

Understanding the ASARCO-El Paso Soil Study¹

Introduction

A new study conducted for the Sierra Club by award-winning chemist Michael E. Ketterer has revealed a probable link between the smelting activities of the American Smelting and Refinery Company (ASARCO) and soil contamination in El Paso and the nearby communities of Anapra, N.M. and Ciudad Juárez, Chihuahua, Mexico. Soil data from all three cities were consistent with pollution from smelting at ASARCO, and all three communities should take seriously the threat of these contaminants.

Background

ASARCO operated a smelter in El Paso from 1887 until 1999 and is now trying to renew its permits to operate again. Smelters refine minerals such as lead and copper from a crude ore that contains a mixture of other elements. The smelting process produces many by-products, some of which are released into the air or dumped as slag. It is well established that smelters contribute to contamination in their vicinity,² but this is the first comprehensive study to look at this ASARCO smelter together with its surroundings.

By-products of smelting, such as lead, arsenic, and cadmium are toxic to humans. They are responsible for a broad range of health issues, including nerve disorders, reproductive problems, and cancer. In high doses, all are deadly. Symptoms of poisoning by these substances can go undetected for years because, at low levels, the effects are subtle. Like many harmful substances, these are particularly harmful to children, affecting physical and mental development.

Although smelters are known to emit a number of harmful substances, these can conceivably come from other possible sources like lead paint and gasoline. Therefore, the presence of high levels of contaminants near a smelter is not enough to establish a clear connection between the two. This study set out to determine if there was a connection. Two different approaches were used: 1) the correlation of concomitant elements – elements that are also by-products of smelting – to lead levels, and 2) the analysis of lead isotope ratios as “fingerprints” for the source.

Chemical Analysis

The by-products of smelting – such as lead, arsenic, and cadmium – are called concomitant elements because they occur together from a smelting source. In this study, lead was compared to other concomitant elements.

If the source of lead had been lead gasoline or paint, then you would expect to find elevated levels of lead but not necessarily any other elements with it. If, however, the lead came from a smelter, you would expect to find both lead and concomitant elements. And you would expect a direct correlation between the amount of lead and other

¹ This executive summary was prepared by Michael Siano for the Sierra Club, regarding Ketterer, Michael E. “The ASARCO El Paso Smelter: A Source of Local Contamination of Soils in El Paso (Texas), Ciudad Juarez (Chihuahua, Mexico), and Anapra (New Mexico). January 2006.

² From report: Glass, 2003; Dudka and Adriano, 1997.

concomitant elements; in other words, if there were twice as much lead in one location as another, there should be twice as much of the concomitant elements as well. The results of this study showed a clear correlation between lead and concomitant elements, indicating that smelting was a probable source of the contamination.

ASARCO's "Fingerprints"

Some elements occur naturally in several different forms. Lead has several different isotopes that can be distinguished by their mass. Lead from different sources or geographical areas has different isotopes. This allows researchers to "fingerprint" lead and determine its origin.

The ASARCO smelter is known to have received much of its ore from the Santa Eulalia mine in Chihuahua. This study compared the lead isotopes found in soil contamination around El Paso to the lead isotopes from the Santa Eulalia mine. The isotopes were also compared to other possible sources. The study found that the lead isotopes contaminating the El Paso area are consistent with lead from the Santa Eulalia mine. The isotopic analysis also confirmed that most of the lead was not from leaded gasoline or paint.

Conclusion

The two processes used in this study conclude that the major source of soil contamination is the ASARCO smelter. The study covered an area that included El Paso (where the plant is located), Anapra, NM, and Ciudad Juárez, Chihuahua, Mexico. Soil contamination in each location was consistent with pollution from smelting at ASARCO. These results are significant to public health concerns in all three cities because of the toxic nature of the pollutants and their presence in populated areas.

References:

Lead Poisoning

<http://www.cdc.gov/nceh/lead/factsheets/leadfcts.htm>

<http://www.cdc.gov/nceh/lead/faq/about.htm>

Arsenic Poisoning

<http://www.atsdr.cdc.gov/tfacts2.html#bookmark05>

Cadmium Poisoning

<http://www.atsdr.cdc.gov/tfacts5.html#bookmark05>