doe Run Company, a joint venture of the Fluor Corporation and The Homestake Mining Company. In 1990, Fluor became the sole owner of The Doe Run Company. It is currently owned and operated by the Doe Run Mining Company, a subsidiary of the Renco Group, Inc. Doe Run is headquartered in St. Louis, Missouri. Doe Run has approximately 360 people on staff and 70 – 90 contractors at the facility.

The 52-acre Herculaneum facility consists of a smelter plant, 24-acre waste slag storage pile and an onsite sulfuric acid plant. The Herculaneum facility operates 24-hours per day, 350 days per year. A lead ore concentrate, consisting of approximately 80% lead sulfide, is processed at the smelter. Concentrate is transported to the smelter by truck from eight lead mines owned by Doe Run in the historical, Viburnum Trend (approximately 75 miles south-southwest of Herculaneum). The following major process operations occur at the Herculaneum facility: Sintering Operations, Smelting Operations, Refining Operations, and Sulfuric Acid Production.

The sulfuric plant was installed in 1970 and produces approximately 50-60,000 tons of sulfuric acid per year. According to Doe Run, the primary purpose of the acid plant is to process the sulfur containing air pollutants into a manageable form.

The Doe Run Lead Smelter produces 250,000 tons of refined lead per year and approximately an equal volume of waste. The waste slag material generated at the Doe Run smelter is disposed of in a Metallic Mineral Waste Management Area (WMA) that was permitted in 1992 under the Metallic Mineral Waste Management Act (effective 4/29/1991). The currently active slag pile is allotted 40 acres. About 24 acres have been used and the future slag pile is allotted 22 acres in an area across Joachim Creek. A large portion of the current waste slag storage area is designated as a wetland and is subject to flooding from Joachim Creek and the Mississippi River. Currently EPA and MDNR are negotiating with Doe Run on a third Administrative Order of Consent (AOC) modification and Statement of Work (SOW) addendum for slag pile design, construction and wetland mitigation.



EPA requires annual reports of toxic chemicals released into the environment under Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA). These reports are submitted on the Toxic Release Inventory (TRI) Reporting Form. The reports are required to provide the public with information on the releases of listed toxic chemicals in their communities and to provide EPA with release information to assist the Agency in determining the need for future regulations. Doe Run's releases include compounds of lead, cadmium, arsenic, zinc, copper, nickel, chromium, antimony, cobalt and sulfuric acid.

There are currently eight high volume air monitoring stations set up in the vicinity of the Doe Run Lead Smelter to track the amount of lead being emitted. Most of the monitors operate for 24 hours every 6th day to gather data on a quarterly basis. Six of the air-monitoring stations have been in place for 20 years. These six stations have met the National Ambient Air Quality Standards (NAAQS – 1.5 $\mu\text{g}/\text{m}^3$) for eight consecutive quarters during 1997 and 1998. The seventh station was added in 1992 at Broad Street, across from the smelter. It had not attained the NAAQS for any quarter since it was installed until April 1, 2002 to 2004 (10 consecutive quarters), but was again out of compliance with the NAAQS in the first 3 quarters 2005. Since 1993, ambient air monitoring has been conducted for sulfur dioxide and inhalant particulate matter (PM10) at the Herculaneum High School sampling location and at two other locations since approximately 2001.

Smelter facilities are likely to impact Herculaneum residential corridors, as the facility resides in the small community (~2,800 people) with an additional 10,000 residents within a five-mile radius. Sources of smelter-related contamination are lead concentrate transportation, on-site materials handling, tracking out of contamination from the facility, stack and fugitive air emissions from production processes, and redistribution through

the environment and mechanical processes. Blood lead data reviewed (**Health Consultation** - Blood Lead Results for 2001 Calendar Year, February 26, 2001) indicated that exposures have occurred, are occurring, and are likely to occur in the future; and short-term exposures are likely to have an adverse impact on human health. Consequently, this site has been classified as an urgent public health hazard.



Health Consultation: February 26, 2001 (ref. 2) specifically concluded the following:

- Twenty-eight percent (28%) of children in this community had blood lead levels (BLL) known to cause adverse health effects.
- Forty-five percent (45%) of the children residing east of Highway 61/Commercial Boulevard had blood lead levels (BLL) known to cause adverse

health effects.

- Of the females of childbearing age in this community tested for BLL, one had a blood lead level that could cause adverse health effects to her developing fetus if she became pregnant.

Health Consultation: Exposure Investigation September 14, 2001(ref.3) concluded:

- Blood lead concentrations were elevated above a level of health concern in young children (2 to 4 years old).
- Lead contamination was detected in ambient air particulates, dust on window sills, surface soil and house dust. Lead from these sources is likely contributing to the elevated blood lead concentrations detected in the young children.
- Lead in paint and water do not appear to be a significant source of lead exposure in the children with elevated blood lead concentrations.

Based on the data presented in **The Speciation and Bio-accessibility of Anomalous Lead Concentrations in Soils from the Herculaneum Community --- Herculaneum, Missouri**, May 24, 2005, (ref.4) the following conclusions were reached with respect to the occurrences of lead found in residential soils and dusts from the Herculaneum area:

- Soils have elevated risk base for adults (RBA) values with respect to the Integrated Exposure Uptake Bio-kinetic (IEUBK) default values and are consistent with the elevated blood leads observed at the site.
- Yards and house dust have “fingerprinting” forms and many of these are common to the Doe Run facility.
- Neither paint nor gasoline is a significant lead contributor to the site.

The lead in residential soils and house dust from the Herculaneum area are the result of activities associated with the Doe Run operation and include smelter-stack emissions, fugitive emissions from hauling and storage, as well as waste and concentrate spillages.”



On May 29, 2001, the Environmental Protection Agency (EPA), Missouri Department of Natural Resources, Missouri Attorney General's Office (AGO), U.S. Fish & Wildlife Service and Doe Run finalized an Administrative Order of Consent (AOC) to characterize the site to determine the extent of contamination and to address the contamination. Ongoing environmental sampling has shown lead contamination throughout the community. For example, lead had been found in yard soils at concentrations up to 33,100 parts per million (ppm); in air ranging from non-detectable (ND) to 85 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$); and in dust on streets ranging from 30,000 ppm to 300,000 ppm. On January 1, 2002 EPA and Doe Run entered into a second AOC requiring Doe Run to accelerate yard soil replacements, clean home interiors and develop and implement a Materials Transportation and Handling Plan. As of November 15, 2005 replacement of contaminated yard soils (above 400 ppm) in 407 yards had been completed and 113 home interiors cleaned. Statistical analyses of quarterly collected soil samples currently show upward trends in soil lead concentrations (recontamination) within 0.08 mile of the smelter.

On April 26, 2002 MDNR and AGO signed a Settlement Agreement with Doe Run. The Settlement Agreement required Doe Run to purchase residential properties that were within 3/8 mile of the smelter. One hundred sixty (160) residents were given the option to sell based on a prioritized schedule. This agreement resolved the appealed order of September 25, 2001. As of November 15, 2005, 149 purchase offers had been made, 142 offers had been accepted and 130 purchases had been closed. Twenty (20) permanent residents did not participate (did not request appraisals by 12/31/2004 or accept purchase offers by 6/30/2005). They are all older residents with no young children in residence; they plan to remain in their homes as long as possible. Since there are so few people living in this area of the City and lighting is very poor, the City police officers have a program whereby they visit the neighborhood regularly and make sure the residents are all right.

Some progress has been made in mitigating the lead contamination of Herculaneum. This progress has taken the form of improved compliance with the prevailing standards on air quality. However, still very troubling are the strong indicators of recontamination after cleaning over 100 yards and house interiors; the failure of Doe Run to meet the ambient air standards at the monitor that is closest to their facility for several quarters; and the increase in lead levels along the haul routes for the trucks delivering lead concentrate to the facility. They are still struggling to meet standards in recent history as well. These realities dictate the need for ongoing vigilance by the citizens, property owners, Doe Run, and the regulating agencies relative to the important business of obtaining and maintaining a healthy environment for Herculaneum. This will be a significant and essential contribution to a bright future for Herculaneum. It is the expressed desire of the Master Plan committee that Doe Run accept the responsibility and obligation to improve the impacted environmental conditions of the Herculaneum community.

References:

(1) Preliminary Assessment Report
March 30, 1999
Herculaneum Lead Smelter Site, Jefferson County Missouri

(2) Health Consultation

Blood Lead Results for 2001 Calendar Year
February 26, 2001
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

(3) Health Consultation

Exposure Investigation
September 14, 2001
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

(4) THE SPECIATION AND BIOACCESSABILITY OF ANOMALOUS LEAD CONCENTRATIONS IN SOILS FROM THE HERCULANEUM COMMUNITY --- HERCULANEUM, MISSOURI

May 24, 2005
FOR
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***** Note from the Board of Alderpersons – July 2006:**

The Environmental Protection Agency (EPA) and the Missouri Department of Natural Resources (MDNR) are negotiating with Doe Run for a new State Implementation Plan (SIP), which must be agreed upon by April 2007 and completed by 2008.