

# Health Consultation

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MASTER METALS INCORPORATION  
DETROIT, WAYNE COUNTY, MICHIGAN  
EPA FACILITY ID: MID039108824

MARCH 2, 2005

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Public Health Service  
Agency for Toxic Substances and Disease Registry  
Division of Health Assessment and Consultation  
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## **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:

Michigan Department of Community Health  
Under Cooperative Agreement with the  
U.S. Department of Health and Human Services  
Agency for Toxic Substances and Disease Registry

Table of Contents

Foreword ..... 1  
Summary ..... 1  
Background and Statement of Issues ..... 1  
Discussion ..... 3  
    Environmental Contamination and Other Hazards ..... 3  
    Site Visits ..... 5  
    Physical Hazards ..... 5  
    Human Exposure Pathways ..... 5  
    Toxicological Evaluation ..... 6  
    Child Health Issues ..... 7  
    Health Outcome Data ..... 7  
    Community Health Concerns ..... 8  
Conclusions ..... 9  
Recommendations ..... 9  
    Public Health Action Plan ..... 10  
References ..... 11  
Preparers of the Report ..... 12

List of Tables

Table 1 Human Exposure Pathways ..... 4  
Table 2. Summary of Phase I Sampling Results for Lead ..... 4  
Table 3. Summary of Phase II Sampling Results for Lead ..... 6  
Table 4. Blood Lead Data for the Master Metals Area ..... 7  
Table. 5 Detroit Citywide EBLL Rates ..... 8

List of Figures

Figure 1. Master Metals .....  
Figure 2. Phase I Sampling Transects.....

## **Foreword**

The federal Agency for Toxic Substances and Disease Registry (ATSDR) and the Michigan Department of Community Health (MDCH) have a cooperative agreement to conduct public health assessments of potential health hazards at sites of environmental chemical contamination within the State of Michigan. In 2003, the United States Environmental Protection Agency (EPA) requested the assistance of the MDCH to complement their activities focused on the Master Metals, Inc. site. The EPA was initiating an investigation of the impact of the former smelting operation on the surrounding community and asked MDCH to provide support in conjunction with ATSDR and local health agency representatives. The current Public Health Consultation addresses the potential human health hazard associated with exposure to off-site lead contamination in soil that may have resulted from emissions from the Master Metals site.

## **Summary**

The Master Metals site currently poses no apparent public health hazard. Lead concentrations in residential surface soil on some properties near the Master Metals site exceeded the Michigan Department of Environmental Quality (MDEQ) 400 parts per million (ppm) criterion for residential soils. Lead concentrations on the site exceeded the MDEQ 900 ppm criterion for soils on industrial properties. However, contractors for the Responsible Parties working under an Administrative Order on Consent with the EPA have removed the lead contaminated soil from the residential properties and from the plant site. Therefore, exposure to lead-contaminated soil is no longer occurring.

## **Background and Statement of Issues**

The Master Metals site is located at 4700 and 4740 East Nevada Street, Detroit, Wayne County, Michigan. The closest residential area is located 100 feet north across East Nevada Street (Figure 1.). The facility functioned under several company names as a lead smelting operation from 1955 to 1983. Raw materials used in production included battery plates, drosses (waste product or impurities formed on the surface of molten metals), iron, cable lead, pig lead and battery lugs. From 1984 to 1990 the Synergy Production Group, Inc. processed ferrous sulfate heptahydrate on the site. The compound is used as a reagent for fixing coloring in wool dyeing, in the manufacture of ink, in water purification as a substitute for aluminum sulfate, as a fertilizer, and as a feed additive. It is also used to produce magnetic ferric oxide. Synergy had planned to conduct tin smelting and solder extrusion, but the historical records found by the EPA do not indicate whether those practices ever took place there.

The urban area surrounding the site is a mixture of industrial, commercial and residential use. It includes private residences, five city blocks of Detroit city housing, the Atkinson Elementary School, a playground west of the school, and the Sojourner Truth residential housing Development. A 1997 EPA Action Memorandum reported that the population within a 1-mile radius of the site was 86% minority and the median income for the same area was \$17,621. Other abandoned properties with varying degrees of restricted access are in the area.

Contractors for the EPA conducted a Site Assessment starting in August 1996. Samples collected during this very limited sampling of soil, debris, dust and other media on the site showed lead, antimony and arsenic at levels that exceeded the MDEQ generic criteria for industrial, commercial and residential use. A total of 9 samples, some grab samples and some composite samples were taken. The maximum levels of these contaminants detected in soil and ash samples were: lead, 330,000 parts per million (ppm); cadmium, 1,600 ppm, antimony, 4,800 ppm; and arsenic, 2,600 ppm (MDCH, 1997).

The EPA also discovered laboratory chemicals on-site in marked containers. They found two 55-gallon drums packed with smaller intact containers with varying amounts of chemicals. Labeling on some of the containers indicated that the materials were sodium hydroxide pellets, hydrofluorosilic acid, carbon tetrachloride, 70% nitric acid, zinc oxide, methyl alcohol, formaldehyde, buffer solution (pH-7), and hydrogen peroxide solution. Based on the observations made on their field visits and the results of the sampling, the EPA concluded that conditions on the site constituted an imminent and substantial endangerment to public health and welfare. In their opinion, the most substantial threats present on the site were potential fuel and fuel oil underground storage tanks and elevated levels of lead, cadmium and total metals.

EPA followed the 1996 sampling with an *in situ* X-ray fluorescence (XRF) investigation of the property in August 1997 to measure concentrations of lead and cadmium in the soil and on-site debris. They sampled 243 locations and checked the measurements by taking field samples at 11% of the locations to send off for confirmatory laboratory analysis. Most of the measurements (97%) found lead in excess of the MDEQ generic cleanup criteria but only two found cadmium in excess of the criteria for this element. Levels of lead in surface soil ranged from nondetectable to 240,000 parts per million (ppm) and levels of cadmium ranged from nondetectable to 4,400 ppm (Weston 1997).

In 1997, EPA asked MDCH to evaluate the associated health risks. MDCH produced a Health Consultation that was released in December 1997. The consultation concluded that conditions at the site posed a public health hazard and recommended actions. MDCH recommended that: the site be properly restricted, lab chemicals and other hazardous waste be removed, the site be remediated to remove the lead exposure opportunity, and that workers on an adjacent property be notified to take precautions on their job-site to avoid exposure to lead.

At the time of the 1997 MDCH/ATSDR consultation there were four structures on the property: a large combined office, warehouse, and laboratory, a lead smelter, a small building and a cooling tower. There was a residential housing development across the street to the north, a business that engaged in recycling and transfer to the west, a railroad right-of-way and a City of Detroit correctional facility to the south, and a trucking company that occupied a parcel of land once a part of Master Metals.

Potentially responsible parties for the site conducted a time critical removal of contaminated materials at the Master Metals facility in 1998. During a subsequent Engineering Evaluation/Cost Analysis (EE/CA) conducted in August 1999, seven soil samples were collected from residential properties near the Master Metal's site to determine if metals from the smelting process were transported off-site. The sampling results showed higher levels of lead upwind

from the Master Metals property than downwind leading investigators to conclude that no off-site releases of metals, including lead, had occurred.

In January of 2003 the Detroit Free Press newspaper initiated a series of articles that included the results of soil sampling the newspaper had conducted independently. The articles claimed that properties in the area near the site had concentrations of lead above the 400 ppm MDEQ residential clean-up criteria. The newspaper did not share the sampling data with the EPA or MDEQ and did not identify a source for the lead contamination. The series of articles also highlighted health statistics for biologic lead screening in the Detroit area reporting that 10.7% of the children under 6 tested had blood lead levels that exceeded the 10 micrograms per deciliter (ug/dl) Centers for Disease Control and Prevention (CDC) level of concern.

In early 2003, the EPA concluded that additional investigation and sampling was needed to determine whether off-site releases of contamination had occurred and to characterize any risks posed to human health and the environment. Details of these investigations are provided in the Discussion section below. The current Public Health Consultation addresses the potential human health hazard associated with exposure to off-site lead contamination in soil that may have resulted from emissions from the Master Metals site.

## **Discussion**

### **Environmental Contamination and Other Hazards**

In response to concerns about off-site lead contamination in soil, the EPA designed an investigation that had two phases. Phase I sought to characterize the presence of off-site metal contamination in the areas surrounding the site and also in the direction prevailing winds could have carried fugitive emissions from the Master Metals operation. Two transects intersecting at the site location were plotted on a map and sampling locations along these lines were planned (Figure 2). EPA contractors started acquiring access agreements in February 2003 and the actual sampling took place in the beginning of March 2003. The contractors collected five composite soil samples within 20 feet of each other at each location, taking material from the soil surface to a maximum depth of 3 inches. The samples were sieved through a 250-micron mesh. This fine fraction of soil sample represents that which people are most likely to come in contact with while living at the residence. A total of 69 composite samples were taken and, of those, two downwind sample locations produced concentrations of lead, at levels of 420 ppm and 540 ppm. Only these two exceeded the concentration of 400 ppm that the EPA adopted as their screening-level criterion for the protection of human health in residential exposures (U.S. EPA, 2003). There were several exceedances of the screening value in crosswind samples south of the site that were determined not to be related to Master Metals deposition because of the presence of numerous much lower concentrations between them and the site. A summary of the results is represented in Table 1.

Table 1. Summary of Phase I Sampling Results for Lead

<b>Direction from Site</b>	<b>Number of Samples</b>	<b>Number Exceeding 400 ppm.</b>	<b>Maximum Detection (mg/kg)</b>
North	15	0	290
South	16	3	870
East (Downwind)	22	2	540
West	16	0	240
On-site	3	3	9,600

The only other metal that exceeded a screening standard downwind of the site was arsenic. Two samples tested exceeded the 43 ppm risk-based concentration for arsenic derived by the EPA based on cancer and non-cancer health endpoints (U.S. EPA, 2003). Both of the samples (53 ppm and 61 ppm) were taken from properties located a long distance from the site with many lower values found in the intervening space. This suggested that the arsenic detected was not the result of a Master Metals release and that arsenic was not a health hazard in the area of Master Metals.

Because of the spatial distribution of the lead levels found in Phase I, EPA concluded that lead was the only metal contaminant of concern detected in the soil that was released by the plant to the neighboring community. The release path appeared to be in the dominant downwind direction extending approximately due northeast from the site. EPA initiated a Phase II sampling event only for lead with the objective of verifying that deposition of lead had occurred and, if so, determining which individual residences in the path of the plume described by Phase I had soil levels exceeding 400 ppm. They took samples from the same strata of soil, 0 to 3 inch depths, removing and taking an approximate 3-inch by 3-inch area of sample for every 500 square-foot of yard or yard segment. Phase 2 sampling collected a total of 557 samples from locations that included 109 private homes, a multiple housing complex, a school and a public park. A summary of the Phase II sampling results can be found in Table 2. The results of the Phase II sampling indicated to the EPA that there was one more area that would be important to sample that was to the northeast, outside the initial boundary of the study area. This area was subsequently sampled in conjunction with the clean-up.

Table 2. Summary of Phase II Sampling Results for Lead

<b>Location</b>	<b>Number of Samples</b>	<b>Number Exceeding 400 ppm</b>	<b>Maximum Detection In mg/kg</b>
School	58	0	360
Park	64	0	320
Sojourner- Truth	65	2	610
Residential Properties	370	118	2,100

In the fall of 2003, MDEQ contracted to remove the buildings from the Master Metals site. This addressed most of the remaining physical hazards that any trespassers who managed to breach site security might encounter. Also at that time, EPA contractor Weston Solutions oversaw



removal of soil from front and back yards of residential properties whose samples had exceeded 400 ppm lead. Contractors for a group of responsible parties for the Master Metals property in a consent agreement with the EPA actually conducted the removal of the impacted soils on- and off-site. The on-site contaminated soil was excavated and removed in accordance with MDEQ industrial action levels for lead (900 ppm), cadmium and arsenic. The cleanup level for lead for residential properties was 400 ppm (U.S. EPA, 2003).

As of July 2004, EPA was in the process of securing warrants for access to five residential properties for which neither the EPA nor the responsible parties were able to identify owners. These properties were subsequently sampled. Three were found to be contaminated but only two were remediated because one absent owner refused access for remediated.

Also in July, there remained one parcel of soil, approximately 50 feet by 50 feet and one foot deep, on the site that needed additional remediation. The rest of the property has been graded with clean soil and vegetated. The remaining parcel has since been remediated to the satisfaction of the EPA.

### **Site Visits**

MDCH staff visited the site and the surrounding area briefly several times in the spring of 2003 while attending site-related meetings. The EPA had established a satellite office on Ryan Road in Detroit, a short walk from the Master Metals site. MDCH observed the improved site restriction and the proximity of the residential properties and other structures and public places along the path of the transect designed for the EPA Phase I investigation.

### **Physical Hazards**

There had been physical hazards on the property historically, but at the time of MDCH re-involvement with the site the property was secure from trespass. The MDEQ was in the process of removing the buildings on-site that had been in various states of disrepair.

### **Human Exposure Pathways**

To determine whether people are or could be exposed to contaminants associated with a property, ATSDR and MDCH evaluate the environmental and human components that lead to human exposure. An exposure pathway contains five elements: (1) a source of contamination, (2) contaminant transport through an environmental medium, (3) a point of exposure, (4) a route of human exposure, and (5) a receptor population. An exposure pathway is considered *complete* if there is evidence that all five of these elements are, have been, or will be present in a community. More simply stated, an exposure pathway is considered complete when it is highly likely people are being exposed to the chemical of concern. It is considered a *potential* exposure pathway if at least one of the elements is missing but could be found present at some time. An *incomplete* pathway exists if at least one element is missing and will never be present.

Table 3. Human Exposure Pathways

Source	Environmental Transport and Media	Chemicals of Concern	Exposure Point	Exposure Route	Potentially Exposed Population	Time Frame	Status
Master Metals Plant Site	Air deposition to off-site soil	Lead	Off-site soil	Dermal contact and incidental ingestion	Neighboring residences and other properties.	Past	Potential
						Current	Incomplete
						Future	Incomplete
Master Metals Plant Site	Air deposition to soil and waste disposal practices	Lead	On-site soil	Dermal contact and incidental ingestion	Trespassers on-site. Workers onsite and at neighboring business	Past	Complete
						Current	Incomplete
						Future	Incomplete

### Toxicological Evaluation

Lead is the primary contaminant of concern for the Master Metals site and for the possible fugitive dust and particulate emissions might have been transported off site. The U.S. EPA and the CDC have determined that childhood blood lead concentrations at or above 10 ug/dl present risks to children's health. Blood lead concentrations greater than this level have been associated with developmental delays in learning and cognition (ATSDR 1999). Children who frequently play in or on soil containing concentrations of lead greater than 400 ppm may exhibit blood lead concentrations greater than 10 ug/dl (ATSDR 1999). Lead is poorly absorbed through the skin, but hand to mouth behavior in children results in introduction of lead-contaminated soil and dust to the digestive tract where it is readily absorbed.

Usually estimated exposure doses are compared with ATSDR-developed Minimal Risk Levels (MRLs) and U. S. EPA –developed Reference Doses (RfDs). Doses below the MRLs and RfDs are not generally expected to result in non-cancer health effects. When appropriate, the risk of developing cancer is evaluated separately from the exposure doses using cancer potency factors developed by the U. S. EPA

MRLs and RfDs are not available for lead exposure. Lead is a cumulative poison that tends to increase in concentration in the body upon prolonged exposure. Because of this accumulation, an individual's response to being exposed to lead depends in part on his or her history of lead exposure, and therefore it is extremely difficult to assess the health potential for adverse human health effects from environmental exposure. Exposure to lead can cause neurological and developmental problems, especially in children. Women, during pregnancy, should avoid exposure to lead as much as possible. Lead has been linked to cancer in laboratory animals, though there is no evidence linking lead exposure to cancer in humans. The U.S. has classified lead as a probable human carcinogen (U.S. EPA Class B2).

As stated in the Exposure Pathway Table 3. above, on-site trespassers, former workers at Master Metals and probably workers at the neighboring business were exposed to lead at levels that could result in health effects. The site is no longer in business and has been restricted so the first two groups have not recently been subject to exposure. Workers at the neighboring business were warned of the lead present as a result of the earlier MDCH/ATSDR Site Review and Update process. People living on near-by residential property may have been exposed to lead in

soil, however soil lead levels have been remediated to concentrations less than 400 ppm. Therefore these exposures are no longer occurring.

### **Child Health Issues**

Children may be at greater risk than are adults from certain kinds of exposure to hazardous substances at sites of environmental contamination. They engage in activities such as playing outdoors and hand-to-mouth behaviors that increase their exposure to hazardous substances. They are shorter than adults, which means they breathe dust, soil, and vapors close to the ground. Their lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. The developing body systems of children can sustain permanent damage if toxic exposures are high enough during critical growth stages.

The concern for children's health was in the forefront of this investigation and remediation. The well-known impacts lead exposure can have on childhood development and the likelihood that children would ingest more soil than adults would for example in the course of play on contaminated soil makes them especially vulnerable to exposure (ATSDR 1999). Children may also be exposed to lead in the Detroit area because a large percentage of the homes are of pre-1950s construction and have lead paint present on their interiors and exteriors (Scott 2004). Drinking water passing through lead pipes in the distribution system and lead-containing solder in household plumbing could also add an additional exposure.

### **Health Outcome Data**

MDCH consulted the database for all children blood-tested for lead from 1998 through 2001 in the census blocks closest to Master Metals. The area included the transect area and the area that was the subject of the more comprehensive Phase II sampling. During this time 2,096 children under the age of 6 were tested. Of those, 311 had a blood lead level equal to or exceeding the 10 microgram per deciliter (ug/dL) the CDC level of concern (Scott 2004). The distribution of concentrations in blood for the 311 is shown in Table 4.

Table 4. Blood Lead Data for the Master Metals Area

Number of children	Blood Lead Level in ug/dL
29	>20
74	15 to 19
208	10 to 14

The elevated blood lead level (EBLL) rate in the census blocks closest to the Master Metals site was 14.8% from 1998 through 2001. The Detroit citywide EBLL for the same period of time is shown in Table 5 (Scott 2004).

Table. 5 Detroit Citywide EBLR Rates

1998	19%
1999	14%
2000	11%
2001	11%
Four year average	13.75%

The EBLR rate of 14.8% in the census blocks closest to the Master Metals site is slightly higher than the four-year average of 13.75 % for the city of Detroit as a whole. It does not appear that Master Metals has greatly contributed to the sources of exposure to lead for the children living downwind of the site.

### Community Health Concerns

In January 2003, the Detroit Free Press ran a series of articles that revealed the results of a reported seven-month investigation on lead contamination and the implications for the Detroit Community. The paper had sponsored independent sampling for lead in neighborhood soils.

During the course of community meetings hosted by the EPA and the MDCH, and in one-on-one conversations and phone calls before and afterward, MDCH captured many community concerns. The ones expressed most often included:

- “How can lead from this site and elsewhere get into my body?”

MDCH addressed this individually and for a mass audience during the health mini-conference it sponsored for the community. They explained pica behavior and incidental ingestion exposure pathways that can be routes of exposure for those playing in, gardening in, or otherwise disturbing the soil.

- Can I be tested for lead that I might have been exposed to when Master Metals was in operation?

We explained the difficulty of determining past exposures from emissions that impacted the air years ago. We did encourage anyone concerned to get a current blood test to indicate his or her present body burden.

- Who is responsible for the contamination and are they going to be made to pay for the damage done to people and property?

MDCH referred this question to the MDEQ, EPA and the responsible parties and their legal counsel.

- Does this site endanger the guards and the inmates in the correctional facility to the south?

The EPA and MDCH did not find a threat from lead contamination to those individuals based on the sampling data gathered in Phase I.

- How soon will the property (and other affected areas) be cleaned up?

The EPA gave a preliminary schedule for the site remediation and the remediation and restoration of private residential properties. The project completion date was expected to be within the 2004 calendar year.

- What about the unpaved alleyways? (Are they contaminated too?)

The citizen was referred to the EPA who searched their data for the area of concern. The agency subsequently addressed all areas that met their contaminant criteria and for which they had access.

- Will there be some dust suppression while cleanup is going on.

The EPA gave assurances that the contractors doing the removals would take measures to limit transport of contaminants via soil or fugitive dust.

- Can I get my yard tested?

The Detroit Department of Health and Wellness Promotion offered to arrange soil sampling for a fee and blood testing for anyone who was concerned about lead contamination but did not reside in the area.

## **Conclusions**

The Master Metals site currently poses no apparent public health hazard. Lead concentrations in residential surface soil on some properties near-by the Master Metals site exceeded the 400 ppm criterion for residential soils. Lead concentrations on the site exceeded the 900 ppm criterion for soils on industrial properties. However, the EPA has removed the lead contaminated soil from the residential properties and from the plant site replacing it with soil that is well below the 400 ppm level. Therefore, exposure to lead contaminated soil is no longer occurring.

The elevated blood lead level rate in the census blocks closest to the Master Metals site for the years 1998 to 2001 was 14.8% compared to the citywide rate of 13.75 for the same period. Residents in the neighborhood may have been exposed to lead from multiple sources. For example, lead based paint in older homes is a significant source of exposure to lead. Also, the distribution piping for the Detroit water supply could have lead fittings and the homes could have lead-containing solder in their plumbing joints. Exposure to lead in surficial soil might be minor in comparison to exposure from lead based paint or contaminated water, however any additional exposures that might occur as a result of soil contamination increases the likelihood of adverse health effects. In removing the lead impacted soil, the EPA eliminated the possibility of exposure to this contamination. By providing health education and increasing the community's access to resources, MDCH has enabled the community to participate in reducing their exposure to lead.

## **Recommendations**

- MDCH and local health departments should make public health information to answer specific questions available in the same venue with the presentation of environmental information and data.
- MDCH and local health departments should educate citizens who are concerned about lead contamination but live outside the designated Master Metal's impacted area. The

agencies should direct people to resources where they can get blood lead tests and soil sampling, for a fee, to satisfy their concerns about their properties.

### **Public Health Action Plan**

MDCH coordinated and co-sponsored with The Detroit Health Department, Clear-Corps – Detroit & Leadbusters, Wayne State University and Michigan State University a mini-conference on lead for the community in the affected area called “Lead Hurts Kids (and Adults, too)” on June 24, 2003. They provided health education on lead and raised the level of community understanding of exposure, biological testing and remedial options.

MDCH and ATSDR provided public health resources at all the information meetings and availability sessions conducted by the U.S. EPA.

MDCH responded to health concern questions following the meetings and phone calls requesting information and referrals.

The City of Detroit Health Department addressed soil sampling for a fee for residents in the neighborhood who were not a part of the EPA investigation area yet wanted to have their soils sampled.

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