PUBLIC HEALTH ASSESSMENT

OLD AMERICAN ZINC

FAIRMONT CITY, ST. CLAIR COUNTY, ILLINOIS

EPA Facility # IL0000034355

Prepared by:

Illinois Department of Public Health
under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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Summary

Old American Zinc in Fairmont City, St. Clair County, Illinois, operated as a primary zinc smelter from approximately 1913 until 1967. While in operation, it produced slab zinc, zinc oxides, zinc carbonate, cadmium, lead, and sulfuric acid. Slag was a by-product of the zinc smelting process. On the basis of information reviewed, the Illinois Department of Public Health (IDPH) concludes that the site poses a public health hazard to on-site workers and possibly to area children.

The U.S. Environmental Protection Agency (USEPA) and IDPH sampled the area around the site to evaluate the potential for exposure to site-related chemicals. This public health assessment evaluates exposures based on the air and dust samples collected by IDPH in 1996, and on the slag, sediment, and soil samples collected by USEPA in November 1999.

IDPH recommends that USEPA use dust-reduction methods and worker personal protective equipment to reduce exposures during any on-site activities that involve disturbing the site wastes, remove or contain site-related chemicals that have been left exposed in slag or surface soil, and sample the surface soil of the mobile home complex north of the site to determine whether elevated levels of metals are present. IDPH will distribute the fact sheet “Reducing Exposure to Chemicals in Soil” to area residents.

Purpose

In 1996, the Agency for Toxic Substances and Disease Registry (ATSDR) released a health consultation (*1*) for the Old American Zinc (OAZ) which concluded that the site posed a public health threat based on chronic exposure of children to arsenic, cadmium, and lead in the residential soils (Attachment 1). In September 2002, USEPA began off-site residential soil excavation for properties with levels of lead greater than 400 parts per million (ppm). As of February 2003, cleanup of the residential areas was continuing, with onsite remediation to occur after the completion of the residential areas. ATSDR asked IDPH to review recent environmental data associated with the OAZ site to determine whether a public health hazard still exists.

Background

History

OAZ operated as a primary zinc smelter from approximately 1913 until 1967. OAZ is in Fairmont City, Illinois, which according to 2000 Census data, has a population of 2,436. Three elementary schools are present within 1 mile of the site and about 15,000 people live within 1 mile of the site. About 75% of the city population is African American.

While OAZ was operating, it produced slab zinc, zinc oxides, zinc carbonate, cadmium, lead, and sulfuric acid. Slag was a by-product of the zinc smelting process. OAZ also produced a fuel called producer gas, which was used in the smelting process. The synthesis of producer gas left coal tars as by-products. How and where the coal tars were disposed of is not known. The smelting operations were moved from Fairmont City to Sauget, Illinois, after the 1967 plant closure. Shortly after the plant closed, the buildings were either removed or demolished.

The site was unoccupied from 1967 to 1976. In 1976, XTRA Intermodal leased the site. XTRA Intermodal leases semi-trailers to railroads and stores them at this site when they are not in use. In 1992, XTRA Intermodal bought the site and continues to operate at that location.

The 132-acre site (Figure 1) is now almost entirely covered with a layer of black slag from the zinc smelter. Three slag piles still exist in the northern section of the property. A large depression in the northern portion of the site has exposed soil that does not support plant life. The entire site is fenced except for the depressed northern section. The area north of the site includes vacant lots, a mobile home park, and some permanent residences. Land use is residential northeast of the site and industrial southeast of the site. Rose Creek is a intermittent stream that flows along the southern portion of the site and then westward along the railroad tracks, before entering a wetland north of Collinsville Road, west of the site. Conrail, which loads and unloads semi-trailers onto trains, and a defunct fertilizer plant are south of the site. Residential areas in Washington Park are across the railroad tracks south of Conrail and the former fertilizer plant. A residential area adjoins the western site boundary.

Residents have stated that Fairmont City used some slag material to spread on the streets during icy weather. In the past, IDPH has spoken to residents surrounding the property and they said that slag dust occasionally blows from the site, and during dry windy days the sky becomes blackened by airborne slag particles. Some residents near the site believe that the problems of blowing slag were increased when XTRA Intermodal spread the slag over the entire site (IDPH personal communication with area residents, 1995).

These complaints prompted the Illinois Environmental Protection Agency (Illinois EPA) to conduct a site investigation and sampling in 1994. Investigations of the OAZ site have included the CERCLA Integrated Assessment investigation; an Illinois EPA and IDPH meeting and site visit on October 18, 1995; and USEPA sampling in November 1999. While sampling during the afternoon of November 2, 1999, USEPA reported sustained winds greater than 25 mph with no observable dust blowing off the industrial property.

In June 2002, USEPA began environmental sampling in preparation for remedial activities. Residential soil sampling and off-site air deposition sampling began in July 2002. In late August, a USEPA contractor began background air monitoring and built an on-site repository to receive the removed residential soil. In September 2002, off-site residential soil excavation began for properties with levels of lead greater than 400 parts per million (ppm). As of February 2003, cleanup of the residential areas was continuing, with onsite remediation to occur after the completion of the residential areas.

Site Visit

IDPH staff have visited the site several times, most recently on October 25, 2002. The site is almost entirely covered with a layer of black slag. Slag piles were present in the northern section of the property. The entire site is fenced except for part of the northern section. Residential areas either border or are within one block of the site on all sides.

1996 IDPH Health Consultation

In February 1996, ATSDR released a health consultation prepared by IDPH for the OAZ site. This health consultation was based on environmental samples collected by Illinois EPA in 1994. In November 1994, Illinois EPA collected five waste samples on the site and seventeen soil and nine sediment samples (one background sample) off the site. Of the five waste samples from the site, three samples were taken from the waste piles in the northern portion of the site, one sample was taken from the producer gas area, and another was taken from the arsenic leaching facility. The on-site samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, and inorganic chemicals.

Sixteen soil samples were taken from residential areas near the site; the 17th sample was a background sample taken from nearby Caseyville. All of these samples were analyzed for inorganic chemicals. Eight sediment samples from seven locations were collected from Rose

Creek and the adjacent wetlands. One background sample was taken upstream of the site. Sediment samples were analyzed for VOCs, SVOCs, pesticides, and inorganic chemicals (*1*).

In the 1996 health consultation, IDPH estimated the potential exposure of children contacting the highest levels of metals detected in residential soil and determined that lead and cadmium posed a public health hazard for children exposed to this residential soil. IDPH concluded that the extent of exposure to airborne chemicals could not be determined without air monitoring data and that workers could be exposed to chemicals on the site (Attachment 1).

1996 Air and Indoor Dust Sampling

From April to September 1996, IDPH set up outdoor air samplers at a residence about 300 feet north of OAZ and collected samples every sixth day over that period. This sampling took place in response to one of the recommendations in the February 1996 health consultation. IDPH also collected indoor dust samples from three homes north of the site.

1999 USEPA START Sampling Activities

On November 2 and 3, 1999, the USEPA Superfund Technical Assessment and Response Team (START) collected samples of on-site slag, sediment, and residential soil. This sampling was done by Ecology and Environment, Inc. (E & E) with oversight by the USEPA on-scene coordinator and USEPA START Project Manager *(2)*. START provided a portion of each sample to a representative of an environmental contractor from Dames and Moore, who represented the potentially responsible parties.

Six slag samples and one duplicate were collected from five locations (Figure 2). These slag samples were collected from the surface to a depth no greater than 12 inches. Two samples were collected directly from the slag piles and were loose grab samples from accessible locations on the piles. The remaining slag samples were collected from slag lying on the ground surface. The slag samples were analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and zinc. Two different analyses, total metals and toxic characteristic leaching procedure, were used to characterize these samples. A recommendation was made in the 1996 health consultation to perform additional sampling for mercury in the arsenic leaching area. Further sampling in that area has not shown elevated levels of mercury.

Four sediment samples were collected: three on the site (Figure 2) and one background sample taken from a wetland northwest of the site. Sediment samples were collected at or below the waterline. These samples were analyzed the same as the slag samples.

Four residential properties were sampled in November 1999. These properties were chosen because previous samples collected by Illinois EPA at these properties showed elevated levels of metals in the soil *(2)*. Eight soil samples were collected, including six from the front yard and back yards of three homes, one from a vacant lot, and one duplicate. These samples were collected from the surface to a depth of 2 inches. The residential samples were analyzed for the same metals analyzed in the slag and sediment samples.

Discussion

IDPH evaluated exposures based on the 1996 IDPH air and dust samples and the November 1999 USEPA slag, sediment, and soil samples. The November 1999 sample data were limited in the number of samples collected and the number of chemicals analyzed.

Chemicals of Interest

The chemicals of interest at OAZ are arsenic, cadmium, and lead in soil and slag, and cadmium and arsenic in air. IDPH compared the results of each environmental sample with the appropriate screening comparison value used to select chemicals for further evaluation for carcinogenic and noncarcinogenic health effects. Chemicals found at levels greater than comparison values or those for which no comparison values exist were selected for further evaluation (Tables 1 and 2). A brief description of each comparison value used is found in Attachment 2.

Exposure to a chemical at a level that exceeds a comparison value does not necessarily mean that adverse health effects will result. The potential for exposed persons to experience adverse health effects depends on how much of each chemical a person is exposed to, how long a person is exposed, and the health condition of the exposed person.

Exposure Pathways

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 chemical might have occurred in the past, might be occurring now, or might occur in the future. When all of these elements linking the chemical source to an exposed population are known, a completed exposure pathway exists. When one of these elements is missing, a potential exposure pathway exists.

Residential Soil

Chemicals in residential soil are a completed exposure pathway. IDPH assumed that children could be exposed to the highest levels found in residential soil while playing and would ingest 200 milligrams of soil daily, 350 days per year.

The arsenic concentrations identified in the residential soils were not outside the normal range for arsenic concentrations found in Illinois metropolitan areas *(3)*.

The potential for exposure to cadmium and lead will be discussed further in the Toxicological Evaluation section. The highest level of cadmium in residential soil in the 1999 sampling was 130 ppm. The highest level of lead in residential soil in the 1999 sampling was 820 ppm.

The IDPH Lead Poisoning Prevention Code states that the permissible limit of lead in soil that is readily accessible to children is 1,000 ppm (*4*). Exposure to lead levels greater than 1,000 ppm in residential soil can increase lead uptake into the body. USEPA often uses 400 ppm as a residential soil cleanup value based on its Integrated Exposure Uptake Biokinetic (IEUBK) model for lead in children.

Overall, the metal concentrations identified in the November 1999 soil samples are similar to those found in November 1994. The highest lead level detected in a residential yard in 1994 was 1,260 ppm. In 1999, the highest lead level detected in a residential yard was 820 ppm. The highest cadmium level detected in a residential yard in 1994 was 205 ppm. In 1999, the highest cadmium level detected in a residential yard was 130 ppm. The 1994 samples were collected from a depth of 0 to 1 inch; the 1999 samples were collected from a depth of 0 to 2 inches. This depth difference might account for the variation between the two sets of samples.

On-site Waste

Exposure to chemicals in slag and on-site wastes are a completed exposure pathway. IDPH assumed that on-site exposure to slag wastes would mainly be for adults ingesting dirt and dust while working 5 days per week, 50 weeks per year. We assumed that no personal protective equipment is used while contacting the waste. Based on the 1999 samples collected by USEPA (Table 1), arsenic concentrations in on-site slag ranged from 5-515 ppm. Cadmium concentrations varied from almost 4 ppm to 745 ppm. Lead concentrations in the 1999 samples ranged from 510 ppm up to 2.3% (23,110 ppm).

Exposure to arsenic, cadmium, and lead has the potential to cause adverse health effects in unprotected workers who come into daily contact with on-site slag waste. Because the property is fenced and a business operates on the site, we did not estimate exposures for trespassers.

Windblown Dust

From April-September 1996, IDPH conducted outdoor air sampling every sixth day at a residence about 300 feet north of the site (Table 2). The average level of cadmium in air during this period was 0.006 micrograms per cubic meter of air (: g/m^3). The average level of arsenic in air during this period was 0.004 : g/m^3. These averages were calculated by using all detected values and one-half the detection limit for samples reported as “no detection.” Sixty-five percent of the cadmium results, and thirty-five percent of the arsenic results, were “no detection.”

IDPH estimated the potential for adverse health effects using the average levels of arsenic and cadmium over the sampling period. On the basis of this exposure scenario, no short-term health effects and no apparent increased cancer risk would be expected from breathing these levels of cadmium and arsenic in air. Interestingly, the average level of cadmium in the air for the year 1996 in East St. Louis, 4 miles away, was 0.007 : g/m^3. Cadmium in air might be a regional phenomenon due to numerous industries in the area.

Windblown dust could result in exposures to both workers on the site and nearby residents. No data were available for on-site worker exposure, but the off-site air monitoring data suggest that chronic exposure to airborne contaminants off the site is not a significant pathway.

Remedial activities involving the removal of slag and on-site soil could result in the generation of dust; however, USEPA removal activities would necessitate the use of dust-suppression methods and air monitoring during operations. This should reduce the potential for workers and residents to be exposed to airborne chemicals.

Off-site Rose Creek Sediment

Rose Creek is a intermittent stream that flows along the southern portion of the site and then westward along the railroad tracks, before entering a wetland north of Collinsville Road, west of the site. Individuals may occasionally contact material from the site in Rose Creek sediments. In the 1996 health consultation, IDPH evaluated exposure to Rose Creek sediments and determined that although elevated levels of arsenic and cadmium were found in the creek sediments, they were similar to levels found in residential soil where exposure would be more frequent. Higher levels of arsenic, cadmium and lead were found in sediments in the wetland north of Collinsville Road, but exposure in this wetland would be much less frequent. No newer sediment data downstream of the site were evaluated for this health assessment.

Toxicological Evaluation

Arsenic

The estimated dose for workers exposed daily to arsenic in slag on the site might be expected to cause noncancer health effects. Exposed workers may experience thickening and darkening of the skin. At much higher levels, workers could experience irritation of the digestive system, with symptoms such as stomach ache, nausea, vomiting, and diarrhea.

IDPH also estimated the potential for an increased risk of cancer from on-site arsenic exposure. Based on our unprotected worker exposure scenario, a low increased cancer risk might be present for exposure to arsenic on the site (Attachment 3). Long-term oral exposure to arsenic might lead to a darkening of the skin and the appearance of small “warts” on the palms, soles, and torso. Some of these might develop into skin cancer. Also, studies suggest that ingestion of arsenic may increase the risk of bladder, prostate, lung, liver, and bladder cancer (*5*).

Cadmium

Oral cadmium exposure in humans has been associated with kidney effects. On the basis of our exposure scenario for cadmium in residential soil, a child could have a daily dose of 0.0014 milligrams per kilogram day (mg/kg-day). This is less than the no-observed-adverse-effect level of 0.0021 mg/kg-day from a long-term study of humans exposed to cadmium (*6*). Therefore, no adverse health effects would be expected from exposure to the highest level of cadmium detected in the residential soil.

The estimated dose for workers exposed daily to cadmium in slag on the site was 0.0004 mg/kg-day. This is less than the no-observed-adverse-effect level of 0.0021 mg/kg-day from a long-term study of humans exposed to cadmium. No adverse health effects would be expected on the basis of this exposure scenario.

Lead

Oral exposure of adults to levels of lead greater than the average level on the site can cause hypertension, anemia, and damage to the male reproductive system. Because lead can damage a developing fetus, exposure of female workers of child-bearing age may be a concern. The connection between these effects and exposure to lower levels of lead is not certain (*7*). The levels of lead on the site are highly variable, so exposure is likely to be highly variable as well. If workers at the site are concerned about whether they have been exposed to elevated levels of lead, a blood test can be performed by their doctors.

The highest lead concentration found in the top 2 inches of residential soil in 1999 was 820 ppm. In 1994, 1,260 ppm of lead was measured in the top 1 inch of residential soil. The IDPH Lead Poisoning Prevention Code states that the permissible limit of lead in soil readily accessible to children is 1,000 ppm (*4*). Exposure to lead levels greater than 1,000 ppm in soil can increase lead uptake into the body. USEPA uses 400 ppm as a soil cleanup value for areas to which children have access. Residents concerned about whether their children have been exposed to elevated levels of lead can have a simple blood test performed. IDPH will distribute the fact sheet "Reducing Exposure to Chemicals in Soil" (Attachment 4) to area residents.

Health Outcome Data

IDPH reviewed the blood lead levels of children younger than 6 years old who were tested in Fairmont City and the surrounding area during 1996 through 1999. Blood samples were collected by both finger stick and venipuncture methods. If multiple blood samples were collected, IDPH used the highest venipuncture results. Otherwise, IDPH used the highest finger stick result. The sample results showed that children living in Fairmont City had a mean blood lead level of 6 micrograms per deciliter (µg/dL) compared with a mean blood lead level of 9 µg/dL for children living outside Fairmont City, but within 1 mile of the site. The percentage of children with blood lead levels greater than 10 µg/dL was 13% for Fairmont City compared with 34% for children living outside Fairmont City, but within 1 mile of the site.

A mobile home complex about 400 feet north of the site had a similar percentage of children (14%) with blood lead levels greater than 10 µg/dL as Fairmont City (13%). Mobile homes would not be expected to contain lead-based paint, a main source of exposure to children younger than 6 years of age. The source of lead exposure for these children is not known.

Community Health Concerns

Residents have expressed concern about windblown dust from the site since the early 1990s. They are concerned that they have been exposed to lead and other metals in this dust, which they believe is now part of their residential soil.

To respond to these concerns, USEPA and IDPH collected residential soil samples and found lead levels greater than the USEPA cleanup value for lead. IDPH also collected outdoor air samples and dust samples from inside homes. IDPH estimated the daily dose of chemicals in outdoor inhaled dust for a resident in the area and determined that no increased health hazard exists. The indoor dust levels did not exceed IDPH comparison values.

This public health assessment was made available for public comment from December 18, 2002 to January 31, 2003. No public comments were received.

Child Health Initiative

IDPH recognizes that children are especially sensitive to some chemicals. For this reason, IDPH included children when evaluating exposures at this site. Children are the most sensitive population considered in this health consultation. The variation in surface soil depth and lead levels between the 1994 and 1999 soil samples suggest that residential lead levels might exceed the IDPH Lead Poisoning Prevention Code 1,000 ppm limit. If residents are concerned about whether their children have been exposed to elevated levels of lead, a simple blood test can be performed. Because of older housing in this area, the Illinois Lead Poisoning Prevention Code requires that children have their blood tested for lead before entering elementary school.

Conclusions

In the 1996 health consultation, IDPH concluded that the Old American Zinc site in Fairmont City, Illinois poses a public health threat based on chronic exposure of children to arsenic, cadmium and lead in residential soil. On the basis of the more recent information reviewed, IDPH concludes that the Old American Zinc site poses a public health hazard to on-site workers and possibly to area children.

Long-term exposure to arsenic and lead could cause adverse health effects if unprotected workers come into regular contact with on-site waste. Lead levels in residential soil have exceeded cleanup levels established by USEPA and IDPH for areas to which children have access. Elevated levels of arsenic and cadmium have been detected in residential yards and off-site ambient air, but not at levels that would be expected to cause adverse health effects. The surface soil in the mobile home complex north of the site has not been evaluated.

Recommendations and Actions Planned

IDPH recommends that –

- USEPA remediate residential soils that contain elevated levels of lead. Although USEPA and IDPH do not use the same value for lead in soil when evaluating the potential for exposure, both agree that soil remediation is a permanent solution to future exposures.

- USEPA use dust reduction methods and worker personal protective equipment to reduce exposures during any activities that involve disturbing the site wastes. This would be part of the USEPA site safety plan for a removal action.

- USEPA remove or contain site-related chemicals that have been left exposed in slag or surface soil in such a way that they are not released to the air or allowed to move by surface runoff. USEPA is considering removal actions at this site.

- USEPA sample the surface soil of the mobile home complex north of the site to determine whether elevated levels of metals are present. If USEPA cannot conduct this sampling, IDPH will seek permission from the mobile home complex owners to do so.

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1. Agency for Toxic Substances and Disease Registry. Health consultation - Old American Zinc, Fairmont City, St. Clair County, Illinois. Atlanta: US Department of Health and Human Services; 1996 Feb 14.

2. US Environmental Protection Agency. Letter Report for Old American Zinc Fairmont City, St. Clair County, Illinois. USEPA Region 5. Chicago.

3. Illinois Environmental Protection Agency. A summary of selected background conditions for inorganics in soil. Springfield, IL: Illinois Environmental Protection Agency. Publication No.: Illinois EPA/ENV/94-161.

4. Illinois Department of Public Health. Lead Poisoning Prevention Code. 1995 Mar.

5. Agency for Toxic Substances and Disease Registry. Toxicological profile for arsenic. Atlanta: US Department of Health and Human Services; 2000 Sept.

6. Agency for Toxic Substances and Disease Registry. Toxicological profile for cadmium. Atlanta: US Department of Health and Human Services; 1999 July.

7. Agency for Toxic Substances and Disease Registry. Toxicological profile for lead. Atlanta: US Department of Health and Human Services; 1999 July.

Certification

This Old American Zinc public health assessment was prepared by the Illinois Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

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

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Tables

Table 1. Chemicals of Interest in November 1999 Samples

Chemicals	Ranges in November 1999 Samples (in ppm)			Comparison Value (in ppm)	
	Slag on the Site	On-site Sediment	Residential Soil	Concentration Child/Adult	Source
Arsenic	<5–515	<7.5–69	<6–9.6	20/200	CEMEG
Cadmium	3.8–745	17–192	10–130	10/100	RMEG
Lead	510–23,110	253–3,440	125–820	1,000	IDPH

ppm = parts per million
RMEG = Reference Dose Media Evaluation Guide
CEMEG = Chronic Environmental Media Evaluation Guide
IDPH = Illinois Department of Public Health Lead Poisoning Prevention Code

Table 2. Chemicals Detected During Outdoor Air Monitoring April through September 1996 (in ug/m^3)

Analyte	Quarterly Average 2nd Quarter 1996	Quarterly Average 3rd Quarter 1996	Average Over Entire Monitoring Period*	Concentration Range	Percent of Samples Less Than Laboratory Detection Limit	Comparison Value (in ug/m^3)	Source
Total Suspended Particulates (TSP)	64	64.87	64.4	25.3 - 129	0	260	Illinois EPA
Arsenic	0.005	0.003	0.004	< 0.002 - 0.013	35	0.0002	CREG
Cadmium	0.006	0.005	0.006	0.003 - 0.009	65	0.0006	CREG
Lead	0.078	0.046	0.062	< 0.032 - 0.2	42	1.5	NAAQS

* Half the detection limit was used for non-detects.
CREG = Cancer Risk Evaluation Guide
Illinois EPA = Primary Standard for TSP
NAAQS = National Ambient Air Quality Standard

Attachments

CONCLUSIONS AND RECOMMENDATIONS FROM FEBRUARY 1996 HEALTH CONSULTATION FOR OLD AMERICAN ZINC

CONCLUSIONS

Based on the information reviewed, the Illinois Department of Public Health concludes that:

1. The Old American Zinc site in Fairmont City, Illinois poses a public health threat based on chronic exposure of children to arsenic, cadmium, and lead in the residential soils.

2. Nearby residents are exposed to contaminated airborne particulates which originate onsite. This exposure would be the highest during dry windy periods or when site activity is high. The extent of this exposure and resulting health effects (if any) cannot be determined without sufficient air monitoring data.

3. Worker exposure to on-site contaminants certainly occurs. The highest exposures would likely occur during activities which disturb the waste material.

4. Past exposures to site related contaminants would have likely been higher in the past, particularly during smelter operation.

RECOMMENDATIONS

Cease/Reduce Exposure Recommendations

1. Reduce exposure of children to contaminated residential soils as much as possible by using appropriate reduction methods (e.g. covering bare soil with vegetation, "clean" soil, mulch, rock, or asphalt); restricting access to areas with bare soil by fencing; reducing or eliminating soil contact activities such as digging; washing hands and face prior to eating or drinking; and cleaning shoes to reduce the amount of soil being tracked into the house.

2. Remove or contain contaminants that have been left exposed on the surface soil in such a way that they are not released to the air or allowed to move by surface run-off.

3. Protect both the on-site workers and nearby residents from site contaminant exposure by taking precautions (e.g. dust reduction methods, protective equipment) to reduce exposures during any on-site activities that involve disturbing the site wastes.

Site Characterization Recommendations

1. Monitoring of air at exposure points to determine airborne exposure to contaminants. Exposure points would include nearby residences and, if warranted, on-site workers. Baseline air monitoring would be important in determining exposure and could later be used with additional air monitoring to determine the effectiveness of the chosen remedial activity.

2. Performing additional soil sampling in the neighborhoods adjacent to the site to provide a more accurate determination of the extent of off-site soil contamination.

3. Performing additional sampling for mercury in the arsenic leaching area to determine the extent of mercury contamination in that area.

ATTACHMENT 2

Comparison Values Used in Screening Contaminants for Further Evaluation

Environmental Media Evaluation Guides (EMEGs) are developed by the Agency for Toxic Substances and Disease Registry 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 from USEPA reference doses 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.

ATTACHMENT 3

Cancer Risk Interpretation for Arsenic

The levels of arsenic in on-site slag waste were greater than the ATSDR Cancer Risk Evaluation Guide (CREG). This is a very conservative level that ATSDR believes is safe for exposure. Initial screening with CREGs are based on continuous exposure for a lifetime (estimated at 70 years). A site-specific cancer risk evaluation involves a more realistic exposure scenario using site-specific conditions.

IDPH assumed that on-site exposure to arsenic in slag wastes would mainly be for adults ingesting 100 milligrams per day of dirt and dust while working 5 days per week, 50 weeks per year, for 20 years. We assumed that no personal protective equipment is used while in contact with the waste.

On the basis of this estimated exposure and the cancer potency factor for arsenic, IDPH determined that the potential increased cancer risk was 0.0002 or 2×10^4. This is a potential increase in cancer of 2 cases per 10,000 workers. ATSDR categorizes this as a low increased cancer risk.

Risk Category Definitions Used by ATSDR*			
Category	**Fraction**	**Decimal**	**Exponential**
No Increased Risk	<1/100,000	<0.00001	$<1 \times 10^5$
No Apparent Increased Risk	1/100,000	0.00001	1×10^5
Low Increased Risk	1/10,000	0.0001	1×10^4
Moderate Increased Risk	1/1,000	0.001	1×10^3
High Increased Risk	1/100	0.01	1×10^2
Very High Increased Risk	>1/100	>0.01	$>1 \times 10^2$

* ATSDR Cancer Policy Framework, January 1993

To put this level into perspective, the American Cancer Society estimates that an average American has a lifetime cancer risk of 0.33, which is 1,650 times the additional risk posed by worker exposure to the highest level of arsenic measured on the Old American Zinc site. For more cancer information, visit the American Cancer Society online at www.cancer.org.

ATTACHMENT 4

Reducing Exposure to Chemicals in Soil

How can I be exposed to contaminants in soil?

People can be exposed by **breathing** contaminated dust, **swallowing or touching** contaminated soil, and **eating** food grown in contaminated soil. Children who live and play in a contaminated area can have increased exposure. Preschool-age children are more likely to be exposed because of their frequent hand-to-mouth activity. Dust from contaminated soil can be tracked into the house on shoes and can end up on indoor surfaces and toys.

What can I do to reduce or prevent exposure to contaminants in soil?

If there is contaminated soil around your home, you should take the following measures to protect your family from exposure:

1) Practice good personal hygiene habits.

- Wash children's hands and faces frequently, especially before eating and bed time. Keep their fingernails clean and short. Adults should wash their hands before feeding their children, smoking, eating or drinking. Discourage children from placing fingers and non-food items in their mouths.

- Frequently clean toys or objects that children put in their mouths.

2) Practice good housekeeping techniques.

- Remove your shoes upon entering your home to prevent tracking contaminated soil inside. Store outdoor shoes at entry ways.

- Vacuum carpeting, rugs and upholstery often. Regular vacuuming will keep dust from accumulating.

3) Create barriers to contaminated soil.

- Removing debris, turning the soil over, sodding, covering with plastic or cement, or excavating and disposing of contaminated soil will reduce exposure. The area should be kept moist while working with the soil to reduce dust formation. Ensure that new soil is not contaminated. Do not disturb contaminated soil on windy days or when children or pregnant women are present.

- Keep windows closed on windy days, at least on the windward side of the house. This will help to keep dust from being blown inside. Fences, bushes and grass help reduce dispersion of contaminated soil.

- Thoroughly wash garden vegetables before eating them.

4) Do not let children play or dig in contaminated soil.

- Build a sandbox with a bottom and fill it with clean sand to provide children with a safe play area.

Where can I get more information?

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Figures

Figure 1

Site Location Map

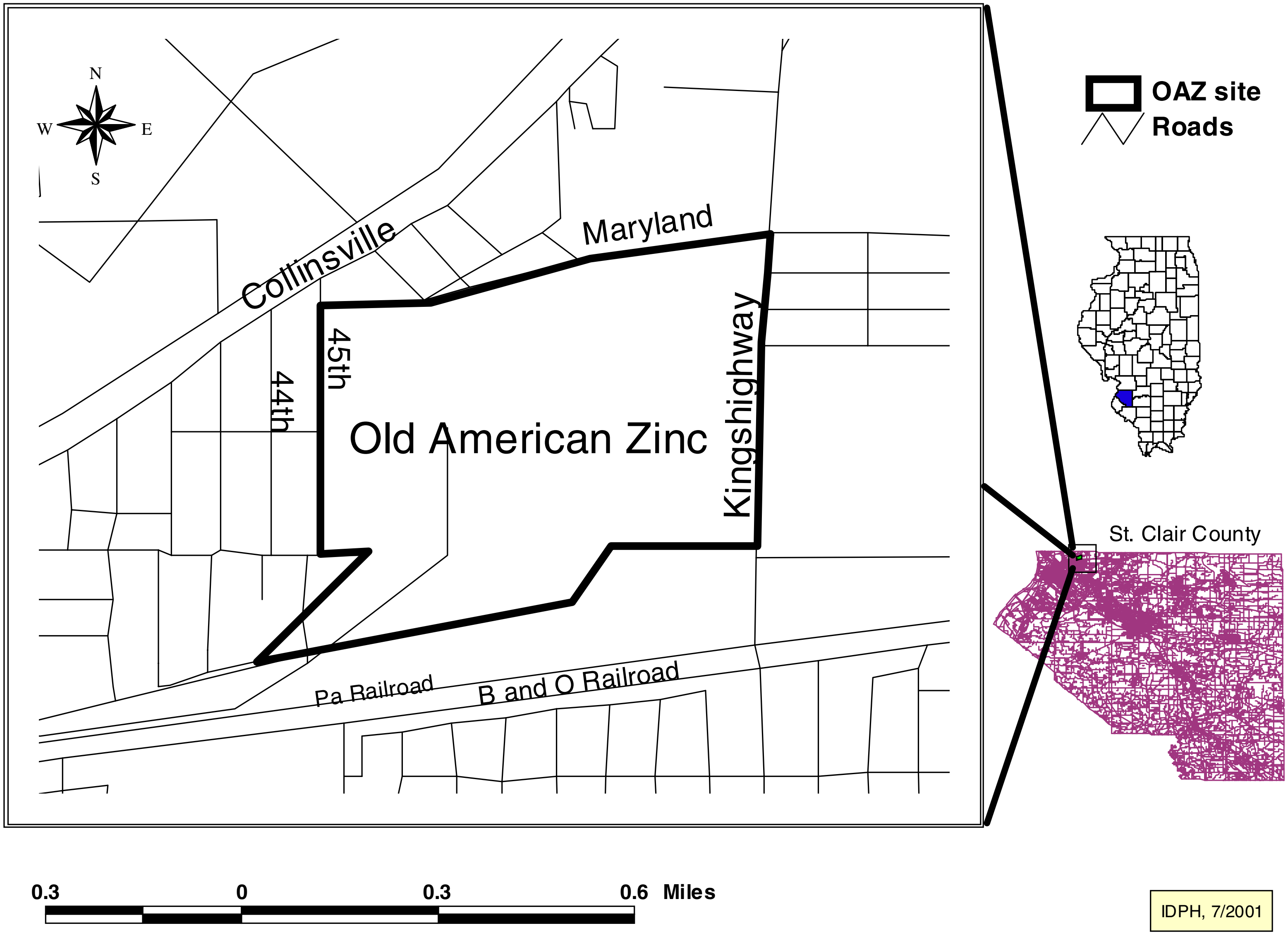

Figure 2

November 1999 Sample Locations - Old American Zinc