Health Consultation

Assessment of Lead Smelters in Minnesota:
National Lead and
Northwestern Smelting and Refining

MINNEAPOLIS, HENNEPIN COUNTY, MINNESOTA
ST. PAUL, RAMSEY COUNTY, MINNESOTA

EPA FACILITY ID: NA

SEPTEMBER 24, 2012

Prepared by:

The Minnesota Department of Health
Environmental Health Division

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

FOREWORD

This document summarizes public health concerns related to an industrial facility in Minnesota. It is based on a formal site evaluation prepared by the Minnesota Department of Health (MDH). For a formal site evaluation, a number of steps are necessary:

- *Evaluating exposure:* MDH scientists begin by reviewing available information about environmental conditions at the site. The first task is to find out how much contamination is present, where it is found on the site, and how people might be exposed to it. Usually, MDH does not collect its own environmental sampling data. Rather, MDH relies on information provided by the Minnesota Pollution Control Agency (MPCA), the US Environmental Protection Agency (EPA), and other government agencies, private businesses, and the general public.

- *Evaluating health effects:* If there is evidence that people are being exposed—or could be exposed—to hazardous substances, MDH scientists will take steps to determine whether that exposure could be harmful to human health. MDH's report focuses on public health— that is, the health impact on the community as a whole. The report is based on existing scientific information.

- *Developing recommendations:* In the evaluation report, MDH outlines its conclusions regarding any potential health threat posed by a site and offers recommendations for reducing or eliminating human exposure to pollutants. The role of MDH is primarily advisory. For that reason, the evaluation report will typically recommend actions to be taken by other agencies—including EPA and MPCA. If, however, an immediate health threat exists, MDH will issue a public health advisory to warn people of the danger and will work to resolve the problem.

- *Soliciting community input*: The evaluation process is interactive. MDH starts by soliciting and evaluating information from various government agencies, the individuals or organizations responsible for the site, and community members living near the site. Any conclusions about the site are shared with the individuals, groups, and organizations that provided the information. Once an evaluation report has been prepared, MDH seeks feedback from the public. *If you have questions or comments about this report, we encourage you to contact us.*

Please write to:	Community Relations Coordinator Site Assessment and Consultation Unit Minnesota Department of Health 625 North Robert Street PO Box 64975 St. Paul, MN 55164-0975
OR call us at:	(651) 201-4897 *or* 1-800-657-3908 (toll free call - press "4" on your touch tone phone)
On the web:	http://www.health.state.mn.us/divs/eh/hazardous/index.html

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List of Acronyms

ATSDR – Agency for Toxic Substances and Disease Registry

BLIS – blood lead information system

CDC – Centers for Disease Control and Prevention

EBLL – elevated blood lead level

EPA – U.S. Environmental Protection Agency

IEUBK – Integrated Exposure Uptake Biokinetic Model for Lead in Children

MDA – Minnesota Department of Agriculture

MDH – Minnesota Department of Health

MPCA – Minnesota Pollution Control Agency

PAHs – polycyclic aromatic hydrocarbons

ppm – parts per million

QA/QC – quality assurance/quality control

SRV – soil reference value

µg/dL – micrograms per deciliter

XRF – X-ray Fluorescence

I. Introduction

On April 19, 2012, *USA Today* published its investigation into former lead smelters across the country and their suspected role in childhood lead poisoning (*USA Today*, 2012a). *USA Today* spent 14 months looking for evidence of historic lead smelter locations and ultimately measured lead levels in soil in 13 states, finding elevated levels in all the neighborhoods they sampled. On May 9, 2012, six members of the U.S. Senate sent a letter to EPA Administrator Lisa Jackson requesting immediate action to review these sites to determine priority locations for remediation. As a result, the Minnesota Pollution Control Agency (MPCA) and the Minnesota Department of Health (MDH) have conducted site visits and reviewed data for two former smelter sites in Minnesota highlighted in the *USA Today* coverage.

II. Background and Site History

Lead smelters emit lead and other metal particulates into the air which can be carried downwind and deposited in soil. This deposition is important because lead is relatively persistent and immobile in the environment and may accumulate at the soil surface where people may be exposed. In 2002, after a paper was published in the American Journal of Public Health describing suspected historical lead smelting sites (Eckel et al., 2001) the EPA provided the names of two suspected former lead smelters to the MPCA - Northwestern Smelting and Refining in Minneapolis and National Lead in St. Paul - and requested that the MPCA determine if further investigation of lead contamination was needed. Due to the lack of evidence found at that time regarding potential past releases of lead from the smelter sites, no further action was taken.

Assessing historic point sources for lead in urban areas is severely constrained by the extensive distribution of lead from gasoline, leaded paint, and a range of industrial and commercial products. Lead poisoning prevention programs at MDH, the City of Minneapolis, and St. Paul-Ramsey County have worked for years to raise awareness of lead hazards and implement environmental and medical case management procedures in response to elevated blood lead results. Both smelters identified by *USA Today* are within areas already established as urban areas at high risk for lead exposure, based on the age of housing and socio-economic status of the population.

A. Soil lead guidance

EPA has developed the *Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children* to assess risk from lead. The IEUBK Model is designed to model exposure from lead in air, water, soil, dust, diet, and paint and other sources with pharmacokinetic modeling to predict blood lead levels in children 6 months to 7 years old. The IEUBK Model is used to estimate risks from childhood lead exposure to soil and household dust that might be encountered at contaminated sites. The IEUBK Model predicts the probability that a typical child will have an elevated blood lead level (EBLL) when exposed to specified lead concentrations. EPA used the model to develop a soil lead screening value of 400 ppm, which is based on model inputs of no more than 5% of the population exceeding a blood lead concentration of ten micrograms of lead per deciliter of blood (10 µg/dL). Using the same inputs to model, MPCA chose to round down to 300 ppm for their soil reference value (SRV) to be more protective because it has been known for many years that any amount of lead in children can be harmful. New CDC guidance in 2012 has changed from identifying a blood lead level of concern at 10 µg/dL to identifying a reference level for elevated lead in the population at 5 µg/dL. One of the goals of this new guidance is to catch elevated blood lead in children earlier and to take steps to prevent a child's future exposure to lead. It is unclear whether EPA will lower soil screening levels in the future in response to CDC's new guidance.

MDH has established a general lead standard of 100 ppm for bare surface soil in residential areas. This value is used as a criterion to mitigate soil lead when children living at a residence are found with EBLLs. Without identification of EBLLs, remediation of lead in residential soil in Minnesota is typically triggered by exceeding the SRV of 300 ppm.

B. National Lead in St. Paul

USA Today discovered the existence of the National Lead site in St. Paul listed on a historical Sanborn fire insurance map. According to *USA Today*, National Lead was a manufacturer of lead pipe, babbit, solder, and printer's metals. The dates of operation were not discovered from an internet search but the St. Louis Park Historical Society notes that National Lead may have begun moving certain functions to St. Louis Park as early as 1933-34, so perhaps operations in St. Paul began a number of years prior to the early 1930s (St. Louis Park Historical Society, 2012). This former smelter site was located in a light industrial area off of Plato Boulevard where the street names have changed over the years (for map see Appendix A). The immediate area contains several former contaminated sites that have been remediated; two are known to have contained high lead levels from battery recycling and scrap metal operations. This area is largely paved and redeveloped. Harriet Island, a nearby park, has been newly landscaped. *USA Today* sampled the soil in the area and reported 54 lead results at 15 locations in parks and residential areas south of the former smelter and found elevated levels at four locations (see

Table 1). The exact locations of the soil samples have not been disclosed by *USA Today*; however, they reported that they found elevated levels in some street-side public rights-of-way.

Table 1: *USA Today* soil lead results in St. Paul near the former National Lead site

Location	Highest sample concentration (ppm)	Highest sample concentration methodology*	Number of types of samples and range of concentrations (ppm)
Upper Landing Park	14	XRF	1 XRF (14)
Harriet Island Regional Park	43	XRF	3 XRF (non-detect-43)
Vicinity of W. Water St.	**535**	Lab	11 XRF (ND-518); 3 Lab (242-535)
Vicinity of Plato Blvd. W. and former Bidwell St. - *Property 1*	**539**	Lab	5 XRF (82-204) 3 Lab (89-539)
Vicinity of Plato Blvd. W. and former Bidwell St. - *Property 2*	94	XRF	3 XRF (19-94)
Vicinity of Prospect Blvd. near Stryker	36	XRF	1 XRF (36)
Vicinity of Prospect Blvd. at Winslow	46	XRF	1 XRF (46)
100 block of Prospect Blvd.	94	XRF	3 XRF (59-94)
Vicinity of Prospect Blvd. at Bidwell	21	XRF	2 XRF (11-21)
Prospect Terrace Park	22	XRF	3 XRF (14-22)
200 block of W. Isabel St.	**449**	XRF	6 XRF (76-449); 1 Lab (406)
300 block of Hall St. - *Property 1*	69	XRF	1 XRF (69)
300 block of Hall St. - *Property 2*	**1484**	Lab	4 XRF (41-851) 1 Lab (1484)
Vicinity of Livingston Ave. and E. George St.	95	XRF	1 XRF (95)
100 block of E. Baker	48	XRF	1 XRF (48)

*XRF, or X-ray Fluorescence, is a method used to measure lead in soil with a portable field instrument. Lab refers to soil samples sent by *USA Today* to an analytical laboratory at Tulane University to validate findings. Detailed quality assurance/quality control (QA/QC) data were not provided by *USA Today* upon MPCA request.
Bolded values are above the MPCA's lead residential soil reference value (SRV) of 300 ppm.

The majority of the samples were analyzed by X-ray Fluorescence (XRF) using a portable field instrument. XRF is a technique using the interaction of X-rays to determine the elemental composition of a material. Sampling by XRF can offer considerable reductions in cost and time

compared to standard lab methods, and decisions regarding the need for additional sampling can be made in the field (US EPA, 2004). *USA Today* posted a video of their sampling, which shows an XRF instrument placed directly on the soil surface to take measurements. This method of sampling in place using XRF leads to concerns regarding precision and accuracy. *USA Today* intended to validate sample results through laboratory analysis; however, the data quality of the laboratory results is uncertain due to their failure to use standard laboratory methods. Despite the lack of confidence in the data, it is not unusual for lead to be found in these urban locations.

C. Northwestern Smelting and Refining in Minneapolis

Northwestern Smelting and Refining was formerly located at 2523 Hiawatha Avenue in Minneapolis (for map see Appendix B). This former smelter, which is known to have operated in the 1940s, was located in what is now a light commercial/industrial area that has been largely paved and redeveloped. *USA Today* conducted soil sampling and reported 75 lead results from 20 locations (see Table 2). Elevated lead was found in six locations in adjacent neighborhood blocks. *USA Today* reported "dangerous" lead levels in the bare dirt under a tricycle in Minneapolis in one of their videos (*USA Today*, 2012b).

1940 photo of Northwestern Smelting and Refining
Courtesy of Minnesota Historical Society and *USA Today*

Table 2: *USA Today* soil lead results in Minneapolis near the former Northwestern Smelting and Refinery site

Location	Highest sample concentration (ppm)	Highest sample concentration Methodology*	Number of types of samples and range of concentrations (ppm)
100 block of E. 19th St.	91	XRF	1 XRF (91)
Vicinity of E. 22nd St. and Bloomington Ave. S.	**341**	Lab	3 XRF (46-315); 1 Lab (341)
2300 block of 17th Ave. S.	144	XRF	1 XRF (144)
Hiawatha Bike Trail between E24th and E26th Street	140	XRF	6 XRF (11-140)
East Phillips Park	105	XRF	5 XRF (non-detect-105)
2200 block of Minnehaha Ave.	132	XRF	1 XRF (132)
2300 block of 22nd Ave. S.	**704**	Lab	4 XRF (70-408); 1 Lab(704)
2300 block of Minnehaha Ave.	239	XRF	1 XRF (239)
Vicinity of E. 24th St. and Snelling Ave.	76	XRF	1 XRF (76)
Vicinity of Ogema Place and E. 24th St.	14	XRF	1 XRF (14)
2400 block of 23rd Ave. S.	223	XRF	6 XRF (76-223)
Cedar Ave. Field	71	XRF	4 XRF (non-detect -71)
2500 block of 18th Ave. S.	**365**	XRF	5 XRF (86-365)
Vicinity of Cedar Ave. and 25th 1/2 St.	non-detect	XRF	1 XRF (non-detect)
1800 block of E. 26th St. - *Prop 1*	**404**	XRF	8 XRF (146-404); 1 Lab (343)
1800 block of E. 26th St. - *Prop 2*	**498**	Lab	13 XRF (65-477); 2 Lab (430-498)
2600 block of Longfellow Ave. S.	25	XRF	4 XRF (7-25)
2600 block of 16th Ave. S.	**574**	Lab	2 XRF (326-573); 1 Lab (574)
2800 block of 28th Ave. S.	75	XRF	1 XRF (75)
3000 block of 30th Ave. S.	32	XRF	1 XRF (32)

*XRF, or X-ray Fluorescence, is a method used to measure lead in soil with a portable field instrument. Lab refers to soil samples sent by *USA Today* to an analytical laboratory at Tulane University to validate findings. Quality assurance/quality control (QA/QC) data were not provided by *USA Today*.
Bolded values are above the MPCA's lead residential soil reference value (SRV) of 300 ppm.

D. Site visits

Site visits were conducted by MDH and MPCA staff on June 7th, 2012. The visits included the approximate location of the former smelters as well as the residential areas sampled by *USA Today*. Representatives from St. Paul-Ramsey County Department of Public Health participated at the St. Paul location and shared their expertise on childhood lead poisoning prevention. The residential area near the St. Paul site is on top of the bluff south of the former smelter. In Minneapolis, the site visit included residential neighborhoods both to the east and to the west of the former smelter. A daycare was located on the block that *USA Today* reported a lead level of 704 ppm. As a result, MDH referred the daycare to the City of Minneapolis for a lead inspector visit. As a result, a small area of bare soil was found during the June inspection and the soil was sampled. The concentration was reported as 136 ppm and the inspector provided advice to cover the bare soil as a precaution.

III. Discussion

Lead, a naturally occurring metal, can be found in concentrations of approximately 15-20 ppm naturally in soil (ATSDR, 2007). It continues to be used in the production of lead batteries, mainly for use in automobiles. Lead is a very common soil contaminant due to its previous use in gasoline and paints, as well as for a variety of industrial uses. Lead-arsenic compounds were also once used as pesticides. Lead does not degrade and is not mobile in soil. A major contributor of lead in urban areas is from lead-based paints that have chipped off the exteriors of older homes and buildings. Soil lead attributable to paint is most concentrated near the foundations of houses. Most homes in St. Paul and Minneapolis are old enough to once have had substantial concentrations of lead in exterior and interior paint. The 2000 Census documented that 89% of the homes in Minneapolis and St. Paul were built before 1978, which is the year lead was banned in residential paint. The City of Minneapolis reports that levels of 350 ppm in soil collected near house foundations are typical throughout Minneapolis. Elevated lead is also found in residential areas from past emissions of leaded gasoline, especially near busy neighborhood streets.

There are sites in Minnesota where it has been possible to attribute lead in the soil to emissions from former lead smelters. However, in this case it would be difficult, if not impossible to attribute lead concentrations in those two residential neighborhoods to the former smelters in the *USA Today* story. The heterogeneity of the lead soil sampling results reported in the neighborhoods surrounding the former smelter sites suggests that the lead is likely not due to area-wide contamination from air emissions from a former smelter stack. Determining the source of lead in soil may be possible through expensive lead isotope laboratory analyses, but such a project would take time, may not produce definitive results, and would not lead to different public health conclusions and recommendations.

The immediate areas surrounding both sites, as well as the sites themselves, have undergone extensive redevelopment and remediation, including both soil removal and the addition of pavement. For example, the former Northwestern Smelting and Refining site was located just a couple blocks north of a former fertilizer plant, CMC Heartland. The area surrounding CMC became the South Minneapolis Residential Soil Contamination Site. Over 600 properties within a ¾ mile radius of CMC Heartland were cleaned up, amounting to a removal of over 50,000 tons of soil contaminated with arsenic (USEPA, 2012). It is likely that a number of these properties also contained elevated levels of lead from a variety of sources. The large amount of soil removed decreases the likelihood of identifying lead contamination from the former smelter as a source.

A. Toxicity

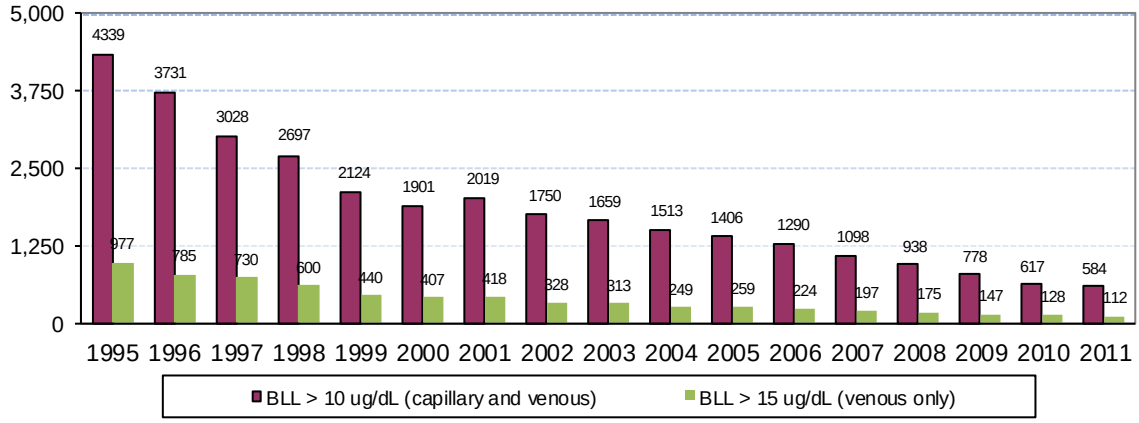
Lead can affect almost every organ and system in the body. The CDC concluded in 2012 that there is no safe level of lead exposure. At high levels lead can cause death. The most sensitive target for lead toxicity is the developing nervous system in children. Subtle effects on learning, behavior, and IQ can occur in children at low blood lead levels. Children under six years old and developing fetuses are the most vulnerable to lead. Children's bodies absorb lead more easily than adults.

In adults, the nervous system is also the main target of lead. Lead can also cause increases in blood pressure, anemia, and damage to the kidneys and the cardiovascular system (ATSDR, 2008). Very high exposure levels to pregnant women may cause miscarriage.

B. Blood Lead Surveillance

MDH maintains an electronic blood lead information system (BLIS) to monitor trends in blood lead levels in adults and children in Minnesota. Analyzing laboratories submit results to the MDH lead program, as mandated by Minnesota Statute 144.9502. The data are used to help identify populations at risk for EBLLs, to help ensure that screening services are provided to groups identified as having the highest risk of lead poisoning and to ensure that environmental and medical follow up are provided to children with EBLLs. In April 2010 MDH entered the millionth record into BLIS, which was started in 1995. Statewide data (Figure 1) shows a significant decline in lead exposure.

Figure 1: Number of Children with Elevated Blood Lead Levels in Minnesota in 2011



Since not all Minnesota children have a high risk for lead exposure, targeted screening based on established risk factors is currently recommended for most areas of the state. Universal screening is recommended for children at one and two years of age, and children up to six years of age who have not previously been screened, and for children living within the city limits of Minneapolis or St. Paul. Therefore, all children in the vicinity of the smelters are already recommended for routine blood lead testing.

Specific testing rates for 2011 for the counties containing the smelter sites are available (Table 3). Within urban counties such as Hennepin and Ramsey, most elevated blood lead tests are identified within the city boundaries. An analysis done in 2007 showed 88 % of the children with blood lead levels > 10 µg/dL, and 95 % of the children with blood lead levels > 15 µg/dL in Ramsey county lived in St. Paul, and 84 % of the children with blood lead levels > 10 µg/dL and 84 % of the children with blood lead levels > 15 µg/dL in Hennepin county lived in Minneapolis.

Table 3: Children with Blood Lead Test for 2011 for Counties with Historic Smelters

County	5 to 14.9 ug/dL	15 ug/dL or greater	Total children tested
Hennepin	781	62	22,118
Ramsey	824	58	12,282

Additional testing around the smelter areas would be duplicative of ongoing efforts. Available data showed no pattern of increased elevated blood lead results in the vicinity of the smelters.

C. Exposure to Lead

People are typically exposed to lead through a variety of media including air, water, food, dust, and soil. The potential for lead exposure in soil is influenced by several site-specific factors, including the type of land use (e.g. play area, garden), frequency and duration of contact, and the lead concentration. It is normal for young children to put things in their mouths. Eating lead paint chips and lead dust is a very common cause of lead poisoning in young children. Young children are also very active and like to explore, which can lead to greater exposure to backyard soils.

As long as lead detected in residential soil sampling remains covered by a vegetative cover, people are not likely to be significantly exposed to it because direct contact with soil contaminants and movement of the soil into the air or home as dust is minimized by the presence of cover over the contaminants. If, however, the contaminants in the soil become uncovered through the loss of vegetation or if the cover is intentionally disrupted (e.g. by digging or tilling) then the lead-contaminated soil may be accessible and people could be exposed. If the exposure is regular or involves extensive contact with high levels of lead, health effects may occur.

Care should be taken to prevent small children from playing on bare urban soil, especially because it may be contaminated with more than just lead. Urban soils are known to contain other common contaminants, including polycyclic aromatic hydrocarbons (PAHs), petroleum compounds, arsenic, and other heavy metals. Children most at risk are toddlers during their hand-to-mouth behavior phase. MDH provides guidance to reduce exposure to contamination from urban soils, including:

- Bare soils should be covered with sod, wood chips, mulch, sand, or other ground cover or covered with a permanent surface such as a deck or patio to put a barrier between children and contaminated soil
- Play areas and gardens should always be located away from buildings and fences with peeling or chipping paint
- Children's hands should be kept clean
- Soil dust in the house should be reduced by minimizing tracking of dirt inside
- Outdoor activities that stir up dust should be minimized
- For additional information on lead in soil and ways to reduce exposure, see Appendix C

If high levels of lead are present in residential soils used for growing food, people might be exposed to lead taken up by the plants or deposited in dust on the surface of the vegetables. The likelihood and potential importance of exposure via this pathway depends on factors such as the

amount of lead in soil, species of plant, portion of plant consumed, amount of vegetables eaten, food washing procedure, etc.

While lead in soil can be an exposure pathway leading to childhood lead poisoning, the vast majority of elevated blood lead levels in children are known to be from leaded paint peeling from older housing. Replacing windows, which removes the exposure from lead paint chips and dust, is thought to be one of the best interventions in preventing childhood lead poisoning cases.

D. Local public health lead programs

Although concern about former lead smelters has not been raised by Minneapolis or St. Paul residents to local or state agencies, *USA Today* has brought attention to an issue that is very important. The City of Minneapolis and St. Paul –Ramsey County Department of Public Health have respected programs to address childhood blood lead levels and exposures, and to provide assistance to reduce lead exposures.

The following responses, implemented by both Minneapolis and St. Paul, to an elevated blood lead report are outlined in Minnesota Statute (MS 144.9504) and the MDH Childhood Blood Lead Case Management Guidelines for Minnesota:

- If levels are less than 10 µg/dL information is entered into the surveillance database and education materials identifying primary sources of lead poisoning may be provided to the family.

- If levels in children are 10 µg/dL or greater, follow-up or confirmation testing and educational intervention are called for. This includes giving the children's parents or guardian a letter, bringing in the child for follow-up or confirmation testing, and providing information on how to reduce and/or avoid exposure to lead in the environment.

- If venous lead levels in a pregnant woman are 10 µg/dL or greater or are 15 µg/dL or greater for children, environmental follow-up is required. This includes a housing risk assessment and may also include an education visit from a public health nurse, enforcement orders, lead hazard reduction or remediation, and clearance testing.

- Levels of 60 µg/dL or greater indicate a medical emergency, and immediate action is taken.

Neither Minneapolis nor St. Paul indicated any noticeable pattern in blood lead cases in the vicinity of the smelters, and would respond to any elevated blood lead case the same, regardless of source. Locations in St. Paul and Minneapolis that are known to be the highest risk for elevated blood lead levels are several miles away from the former smelter locations.

IV. Conclusions

- Childhood lead poisoning continues to be a major, preventable environmental health problem.
- Lead is found in urban soils from a number of sources. Regardless of the source of lead in soil, it can be a source of lead poisoning to young children. Most often, lead poisoning is associated with lead in housing, especially lead paint from windows.
- A health concern exists if children play in soil with elevated lead.
- Attributing or quantifying the relative contribution from any single source such as a former lead smelter to elevated soil lead levels in St. Paul and Minneapolis is very difficult. Property redevelopment and remediation of contaminated sites has occurred in these neighborhoods making it unlikely that remaining lead can be attributed to former smelters.
- Because the locations of the soil sampling by *USA Today* are only known to be somewhere on a given block, it is unknown if levels of lead were found in residential yards, play areas, or with areas of bare soil. *USA Today* reported that the elevated levels found in St. Paul were found in street-side public rights-of-way. Less is known about the locations of the elevated results in Minneapolis.

V. Recommendations

- There should be a continued effort by state and local public health officials to inform parents of specific measures to prevent or minimize their child's exposure to lead and urban soils throughout Minnesota.
- Children under six years old should continue to be routinely screened for elevated blood lead, consistent with established MDH guidelines for the area.

VI. Public Health Action Plan

- MDH will continue to provide information to citizens and neighborhood groups to address lead exposures and prevention.
- Local public health officials will continue to work with the parents of children with elevated blood lead levels on a case-by-case basis to minimize lead exposure.
- If additional environmental data becomes available, MDH will evaluate the data and provide recommendations as needed.

VII. References

Agency for Toxic Substances and Disease Registry (ATSDR) (2007) Toxicological Profile for Lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

CDC (2012) CDC Response to Advisory Committee on Childhood Lead Poisoning Prevention Recommendations in "Low Level Lead Exposure Harms Children: A Renewed Call of Primary Prevention." Accessed at http://www.cdc.gov/nceh/lead/acclpp/cdc_response_lead_exposure_recs.pdf on June 26, 2012.

Eckel WP, Rabinowitz MB, Foster GD (2001) Discovering Unrecognized Lead-Smelting Sites by Historical Methods. American Journal of Public Health Vol. 91, No. 4, April 2001.

St. Louis Park Historical Society (2012). National Lead. Accessed at http://www.slphistory.org/history/nationallead.asp on July 5, 2012.

USA Today (2012a) Ghost Factories – Poison in the Ground. April 19, 2012. Accessed at http://www.usatoday.com/news/nation/smelting-lead-contamination on April 23, 2012.

USA Today (2012b) Ghost Factories: *USA Today*'s soil testing findings (video). Accessed at http://www.usatoday.com/news/nation/story/2012-04-20/smelting-lead-contamination-soil-testing/54420418/1 at approximately 0:30 on July 3, 2012.

USEPA (2012) Agencies and Neighbors Work Together on Cleanup – South Minneapolis Residential Soil Contamination Site, Minneapolis, Minnesota. June 2012. Accessed at http://www.epa.gov/region5/cleanup/cmcheartland/pdfs/sompls_fs_201206_english.pdf on July 2, 2012.

USEPA (2004) X-ray Fluorescence (XRF) Instruments Frequently Asked Questions (FAQ). May 2004. Accessed at http://epa.gov/superfund/lead/products/xrffaqs.pdf on July 3, 2012.

REPORT PREPARATION

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CERTIFICATION

This Urban Soil Lead Assessment Health Consultation was prepared by the Minnesota Department of Health (MDH) with support from the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health **co**nsultation was begun. This document has not been reviewed and cleared by ATSDR. Editorial review was completed by additional programs of MDH.

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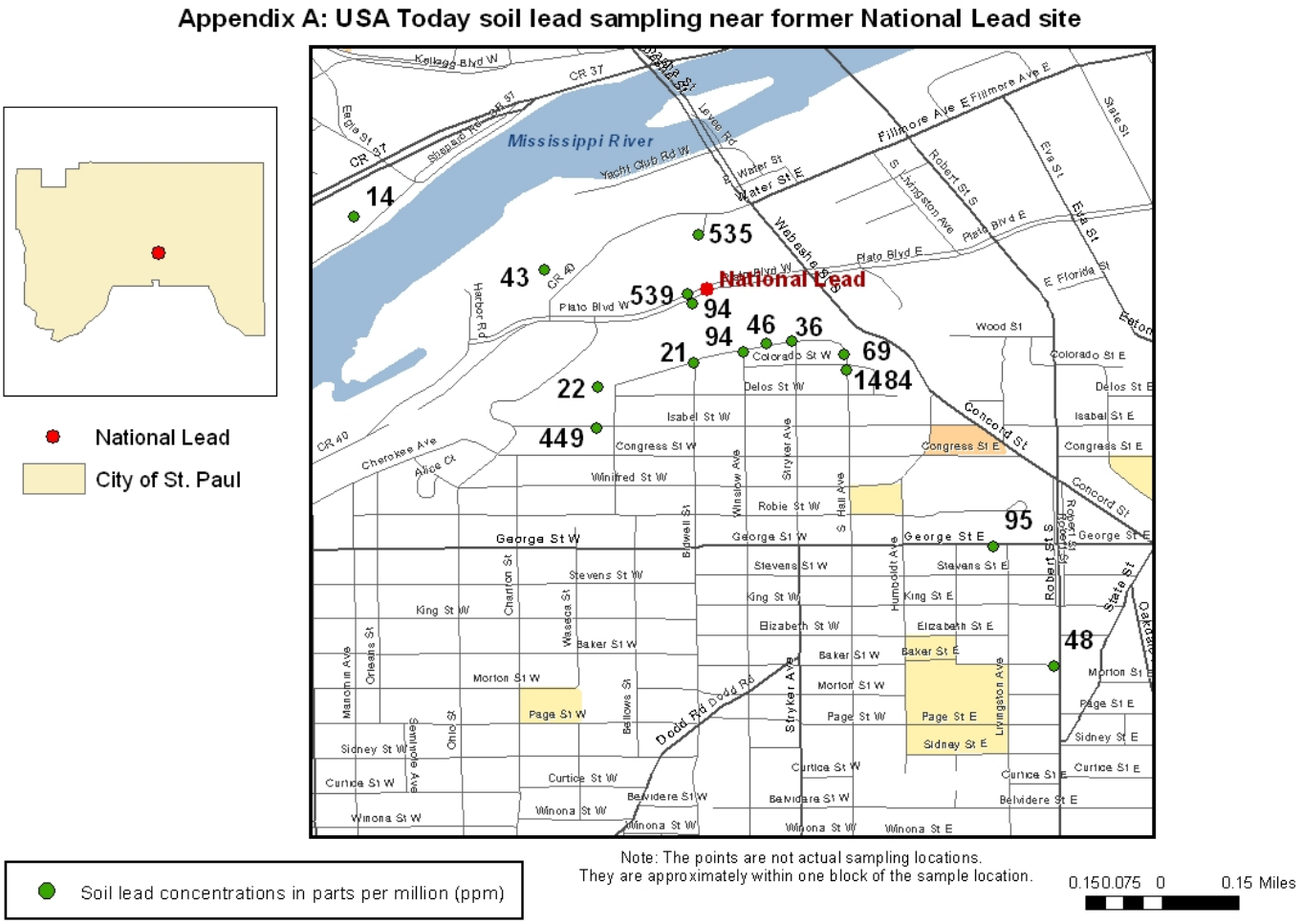
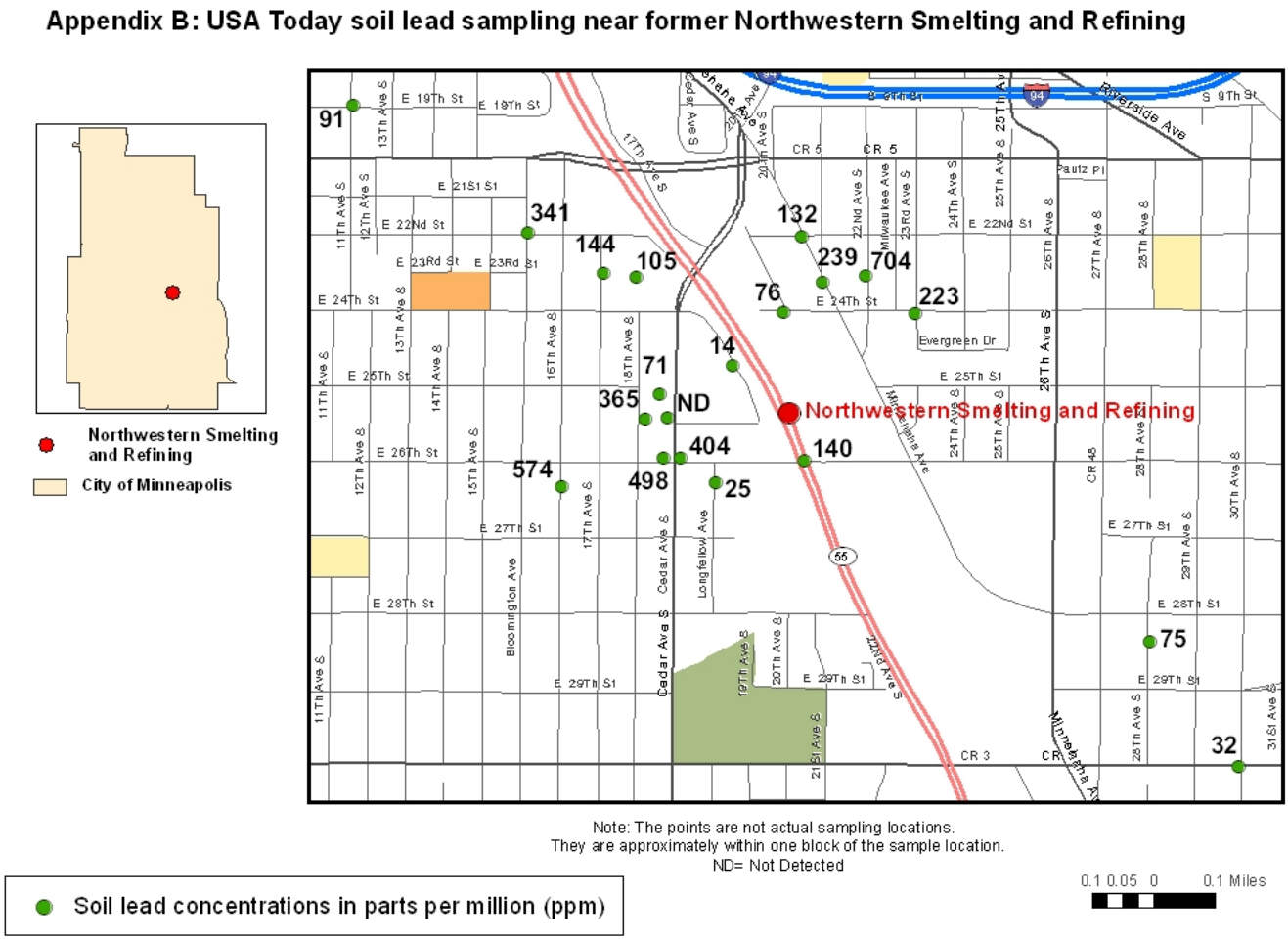
Appendix A: USA Today soil lead sampling near former National Lead site



Appendix B: USA Today soil lead sampling near former Northwestern Smelting and Refining



Appendix C: Minnesota Department of Health Lead in Soil Information Sheet

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Lead in Soil

Lead is a commonly used metal that can be in air, soil, or water. This information sheet discusses lead in soil and the possible health concerns from contact with lead.

More about lead in soil…

Lead does not break down and does not move in soil. When lead is released to the air, it may travel long distances before settling to the ground. Once lead falls onto soil, it usually sticks to soil particles.

How does lead get into the soil?

- *Past use of leaded paint* - The soil near foundations of houses or near other painted structures often has high amounts of lead from old paint that has peeled or from the leaded dust created from friction caused when using windows or doors.
- *Past use of leaded gasoline* – Until the mid-1980's, lead released into the air from car exhaust fell into the soil and is still found near major roadways or intersections in urban areas.
- *Past and current industrial lead use*
- *Lead-arsenic compounds once used as pesticides*

How can people be exposed to lead in soil?

While it is possible to breathe in contaminated dust, accidental ingestion of contaminated soil is a greater concern. Accidental ingestion of contaminated soil may occur when normal activities leave soil residue on our fingers and hands, increasing the chance that contaminants could be swallowed.

Children who live and play in a contaminated area can have more exposure than adults. Young 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.

Lead was banned in residential paint in 1978.
About 75% of homes built before 1978 contain some lead-based paint.

89% of the homes in St. Paul and Minneapolis were built before 1978. (2000 Census)

At a Glance…

Lead is…

- a naturally occurring bluish-gray metal found in small amounts in the earth's crust
- found in all parts of our environment and in people.
- used in making batteries, ammunition, metal products, and devices to shield x-rays.

Lead enters your body through…

- lead dust
- lead-based paint
- soil
- food
- water
- folk medicine

There is no safe level of lead exposure. If you are concerned about being exposed to lead, consider having a blood lead test. Blood lead testing is the best way to find out if you are being exposed to lead. More information about lead poisoning can be found at www.health.state.mn.us/lead

Possible health concerns from contact with lead …

- young children may have more problems with health, learning, and behavior
- adults may have more problems with high blood pressure, kidney damage, and fertility problems

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How can people lower their exposure to lead in soil?

Give children a safe play area

- Build a sandbox with a bottom and fill it with clean sand. Cover it when not in use to keep out soil dust and other contaminants.
- Bare soils should be covered with sod, wood chips, mulch, sand, or other ground cover or covered with a permanent surface such as a deck or patio to put a barrier between children and contaminated soil
- Play areas and gardens should always be located away from buildings and fences with peeling or chipping paint

Keep hands clean

- Wash children's hands and faces frequently. Clean toys or objects children put in their mouths.
- Wash hands before feeding children, eating or drinking.

Reduce soil dust in the house

- Take off your shoes and store them in the entryway of your home to prevent tracking soil inside.
- Keep in mind that pets can carry in soil dust on their paws.
- Dust with a damp cloth, scrub floors and wash windowsills. Check around windows for chipping or peeling old paint and repair if needed.
- Change the furnace filter every three months.

Reduce outdoor activities that stir up dust

- Seed or sod bare areas of your yard. Bushes and grass help keep soil in place and reduce the amount of dust in the air.
- Minimize mowing over areas of sparse lawn during periods of dry weather.
- Avoid digging or disturbing soil. Keeping the soil moist will reduce dust.

Take special care when gardening or harvesting

- Use gardening gloves to prevent swallowing of soil residue from fingers or hands.
- All plants used for traditional or cultural purposes should be rinsed off carefully.
- Thoroughly wash and peel home-grown produce before eating or cooking them. If possible, grow produce in raised bed gardens filled with clean soil.

Contact with questions or for more information:

MDH - Site Assessment and Consultation Unit
Phone: 651-201-4897 or toll-free 1-800-657-3908 and press "4" to leave a message
Email: health.hazard@state.mn.us or visit: http://www.health.state.mn.us/divs/eh/hazardous/index.html

This information sheet was prepared in cooperation with U.S. Agency for Toxic Substances and Disease Registry

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Appendix C