

Health Consultation

AGAWAM SPORTSMAN'S CLUB
AGAWAM, HAMPDEN COUNTY, MASSACHUSETTS

April 6, 2009

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, GA 30333

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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AGAWAM, HAMPDEN COUNTY, MASSACHUSETTS

Prepared by:

Massachusetts Department of Public Health
Bureau of Environmental Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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PURPOSE AND STATEMENT OF ISSUES

This public health consultation was prepared by the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health (BEH), Environmental Toxicology Program (ETP) for a site known as the Agawam Sportsman's Club in Agawam, Massachusetts. The consultation was requested by the U.S. Environmental Protection Agency (U.S. EPA) New England and conducted under MDPH's cooperative agreement with the U.S. Agency for Toxic Substances and Disease Registry (ATSDR). U.S. EPA asked MDPH to review environmental data that they collected in October 2008, and completely reported to MDPH in late February, 2009, to determine whether levels of constituents, primarily lead and arsenic, in surface soils represent a health concern to individuals who may access the site.

The MDPH evaluated surface soil sampling results for the site, as well as available data on blood lead levels (BLLs) in children who live or have lived near the site. The review of available BLL data was done to better assess whether exposure opportunities to lead in soil at the site may have resulted in elevated BLLs among children living near the site.

SITE DESCRIPTION AND SOIL SAMPLING

Physical Site Description

The site, located at 358 Corey Street in Agawam, MA, is a 5.5 acre property, and is formerly the site of the Agawam Sportsman's Club (ASC), which includes a 5,000 square-foot single-story building used previously as an indoor shooting range. The property has been vacant for approximately 5 – 10 years (personal communication with Randall White, RS, Director, Agawam Health Department). The site also contains a former outdoor shooting range. The gun rack for the outdoor shooting range was situated about 100 feet east of the site building.

From the rack, shooters could fire at targets to the northeast and southeast, approximately 200-300 feet away. In addition, abutting the site to the east, there is undeveloped and wooded property owned by the Town of Agawam. The town property is separated from the ASC property on the eastern border by a stream (unnamed) that flows to the south. The site is bordered to the north by Corey Street, which runs parallel to Route 57, and to the south, west, and further east, beyond the Town of Agawam property, by residential properties.

Site Visit and Current Site Description

On January 15, 2009, a representative from MDPH met with U.S. EPA, U.S. ATSDR, and Massachusetts Department of Environmental Protection (MDEP) representatives to tour the site. There were about 8 inches of snow cover on the site during this visit, and vehicle tire tracks, deer tracks, and footprints were visible in the snow. In front of the property, facing the Corey Street side, there is a “No Trespassing” sign posted right next to a sign announcing the Agawam Sportsman’s Club. A short cable, about a foot high, lined this side of the property facing the street, continuing around the east edge of the site building, separating a foot and vehicle path from the perimeter of the building, running roughly parallel to the former outdoor shooting range gun rack. This cable was down in some areas, both weighted by snow, and, in some instances, by dumped items (e.g. full black garbage bags, cardboard boxes). Thus, it did not present a barrier to access to the site on foot. The vehicle/foot path extends south east of the site building, toward a man-made pond. Orange netted fencing placed by MDEP encircled areas the MDEP had determined, based on previous soil testing conducted in 2007, to be of “imminent hazard” based on lead and arsenic concentrations in soil. There are recently reposted signs on the fencing that read, “Danger, Keep Away. Arsenic and Lead contaminated soil. Contact with the soil can cause brain, kidney, nerve and liver damage. Authorized personnel only. Respirators and protective clothing are required in this area.” In some

areas the fencing looked trampled, possibly by deer, as tracks could be seen emanating from the encircled areas.

Throughout the site there was evidence of dumping, both historical (e.g., furniture, discarded construction materials) and more recent (e.g., package wrappers, trash bags, beverage cans).

The man-made pond on the site was iced over, and recent snowfall had been cleared off resulting in a large rectangular area of the ice. Hockey related paraphernalia were present (e.g., goal/net, hockey puck, and sticks). Near the goal/net, what looked to be recently discarded food wrappers and beverage containers appeared on the ground. A pathway in the snow could be seen from residential backyards, abutting the property line of the site to the south, to the cleared area of the ice. There was fencing along the property line; however, some areas were either down, or weighted down by snow. Due to the height of the snow pile, the fencing was easily scalable by children (less than 3 feet tall). About three or four back yards in this area had items indicating children in residence, such as a tire swing, an above ground pool, and swing sets. In a previous visit to the site (October 2008) by a representative from the U.S. ATSDR, empty soda cans and a hockey puck were located on the grounds of the site, as well as parts of old targets, a few discarded ammunition storage containers, and a spent bullet. Possible evidence of fishing (e.g. bait bucket) was located near the man made pond.

Soil Sampling

In October of 2008, U.S. EPA conducted sampling of topsoil at various locations at the site (see Figure 1 for sampling locations) at a depth of about 0 – 3 inches. Sampling focused primarily on the former outdoor shooting range area, where 11 samples were collected. Two samples, numbers 15 and 16, were collected on the Town of Agawam property, just slightly to the east of the unnamed stream

that separates the site from the town property. Sample 19 was taken from a waste pile just outside of the west side of the site building (opposite side from the outdoor shooting range) where sweepings from the former indoor shooting range located inside the site building had been reportedly dumped. Samples 7, 8, 12, 17 and 18 (duplicate for 17) were taken from the northern and eastern perimeters of the pond, within about 50 feet of the shore line. Samples were delivered to the U.S. EPA laboratory in Chelmsford, MA, for analysis for 20 metals: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium (total), cobalt, copper, iron, lead, magnesium, manganese, nickel, selenium, silver, thallium, vanadium and zinc.

METHOD FOR EVALUATING CHEMICAL CONCENTRATION DATA

Health assessors use a variety of health-based screening values, called comparison values (CVs), to help decide whether compounds detected at a site might need further evaluation. These comparison values include ATSDR Environmental Media Evaluation Guides (EMEGs), Reference Dose Media Evaluation Guides (RMEGs), and Cancer Risk Evaluation Guides (CREGs). When ATSDR CVs are not available, EPA Risk Based Concentrations (RBCs) can be used. These values have been scientifically peer-reviewed or derived from scientifically peer-reviewed values and published by ATSDR and/or U.S. EPA. EMEG, RMEG and RBCs values are used to evaluate the potential for non-cancer health effects. CREG values provide information on the potential for carcinogenic effects.

If the concentration of a compound exceeds its comparison value, adverse health effects are not necessarily expected. Rather, these comparison values help in selecting compounds for further consideration. For example, if the concentration of a chemical in a medium (e.g., soil) is greater than the EMEG for that medium, the potential for exposure to the compound should be further evaluated for the specific situation to determine whether non-cancer health effects might be

possible. Conversely, if the concentration is less than the EMEG, it is unlikely that exposure would result in non-cancer health effects. EMEG values are derived for different durations of exposure according to ATSDR's guidelines. Acute EMEGs correspond to exposures lasting 14 days or less. Intermediate EMEGs correspond to exposures lasting longer than 14 days to less than one year. Chronic EMEGs correspond to exposures lasting one year or longer. CREG values are derived assuming a lifetime duration of exposure. RMEG values also assume chronic exposures. All of the comparison values are derived assuming opportunities for exposure in a residential setting.

No ATSDR comparison value or EPA RBC is available for lead. Recently published Regional Screening Levels for Chemical Contaminants at Superfund Sites developed by Oak Ridge National Laboratory (ORNL) under an interagency agreement with U.S. EPA lists a screening level for lead in residential soils of 400 ppm (ORNL, 2008). This screening level is equivalent to the U.S. EPA hazard standard¹ for residential soil (U.S. EPA, 2001). This hazard standard is derived to protect 95% of similarly exposed children in a population predicting a blood lead level not exceeding the U.S. Centers for Disease Control and Prevention's (CDC) level of concern of 10 µg/dL.

In addition, many metals occur naturally in soils throughout the U.S. or have accumulated through human activities over the decades and centuries. Thus, concentrations of metals at the site were also compared with typical background levels reported in the literature, including those reported by ATSDR toxicological profiles, the U.S. Geological Service (USGS) and the MDEP for Massachusetts. For example, the USGS reports typical background lead levels in eastern U.S. soils ranging from <10 ppm to 300 ppm (Shacklette and Boerngen, 1984).

¹ The EPA risk reduction goal for contaminated sites is to limit the probability of a child's blood lead concentration exceeding 10 µg/dL to 5% or less after cleanup (U.S. EPA, 2007).

REVIEW OF SOIL SAMPLING RESULTS

Soil samples were analyzed following the EPA Region I SOP, EIASOP-INGDVICP1, which is based on “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd edition, Revision 2, Final Update III, Methods 3050B and 6010B,” respectively (U.S. EPA, 1996). Samples were analyzed using a Perkin Elmer 4300 Dual View Inductively Coupled Plasma – Optical Emission Spectrometer.

Analytical results from U.S. EPA’s October 2008 soil sampling effort are summarized in Table 1, which lists the results by the 20 metals analyzed, including the number of detects out of 19 samples, and the minimum, mean, and maximum concentrations detected. Also listed are the relevant health-based comparison values and available background levels for metals.

The data indicate that three metals were detected at levels above health-based comparison values and typical background levels: arsenic, antimony, and lead. These metals may be associated with older munitions. For example, older bullets may be composed of a lead-antimony alloy core, which may also contain other elements, such as arsenic, in lower quality alloys. All other metals, if detected, were detected at concentrations below their respective comparison values or typical background levels.

Lead

Lead was detected in all 19 samples. The overall mean and maximum values for lead (39,709 mg/kg and 120,000 mg/kg, respectively) exceeded typical background range for this element in eastern U.S. soils, 300 mg/kg (Shacklette and Boerngen, 1984). They also exceeded the U.S. EPA screening level for lead (400 mg/kg).

Lead detected in the area of the former outdoor shooting range (samples 1, 2, 3, 4, 5, 6, 9, 10, 11, 13, and 14) had a mean value of approximately 57,655.5 mg/kg. Lead concentrations around the perimeter of the pond, samples 17/18, 7, 8, and 12 averaged approximately 1414 mg/kg. The two samples, numbers 15 and 16, taken from the Town of Agawam property averaged 2250 mg/kg for lead. Finally, sample number 19, taken from the west side of the site building had a lead concentration of 110,000 mg/kg.

Arsenic

Arsenic was detected in 11/19 samples, with detections ranging from 2.5 mg/kg to 1100 mg/kg. The mean arsenic level detected in the 11 samples was approximately 381 mg/kg. Thus, arsenic was detected at concentrations that exceeded the ATSDR chronic EMEGs (soil) for both children and adults (20 mg/kg and 200 mg/kg, respectively). Nine of the 11 samples taken from locations within the former outdoor shooting range had detectable arsenic, ranging from 30 mg/kg (sample 11) to 1100 mg/kg (sample 5). The mean value of arsenic for the samples taken from the location around the former outdoor shooting range (assuming non-detects are one half of the reporting limit) is approximately 389.5 mg/kg.

Two other samples had detectable arsenic levels but both detections were below health-based comparison values and typical background for soil arsenic. One sample from the Agawam Town property had an arsenic concentration of 13 mg/kg, while one sample taken near the perimeter of the on-site pond had an arsenic concentration of 2.5 mg/kg. All other soil samples from these areas (and the one sample from the west side of the building) were non-detect.

Antimony

Antimony was detected in 14 out of 19 soil samples analyzed, with detected concentrations ranging from 1.2 mg/kg to 3900 mg/kg, and an arithmetic mean of 1337 mg/kg. Ten of the 11 samples taken from former outdoor shooting range area had detectable antimony, ranging from 24 mg/kg to 3900 mg/kg. These concentrations exceeded RMEGs for both children and adults (20 mg/kg and 300 mg/kg, respectively). The arithmetic mean value for antimony in samples taken from the location of the former shooting range (assuming non-detects are one half of the reporting limit) is approximately 1608 mg/kg.

The antimony values for samples 7 and 8, taken from locations within 50 feet north of the pond shore were 1.2 and 17 mg/kg, respectively. Sample 12, taken within 50 feet east of the man-made pond shore, did not have a detectable level of antimony (reporting limit was 1 mg/kg). In addition, samples 17/18 taken near the pond were also non-detect. Sample 19, taken from a waste pile just outside the west side of the site building had a value of 1000 mg/kg for antimony. One of the two samples taken from the town property showed a concentration of 6.9 mg/kg, while the other sample was non-detect. Thus, other than samples taken in the area of the outdoor shooting range, only one other soil sample, (sample 19) from the EPA sampling effort had antimony detections above health-based screening values.

PATHWAY ANALYSIS

To determine whether residents living nearby to the site were, are, or could be exposed to contaminants, an evaluation was made of the environmental and human components that lead to human exposure. The pathway of analysis consists of five elements: a source of contamination, transport through an environmental medium, a point of exposure, a route of human exposure, and a receptor population.

Exposure to a chemical must first occur before any adverse health effects can result. Five conditions must be met for exposure to occur. First, there must be a source of that chemical. Second, a medium (e.g., soil) must be contaminated by either the source or by chemicals transported away from the source. Third, there must be a location where a person can potentially contact the contaminated medium. Fourth, there must be a means by which the contaminated medium could enter a person's body (e.g., ingestion). Finally, someone must contact the chemical and the chemical must actually reach the target organ susceptible to the toxic effects from that particular substance at a sufficient dose for a sufficient time for an adverse health effect to occur (ATSDR, 1993).

A completed exposure pathway exists when all of the above five elements are present. A potential exposure pathway exists when one or more of the five elements is missing and indicates that exposure to a contaminant could have occurred in the past, could be occurring in the present, or could occur in the future. An exposure pathway can be eliminated if at least one of the five elements is missing and will not likely be present.

Completed Exposure Pathway

Clearly, the site is accessible and has evidence of use (e.g., skating, foot paths, dumping). On the assumption that children that live near the site access the site, the completed pathway that could present opportunities for exposure at the site is incidental ingestion of soil. As noted previously, the contaminants of concern are lead, arsenic, and antimony.

To evaluate the potential for health effects, ATSDR Minimal Risk Levels (MRLs) were compared to exposure estimates for arsenic and antimony. The MRL is an estimate of daily exposure to a contaminant below which non-cancer adverse health outcomes are unlikely to occur. If an MRL was not available, an EPA

Reference Dose (RfD) was used for non-cancer effects. In addition, exposure estimates for arsenic were combined with EPA cancer slope factors provided by ATSDR to evaluate potential cancer risk. No MRL or RfD is available for lead, which is evaluated using a pharmacokinetic model and discussed further in the next section.

DISCUSSION

Lead

Young children less than six years old are the most sensitive population with regard to exposure to lead because of their greater hand-to-mouth activity, greater absorption of lead into their bodies, and greater sensitivity to lead exposures. Exposure opportunities to lead for young children are assessed using the U.S. EPA Integrated Exposure Uptake and Biokinetic Model for Lead in Children (IEUBK) (U.S. EPA, 2005). This model combines physiologically based assumptions (e.g., the relationship between lead uptake and blood lead levels) along with exposure assumptions (e.g., daily amount of soil ingestion) to predict blood lead concentrations in young children exposed to lead from several sources and by several routes. The model mathematically and statistically links environmental lead exposure to blood lead concentrations for a population of children (0-84 months).

Soil lead concentrations at the site were highest in the former outdoor shooting range area (average of 57,655.5 mg/kg), with average concentrations around the pond perimeter of 1414 mg/kg and in the two samples on the adjacent town property of 2,250 mg/kg. Of the five samples around the pond, four were below 400 mg/kg, and the fifth was 5200 mg/kg. Sample 19, taken from a waste pile reportedly containing sweepings from the former indoor shooting range, just outside of the west side of the site building, had a soil lead level of 110,000 mg/kg, which is just below the highest level of lead in soil detected overall in

samples 2 and 5, both taken in the area of the outdoor shooting range, with a lead level of 120,000 mg/kg.

The IEUBK model will only accept entry of values of 27,000 ppm lead in soil or less, because of lack of calibration or empirical validation for the model at higher exposure for BLLs. Using the average soil lead concentration of 1414 mg/kg around the pond perimeter, the IEUBK model predicted a geometric mean BLL of 11.656 ug/dL, meaning about 62.78% of similarly exposed children would be expected to have a BLL of 10 ug/dL or greater. The average soil lead concentration for the two samples from the Town property was 2,250 mg/kg. For the average soil lead value on the Town property, the model predicted that 84% of children exposed would exceed a BLL of 10 µg/dL and the predicted geometric mean BLL would be about 16 µg/dL.

It is clear, therefore, that the lead in soil concentrations at the site pose health concerns to young children if young children were exposed to the extent that the IUEBK model predicts. In order to better address whether children were indeed being exposed to lead in soil such that their body burden might increase to levels predicted by the IUEBK model, MDPH evaluated blood lead level (BLL) data for Agawam children from the MDPH/BEH Childhood Lead Poisoning Prevention Program (CLPPP). CLPPP was established for the prevention, screening, diagnosis, and treatment of lead poisoning in children residing in Massachusetts. Annual blood lead screening for all children ages 9 months to 3 years is required by the Massachusetts Lead Law (105 CMR 460.000) and this requirement extends to children aged 4 years old who reside in any one of the designated high risk communities in MA.² BLL data for the period 1990 through February 2009 were reviewed for Agawam children.

² High risk communities have characteristics that put a child at increased risk for elevated blood lead levels. These community characteristics include lower household income, rates of lead poisoning greater than the state rate, older housing stock, and a lower percentage of blood lead screenings among children. Agawam is not a high risk community.

Figure 2 provides an aerial map depicting the area of focus for evaluating blood lead levels of children living near the site. Directly north of the site is Route 57, a major multi-lane highway, which acts as a barrier to access for residents north of the site. Therefore, BLL data for children residing south of Route 57 and within one-half mile of the site were specifically reviewed.

During the period 1990 through February 2009, 105 children living within a half-mile of the site and south of Route 57 were screened for BLLs.³ During that time period, 6 children (or six percent) had BLLs that were equal to or greater than the CDC level of concern of 10 µg/dL (ICDC 2005). Five of the six children had a capillary blood sample tested which was not confirmed with the more accurate and reliable venous blood sample. The range of BLLs among these five children was 10 µg/dL to 27 µg/dL. The sixth child had a venous blood lead level of 11 µg/dL. For comparison, during the same time period, of the 4,392 children whose addresses were geocoded (94 percent of all addresses were geocoded), 242 had BLLs of 10 µg/dL or greater, or six percent of those screened. Thus, it did not appear that the experience of young children in the vicinity of the site was different from the rest of Agawam in terms of elevated BLLs.

The BLL data for children living near the site indicate that although soil lead concentrations inputted into the IUEBK model resulted in high predicted BLLs, actual BLLs among nearby children are considerably lower and the prevalence of elevated BLLs in this area is similar to the town wide experience. Thus, young children do not appear to be exposed to these soil lead concentrations such that health impacts would be expected. It is important to note that because the site is so easily accessible and that it is clearly used in all seasons, the high concentrations in surface soil still pose serious health concerns if exposures were to occur to young children, in particular.

³ Screening blood lead levels used for this analysis are defined as the maximum venous blood sample or maximum capillary sample, if no venous test was available, for each individual child screened. Ninety-four percent of BLL data for Agawam was geocoded.

Arsenic

Arsenic was detected at the site in 11 out of 19 samples, with nine of these detections in the former shooting range area. Samples taken from the pond perimeter and adjacent town property were either non-detect or did not exceed comparison values. The average soil arsenic concentration at the outdoor shooting range area (assuming non-detects are one half of the reporting limit) is 390 mg/kg.

It is more likely that older children (ages 6 - 12, weighing about 35 kg) would access the site than younger, unsupervised children less than six years old. Assuming that a 35 kg child accessed the site and incidentally ingested the average concentration of arsenic detected in the shooting range soil (390 mg/kg) for 7 days a week for eight months of the year (32 weeks) (November through February would likely have frozen ground or snow cover) over a 10 year period, the child would have been exposed to arsenic at a level (0.0006 mg/kg-d) that exceeds the ATSDR chronic oral MRL (0.0003 mg/kg-d).⁴ The MRL is based on a human study showing dermal lesions, where no lesions were seen at a dose level of 0.0008 mg/kg-d, or higher than the predicted exposure doses here. Thus, it is unlikely that non-cancer health effects would result from these assumed exposures. Using the same assumption and scenarios above, the estimated excess lifetime cancer risk from exposure would be about 1 in 10,000.⁵ Therefore, this exposure would not present an unusual cancer risk.

⁴ Non-Cancer Effects Exposure Factor = (7 days/week)(32 weeks/year)(10 years) / (10 years)(365 days/year) = 0.61369863

Non-Cancer Effects Exposure Dose = (390 mg/kg)(100 mg/day)(0.61369863)(0.000001 kg/mg) / (35 kg) = 0.00068 mg/kg/day

ATSDR Chronic Oral MRL = 0.0003 mg/kg/day

⁵ Cancer Effects Exposure Factor = (7 days/week)(32 weeks/year)(10 years) / (70 years)(365 days/year) = 0.087671233

Cancer Effects Exposure Dose = (390 mg/kg)(100 mg/day)(0.087671233)(0.000001 kg/mg) / (35 kg) = 9.77×10^{-5}

Cancer Risk = (Cancer Effects Exposure Dose)(Cancer Slope Factor) = (9.77×10^{-5} mg/kg/day)(1.5)(mg/kg/day)⁻¹ = 1.47 in 10,000

Antimony

Antimony was detected in 14 out of 19 samples. The average concentration in the outdoor shooting range area is 1608 mg/kg (assuming the non-detect is one half of the reporting limit). The four samples and one duplicate sample from the pond area were either non-detect or less than comparison values. Sample 19, taken from the waste pile just outside of the west side of the site building, detected antimony at a level of 1000 mg/kg.

Assuming that a 35 kg child accessed the site and incidentally ingested the average concentration of antimony detected in the shooting range soil (1608 mg/kg) for 7 days a week, for eight months of the year (32 weeks) during a 10 year period, the child would have been exposed to antimony at a level (0.003 mg/kg-d) that exceeds the EPA chronic oral RfD of 0.0004 mg/kg/day.⁶ The RfD is based on an animal study where metabolic and weight changes were seen at a dose of 0.35 mg/kg-d, to which an uncertainty factor of 1,000 was applied to derive the RfD. Because the estimated exposure dose for antimony in soil was about 100 times lower than the level used to derive the RfD, it is unlikely that health effects would result from this exposure.

CONCLUSION

The information reviewed for this public health consultation indicates that the concentrations of lead in soil are at levels that pose health concerns for young children if they are exposed to the extent that the IEUBK model predicts. In order to better assess actual exposure opportunities, MDPH evaluated available blood

⁶ Non-Cancer Effects Exposure Factor = (7 days/week)(32 weeks/year)(10 years) / (10 years)(365 days/year) = 0.61369863

Non-Cancer Effects Exposure Dose = (1608 mg/kg)(100 mg/day)(0.61369863)(0.000001 kg/mg) / (35 kg) = 0.003 mg/kg/day

U.S. EPA Chronic Oral RfD = 0.0004 mg/kg/day

lead level data for young children living near the site. This evaluation did not indicate that there are unusual rates of elevated blood lead levels in the vicinity of the site versus the rest of Agawam, suggesting that exposures to lead in soil at the site have not been sufficient to result in elevated blood lead levels. However, should sufficient exposure occur, serious blood lead levels could result.

Levels of arsenic and antimony, although exceeding their respective MRL or RfD, are unlikely to pose health concerns to individuals accessing the site. It should be noted that the highest concentrations of these metals were in the outdoor shooting range area, which also had the highest soil lead concentrations. Arsenic and antimony were not elevated in other areas sampled by EPA, other than one sample taken from the waste pile just outside the west side of the site building where 1000 mg/kg antimony was detected.

ATSDR requires that one of five conclusion categories be used to summarize the findings of public health consultations and public health assessments. These categories are: (1) Urgent Public Health Hazard, (2) Public Health Hazard, (3) Indeterminate Public Health Hazard, (4) No Apparent Public Health Hazard, and (5) No Public Health Hazard. A category is selected using site-specific conditions such as the degree of public health hazard based on the presence and duration of human exposure, contaminant concentration, the nature of toxic effects associated with site-related contaminants, presence of physical hazards, and community health concerns.

On the basis of ATSDR criteria, ATSDR classifies the Agawam Sportsman's Club site under current site conditions as a "Public Health Hazard" because exposures to lead in soil at the site can result in blood lead levels of health concern.

RECOMMENDATIONS

1. Actions should be taken to reduce contact with contaminated soil at this site.
2. Health education activities should be conducted for residents living near the area regarding the findings of this health consultation.

PUBLIC HEALTH ACTION PLAN

1. The U.S. EPA will take action to reduce contact with contaminated soil at this site.
2. MDPH/BEH will coordinate with ATSDR and U.S. EPA on a plan for health education activities for nearby residents.

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PREPARER

This document was prepared by the Bureau of Environmental Health of the Massachusetts Department of Public Health. If you have any questions about this document, please contact Suzanne K. Condon, Director of BEH/MDPH at 250 Washington Street, 7th Floor, Boston, MA 02108.

CERTIFICATION

The Health Consultation, *Agawam Sportsman's Club, Agawam, Hampden County, Massachusetts*, was prepared by the Massachusetts Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the Health Consultation was initiated. Editorial review was completed by the cooperative agreement partner.

Technical Project Officer, CAT, SPAB, DHAC, ATSDR

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

Team Lead, CAT, SPAB, DHAC

APPENDIX: FIGURES AND TABLES

Figure 1: Site Map with EPA October 2008 Sampling Locations



Table 1: Summary of Site Sample Results for Metals

<u>Compound</u>	<u>Number of detects/samples</u>	<u>Minimum Concentration (mg/kg)</u>	<u>Mean concentration (mg/kg)</u>	<u>Maximum Concentration (mg/kg)</u>	<u>Comparison values</u>	<u>Background range (mg/kg) (USGS Eastern Region, Shacklette and Boerngen, 1984)</u>
Aluminum	19/19	2000	7658	17000	Chronic EMEG (Soil, Child) = 50,000 mg/kg, Chronic EMEG (Soil, Adult) = 700,000 mg/kg, Intermediate EMEG (Pica, Child) = 2,000 mg/kg	0.7 - >10 (%); 10,000 (MDEP, non-fill, "natural" soil)
Antimony	14/19	1.2	1337	3900	RMEG (Soil, Child) = 20 mg/kg, RMEG (Soil, Adult) = 300 mg/kg	<1 - 8.8
Arsenic	11/19	ND (2.0)	381	1100	Chronic EMEG (Soil, Child) = 20 mg/kg, Chronic EMEG (Soil, Adult) = 200 mg/kg, CREG = 0.5 mg/kg, Acute EMEG (Pica, Child) = 10 mg/kg	<0.1 - 73
Barium	10/19	ND (22)	25.43	61	Chronic EMEG (Soil, Child) = 10,000 mg/kg, Chronic EMEG (Soil, Adult) = 100,000 mg/kg, RMEG (Soil, Child) = 10,000 mg/kg, RMEG (Soil, Adult) = 100,000 mg/kg	10 - 1500
Beryllium	0/19	ND (0.77)	N/A	ND (91)	Chronic EMEG (Soil, Child) = 100 mg/kg, Chronic EMEG (Soil, Adult) = 1,000 mg/kg, RMEG (Soil, Child) = 100 mg/kg, RMEG (Soil, Adult) = 1,000 mg/kg	<1 - 7
Cadmium	0/19	ND (0.96)	N/A	ND (110)	Chronic EMEG (Soil, Child) = 10 mg/kg, Chronic EMEG (Soil, Adult) = 100 mg/kg, RMEG (Soil, Child) = 50 mg/kg, RMEG (Soil, Adult) = 700 mg/kg	2 (MADEP, non-fill, "natural" soil)
Calcium	14/19	ND (500)	889.29	1800	N/A	0.01 - 28 (%); (MADEP N/A)

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Chromium	4/19	ND (9.8)	9.15	12	Hexavalent Chromium: RMEG (Soil, Child) = 200 mg/kg, RMEG (Soil, Adult) = 2,000 mg/kg	1 - 1000
Cobalt	3/19	ND (9.8)	2.633	2.8	Intermediate EMEG (Soil, Child) = 500 mg/kg, Intermediate EMEG (Soil, Adult) = 7,000 mg/kg	<0.3 - 70
Copper	9/19	ND (21)	120.5	480	Intermediate EMEG (Soil, Child) = 500 mg/kg, Intermediate EMEG (Soil, Adult) = 7,000 mg/kg	<1 - 700
Iron	19/19	4600	12742.11	28000	N/A	0.01 - >10 (%); 20,000 (MADEP, non-fill, "natural" soil)
Lead	19/19	17	39709.26	120000	EPA screening level = 400 mg/kg, MA DEP clean up level = 300 mg/kg	<10 - 300
Magnesium	19/19	370	2782.63	5600	N/A	0.005 - 5 (%); 5,000 (MADEP, non-fill, "natural" soil)
Manganese	17/19	ND (190)	175.65	430	RMEG (Soil, Child) = 3,000 mg/kg, RMEG (Soil, Adult) = 40,000 mg/kg	<2 - 7000
Nickel	4/19	ND (9.8)	9.325	13	RMEG (Soil, Child) = 1,000 mg/kg, RMEG (Soil, Adult) = 10,000 mg/kg	<5 - 700
Selenium	0/19	ND (1.9)	N/A	ND (230)	Chronic EMEG (Soil, Child) = 300 mg/kg, Chronic EMEG (Soil, Adult) = 4,000 mg/kg, RMEG (Soil, Child) = 300 mg/kg, RMEG (Soil, Adult) = 4,000 mg/kg	<0.1 - 3.9
Silver	0/19	ND (0.96)	N/A	ND (110)	RMEG (Soil, Child) = 300 mg/kg, RMEG (Soil, Adult) = 4,000 mg/kg	0.6 (MADEP, non-fill, "natural" soil)

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Thallium	0/19	ND (1.9)	N/A	ND (230)	N/A	0.6 (MADEP, non-fill, "natural" soil)
Vanadium	10/19	ND (11)	29.3	43	Intermediate EMEG (Soil, Child) = 200 mg/kg, Intermediate EMEG (Soil, Adult) = 2,000 mg/kg	<7 - 300
Zinc	11/19	ND (100)	55.82	170	Chronic EMEG (Soil, Child) = 20,000 mg/kg, Chronic EMEG (Soil, Adult) = 200,000 mg/kg, RMEG (Soil, Child) = 20,000 mg/kg, RMEG (Soil, Adult) = 200,000 mg/kg	<5 - 2900