

PETITIONED HEALTH CONSULTATION

FORMER ELK RAPIDS SPORTSMAN'S CLUB

ELK RAPIDS, ANTRIM COUNTY, MICHIGAN

AUGUST 28, 2008

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a 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.

MDCH provided a public comment period for the November 13, 2007, Petitioned Health Consultation that closed on June 27, 2008. Comments received are summarized and MDCH responses are provided in Appendix A.

The conclusions and recommendations presented in this health consultation are the result of site-specific analyses and are not to be cited or quoted for other evaluations or health consultations. Correspondence regarding this health consultation may be address to:

Linda D. Dykema, Ph.D.
Michigan Department of Community Health
Division of Environmental Health
P.O. Box 30195
Lansing, Michigan 48909

You May Contact ATSDR TOLL FREE at
1-888-42ATSDR

or

Visit our Home Page at: <http://www.atsdr.cdc.gov>

PETITIONED HEALTH CONSULTATION

FORMER ELK RAPIDS SPORTSMAN'S CLUB

ELK RAPIDS, ANTRIM COUNTY, MICHIGAN

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

| | |
|--|-----|
| Acronyms and Abbreviations | iii |
| Summary | 1 |
| Purpose and Health Issues | 1 |
| Background | 1 |
| Discussion | 4 |
| Environmental Contamination | 4 |
| Soil | 4 |
| Groundwater | 6 |
| Buildings | 6 |
| Exposure Pathways Analysis | 6 |
| Toxicological Evaluation | 7 |
| Children’s Health Considerations | 8 |
| Conclusions | 9 |
| Recommendations | 9 |
| Public Health Action Plan | 9 |
| Preparers of Report | 10 |
| References | 11 |
| Certification | 12 |

List of Tables

| | |
|---|---|
| Table 1. Range of total lead concentrations detected in analyzed soil samples from the former Elk Rapids Sportsman’s Club | 5 |
| Table 2. Lead concentrations detected in 0-6 inch soil samples analyzed for total, coarse and fine soil fractions from the former Elk Rapids Sportsman’s Club | 6 |
| Table 3. Exposure Pathways for lead contamination at the former Elk Rapids Sportsman’s Club | 7 |

List of Figures

| | |
|--|---|
| Figure 1. Elk Rapids and Vicinity, Antrim County, Michigan | 2 |
| Figure 2. Elk Rapids Sportsman’s Club Site Plan, Elk Rapids, Antrim County, Michigan | 3 |

List of Attachments

| | |
|--|----|
| Attachment 1. Responsiveness Summary | 13 |
|--|----|

Acronyms and Abbreviations

| | |
|-------|--|
| ATSDR | Agency for Toxic Substances and Disease Registry |
| BLL | blood lead level |
| CDC | Centers for Disease Control and Prevention |
| COC | Contaminant of Concern |
| DCC | Direct Contact Criteria |
| DEH | Division of Environmental Health |
| DWC | Drinking Water Criteria |
| ERSC | Elk Rapids Sportsman's Club |
| IEUBK | Integrated Exposure Uptake Biokinetic (model) |
| µg/dl | micrograms per deciliter |
| MDCH | Michigan Department of Community Health |
| MDEQ | Michigan Department of Environmental Quality |
| NMCHA | Northwest Michigan Community Health Agency |
| PAH | Polycyclic Aromatic Hydrocarbons |
| ppb | parts per billion |
| ppm | parts per million |

Summary

The Elk Rapids Sportsman Club (ERSC) site was a small arms firing range for pistols, shotguns, and rifles for more than 70 years. After the ERSC closed in 2006, the Elk Rapids Township developed plans to turn the former shooting range into a public park. A private citizen petitioned the federal Agency for Toxic Substances and Disease Registry (ATSDR) for public health assessment activities at the site, expressing concern for the potential public health hazards associated with lead and other contaminants on the site. The Michigan Department of Community Health (MDCH) conducted this health consultation for ATSDR under a cooperative agreement.

The MDCH finds that the site poses a **public health hazard** in its current condition. Surface soil at the site contains lead at levels that could produce neurological damage to children. Plans to turn the ERSC site into a public park should include provisions to protect public health including a lead inspection and risk assessment in all site buildings, removal and/or appropriate containment of lead contaminated soils, soil sampling throughout the site, and monitoring for potential future impacts to groundwater.

Purpose and Health Issues

A private citizen living in Elk Rapids, Michigan petitioned the federal Agency for Toxic Substances and Disease Registry (ATSDR) for public health assessment activities at the former Elk Rapids Sportsman's Club (ERSC). The citizen expressed concern over lead and other potential contaminants on the site and the Elk Rapids Township's plans to convert it into a public park (Petitioner for ERSC site 2006). The ATSDR evaluates the potential health impacts of hazardous waste sites or spills. The Michigan Department of Community Health (MDCH) conducted this health consultation for ATSDR under a cooperative agreement.

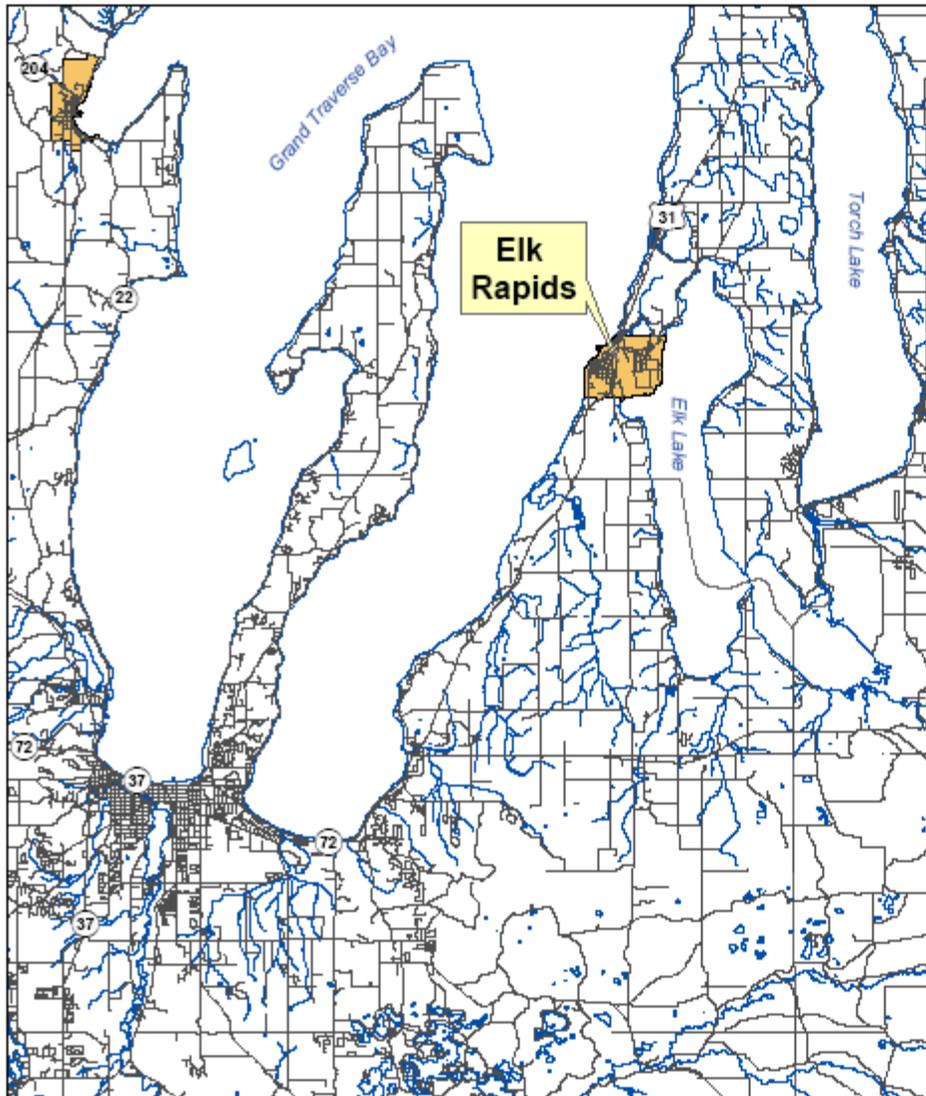
The purpose of this health consultation is to review the available data concerning lead and other contaminant levels on the former shooting range property and evaluate the potential public health concern under current conditions as well as future development as a park. Exposures that may have occurred when the site was operated as the ERSC will not be evaluated here. Potential off-site contamination resulting from activities at the former shooting ranges may be addressed in future health consultations.

Background

The former ERSC is located on 10.95 acres of land in Antrim County, Michigan, south of the intersection of US-31 and Williams Road (Figure 1). Club members used the site for more than 70 years as a small arms firing range for pistols, shotguns, and rifles (short, mid, and long range). The ERSC started in 1936 with just eight members, expanding over the years to include a clubhouse built in 1958 with two subsequent additions, skeet and trap houses, a range house and two on-site garages (Figure 2).

The ERSC contained both high velocity ranges for pistol and rifle, as well as a low velocity shotgun area. The pistol and short-, mid-, and long-range rifle areas consisted of a firing line, targets, backstops and site berms to contain bullets and bullet fragments. Figure 2 shows the four constructed dirt impact berms as well as the natural hillside used as backdrops for the high velocity shooting ranges (Global 2006). The low-velocity shotgun skeet range was located in the southeast area of the site (Figure 2). Layers of clay pigeon debris are evident throughout this area.

Figure 1. Elk Rapids and Vicinity, Antrim County, Michigan

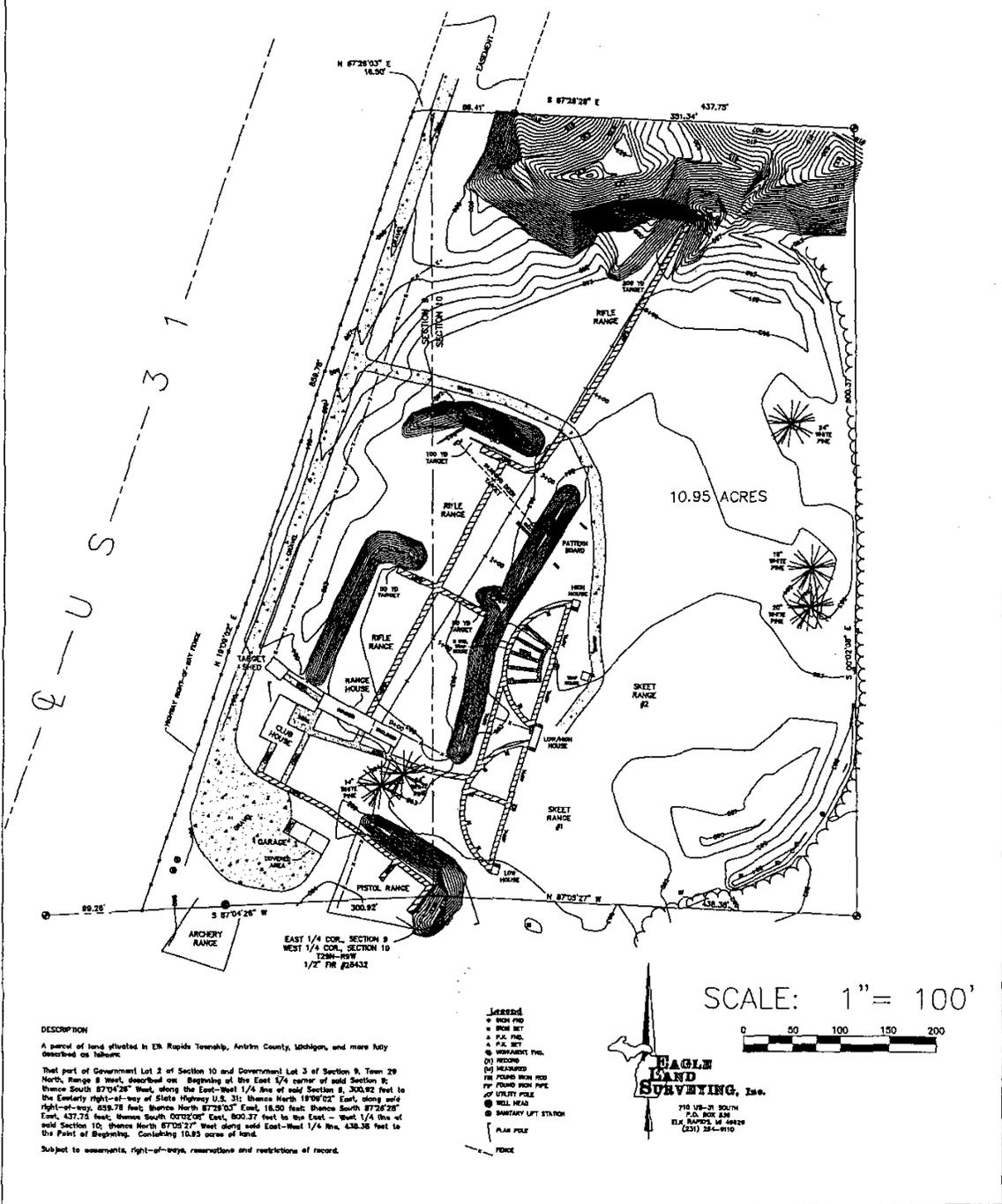


Location



SITE PLAN

Part of Sectins 9 & 10,
T29N-R9W, Elk Rapids Twp.,
Michigan



DESCRIPTION

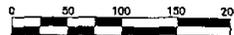
A parcel of land situated in Elk Rapids Township, Antrim County, Michigan, and more fully described as follows:

That part of Government Lot 2 of Section 10 and Government Lot 3 of Section 9, Town 29 North, Range 9 West, described as: Beginning at the East 1/4 corner of said Section 9; thence South 87°04'28" West, along the East-West 1/4 line of said Section 9, 303.82 feet to the Easlerly right-of-way of State Highway U.S. 31; thence North 18°00'22" East, along said right-of-way, 639.78 feet; thence North 87°28'03" East, 18.50 feet; thence South 87°28'28" East, 437.75 feet; thence South 02°02'08" East, 803.37 feet to the East-West 1/4 line of said Section 10; thence North 87°02'27" West along said East-West 1/4 line, 438.36 feet to the Point of Beginning. Containing 10.95 acres of land.

Subject to easements, right-of-ways, reservations and restrictions of record.

- Legend**
- IRON PIN
 - IRON SET
 - ▲ P.C. PILE
 - ▲ P.S. SET
 - ⊙ UNMARKED PILE
 - (O) IRONING
 - (M) MEASURED
 - FM FOUND IRON ROD
 - FM FOUND IRON PIPE
 - FM FOUND IRON PIPE
 - FM UTILITY POLE
 - ⊙ WELL HEAD
 - ⊙ SANITARY LIFT STATION
 - FENCE

SCALE: 1" = 100'



BAGLE LAND SURVEYING, Inc.
710 1/2-31 SOUTH
P.O. BOX 848
ELK RAPIDS, MI 49829
(517) 384-9110

Figure 2. Elk Rapids Sportsman's Club Site Plan, Elk Rapids, Antrim County, Michigan

There are four main buildings on the site: the rifle range building, a clubhouse, and two garages. Shooters using the rifle range could fire from windows on the north face of the rifle range building. Lead vaporizes from the bullet during firing and will settle out into dust where it can be resuspended through activities such as dry sweeping. Club members likely also made lead shot at a work area in the rifle range building (Global 2006). Other site buildings may have been affected by lead contaminated soil tracked from other areas of the site on shoes or vehicles.

During the years the site was operated as a shooting club, management practices allowed spent ammunition to accumulate across the property. When left in the environment, lead containing ammunition oxidizes and releases lead carbonates and sulfates to the soil. Many factors may contribute to the rate of release of these lead containing compounds including precipitation levels, pH of rain and soil, and the type of ammunition used. People may be exposed to lead at former shooting ranges if these sites are later developed for other uses.

The ERSC closed in August of 2006 and the Elk Rapids Township has assumed control over the use of the property (Global 2006). The Township has proposed plans to develop the property into a public park that could include playgrounds, a sledding hill, a pond, and overnight camping.

On August 22, 2007, MDCH staff visited the former ERSC site. After the site tour, MDCH met with representatives from the Michigan Department of Environmental Quality (MDEQ) Remediation and Redevelopment Division Gaylord Field Office, the Northwest Michigan Community Health Agency (NMCHA), the Elk Rapids Township and their consultants, and a descendant of the former owner of the property. The Township agreed to consider recommendations for revisions to the plans for redevelopment of the site into a public park.

Discussion

Environmental Contamination

MDCH compared contaminant concentrations at the former ERSC site to the appropriate MDEQ Part 201 Generic Cleanup Criteria. The generic criteria are media-specific values that state risk assessors use to evaluate a site for human health hazards and to determine the need for remedial actions.

MDCH used the Residential and Commercial I Direct Contact Criteria (DCC) to evaluate soil contamination at the former ERSC site. The DCC identifies a soil concentration that is protective of adverse health effects due to long-term, daily ingestion (eating) of and dermal (skin) exposure to contaminated soil. MDCH used the Residential and Commercial I Drinking Water Criteria (DWC) to evaluate groundwater concentrations. The DWC is protective of adverse health effects due to long-term daily use of groundwater as a source of drinking water (MDEQ 2005b).

Soil - In 2006, a consultant for the Elk Rapids Township conducted a site investigation of the former ERSC site. The consultant reviewed historical records to determine the location of the impact berms and shooting ranges prior to changes in the layout made in 1994. Four general areas of concern were identified: 1) the shotgun range, 2) rifle range, 3) pistol range, and 4) the minimal impact area surrounding the site buildings and the road (Global 2007).

Soil was sampled in each of the areas of concern, including the impact berms and in the range floor in the shooting ranges. Trenches were excavated into the impact berms to reveal the soil

profile and take representative samples. The consultant collected samples from 149 locations including 61 locations in the shotgun area (128 samples), 67 locations in the rifle range (143 samples), 10 locations in the pistol range (21 samples), and 11 locations in the minimal impact area (22 samples). Not all samples were submitted for analysis.

Some samples submitted for lead analysis were dry sieved to remove lead shot and fragments. Table 1 presents the levels of detected total lead soil in samples taken from range floors and the minimal impact area. All concentrations are given in parts per million (ppm).

Table 1. Range of total lead concentrations in parts per million (ppm) detected in analyzed soil samples from the former Elk Rapids Sportsman’s Club.

| Location | 0 – 6 inches | 6 - 12 inches | 12 -18 inches |
|---------------------|---------------------|----------------------|----------------------|
| Shotgun Range | 10 to 37,120 | 2 to 35 | NA |
| Long Range Rifle | ND to 2,570 | ND to 910 | 1 to 27 |
| Mid-Range Rifle | 16 to 22,380 | 2 to 51 | NA |
| Short Range Rifle | 2 to 6,030 | 10 to 101 | 27 |
| Pistol Range | 9 to 812 | 3,200 | NA |
| Minimal Impact Area | 4 to 39 | NA | NA |

Global 2007

NA = Not Analyzed

ND = Not Detected (i.e., Below Detection Limit)

A subset of soil samples was analyzed for total, coarse, and fine fraction lead consistent with MDEQ guidelines (MDEQ 2005a). The fine soil fraction (i.e., less than 250 microns) is the portion of the soil that is most likely to be inhaled as dust. The fine fraction is also most likely to be transported by wind, tracked into buildings on shoes, and to stick to hands and other objects that may transmit contaminants to the mouth where they may be swallowed. Table 2 presents the levels of detected total, coarse, and fine fraction lead in soil samples submitted for fraction analysis. Some concentrations exceed the MDEQ generic residential criterion for lead of 400 ppm (MDEQ 2005b). Lead will be carried through the health consultation as a contaminant of concern (COC).

Lead is the major contaminant at shooting ranges, but bullet jackets may also contain arsenic, antimony, copper, iron, tin and zinc. Four soil samples from the impact berms were also analyzed for these additional inorganic metals of concern. None of these metals was detected at concentrations exceeding naturally occurring background levels in soil (MDEQ 2005b). One sample from the shotgun area where clay pigeon debris was observed was analyzed for polycyclic aromatic hydrocarbons (PAHs). Detected levels of PAHs were below their respective MDEQ generic residential cleanup criteria for soils (Global 2007, MDEQ 2005b). These compounds will not be considered further in this health consultation.

Table 2. Lead concentrations in parts per million (ppm) detected in 0-6 inch soil samples analyzed for total, coarse and fine soil fractions from the Elk Rapids Sportsman’s Club.

| | Total | Coarse | Fine |
|-------------------|------------------|---------------|-------------|
| Shotgun Range | 30,550 | 845 | 1,705 |
| | 116 | 6,50 | 459 |
| | 26 | 20 | 56 |
| | 15,160 | 27 | 65 |
| | 17,040 | 34 | 206 |
| | NA | 112 | 500 |
| | 53 | 21 | 74 |
| | 174 | 63 | 664 |
| | 37,120 | 90 | 1,201 |
| | 302 | 119 | 1,140 |
| | 16,430 | 85 | 408 |
| | 22,090 | 86 | 153 |
| | Long Range Rifle | 911 | 204 |
| 17 | | 11 | 31 |
| Mid-Range Rifle | 171 | 318 | 490 |
| Short Range Rifle | 81 | 51 | 258 |
| | 200 | 83 | 709 |
| | 381 | 446 | 728 |
| | 2 | 2 | 4 |
| Pistol Range | 343 | 253 | 2,460 |

Global 2007

Groundwater - The shallow groundwater aquifer at the former ERSC site ranges from 3 to 11 feet below the ground surface. In September of 2006, the consultant installed three wells that were used to determine the flow of groundwater, followed by three additional monitoring wells. All wells were sampled for lead concentrations and four wells were sampled for arsenic. No lead concentrations above the MDEQ generic residential drinking water criterion of 4 parts per billion (ppb) were detected. However, a level of 4 ppb was found in a single sample in one well. Arsenic levels were non-detect in the four samples analyzed for this contaminant. Near-by residential drinking water wells are installed in a deeper aquifer that has not been sampled, but is not expected to be impacted (MDEQ 2005b, Global 2007)..

Buildings – No samples have been collected to assess the potential for lead contamination inside the buildings on the property.

Exposure Pathways Analysis

To determine whether persons are, have been, or are likely to be exposed to contaminants, MDCH evaluates the environmental and human components that could 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, or a high probability, that all five of these elements are, have been, or will be present at

a site. It is considered either a potential or an incomplete pathway if there is no evidence that at least one of the elements above are, have been, or will be present, or that there is a lower probability of exposure. The exposure pathway elements for the ERSC site are shown in Table 3.

Table 3. Exposure Pathways for Lead Contamination at the Former Elk Rapids Sportsman’s Club

| Source | Transport Media | Chemical of Concern | Exposure Point | Exposure Route | Exposed Population | Time Frame | Status |
|--------------------------|-----------------|---------------------|------------------------|------------------------------------|--|------------|------------|
| Former Shooting Range(s) | Air | Lead | Indoor Dust & Surfaces | Inhalation Incidental ingestion | Park Visitors | Past | Unknown |
| | | | | | | Present | Incomplete |
| | | | | | | Future | Complete |
| | Air | | Outdoor Soil & Dust | Inhalation | Local residents, Trespassers Park visitors | Past | Unknown |
| | | | | | | Present | Complete |
| | | | | | | Future | Complete |
| | Soil | | Soil | Incidental ingestion Dermal | Trespassers Park visitors | Past | Unknown |
| | | | | | | Present | Complete |
| | | | | | | Future | Complete |
| | Groundwater | | Drinking Water | Ingestion, Inhalation Dermal | Local residents Park visitors | Past | Incomplete |
| | | | | | | Present | Incomplete |
| | | | | | | Future | Potential |

Indoor dust on floors and surfaces in the rifle range building is likely to be contaminated with lead. It is not known what exposures may have occurred in the past. The site buildings are currently closed to public use. If the buildings will be used after the site is developed into a public park, visitors could inhale lead attached to dust particles suspended in the air. Visitors could also transfer lead contaminated dust from surfaces via their hands and then to their mouths where the lead could be swallowed.

Elevated lead levels have been detected in surface soil at the ERSC. While vegetation at the site may limit emissions, people who visit the site or live near-by could be exposed to outdoor dust picked up by the wind. Workers or near-by residents could also be exposed to lead contaminated outdoor dust during construction of the proposed park.

Access to the ERSC site is currently not adequately restricted. A gate limits vehicle access, but trespassers could easily walk into the site. People visiting the site may be exposed to contaminated soil through incidental ingestion and dermal exposure. Incidental ingestion is the primary route of exposure as lead is not readily absorbed through the skin. Future park visitors could also be exposed to lead contaminated soil if it remains in place after construction of the proposed park.

Shallow groundwater is not used now or in the past as a source of potable drinking water at the park or by down gradient residents. However, future impacts to shallow groundwater could affect the deeper aquifer currently used as a source of drinking water.

Toxicological Evaluation

The neurotoxic effects of lead in children are well known and include learning and behavioral difficulties. In adults, lead may cause decreased reaction times, weakness in the hands and

ankles, and impaired memory. It can also damage the kidneys, the reproductive system, and cause anemia.

The National Toxicology Program recently reported that lead may be “reasonably anticipated to be a human carcinogen” (NTP 2004). This determination was based on limited evidence in human studies and sufficient evidence in animal studies. The human studies investigated occupational settings in which workers primarily were exposed by inhalation (NTP 2004). Exposure to the lead in soils on former shooting ranges would likely occur primarily through incidental ingestion. It is unknown whether exposure by ingestion has as great a cancer risk as inhalation exposure.

The level of lead in the body is usually expressed as a blood lead level in units of micrograms of lead per deciliter of blood ($\mu\text{g}/\text{dl}$). The Centers for Disease Control and Prevention and the state of Michigan consider 10 $\mu\text{g}/\text{dl}$ blood lead in children to be the “level of concern.” Recent research suggests that subtle neurotoxic effects occur at lower levels (Canfield et al. 2003, Cory-Slechta 2003). These findings have strengthened the assertion, by scientists as well as activists, that there is no threshold level below which adverse effects are not observed for lead in the body.

Exposure to lead can occur from several different sources, and models that account for these multiple sources are often used to assess potential effects from exposure to lead in the environment (ATSDR 1999). The MDEQ generic residential criterion for lead of 400 ppm in soil was developed using the Integrated Exposure Uptake Biokinetic (IEUBK) model with generic assumptions about levels of lead in other media such as air and drinking water and a target blood lead level of 10 $\mu\text{g}/\text{dl}$ (MDEQ 2005b).

Children’s Health Considerations

Children may be at greater risk than adults from exposure to hazardous substances at sites of environmental contamination. Children engage in activities such as playing outdoors and hand-to-mouth behaviors that could increase their intake of hazardous substances. They are shorter than most adults, and therefore breathe dust, soil, and vapors found closer 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. Injury during key periods of development of an unborn child could lead to malformation of organs (teratogenesis), disruption of function, and premature death. Exposure of the mother could lead to exposure of the fetus, via the placenta, or affect the fetus because of injury or illness sustained by the mother (ATSDR 1998). The obvious implication for environmental health is that children can experience substantially greater exposures to toxicants in soil, water, or air than adults can.

Young children are at the greatest risk for experiencing lead-induced health effects. Children less than 5 years old absorb lead from the gastrointestinal tract more efficiently than do adults (about 50% versus 15% relative absorption, respectively). Thumb-sucking, other hand-to-mouth and pica behaviors (consuming large quantities of non-food items) can increase the amount of lead-contaminated dust and dirt being transferred to the gastrointestinal tract. Deficits in some nutrients, including calcium, iron, and zinc, can exacerbate the toxic effects of lead. Lead can pass across the placenta to a developing fetus and very small amounts can be secreted through breast milk (ATSDR 1999).

Conclusions

The ERSC site poses a *public health hazard* in its current condition. Lead has been detected in surface soil at levels that could produce neurological damage to children. Access to the site is currently unrestricted for foot traffic and trespassers could frequent the site without detection.

The Elk Rapids Township has proposed plans to turn the ERSC site into a public park. Removal and/or containment of the lead contaminated soil and other media is necessary to prevent unacceptable exposures in the future.

Recommendations

- ❖ Advise the public of the health hazards currently on the former ERSC site.
- ❖ Include the following provisions in plans to redevelop the site as a public park:
 - Conduct a lead inspection and risk assessment in all buildings remaining on site to determine the need for lead hazard remediation.
 - Screen impacted soil to remove lead fragments and other debris.
 - Remove and/or consolidate soil that contains lead at concentrations greater than 400 ppm into a site feature that includes an engineered liner and cap.
 - Restrict access to the on-site consolidation area using engineered exposure barriers (e.g., clean soil cover, fences, etc.) as appropriate.
 - Conduct verification sampling on the entire site after removal and/or consolidation of impacted soil.
 - Monitor groundwater to detect any future impacts from the site.
- ❖ Develop and implement a communication plan to inform the local community of proposed redevelopment plans.

Public Health Action Plan

ATSDR will provide a copy of this document directly to the citizen who petitioned the ATSDR for public health activities at the former ERSC site.

MDCH will assist the Elk Rapids Township and the NMCHA to develop a Public Health Advisory alerting the public to the lead hazard currently present on the former ERSC site.

The Elk Rapids Township has proposed plans to redevelop the site into a public park. The Township should continue to consult with the NMCHA, the MDEQ and the MDCH to ensure that revised plans will be protective of public health.

The NMCHA, the MDEQ and the MDCH should provide advice and assistance at the request of the Elk Rapids Township.

MDCH will remain available as needed for future consultation at this site.

If any citizen has additional information or health concerns regarding this health consultation, please contact MDCH's Division of Environmental Health at 1-800-648-6942.

Preparers of Report

Michigan Department of Community Health Division of Environmental Health

Linda D. Dykema
Toxicologist

Brendan Boyle
Community Involvement Specialist

ATSDR Region 5 Office

Mark Johnson
Office of Regional Operations

ATSDR Division of Health Assessment and Consultation

Trent LeCoultre, Technical Project Officer
Cooperative Agreement Program Evaluation Branch

References

- Agency for Toxic Substances and Disease Registry (ATSDR). 1998. ATSDR, Division of Health Assessment and Consultation. Guidance on Including Child Health Issues in Division of Health Assessment and Consultation Documents. July 2, 1998.
- Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological Profile for Lead. Atlanta: US Department of Health and Human Services; 1999 July.
<http://www.atsdr.cdc.gov/toxprofiles/tp13.html>.
- Canfield RL, Kreher DA, Cornwell C, and Henderson Jr. CR. 2003. Low-level lead exposure, executive functioning, and learning in early childhood. *Child Neuropsychology* 9(1):35-53.
- Cory-Slechta DA. 2003. Lead-induced impairments in complex cognitive function: offerings from experimental studies. *Child Neuropsychology* 9(1):54-75.
- Global Environmental Engineering Inc. (Global). Phase I Environmental Site Assessment, Woodland Drive Property Formerly Occupied by the Elk Rapids Sportsman's Club, Elk Rapids, Michigan, 49629. October 3, 2006.
- Global Environmental Engineering Inc. (Global). Elk Rapids Sportsman's Club, Site Investigation Report, Woodland Drive Property Elk Rapids, Michigan, 49629. February 13, 2007.
- Michigan Department of Environmental Quality (MDEQ). 2005a. Environmental Lab. MDEQ SOP #213 (Revision 2). Soil Fraction Preparation for Lead Analysis (Creating Total, fine and Coarse Soil Samples). January 2005.
- Michigan Department of Environmental Quality (MDEQ). 2005b. Operational Memorandum No. 1 from Andrew W. Hogarth, MDEQ Remediation and Redevelopment Division, to interested parties concerning Part 201 cleanup criteria and Part 213 risk-based screening levels; Tables 1 and 2. Lansing, Michigan. June 24, 2005.
http://www.deq.state.mi.us/documents/deq-rrd-OpMemo_1-Attachment1Table2SoilResidential.pdf
- National Toxicology Program (NTP). 2004. 11th Report on Carcinogens: Lead (CAS No. 7439-92-1) and Lead Compounds. Research Triangle Park (NC): US Department of Human Health and Services, National Institute of Environmental Health Sciences.
<http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s101lead.pdf>
- Petitioner for Elk Rapids Sportsman's Club (ERSC) site. Petition Letter to ATSDR. Atlanta, Georgia. October 3, 2006.

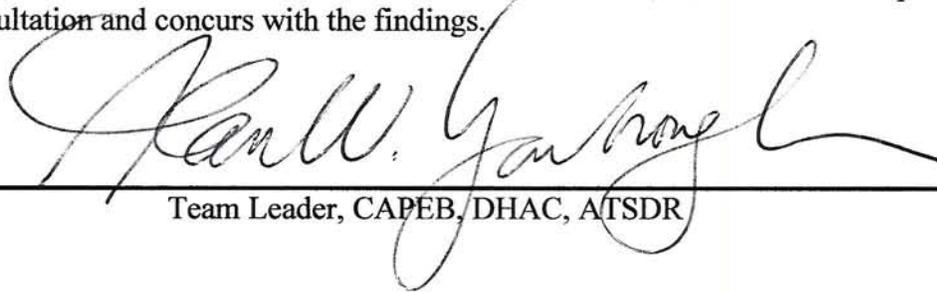
Certification

This Health Consultation was prepared by the Michigan Department of Community Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures. Editorial review was completed by the cooperative agreement partner.



Technical Project Officer, Cooperative Agreement Program Evaluation Branch (CAPEB), Division of Health Assessment and Consultation (DHAC), ATSDR

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



Team Leader, CAPEB, DHAC, ATSDR

Attachment A. Responsiveness Summary

MDCH received comments from the Elk Rapids Township Supervisor indicating the Township's intent to meet the recommendations provided in the November 13, 2007, Public Comment Draft Health Consultation. The Township is preparing a "detailed Contaminant Removal Plan" for the site that will be submitted to the MDEQ for review. MDCH requests that a copy of the Plan be provided to Dr. Linda D. Dykema at the address shown on page "i" of this Health Consultation.

MDCH recommendations are restated here for ease of reading, followed by the Township's comment and MDCH response.

Recommendation 1: Advise the public of the health hazards currently on the former ERSC site.

Comment: "The Township placed warning signs this past winter around the perimeter of the property warning the public of the lead contamination."

MDCH Response: MDCH has obtained a photograph of the signs posted around the site. The signs are an adequate warning to the public of the contamination currently present on the site.

Recommendation 2: Conduct a lead inspection and risk assessment in all buildings remaining on site to determine the need for lead hazard remediation.

Comment: "The Contaminant Removal Plan details proposed sampling activities in the buildings. Prior to the start of any construction wipe samples will be obtained for the three structures on the site (Club house, old shooting range building located north of the existing club house and exterior & interior shooting stations). Approximately nine wipe samples will be obtained from each structure."

MDCH Response: Please provide a copy of the Contaminant Removal Plan to MDCH as requested above. Sampling prior to construction is a prudent measure to ensure compliance with occupational standards administered by the Michigan Occupational Safety and Health Administration. MDCH recommends that post-construction/cleanup sampling also be conducted to ensure that the buildings are safe for future recreational or other use.

Recommendation 3: Screen impacted soil to remove lead fragments and other debris.

Comment: "The Township is in the process of retaining a contractor to reclaim the lead. The Township has discussed the site with two different contractors. The contractor will screen the soil and remove both lead shot from the shotgun areas and bullet fragments from the impact berms. The Contaminant Removal Plan details which areas will be screed [screened] by lead reclaiming. The reclaimed lead will be recycled."

MDCH Response: MDCH is pleased that the Township intends to screen and reclaim lead fragments and other debris from the soil. Please provide a copy of the Contaminant Removal Plan to MDCH as requested above.

Recommendation 4: Remove and/or consolidate soil that contains lead at concentrations greater than 400 ppm into a site feature that includes an engineered liner and cap.

Comment: "Present plans call for all soils from the reclaiming activities to be placed in a non-use berm that will be lined with a minimum of a 20 ml liner. We are actually looking at installing

a 40 ml liner at this time. Additional soils from the berms and shotgun areas that were not processed during reclaiming activities but have lead concentrations greater than 400 mg/Kg, will also be placed in the non use berm.”

MDCH Response: MDCH is pleased that the Township intends to consolidate lead-contaminated soils in a non-use area of the site. Please provide a copy of the Contaminant Removal Plan to MDCH as requested above.

Recommendation 5: Restrict access to the on-site consolidation area using engineered exposure barriers (e.g., clean soil cover, fences, etc.) as appropriate.

Comment: “After the berm is filled and capped, a vegetative cover will be established and the bermed area fenced to restrict access.”

MDCH Response: The Plan should also include provisions for long-term inspection and maintenance to detect any breach of the exposure barriers or damage to the fence. Please provide a copy of the Contaminant Removal Plan to MDCH as requested above.

Recommendation 6: Conduct verification sampling on the entire site after removal and/or consolidation of impacted soil.

Comment: Verification sampling will be completed on areas as the soil is removed and in accordance with MDEQ Guidelines. Any areas exhibiting concentrations exceeding 400 mg/Kg will be further delineated, removed and placed in the non use berm. Sampling procedures will be presented in the Contaminant Removal Plan.”

MDCH Response: Verification sampling will ensure that lead concentrations in remaining site soils do not present an unacceptable hazard to future park visitors. Please provide a copy of the Contaminant Removal Plan to MDCH as requested above.

Recommendation 7: Monitor groundwater to detect any future impacts from the site.

Comment: [The] “Proposed long-term maintenance plan will include the installation of monitoring wells along the western edge of the berm (direction of groundwater flow is westerly) and routine monitoring. The frequency of groundwater monitoring will be discussed with MDEQ. Present plans call for semiannual monitoring.”

MDCH Response: This is an adequate response to the MDCH recommendation. MDCH defers review of the groundwater monitoring plan to the MDEQ.

Recommendation 8: Develop and implement a communication plan to inform the local community of proposed redevelopment plans.

Comment: “The Township is planning on establishing this communication program to educate the public with the help of the MDEQ and MDCH. The MDEQ and MDCH help was offered at the meeting held in August 2007.”

MDCH Response: MDCH remains available to assist the Township in developing a public communication plan.