Health Consultation

FORMER MARJOL BATTERY SITE

BOROUGH OF THROOP, LACKAWANNA COUNTY, PENNSYLVANIA

Prepared by the
Pennsylvania Department of Health

MARCH 30, 2010

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners 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 or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Summary

Introduction

At the request of concerned community members, the Pennsylvania Department of Health (PADOH) and the Agency for Toxic Substances and Disease Registry (ATSDR) prepared this Health Consultation (HC) document for the former Marjol Battery site ("the site") in the Borough of Throop, Lackawanna County, Pennsylvania. The property owner, Gould Electronics, cleaned up and removed contaminated soil from residential and commercial properties with lead contamination attributable to the historical site activities. Subsequent soil sampling in 2000 and 2008 confirmed the residential clean-up of historical lead from site-deposition was complete and EPA concluded residential areas with isolated high concentrations of lead were most likely attributable to lead paint and/or historical use of leaded gasoline. The purpose of this HC is to determine if lead is present in the Throop community, as a result of on-going site remediation activities, at levels that could harm the publics' health. To that end, PADOH and ATSDR reviewed the limited residential soil samples for lead and available air monitoring data collected along the site perimeter and in the nearby community during the current site remediation activities.

In addition, concerned community members have indicated they are aware of some children in the Throop area who may have elevated blood lead levels. PADOH and ATSDR reviewed the available blood lead data for the Throop community from two data sources, including the PADOH Childhood Blood Lead Program and a voluntary blood lead program offered to the community by Gould. PADOH and ATSDR will review additional environmental sampling data, specifically residential soil sampling collected after site remediation activities conclude, and blood lead data, collected in the community. In addition, PADOH and ATSDR will remain available to discuss any public health questions or concerns related to the site with community members and local authorities. PADOH worked under a cooperative agreement with ATSDR to complete this Health Consultation document.

Conclusions

Upon review of the environmental and blood lead data provided, thus far, PADOH and ATSDR conclude that:

Conclusion 1

Based on a review of air monitoring data collected by the property owner (Gould) along the site perimeter, ***it does not appear that airborne lead is leaving the site at levels that could harm the publics' health.***

Basis for conclusion

The perimeter air monitoring data showed lead in air at levels below the proposed new Environmental Protection Agency (EPA) National Ambient Air Quality Standard (NAAQS) of 0.15 µg/m^3. However, PADOH and ATSDR understand that site conditions often can change over time and the use of perimeter air monitoring data has limitations. Limitations in the use of perimeter monitoring data are due to variability in climate and meteorology, ongoing site-related and non-site related activities, limitations in sampling equipment, and other factors that can limit the representativeness of airborne dust results. Appropriate implementation of engineering controls, including dust suppression, would be the most effective step in mitigating releases of dust from the site.

Next Steps

PADOH and ATSDR will consider reviewing additional air monitoring data collected at the site or in the community if requested.

Conclusion 2

Based on a review of the limited community-based and perimeter air monitoring collected by the Borough of Throop, ***it does not appear that lead in air is at levels that could harm the publics' health.***

Basis for conclusion

Community-based air sampling results showed levels well below the current NAAQS for lead. Some perimeter monitor results for lead in air were above the NAAQS value of 0.15 µg/m^3, however, the NAAQS value is intended as a 3 month rolling average. Since the community-based air sampling data is very limited, ***additional community-based air sampling should be performed*** down-wind of the site to determine if lead in air is at levels that could harm the publics' health.

Next Steps

PADOH and ATSDR will consider reviewing additional community-based air monitoring data collected in the Throop community, if requested.

Conclusion 3

PADOH and ATSDR reviewed the available historical blood lead data for the communities adjacent to the site. Based on this data***, it does not appear children in the Throop area have elevated blood lead levels, compared to Lackawanna County, Pennsylvania and national trends.***

Basis for conclusion

The historical child blood lead levels for the Throop area were similar to the current national trends (i.e., an average blood lead level of approximately 2 µg/dL). In addition, the percent of elevated blood lead results were similar to the levels observed in Lackawanna County and Pennsylvania as a whole, during the same time period. While some children in the Throop and Dickson City area did have elevated blood lead levels (14 total in 2006 to 2008), PADOH and ATSDR do not anticipate wide-spread health effects in the community, due to site-specific lead exposures. There are many sources of potential lead exposure including, lead paint, lead in soil from the use of lead gasoline, lead based solder used in the plumbing within those homes, and other possible sources. It is the understanding of PADOH and ATSDR that children who had blood lead levels above 10 µg/dL received intervention services (i.e., a home evaluation, sampling, and follow-up testing) by the PADOH Childhood Blood Lead program, in order to reduce any potential future exposures. PADOH and ATSDR recommend that parents of children under the age of seven years be tested for lead if they have not been tested within the past year, regardless of their exposure history and residents take steps to reduce their potential exposure to lead in surface soil, as outlined further in the Recommendations Section.

For More Information

If you have concerns about your health, you should contact your health care provider. For questions or concerns about the former Marjol Battery site, please contact the Pennsylvania Department of Health, Division of Environmental Health Epidemiology at (717) 346-3285.

Background and Statement of Issues

Background

At the request of concerned community members, the Pennsylvania Department of Health (PADOH) and the Agency for Toxic Substances and Disease Registry (ATSDR) prepared this Health Consultation (HC) document for the former Marjol Battery site ("the site") in the Borough of Throop ("Throop"), Lackawanna County, Pennsylvania. The purpose of this HC is to determine if lead is present in the Throop community as a result of the on-going site remediation activities, at levels that could harm the publics' health. PADOH, under a cooperative agreement with ATSDR, prepared this HC for the former Marjol Battery site.

Site Description

The former Marjol Battery site is a 44 acre site located in the borough of Throop, Lackawanna County, Pennsylvania (Figures 1 and 2). The Lackawanna River is located along the western border of the site. Approximately 5,500 people live within a one-mile radius surrounding the site. The closest residential communities are located along the east and south sides of the site. The Marjol property, prior to 1962, was used for surface and subsurface coal mining. The Marjol Battery and Equipment Company owned and operated a recycling facility on the site from 1962 to 1980. Operations consisted of lead reclamation from used automotive batteries by cutting the batteries open to remove the lead plates, discarding the acid in the battery and crushing the casing. At times, lead posts and connectors were removed from the top of the battery, melted and formed into ingots. The crushed casings were placed in a former drainage way and strip pits left from the past mining. Later in the operations the casings were recycled. As a result of these lead reclamation operations, a large volume of battery casing material and soil (both on-site and off-site) became contaminated with lead. The total estimated volume of soils and battery casings exceeding the Site clean-up level of 500 parts per million (ppm) lead is approximately 372,000 cubic yards.

Gould Electronics ("Gould") purchased the site in May of 1980. Shortly thereafter, Gould began to phase out plant operations and ceased operations completely in April 1982. In 1988 through 1992, residential properties adjacent to the site were cleaned/soil excavated on properties with lead concentrations above 500 mg/kg that were attributable to site activities. In 1989 and 1990, the ground surface of the site was significantly modified by Gould during stabilization efforts designed to prevent migration of contaminants. Additional residential soil samples were collected in 2000 and 2008 to determine if residential remediation efforts were complete. In July 2006, Gould entered into a consent order with EPA and PADEP to perform the permanent cleanup of the site. Construction activities started in May 2008, with the movement/excavation of contaminated material starting in August 2008. In order to control storm water at the Site both during and after construction activities and to keep sediment on the site and out of the Lackawanna River, a basin and other drainage features such as check dams and swales were constructed. [1]

The site, under EPA and PADEP oversight, is currently undergoing remediation to control on-site soil contamination. Site-activities will be completed in spring of 2010. A layer of clean, solidified soil covers the containment area on the site. A sedimentation basin is located on the site, to catch any potential runoff during the remediation activities. The basin will be drained, depending on

weather conditions, and the contaminated sediments are removed, mixed with clean material and solidified, and placed in the containment area. The solidified sediments in the contaminated area are covered with a tarp or clean soil, depending on site conditions. A cap will be placed will be installed over the entire contaminated area in spring 2010. [2]

Site Visit

In November 2009, the PADOH Health Assessment Program and ATSDR Region 3 personnel met with the PADEP Northeast Regional Office and ATSDR to discuss site background information and community concerns. In addition, a site visit, during the on-site remediation activities, as well as a tour of the surrounding community was conducted.

Public Health Involvement

In 1999, in response to community concerns, PADOH and ATSDR produced a HC to address past exposures potentially related to the former Marjol Battery site. The document reviewed both historical blood lead data and cancer incidence and mortality data. The HC evaluated blood lead data for children age 11 and under from 1975 to 1988 in Throop. During these reporting years the CDC lowered the blood lead level standard, twice, from an original value of 30 µg/dL to the current guidance of 10 µg/dL. Based on a review of the blood lead data, the HC concluded that, although some children did experience elevated blood lead levels which may have adversely affected their health, elevated blood lead levels were not widespread in Throop, nor were widespread health effects anticipated for the reported blood lead levels. It is the understanding of PADOH and ATSDR that children who had blood lead levels above 10 µg/dL received intervention services (i.e., a home evaluation, sampling, and follow-up testing) by the PADOH Childhood Blood Lead program, in order to reduce any potential future exposures. There are many sources of potential lead exposure, including lead-based paint and the historical use of lead in gasoline. PADOH and ATSDR recommend, as outlined in the Recommendations Section, that residents take steps to reduce their potential exposure to lead in surface soil, as much as possible,

The HC also reviewed cancer rates in Throop and the surrounding communities of Dunmore, Dickson City, and Olyphant from 1985 to 1995 for 23 primary cancer sites. The observed cancer rates in these communities were compared against expected cancer rates for the Commonwealth of Pennsylvania to determine if rates were elevated. The cancer statistics did not indicate an elevated rate of cancers in the community, compared to the Commonwealth data, with the exception of a few cancer including colon, stomach, buccal cavity and pharynx, rectum, anus and rectosigmoid; larynx; and urinary bladder. However, these elevations were not isolated to the Throop area, as similar elevated rates of these cancers were also observed in northeastern Pennsylvania, including Lackawanna, Luzerne and Wyoming counties. Therefore, the cancer rates in Throop and the surrounding communities were found to be similar to the rates in northeastern Pennsylvania. [3]

In June 2009, PADOH and ATSDR in conjunction with Pinnacle Health's Childhood Blood Lead Screening Program offered a blood lead screening for children 7 and under and pregnant women in the Borough of Throop.

Air Sampling

During construction and remediation projects in contaminated areas, on-site dust can potentially be transported to nearby receptors where exposures can occur. To reduce the likelihood of such exposures during on-site remediation activities, Gould and their contractors, Advanced GeoServices, Inc. are collecting three types of air data at the site:

1. **Site Perimeter High-volume Sampling** (ambient air monitoring for lead) is performed to determine if airborne lead is leaving the Site. Perimeter air sampling is conducted every six days using 6 samplers at various locations around the perimeter that run simultaneously over a 24-hour period. The sampler draws air over a filter and then the filter is analyzed for lead content. The volume of air that is drawn in is also recorded which gives us the results in micrograms (µg) of lead per cubic meters (m^3) of air. Two of the air monitors that were previously located at the site were relocated to provide additional information for the community. One was placed just inside the perimeter fence on Delaware Street - provides air lead data for residential areas adjacent to the Site and the other was relocated to the Mid-Valley Secondary Center

2. **Real-Time Dust Air Monitoring** is collected, using DustTrack monitors. The DustTrack measures opacity at the site for total dust not just lead. This monitoring provides immediate information on dust levels, upwind and downwind of the work zone during all phases of work with potential for significant release of dust. The monitors are moved around on a daily basis based on the location of work activities for the day. If excess dust levels are observed, additional engineering control measures can be implemented to ensure dust does not move off-site. Since this data is for total dust on-site and serves as a catalyst to potentially implement additional engineering controls, PADOH and ATSDR do not feel the DustTrack data are applicable to community-level exposures at large.

3. **Personal Air Monitors (PAM)** are co-located with the real-time dust monitoring, analyzed for lead and serve as a supplement to the hi-volume samples, during both working and non-working hours. The co-located PAM shows how much lead is in the dust, at areas downwind of on-going site activities. PAM monitors are not always located at the perimeter and due to the design of the sampling equipment are not comparable to ambient monitoring/NAAQS. In addition, since the PAM monitors are located on-site, often representing the 'worst case scenario' for dust generation, and serve as catalyst to implement further engineering controls, PADOH and ATSDR do not feel the PAM data are applicable to the community exposures at large.

Perimeter Air Sampling

PADOH and ATSDR reviewed the perimeter air sampling data for the Marjol Battery site. Since the 1990's, Gould has collected perimeter air sampling data. In April 2008, EPA began

conducting air monitoring along the site perimeter to determine if lead is leaving the site during the on-going site remediation activities. The site has six air monitors including; three downwind and along the site perimeter (HV-1, HV-2, and HV-3); 1 monitor upwind/on-site (HV-4); 1 downwind/4500 ft from the site and adjacent to a local school (HV-6); and 1 background/off-site monitor locate 1-mile north of the site (HV-7) (Figures 1 and 2).

The air data was summarized, by Advanced Geoservices Corp. (AGC) for Gould, as quarterly averages for April 2008 through June 2009 (Figure 3), and monthly averages for the May through September 2009 (Figure 4). Overall, the quarterly and monthly averages for lead in air were well below the current EPA National Ambient Air Quality Standard (NAAQS) for lead of 0.15 $\mu g/m^3$ (average for a rolling three month time period). Only one maximum quarterly value exceeds the new NAAQS. Air monitor HV-3, which is located along the site perimeter and downwind of current site activities, displayed a quarterly maximum of 0.16 $\mu g/m^3$. PADOH and ATSDR do not anticipate the general public would be exposed to this level on an on-going basis. [1]

The Marjol site perimeter air data does not indicate that lead is present in the air at levels of public health concern, based on the available quarterly and monthly average data reviewed thus far. PADOH and ATSDR acknowledge that perimeter air monitoring is not without limitations and shortcomings which could underestimate the total offsite dust volume. DustTrak and PAM monitoring were used to address the limitations of the perimeter hi-vol monitors. However these monitors do not correspond to community-level exposures because this sampling occurs near on-site work locations, down-wind during 'worst-case' scenarios. Dust outside the area of influence of each individual air monitor is not sampled and perimeter fences, where these monitors are typically located, can cause air flow diversions. Meteorological conditions including, precipitation, temperature, time of day, wind speed, and variability of wind direction are also can cause variation in levels of contaminants. These meteorological conditions can influence the distance contaminants are transported, their concentration, and their rates of mixing and dispersion. For example, wind speed can affect how far a contaminant travels, while wind stability (or changes in wind direction) may influence the concentration of pollutants. However, PADOH and ATSDR also recognizes that the shortcomings of perimeter monitoring can be alleviated or reduced by the use of appropriate engineering controls, such as water sprays, to limit the amount of dust released into the air from the site. [4]

Air sampling - Throop

In addition to the air monitoring data discussed above, the Borough of Throop contracted with Cocciardi and Associates, Inc. to perform community-based air sampling and additional site perimeter sampling (Table 1 and 2). The monitoring was performed to address community concerns that lead dust from on-site construction activities at the former Marjol Battery site could be migrating off-site into residential areas and harming their health. For the community-based sampling, lead-in-air monitoring was conducted on 6 days in April and May 2009 at residential receptors approximately 560 yards south to southeast of the site, during site working hours and site non-working hours. Community-based results showed levels well below the current NAAQS for lead of 0.15 $\mu g/m^3$. However, since the air sampling data is very limited, additional community-based air sampling should be performed, down-wind of the site to determine if lead in air is at levels that could harm the publics' health.

Perimeter air monitoring for lead was conducted on 5 days in April and May 2009 during site working hours along the Delaware Street and Grove Street perimeter fences. Seven of the ten perimeter monitor results for lead in air were above the NAAQS value of 0.15 $\mu g/m^3$. The maximum concentration was 1.59 $\mu g/m^3$ at the Grove Street perimeter fence. However, the NAAQS value is intended as a 3 month rolling average and the perimeter monitoring events by Throop were limited. These samples were collected while contaminated material was being excavated along this perimeter. According to EPA, all contaminated material is currently covered with a layer of clean, solidified soil, with the exception of sediment in the sedimentation basin, which will be removed, solidified and covered with clean material when weather permits. PADOH and ATSDR do not anticipate that the general public would be exposed to any on-site levels on an on-going basis, but additional air samples would better define these levels. [5]

Soil Sampling

In 1988 to 1991, under EPA oversight, Gould cleaned up/removed soil from 133 residential and commercial properties adjacent to the site, with soil lead levels > 500ppm and attributable to the former Marjol Battery site. (Figure 5) In addition, of the 133 remediated properties, 107 residential properties also received interior cleaning for lead dust. In 2000 and 2008, EPA collected addition samples at the request of the Borough of Throop to determine if the original site-related deposition zone extended further into the community. A few properties had lead concentrations >500 ppm, along Dunmore Street in the front yards.

In 2000, EPA collected soil samples from 39 properties (113 samples) in 4 residential areas adjacent to the clean-up/removal area. Most of the results (88%) were below the 500 ppm action level for lead. Six properties along Dunmore Street had elevated lead levels in samples from the front/side yards, while the back yard samples were below 500 ppm lead. The minimum and maximum lead concentrations from the Dunmore Street front/side yard samples were 136 ppm and 1,860 ppm lead, respectively.

In April 2008, EPA collected additional residential soil samples at properties along Dunmore St., prior to the current on-site remediation activities. Ninety-five samples were collected from 6 properties. The concentrations of lead appear to increase as sampling points are located nearer to the roadway (e.g., concentrations in back yards along the Dunmore Avenue average 240 ppm, while concentrations in the front yards of these properties average 648 ppm with side yard concentrations at 460 ppm). The concentrations of lead were highest near the houses and/or where paint chips were present. The 2000 and 2008 sampling events confirmed that the residential clean-up was complete. Based on this sampling data, EPA concluded these isolated high concentrations were most likely attributable to lead paint and/or historical use of leaded gasoline.

It is the understanding of PADOH and ATSDR that the August 2008 soils samples were collected before the recent site remediation activities commenced and therefore possible site-related lead deposition could be taking place in the adjacent residential community. The potential sources of elevated lead in residential soils include air deposition from the Marjol site, as well as historic use of leaded gasoline and lead paint. There are a number of potential sources of elevated lead levels in residential property soils. Without additional information, the source of the lead contamination observed in nearby soils is unknown. PADOH and ATSDR believe it would be beneficial to collect additional residential soil samples during the current site remediation activities, to delineate

any potential migration of lead to the off-site receptors and as a point of comparison with historical sampling events.

In addition, in 2008, Gould contractors collected 10 pre-construction samples in 5 off-site locations. Once on-site remedial activities are completed, soil samples will be collected from the same locations to ensure lead did not migrate off-site during construction activities. Locations were selected that contained the highest historical soil lead levels and presumably would be the highest for off-site deposition during construction activities. In addition, post-construction samples will be collected at residential properties along Sulfur Creek, which is adjacent to the Marjol site. PADOH and ATSDR will consider reviewing additional soil data, when available and appropriate. [1]

Blood Lead Data

Concerned community members have indicated they are aware of children in the Throop area with elevated blood lead levels (BLL). To address these concerns PADOH and ATSDR attempted to review the available blood lead data for the community. PADOH and ATSDR reviewed two sources of blood lead level data for this health consultation:

- The first is voluntary community blood-lead screening program offered by Gould. In 1997 Gould began voluntarily providing annual community blood-lead screening to Throop Borough residents.
- The second source of blood lead data is PADOH's Childhood Lead Surveillance Program.

PADOH and ATSDR reviewed and summarized the voluntary blood lead data for 2005-2008 (Table 3). During the past 5 years of data reviewed no child (age 6 years or younger) exceeded the current Centers for Disease Control and Prevention (CDC) guideline of 10 micrograms per deciliter of blood (μg/dL). The maximum adult and child BLL for this data set was 8 μg/dL (2007) and 4 μg/dL (2006), respectively. The average child BLL ranged from 1.8 μg/dL (2009) to 3.3 μg/dL (2006). Overall, this range is consistent with national data trends for BLL (i.e. 2 μg/dL) According to the voluntary BLL data available on Marjol Battery website, since the inception of the community BLL screening program, no child (12 years or younger) has had a blood lead level above 5 μg/dL. Additionally, it is important to note, during 2009 when on-site remediation activities occurred, no child or adult exceeded the CDC intervention guideline. PADOH and ATSDR conclude that, based on the available data, Throop residents who participated in this voluntary program did not exhibit elevated BLL, above current CDC intervention guidelines, therefore PADOH and ATSDR would not anticipate these levels would cause wide-spread adverse health effects. [6]

PADOH and ATSDR also reviewed and summarized the available child BLL data from the PADOH Childhood Lead Surveillance Program (Table 4). Since 2003, PADOH Childhood Lead Poisoning Prevention Program has used an on-line disease surveillance system called PA-NEEDS. A 2002 amendment made all BLL, both confirmed and unconfirmed cases and regardless if they are elevated, reportable by certified laboratories. A confirmed elevated BLL is defined by the Council for State & Territorial Epidemiologists (CSTE) as a child with one venous blood specimen equal to, or greater than, 10 μg/dL, or any combination of two capillary and/or unknown blood specimens equal to, or greater than, 10 μg/dL within 12 weeks of each other. It is common

for quantitative test results from children tested initially by capillary method (finger stick) to be high, and subsequent confirmatory test results are lower.

For 2006-2008, PADOH and ATSDR tabulated the number of confirmed elevated BLL cases (i.e. above 10 µg/dL) for children 6 years of age and under in Throop and Dickson City, which is adjacent to the site, reported to PA-NEDS. In addition, the number of confirmed evlevated BLL for Lackawanna County and Pennsylvania (all 67 counties) were also included to compare again levels observed in Throop and Dickson City. At the time this health consultation document was written, blood lead data for 2009 was not yet available. Overall, for 2006 to 2008, there were a total of 14 confirmed elevated BLL for children in Throop and Dickson City, or 1.4% of the children tested had confirmed elevated BLL. The number of children in Throop and Dickson City with elevated BLL for 2006, 2007, and 2008 were 1 (0.37% of the 269 children tested), 10 (2.69% of the 372 children tested), and 3 (0.89% of the 336 children tested), respectively. During the same time frame, the levels of confirmed elevated BLL in Lackawanna County, as a whole, ranged from 1.32% to 1.58%. For comparison purposed, the percentage of confirmed elevated BLL in Pennsylvania as a whole ranged from 2.13% to 3.17%.

The confirmed elevated BLL in Throop and Dickson City are similar to those observed in Lackawanna County and less than Pennsylvania as a whole, during 2006-2008. While some children in the study area did have elevated BLL (14 total for 2006 to 2008), PADOH and ATSDR do not anticipate wide-spread health effects to lead exposure in the community from the site. It is the understanding of PADOH and ATSDR that children with blood lead levels above 10 µg/dL received follow-up intervention services (i.e., a home evaluation, sampling and follow-up testing) by the PADOH Childhood Blood Lead Program, in order to reduce any potential future exposures. PADOH and ATSDR recommend that parents of children under the age of seven years be tested for lead if they have not been tested within the past year, regardless of their exposure history and residents take steps to reduce their potential exposure to lead in surface soil, as outlined further in the Recommendations section [7]

CDC has determined that a blood lead level greater than or equal to 10 µg/dL in children indicates excessive lead absorption and constitutes the grounds for intervention. Although no threshold level for adverse health effects has been established, evidence suggests that adverse effects occur at blood lead levels at least as low as 10 µg/dL. The current reference level for adult blood lead is 25µg/dL. Since the late 1970s, average blood lead concentration for children aged 1 to 5 have dropped significantly, from about 15 µg/dL to less than 2 µg/dL. However, new studies show that health effects occur even at very low blood lead levels. Evaluating blood lead data has several limitations including:

- The body eliminates most of the lead in the blood in 4 to 5 months (half-life 28 - 36 days) Therefore, blood lead levels only represent recent exposures and not long-term exposure.

- There are many sources of lead in the environment. In evaluating blood lead data, it is not possible to identify how much lead was contributed by a given source. In Throop area, the sources of lead could include the Marjol Battery site, lead paint, lead in soil from the use of lead gasoline, lead based solder used in the plumbing within those homes, and other possible sources.

- It is not usually possible to determine a cause and effect relationship. That is a certain health effect was caused by lead exposure because most health effects can have more than one cause.

- Available scientific data suggest health effects can occur when certain blood lead levels are reached. That does not mean that any given health effect will occur. However, symptoms of lead exposure can often be hard to recognize.

- When the possibility or likelihood of health effects is discussed, we are considering the possibility of seeing that effect in the community as a whole, not in any one person. It is not possible for us to be certain that lead caused or will cause any health effect in a specific person. [3]

Contaminant Evaluation

This section provides more information on lead. The majority of information summarized below, has been extracted from ATDSR's chemical-specific Toxicological Profile for lead. For more information about lead, please refer to the online Toxicological Profile at http://www.atsdr.cdc.gov/toxprofiles/tp13.html

As explained in the previous sections, based on an evaluation sampling data and the blood lead, PADOH and ATSDR would not expect exposure to the levels that have been detected would harm the publics' health. That being said, the adverse health effects documented in the toxicological literature and summarized here are based on much higher levels than were observed in communities adjacent to site. Lastly, simply being exposed to a hazardous substance does not make it a hazard. The magnitude, frequency, timing, and duration of exposure and the toxicity characteristics of individual substances affect the degree of hazard, if any.

Lead

Lead has been used in the production of batteries, ammunition, metal piping, and devices to shield X-rays. Lead is released into the air during burning coal, oil, waste, mining activities, smelting activities and factories. The use of lead as an additive to gasoline was banned in 1996 in the United States. Lead is commonly found in soil especially near roadways, older houses, old orchards, mining areas, industrial sites, near power plants, incinerators, landfills, and hazardous waste sites. People living near hazardous waste sites may be exposed to lead by breathing air, drinking water, eating foods, or swallowing dust or dirt that contain lead. Because of the widespread historical use of lead, urban soils often have lead concentrations much greater than normal background levels. These soil concentrations frequently range from 150 mg/kg to greater than 10,000 mg/kg near the base of a home painted with lead-based paint.

When lead is released to the air, it may travel long distances before settling to the ground. Lead particles from emissions deposit on the soil, become tightly bound to soil particles, and are retained in the upper portions of surface soil (upper 1 to 2 inches of soil) unless the soil has been disturbed by activities such as excavation for building or tillage for landscaping and gardening.

Since lead does not dissipate, biodegrade, or decay, the risk of exposure is long-term. People are exposed to soil lead from direct contact with contaminated soil or from contact with very fine soil particles carried into houses as airborne dust or either on shoes, clothing, or pets. Lead is taken into the body by either ingestion (eating) or inhalation (breathing).

Exposure also may result from eating garden produce grown in or near contaminated soil. Lead can be taken up from the soil into plant tissues, or contaminated dust may settle on edible leaves and fruits. When ingested, 10%-to-80% (depending on various factors) is absorbed directly, distributed throughout the body through the bloodstream, and what remains is excreted. Lead is primarily distributed through the kidneys, bone marrow, liver, brain, bones, and teeth. Bone and tissue have been found to contain 95% of the total amount of lead stored in the body. Therefore, collecting and analyzing blood samples for lead measures recent and ongoing exposures, but not the lead that is being stored.

The main target for lead toxicity is the nervous system, both in adults and children. The Department of Health and Human Services (DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens and based on animal data the EPA has determined that lead is a probable human carcinogen. Many factors will determine the severity of the health effects from lead exposure. These factors include: dose; age at exposure; duration of exposure; occupational exposures; life stages of women (childbirth, lactating, and menopause); health and lifestyle of person exposed; and nutrional status of the person. The efficiency of lead absorption from the gastrointestinal tract is greater in children than in adults. In addition, a diet containing more calcium and iron may reduce lead absorption. [9, 10]

The possibility of exposure to lead-based paint in homes constructed prior to 1978 and/or other sources of lead could also contribute to the overall dose of lead that is taken into the body. In the early 1970's EPA began to phase-out the use of leaded gasoline because of its effects on the environment from automobile emissions. By 1988, less than 1% of gasoline contained lead as compared to the gasoline used in 1970. In 1988, the Lead-Based Paint Poisoning Prevention Act was passed through legislation and became law.

EPA regulates lead in air under the Clean Air Act and has designated lead as a hazardous air pollutant. Prior to the Clean Air Act in 1977, the amount of lead discharged by stack emissions from industrial sources, and eventually settling and accumulating in nearby soil was not restricted. The Clean Air Act requires EPA to set NAAQS for lead and five other pollutants (the other pollutants are ozone, particulate matter, nitrogen oxides, carbon monoxide, and sulfur dioxide). Since 1978, ambient air lead standards have been set at 1.5 μg/m3 and recently reduced to 0.15 μg/m3 (3 month rolling average) to protect public health and the environment. Scientific evidence about lead and health has expanded dramatically since EPA issued the initial standard of 1.5 μg/m3. The law also requires EPA to periodically review the standards to ensure that they provide adequate health and environmental protection, and to update those standards as necessary. According to the NAAQS, ingestion of lead that has settled onto surfaces is the main route of human exposure to lead originally released into the air. [11]

In 2001, in compliance with the Toxic Substance Control Act (TSCA) §403, EPA published a final rule for dangerous levels of lead. That rule establishes a soil-lead screening level of 400 ppm for bare soil in play areas and 1,200 ppm for bare soil in non-play areas for the rest of the yard, based on an average of all other samples collected. As recognized in the TSCA, lead

contamination at levels equal to or exceeding the 400 ppm and 1,200 ppm standards may pose serious health risks. The potential risks are site-specific and may warrant timely response actions. Property owners and other decision makers should implement effective measures to reduce or prevent children's' exposure to lead in soil that exceeds these levels. These measures may incorporate, but are not limited to, interim controls that include covering bare soil and placement of washable doormats in entryways. [10]

Child Health Considerations

ATSDR and PADOH recognize that children are especially sensitive and at greater risk than are adults from exposure to hazardous substances. In communities faced with air, water, or soil contamination, the physical differences between children and adults demand special emphasis. Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than are adults; this means they breathe or ingest dust and soil close to the ground. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus adults need as much information as possible to make informed decisions regarding their children's health.

Small children can be exposed to lead by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing soil that contains lead. Children, especially under the age of six, are considered are more vulnerable to lead poisoning than adults. Some young children exhibit *pica* behavior, which is the desire to eat larger quantities of soil. The reasons for children's increased vulnerability to lead poisoning are due to the following factors:

1. children's developing central nervous system;
2. hand-to-mouth behavior exhibited by children increases the ingestion rate for either contaminated soil or the ingestion of lead containing dust or paint chips;
3. children's efficiency of lead absorption from the gastrointestinal tract is greater than adults; and
4. Iron and calcium deficiencies that are prevalent in children may enhance the absorption and increase the toxic effects of lead.

Chronic exposure to low lead levels has been shown to cause subtle effects on the central nervous system, which can result in deficits in intelligence, behavior, and school performance. Health effects from lead exposure in children and unborn fetuses include both physical and mental impairments, hearing difficulties, impaired neurological development, and reduced birth weights and gestational age. Some persons with lead poisoning may not be overtly symptomatic because of the differences in individual susceptibility, symptoms of lead intoxication and their onset may vary. Some health effects from lead exposure, such as impaired academic performance and motor skills, may become irreversible and persist, even when blood lead concentration return to below 10 µg/dL. Although

no threshold level for adverse health effects has been established, evidence suggests that adverse effects occur at blood lead levels at least as low as 10 µg/dL. The Centers for Disease Control and Prevention (CDC) has determined that a blood lead level greater than or equal to 10 µg/dL in children indicates excessive lead absorption and constitutes the grounds for intervention. Residents that have young children at home should take precautions to avoid tracking in potentially contaminated soil into their home.

A blood lead test is the most useful screening and diagnostic test for evaluating a possible exposure to lead. Therefore, as a prudent public health practice, blood lead tests are recommended for children (five years of age and younger). At this site PADOH and ATSDR recommends that all children under the age of six should have their blood tested for lead, if they have not recently been tested, regardless of their known exposure to the surface soil. Pennsylvania screening recommendations include a blood lead test for all children at ages one and two years for all children and for all children age's three to six without a confirmed prior lead blood test. [10]

Conclusions

Based upon a review of the available environmental sampling and community blood lead data following:

1. Based on a review of air monitoring data along the site perimeter, collected by Gould, lead in air results were below the new EPA NAAQS for lead in air of 0.15 µg/m^3. PADOH and ATSDR ***do not anticipate these levels would harm the publics' health.*** However, PADOH and ATSDR understand that site conditions often can change over time and the use of perimeter air monitoring data has limitations. Limitations in the use of perimeter monitoring data are due to variability in climate and meteorology, ongoing site-related and non-site related activities, limitations in sampling equipment, and other factors which can limits the representativeness of airborne dust results. Appropriate implementation of engineering controls, including dust suppression at the site, would be the most effective step in mitigating releases of dust from the site.

2. PADOH and ATSDR reviewed the limited community-based and additional perimeter air monitoring data collected by the Borough of Throop. Community-based results showed most air in lead levels well below the current NAAQS for lead. Some perimeter monitor results for lead in air were above the NAAQS value of 0.15 µg/m^3. However, the NAAQS value is intended as a 3 month rolling average. ***It does not appear that lead in air is at levels that could harm publics' health.*** Since the sampling activities were limited, additional community-based air samples will better determine lead in air levels in the adjacent community.

3. In response to community concerns, PADOH and ATSDR reviewed the available historical blood lead data for the communities adjacent to the site. Based on this data**,** ***it does not appear children in the Throop area have elevated blood lead levels, compared to Lackawanna County, Pennsylvania and national trends.*** The historical child blood lead levels for the Throop area were similar to the current national trends (i.e., an average blood lead level of approximately 2 µg/dL). In addition, the percent of elevated blood lead results were similar to the levels observed in Lackawanna County

and Pennsylvania as a whole, during the same time period. While some children in the Throop and Dickson City area did have elevated blood lead levels (14 total in 2006 to 2008), PADOH and ATSDR do not anticipate wide-spread health effects in the community, due to site-specific lead exposures. There are many sources of potential lead exposure including, lead paint, lead in soil from the use of lead gasoline, lead based solder used in the plumbing within those homes, and other possible sources. It is the understanding of PADOH and ATSDR that children who had blood lead levels above 10 µg/dL received intervention services (i.e., a home evaluation, sampling, and follow-up testing) by the PADOH Childhood Blood Lead program, in order to reduce any potential future exposures. PADOH and ATSDR recommend that parents of children under the age of seven years be tested for lead if they have not been tested within the past year, regardless of their exposure history and residents take steps to reduce their potential exposure to lead in surface soil, as outlined further in the Recommendations Section.

Recommendations

Based on a review of the available environmental and blood lead data, thus far, PADOH and ATSDR recommend the following:

1. PADOH and ATSDR, as a general recommendation and prudent public health measure, recommend that all children under the age of seven years be tested for lead if they have not been tested within the past year, regardless of their exposure history. The possibility for exposure to lead-based paint and other sources of lead in the home (i.e., old plumbing) or an urban environment (i.e., surface soil contaminated from leaded gasoline), although not site related, make this public health recommendation appropriate in this situation. The screening recommendations for Pennsylvania encourage:
    a. A blood lead test for all children at ages one and two years
    b. A blood lead test for all children and for all children ages three to six without a confirmed prior blood lead test
    c. Women who are pregnant or who may become pregnant should also discuss their possible lead exposures with their personal physician.

2. PADOH and ATSDR recommend, as a prudent public health measure, that residents take the following steps to reduce their potential exposure to lead in surface soil, as much as possible, both at the site and adjacent residential areas:
    - Establish a clean hands policy – children should wash their hands when coming in from playing outside and before eating.
    - Provide children with a covered sand box and discourage them from playing in the soil.
    - Maintain a healthy grass or sod on play areas. Bare play areas, such as those under a swing set, can also be covered with woodchips, mulch, or clean sand.

- Do not eat or smoke in areas with contaminated soil.
- Avoid tracking soil into the house on your shoes and clothing and by household pets. Ask family members to remove their shoes by the door, and frequently bathe your pets as they could also track contaminated soil into your home.
- Regularly conduct damp mopping and damp dusting of surfaces. Dry sweeping and dusting could increase the amount of lead-contaminated dust in the air.
- If you have carpets, use a vacuum with a High Efficiency Particulate Air (HEPA) filter. Vacuuming without this type of filter can increase the amount of lead-contaminated dust in the air.

3. PADOH and ATSDR suggest EPA or PADEP consider collecting additional surface residential soil samples, to delineate any elevated soil lead levels in the adjacent community, related to the on-going site remediation activities and as a point of comparison from historical and pre-construction residential sampling events

4. ATSDR and PADOH recommend that EPA or PADEP consider collecting additional community-based air sampling in close proximity to the residential areas under differing weather and climate conditions to increase confidence in the available air monitoring data. PADOH and ATSDR will continue to encourage the environmental agencies and site contractors to employ rigorous engineering controls to reduce potential dust emissions from the site.

Public Health Action Plan

The public health action plan for the site contains a description of actions that have been or will be taken by PADOH, ATSDR and other government agencies at the site. The purpose of the public health action plan is to ensure that this health consultation both identifies public health hazards and provides a plan of action designed to mitigate and prevent harmful human health effects resulting from exposure to hazardous substances.

Public health actions that have been taken include:

PADOH and ATSDR conducted a visit of the site and the surrounding community

PADOH and ATSDR discussed community concerns related to the site with the local community, PADEP and EPA.

PADOH and ATSDR offered a free blood lead screening to Throop Borough residents

PADOH and ATSDR completed this HC

Public health action that currently or will be implemented:

PADOH and ATSDR will provide and discuss this HC with community members as appropriate.

PADOH and ATSDR will pursue meetings with the community, as well as state and local government agencies as appropriate.

PADOH and ATSDR will review additional environmental sampling data and community blood lead data, if requested and deemed appropriate, and issuing a public health conclusion

PADOH and ATSDR will remain available to discuss any public health questions or concerns related to the site with community members and local authorities as appropriate.

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Certification

This letter health consultation for the former Marjol Battery site was prepared by the PADOH under a cooperative agreement with the ATSDR. It is in accordance with approved methodology and procedures existing at the time the health consultation were initiated. Editorial review was completed by the cooperative agreement partner.

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

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Figures

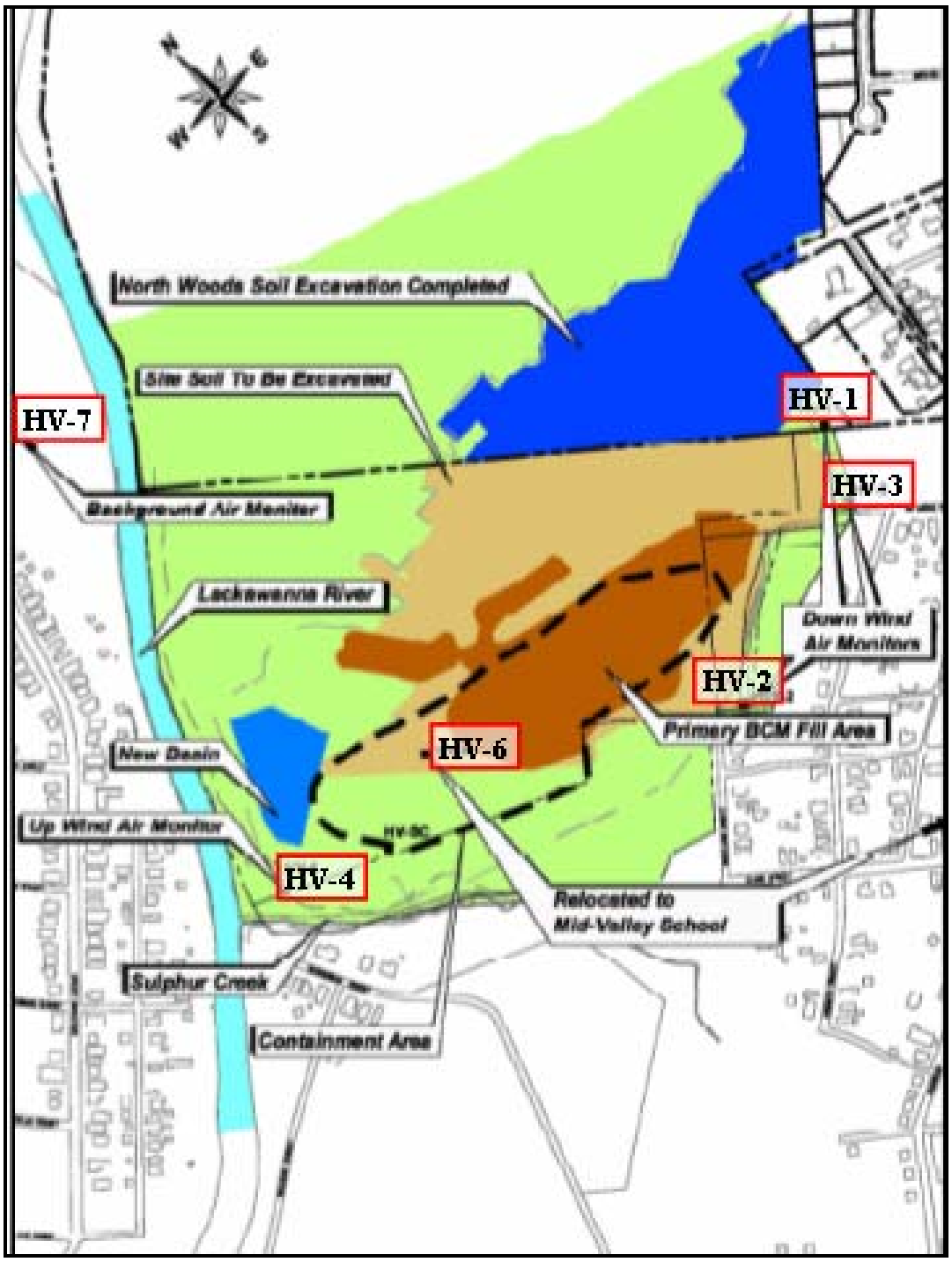


Figure 1 – Site map, with air monitoring locations

◆ Site Perimeter Monitors (Ambient Air Monitoring for Lead)

Figure 2 – Aerial site map, with air monitoring locations

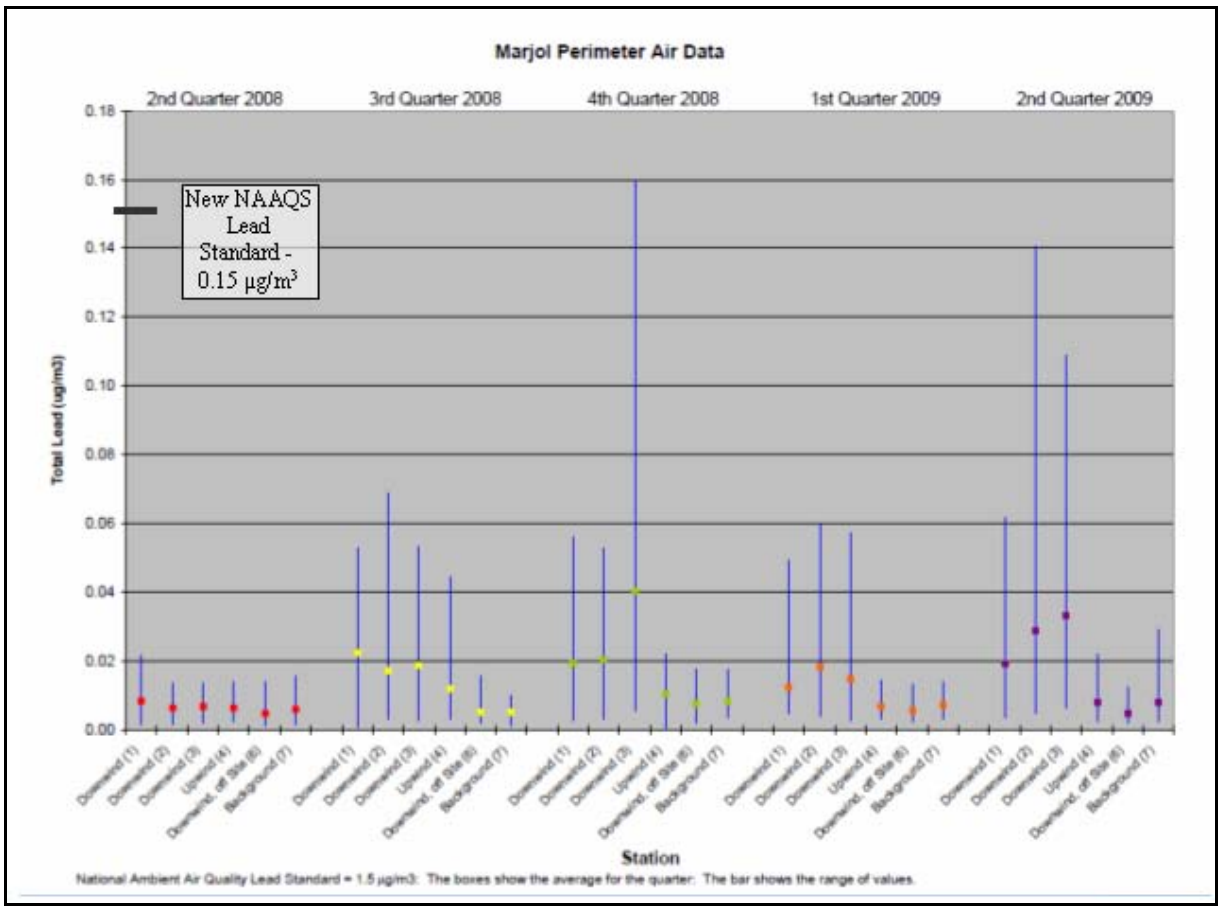


Figure 3 – Perimeter air monitoring, 2008-2009 (quarterly averages)

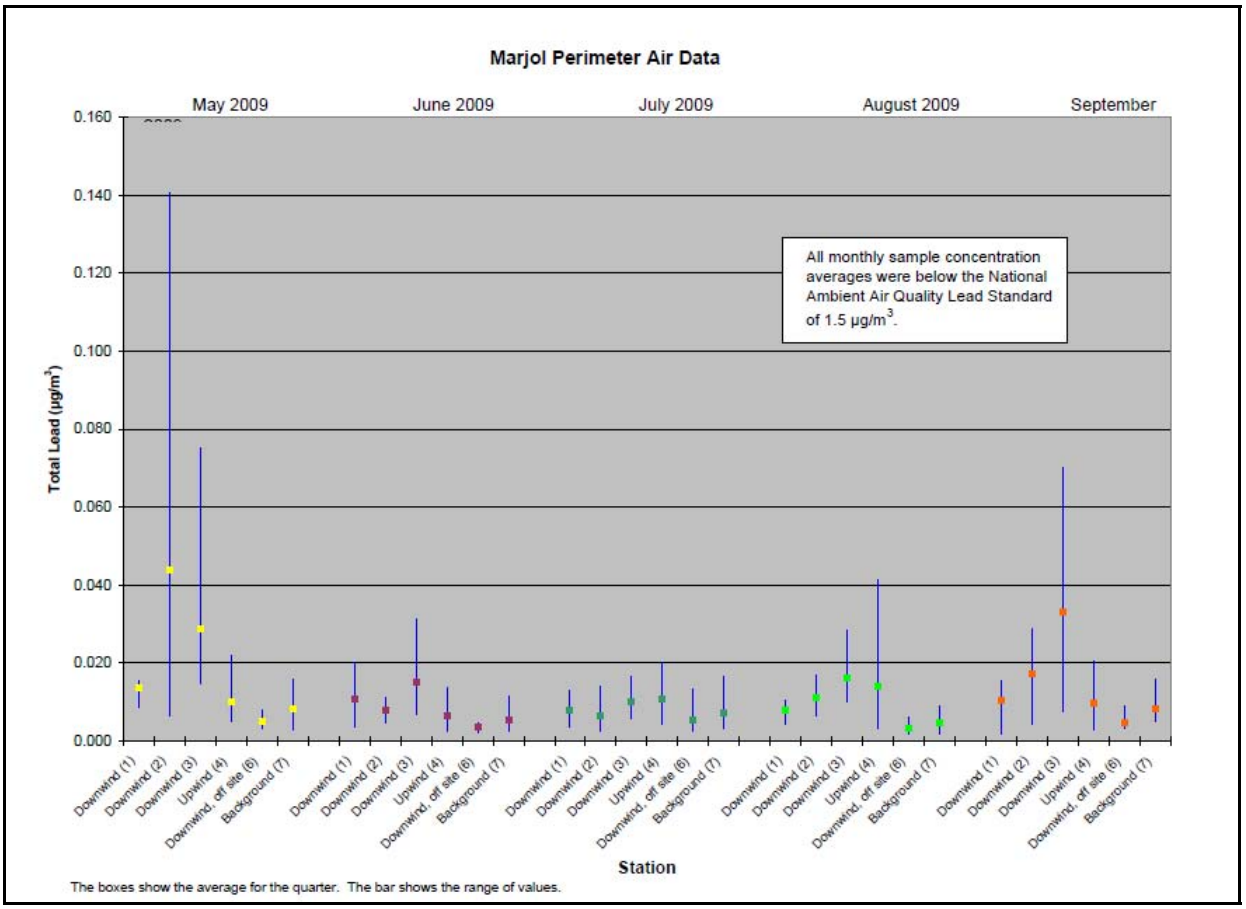
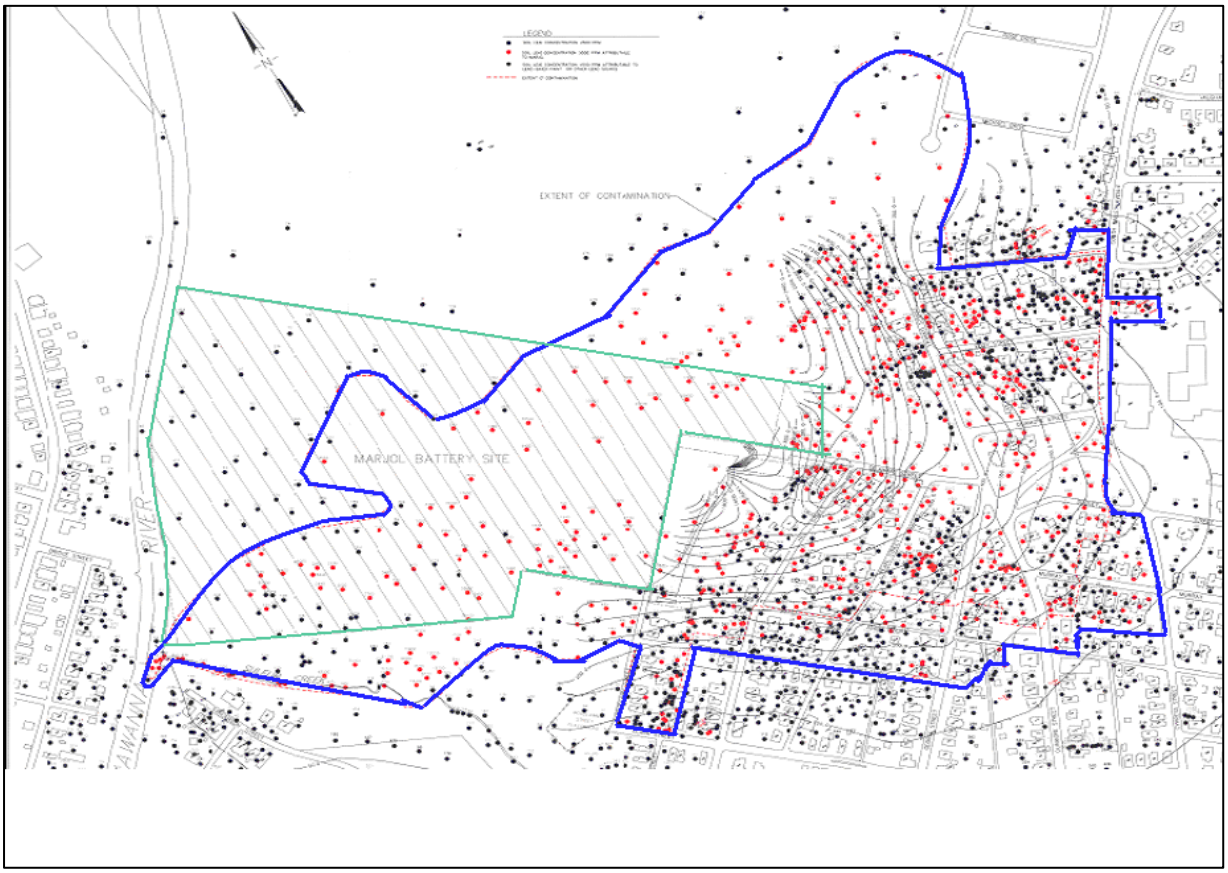


Figure 4 – Perimeter air monitoring, 2009 (monthly averages)



Samples with soil lead levels > 500 ppm attributable to Marjol

● Soil lead levels < 500 ppm, or soil lead > 500 ppm and attributable to lead-based paint or other lead sources

— Area of soil remediation (1988-1992)

— Marjol Battery site boundary

Figure 5 – Map indicating soil lead levels and zone of remediation surrounding the former Marjol Battery site. (Additional soil samples collected in 2000 and 2008 in residential areas)

Tables

Table 1 - Residential air sampling (Cocciardi and Associates, Inc. for the Borough of Throop)

Date	Time of Day	Result (µg/m^3)
4/29/2009	During site work	<0.030 *
4/30/2009	During site work	<0.039 *
5/1/2009	During site work	<0.036 *
5/2 -5/3/2009	Non-working	<0.021 *
5/4/2009	During site work	<0.034 *

* Below laboratory reporting limit

Table 2 - Perimeter air sampling (Cocciardi and Associates, Inc. for the Borough of Throop)

Date	Time of Day	Location	Result (µg/m^3)
4/28/2009	During site work	Delaware St.	0.49
		Grove St.	1.42
4/29/2009	During site work	Delaware St.	0.4
		Grove St.	1.59
4/30/2009	During site work	Delaware St.	<0.056 *
		Grove St.	<0.059 *
5/1/2009	During site work	Delaware St.	0.827
		Grove St.	0.084
5/4/2009	During site work	Delaware St.	0.164
		Grove St.	0.259

* Below laboratory reporting limit

Table 3 - Voluntary community blood lead data for Throop – average, minimum and maximum values (collected by Gould)

Year	# Participants Age 6 or Younger	Results for Participants Age 6 or Younger (µg/dL)	# Participants Age 7 or Older	Results for Participants Age 7 or Older (µg/dL)
2005	3	Min = 2 Max = 2 Avg = 2	21	Min = 1 Max = 6 Avg = 2.7
2006	3	Min = 3 Max = 4 Avg = 3.3	32	Min = 1 Max = 7 Avg = 2.87
2007	2	Min = 3 Max = 3 Avg = 3	30	Min = 2 Max = 8 Avg = 3.2
2008	0	Min = n/a Max = n/a Avg = n/a	35	Min = 1 Max = 7 Avg = 2.1
2009	4	Min = 1 Max = 2 Avg = 1.8	53	Min = 1 Max = 5 Avg = 1.9

Table 4 – Child blood lead data reported to PADOH Child Blood Lead Program for Throop and Dickson City

	2006		2007		2008		Total	2006-2008
Area	# Highs: ≥ 10 µg/dL	Total Children Tested	# Highs: ≥ 10 µg/dL	Total Children Tested	# Highs: ≥ 10 µg/dL	Total Children Tested	# Highs: ≥ 10 µg/dL	Total Children Tested
Throop & Dickson City	1 (0.37%)	269	10 (2.69%)	372	3 (0.89%)	336	**14 (1.4%**	**977**
Lackawanna County	29 (1.55%)	1,874	36 (1.58%)	2,276	26 (1.32%)	1,969	**91 (1.4%)**	**6119**
Pennsylvania	3370 (3.16%)	106,796	2769 (2.17%)	127,652	2868 (2.13%)	134,367	**9007(2. 4%)**	**368,815**