Letter Health Consultation

ROSE EXTERMINATOR SITE

NORWOOD, OHIO

APRIL 17, 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, Georgia 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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LETTER HEALTH CONSULTATION

ROSE EXTERMINATOR SITE

NORWOOD, OHIO

Prepared By:

Ohio Department of Health
Bureau of Environmental Health
Health Assessment Section
Under a cooperative agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Steven Renninger
U.S. Environmental Protection Agency
Emergency Response Section
26 West Martin Luther King Drive (G41)
Cincinnati, OH 45268

Dear Mr. Renninger:

This letter is in response to your request to evaluate potential arsenic exposures at the Rose Exterminator site in Norwood, Ohio. The Ohio Department of Health's Health Assessment Section (HAS) evaluated the U.S. EPA data for this site in order to give a recommendation regarding a removal action. Arsenic is the contaminant of concern; however, lead was also found above acceptable limits in some areas of the site.

Included below is a list of documents that HAS reviewed in order to evaluate this site:

1. Sketch of property with XRF readings.
2. Summary of XRF readings.
3. Summary of lab results (4 samples) -- S-1 through S-3 collected inside building and sample S-4 collected outside of building.

Background and Statement of Issues

The Rose Exterminator site is a former pesticide facility located at 5421 Carthage Avenue adjacent to a residential area in Norwood, Ohio. The building on the site was once used to produce and package rodenticide containing arsenic from about 1950 to 1974. It has been unoccupied since 1974 and is now structurally impaired with a collapsed roof. Residential properties are located directly to the east and west of the site (U.S. EPA 2009). The site is not fenced off - the building is vacant and posted "no trespassing". The building directly north of the site is vacant and the house south of the site is also vacant. All the residences immediately behind the site are occupied (NCHD 2009). The site's location within the residential neighborhood is shown in Figure 1.

The National Institute for Occupational Safety and Health (NIOSH) investigated the site in 1974 and found it highly contaminated with the rodenticide arsenic trioxide. In 1981, NIOSH found that the site was still contaminated with arsenic. Six floor samples had 3 to 41 percent arsenic by weight. Walls and ceiling surfaces were also contaminated. NIOSH recommended that the building be decontaminated under strict guidelines (NIOSH 1982). However, 28 years later, the site has still not been decontaminated. The U.S. EPA investigated the site in December 2008 to evaluate residual arsenic in and around the building (U.S. EPA 2009).

Exposure Evaluation Summary

In December 2008, the U.S. EPA collected 35 soil samples and analyzed them by XRF (X-ray Fluorescence). Arsenic concentrations ranged from 346 to 73,100 parts per million (ppm) in the interior of the structure, where 17 samples were taken. Arsenic was also found around the exterior of the building, where 18 samples were taken, at concentrations up to 2,720 ppm. Lead was also detected at levels up to 1,795 ppm (interior) and 1,637 ppm (exterior). The sketch of the property and XRF sample results are presented in Figure 2.

Additional laboratory results of four samples (three collected inside and one collected outside of the building) detected arsenic levels as high as 7 percent arsenic by weight inside and 3 percent outside of the building. The exterior sample also detected lead at a concentration of 1,560 ppm by weight.

The levels of arsenic are well above (by as much as 3,600 times) the ATSDR-recommended Comparison Value for arsenic in soil of 20 ppm. In addition, soil sampling at the site indicates lead contamination of soils above the 400 ppm removal guideline for lead. There are no soil sample results from adjacent yards; however, sampling is planned during the pending removal.

Because the site is unfenced, there is relatively easy access to the contamination on-site. Residences are very close to the south and west of the building; however, the adjacent homes do have fences that prohibit someone from walking onto the property. A ladder was leaning against the western wall of the building, although it is not certain that people were entering the building by that route. Toys were found inside the building; most likely thrown over the building wall. It is possible that people have been in and out of the building over the last 30 years, as the door to the building was just nailed shut. Therefore, a pathway for exposure to arsenic and lead through contact with contaminated soil and dust likely existed in the past and continues to pose a potential public health threat to nearby residents trespassing on the site at the present.

Health Evaluation Summary

ODH HAS believes that the site-specific contamination, especially the high levels of arsenic, indicate a cause for concern for noncancer and cancer health effects from acute or chronic exposure to contaminated soil, assuming the exposure scenarios described in the attached appendix. The main exposure routes with regard to arsenic and lead poisoning are by ingestion (eating or drinking) or inhalation (breathing it in). The major pathway of concern, especially with regard to young children, is by incidental ingestion of arsenic- and lead-contaminated soil/dust resulting from repeated hand-to-hand mouth activity. Small children are closer to and spend more time on the ground where they may come into contact with contaminated soil and dust.

Children and adults who are exposed to inorganic arsenic may have similar health effects, such as irritation of the stomach and intestines, blood vessel damage, skin changes, and reduced nerve function. There is some evidence that long-term exposure to arsenic in children may result in

lower IQ (intelligence quotient) scores and that exposure to arsenic in early life (including in the womb) may increase mortality in young adults. The International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), and the U.S. EPA have all determined that inorganic arsenic is a human carcinogen (ATSDR 2007a).

Children are more sensitive to the effects of lead exposure than are adults. Neurological effects in children may begin at low blood lead levels and studies have found a measured decrease in IQ as blood lead levels increase. For a full discussion of the health evaluation for both arsenic and lead, see the attached appendix A.

Conclusions

1. The unsecured Rose Exterminator site, as indicated by a recent U.S. EPA site investigation, is highly contaminated with arsenic. *At present*, the site poses a ***public health hazard*** to adults and children who may come in contact with the high levels of arsenic residue present in on-site soils and the surfaces of the former Rose Exterminator building.

2. The Rose Exterminator site posed a ***public health hazard*** *in the past*. In 1974, the site was found to be heavily contaminated with arsenic. In 1981, NIOSH found that the site was still contaminated with arsenic. No remediation of the site has taken place.

3. If the site is not decontaminated, the continued presence of elevated arsenic in the structure and soils will continue to pose a ***public health hazard*** to people *in the future*.

Recommendations

1. Additional soil samples should be collected on-site and from adjacent residences to fully define the extent of the arsenic and lead contamination in the area.

2. Access to the property should be restricted to prevent exposure to the contaminated building and soils.

3. Future exposure to arsenic and lead contamination at the site can be eliminated by removing the arsenic-contaminated building and contaminated soils from the site.

4. Workers involved in any remedial activities at the site should be adequately protected against exposure to arsenic and lead.

5. Adequate safeguards should be taken to ensure that remedial actions at the site do not pose an additional exposure risk to area residents.

Public Health Action Plan

1. ODH will educate the community at a future public meeting and will specifically inform the neighbors who live adjacent to this site about the health dangers from this site.

2. ODH will review any additional sampling data as it becomes available to ensure that the site no longer poses a public health threat to the community in the future.

Sincerely,

Robert C. Frey, Ph.D.
Chief, Health Assessment Section
Ohio Department of Health

RF/jk

CERTIFICATION

The Rose Exterminator Site Letter Health Consultation was prepared by the Ohio Department of 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 begun. Editorial review was completed by the Cooperative Agreement Partner.

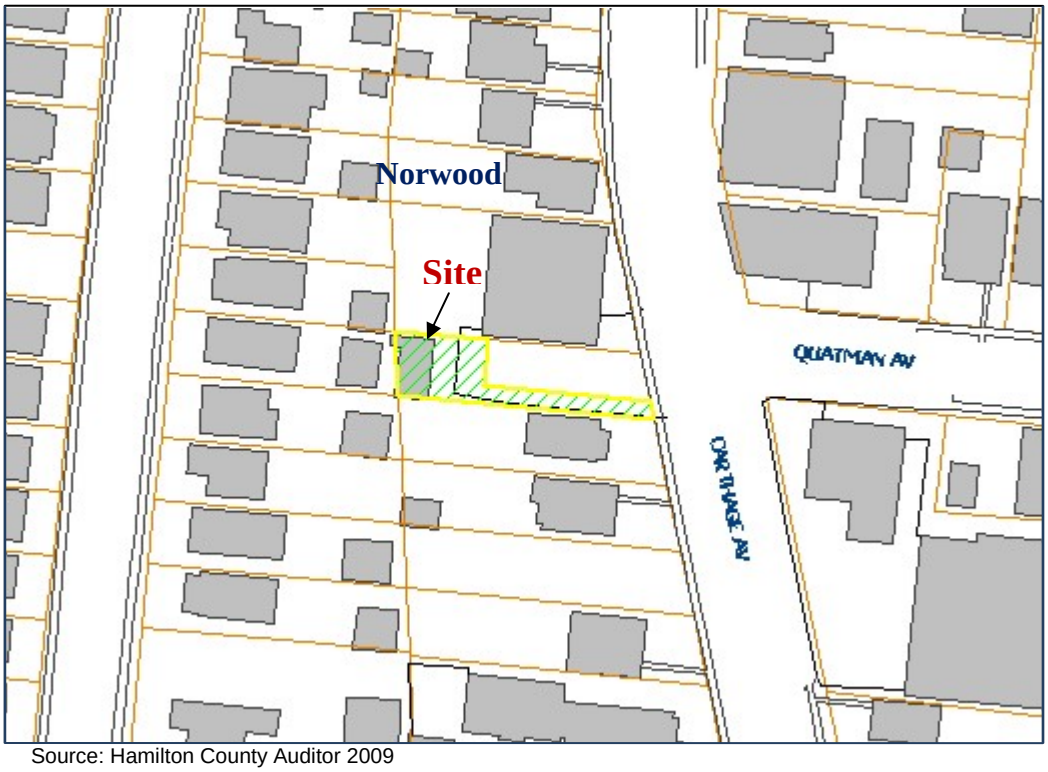
Technical Project Officer, CAT, CAPEB, DHAC, ATSDR

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

Team Lead, Cooperative Agreement Team, CAPEB, DHAC, ATSDR

Figure 1. Rose Exterminator Site Location Map

Ohio Department of Health
Health Assessment Section



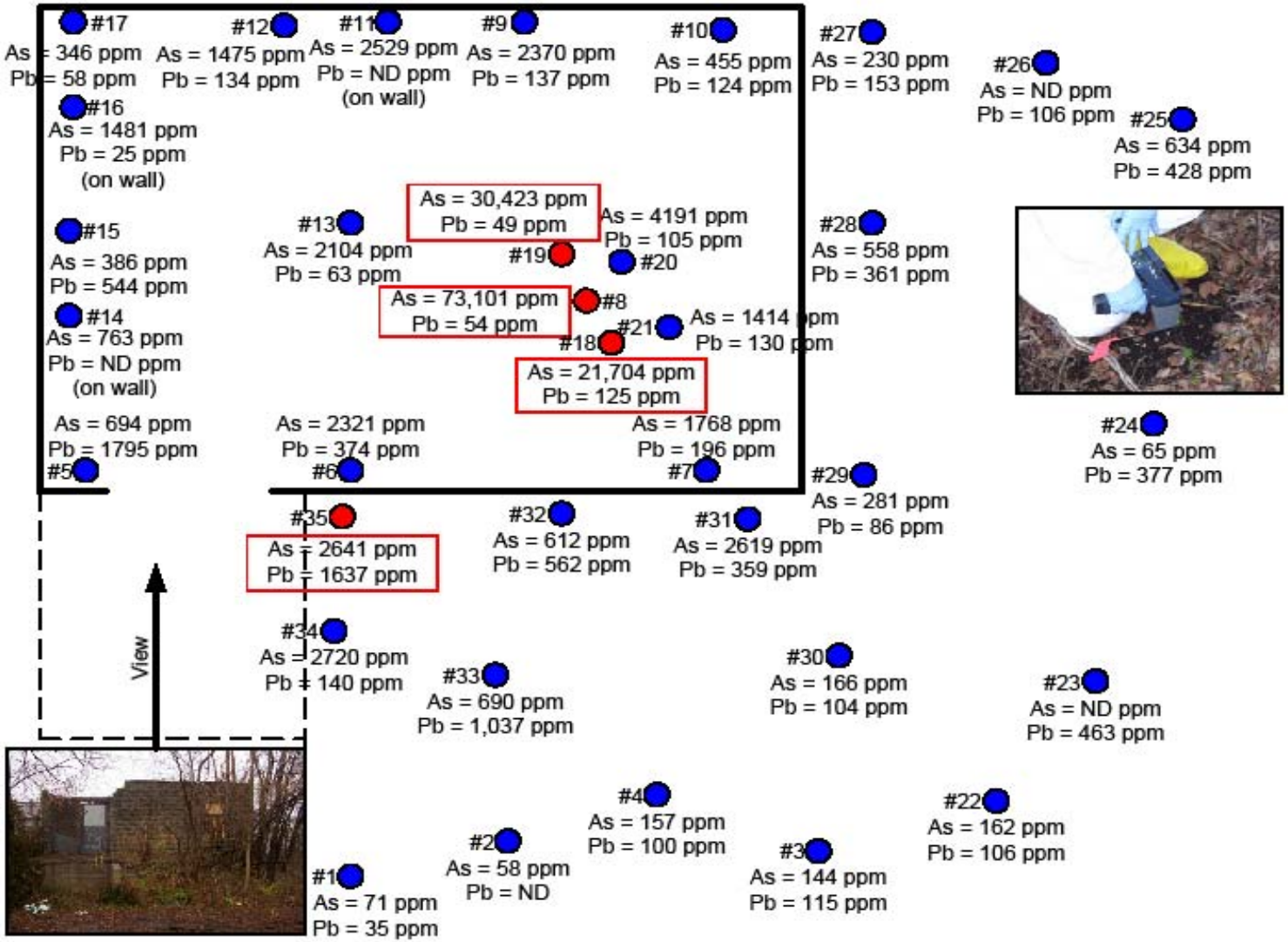
Source: Hamilton County Auditor 2009

Front of Building. Source: U.S. EPA OSC. 2008

Demographic Statistics Norwood, Ohio	
Total Population	21,675
White	20,429
Black or African American	509
Am. Indian & Alaska Native	80
Asian	167
Native Hawaiian & Other Pacific Islander	4
Some other race	190
Two or more races	296
Hispanic or Latino (of any race)	401
Under 5 years	1,304
18 years and over	16,603
65 years and over	2,733
Total Housing Units	10,044

Source: 2000 U.S. Census

Figure 2. Diagram of Property and XRF Readings



Source: U.S. EPA 2008

Appendix A. Health Evaluation

The risks posed by arsenic are the main driver of risk at the Rose Exterminator site in Norwood, Ohio. This section presents a summary of arsenic's properties and the health effects that can result from excess arsenic exposure. Lead was also found at this site and is also included in this appendix.

Arsenic

Discussion
Arsenic is a naturally occurring element widely distributed in the earth's crust. Natural levels of arsenic in soil range from 1 to 40 ppm, with an average level of 5 ppm. In nature, arsenic is mostly found in minerals as opposed to its elemental form. Arsenic, primarily as arsenic trioxide, is a byproduct of smelting of copper, lead, cobalt, and gold ores. Major applications include the production of copper chromated arsenic (CCA, formerly used as a wood preservative), pesticides and herbicides used in agriculture, and alloying agents. In recent years, the use of inorganic arsenic compounds in agriculture and wood treatment has been phased out, but many sites are contaminated with these compounds from past use. Organic arsenic compounds, which are generally less toxic, are still used commercially. The organic compound arsenobetaine is found at relatively high levels in some foods, especially seafood and shellfish, but is generally considered nontoxic.

Arsenic is a potent toxicant that may exist in several valence states and in a number of inorganic and organic forms. Most cases of arsenic-induced toxicity in humans are due to exposure to inorganic arsenic; differences in potencies of different inorganic chemical forms are usually minor. Organic arsenic compounds (methyl and phenyl derivatives of arsenic acid are the most common) also may produce adverse health effects in humans, but it is generally considered that organic arsenicals are substantially less toxic than the inorganic forms.

Acute effects
Health effects depend on the exposure concentration (how much), the frequency (how often) and duration of exposure (how long) and can occur upon inhalation, ingestion, or dermal exposure to arsenic or arsenic compounds. Poisoning and foodstuff contamination cases provide the main body of knowledge about acute, short-term exposures involving humans. Very high oral or inhalation exposures can be life-threatening or fatal. High oral exposures can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet. High inhalation exposures can result in irritation of the lungs or throat. Inhaled inorganic arsenic can produce neurological effects, including peripheral neuropathy (numbness, loss of reflexes, muscle weakness, tremors). Ingestion of inorganic arsenic can cause injury to the nervous system, including peripheral neuropathy and intellectual deficits in children. The main effect of dermal exposure to arsenic is local irritation and dermatitis (ATSDR 2007a).

ODH HAS estimated the exposure dose from incidental ingestion of soil based on inorganic

arsenic at the maximum detected value of 73,100 ppm, assuming an acute ingestion exposure of 200 mg to a 16 kg child. The estimated exposure dose (0.91 mg/kg/day) was well above ATSDR's acute minimal risk level (MRL) of 0.005 mg/kg/day based on the lowest-observed-adverse-effect level (LOAEL) of 0.05 mg/kg/day for gastrointestinal effects and facial edema.

Chronic effects (Noncancer)
In addition to acute effects, arsenic is well documented to result in adverse health effects upon chronic, lower-level exposure. Several human epidemiologic studies provide this information. Most inhalation studies focus on workers in occupational settings such as smelters and chemical plants, where the predominant form of airborne arsenic is arsenic trioxide dust. Oral studies are commonly of populations exposed to elevated levels of arsenic, presumably inorganic in form, in drinking water.

At less than lethal doses, chronic oral (or inhalation) exposure to arsenic can result in such effects as a darkening of the skin and the appearance of corn- or wart-like growths on the palms, soles of the feet, or torso. In addition, serious effects on the cardiovascular system are reported.

ODH HAS estimated the exposure dose from chronic exposure to inorganic arsenic assuming ingestion of 100 mg soil containing the geometric mean total arsenic level (610 ppm) to a 70 kg individual. The estimated exposure dose (0.0009 mg/kg/day) was above ATSDR's chronic-duration oral MRL of 0.0003 mg/kg/day based on the no-observed-adverse-effect level (NOAEL) of 0.0008 mg/kg/day for dermal effects.

Cancer risk
Chronic inhalation exposure to arsenic in air increases the risk of lung cancer. Chronic oral exposure is known to increase the risk of skin cancer and cancer in the lungs, bladder, liver, kidney and prostate. The International Agency for Research on Cancer (IARC) classifies arsenic and arsenic compounds as *carcinogenic to humans (Group 1)*. In the 11th Report on Carcinogens, the National Toxicology Program (NTP) of the U.S. Department of Health and Human Services concluded that "inorganic arsenic compounds are "*known to be human carcinogens*" (NTP 2005). The U.S. EPA has also determined that inorganic arsenic is a human carcinogen.

ODH HAS calculated the estimated increase in cancer risk assuming a 30-year exposure to a 70 kg individual ingesting 100 mg soil with a mean concentration of 610 ppm inorganic arsenic using EPA's Cancer Slope Factor (1.5 per mg/kg-day) [IRIS 2009]. The resulting estimate of the theoretical increase in cancer risk was 5.6×10^{-4}, or about 6 additional cases of cancer per 10,000 individuals, which is above the health guideline for cancer risk (usually 1 in 10,000 or 1×10^{-4}).

Regulations and Guidelines
ATSDR has established an acute minimal risk level (MRL) for oral exposure to inorganic arsenic of 0.005 mg/kg/day; this is the short-term (≤ 14 days) dose below which no adverse effects are expected. In addition, ATSDR has derived a chronic-duration (≥ 1 year) MRL for oral exposure to inorganic arsenic of 0.0003 mg/kg/day.

The ATSDR uses Comparison Values to select environmental contaminants for further evaluation. Comparison Values are calculated concentrations of chemicals in air, soil, or water that are not likely to cause harmful health effects in exposed people. The ATSDR Environmental Media Evaluation Guide (EMEG) for arsenic in soil is 20 ppm for a child and 200 ppm for an adult (ATSDR CVs 2007).

The U.S. EPA Soil Screening Guidance (U.S. EPA 1996), when applied to the ingestion of carcinogenic arsenic in residential soil is calculated to be 0.5 ppm. The screening level equation for ingestion of a noncarcinogenic contaminant would yield a calculated screening level of 20 ppm for arsenic, based on a Reference Dose (RfD) of 0.0003 mg/kg-day. ATSDR has listed the 0.5 ppm level as a cancer risk evaluation guide (CREG); however, they note that this value is below background levels found in soil. Therefore, the ATSDR-recommended Comparison Value for arsenic in soil is 20 ppm (ATSDR CVs 2007).

Lead

Discussion

Lead is a heavy, low melting, bluish-gray metal that occurs naturally in the Earth's crust. However, it is rarely found naturally as a metal. It is usually found combined with two or more other elements to form lead compounds. Once lead falls onto soil, it sticks strongly to soil particles and remains in the upper layer of soil. Some lead compounds are changed into other forms of lead by sunlight, air, and water; however, elemental lead cannot be broken down.

Lead contaminated soil can pose a risk through direct ingestion, uptake in vegetable gardens, or tracking into homes. Uncontaminated soil contains lead concentrations less than 50 ppm but soil lead levels in many urban areas exceed 200 ppm. The EPA’s standard for lead in bare soil in play areas is 400 ppm by weight and 1200 ppm for non-play areas. This regulation applies to cleanup projects using federal funds (ATSDR 2007c).

Lead exposure in the general population (including children) occurs primarily through ingestion, although inhalation also contributes to lead body burden and may be the major contributor for workers in lead-related occupations. Because of their behavior and physiology, children are more affected by exposure to lead than are adults. Children absorb more ingested lead than do adults. Children generally ingest lead-contaminated soil and house dust at higher rates than adults because of mouthing and hand-to-mouth behaviors. Children who exhibit pica, a compulsive hand-to-mouth behavior and repeated eating of nonfood items, are at greatest risk. Children have a higher breathing rate than adults, breathing in a greater volume of air per pound. Being shorter than adults are, children are more likely to breathe lead-contaminated dust and soil as well as fumes close to the ground. In addition, the percent of lead absorbed in the gut, especially in an empty stomach, is estimated to be as much as five to 10 times greater in infants and young children than in adults. (ATSDR 2007c).

Acute effects
An acute high exposure to lead can lead to high short-term blood lead levels (BLLs) and cause symptoms of lead poisoning. In children, acute exposure to very high levels of lead may produce encephalopathy and other accompanying signs of coma, convulsions, death, hyperirritability, lack of coordination and stupor. The BLLs associated with encephalopathy in children vary from study to study, but BLLs of 70-80 µg/dL or greater appear to indicate a serious risk. Even without encephalopathy symptoms, these levels are associated with increased incidences of lasting neurological and behavioral damage (ATSDR 2007c).

Chronic effects (Noncancer)
Children are more sensitive to the effects of lead exposure than are adults. Neurological effects in children may begin at low BLLs, at or below 10 micrograms per deciliter (µg/dL) in some cases. Studies have found a measured decrease in IQ as blood lead levels increase. There is also evidence that attention deficit hyperactivity disorder (ADHD) and hearing impairment in children increase with increasing BLLs, and that lead exposure may disrupt balance and impair peripheral nerve function (ATSDR 2007b).

Site Assessment
ODH HAS used EPA's Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) to determine if there is a probability that a blood lead level above 10 micrograms per deciliter (µg/dL) could occur from exposure to lead in soil at the Rose Exterminator site. At the maximum soil lead level of 1,795 ppm, a blood lead level of 18 µg/dL is predicted for a child in the age range of 2 to 3 years and 15 µg/dL for a child in the age range of 4 to 5 years. Using the geometric mean lead concentration of 112 ppm found in soil at the site, a blood lead level of 2.8 µg/dL is predicted for children up to 7 years old. Therefore, exposure to the maximum levels of lead detected in soils on-site is likely to result in blood lead levels above 10 µg/dL, CDC's blood lead level of concern.

Regulations and Guidelines
CDC considers children to have an elevated level of lead if the amount of lead in the blood is at least 10 µg/dL. Ohio considers children with blood lead levels equal to or greater than 10 µg/dL as lead-poisoned [OAC 3701-30-01 (N)]. EPA requires that the concentration of lead in air that the public breathes be no higher than 1.5 micrograms per cubic meter ($\mu g/m^3$) averaged over three months.

The Agency for Toxic Substances and Disease Registry (ATSDR) has not derived Minimal Risk Levels (MRLs) for lead, and the EPA has not developed a Reference Dose (RfD) for chronic oral exposure for lead. The EPA has decided that it would be inappropriate to develop a reference dose for inorganic lead (and lead compounds) because some of the health effects associated with exposure to lead occur at blood lead levels as low as to be essentially without a threshold (IRIS 2009).

The EPA's standard for lead in bare soil in play areas is 400 ppm by weight and 1200 ppm for non-play areas. This regulation applies to cleanup projects using federal funds (ATSDR 2007c).

Seven of the soil samples collected by the U.S. EPA at the Rose Exterminator Site were above the 400 ppm level and two samples were above the 1,200 ppm level for lead.

Cancer risk

The International Agency for Research on Cancer (IARC) classifies inorganic lead compounds as *probably carcinogenic to humans (Group 2A)*, based on limited evidence of carcinogenicity in humans and sufficient evidence in animals. In the 11th Report on Carcinogens, the National Toxicology Program (NTP) of the U.S. Department of Health and Human Services concluded that "lead and lead compounds are *reasonably anticipated to be human carcinogens*" (NTP 2005). In arriving at its conclusions, the NTP relied upon studies on laboratory animals and workers exposed to high levels of lead. The laboratory animals developed brain, kidney, and lung cancer. The workers inhaled high levels of lead fumes or accidentally ingested lead dust. The worker studies did not account for diet, smoking, and exposure to other cancer-causing agents. The worker study showed weak evidence for increased risk for lung, stomach, or bladder cancer. The workers were exposed to lead at 50 to 5,000 micrograms per cubic meter ($\mu g/m^3$) in air and had 40 to 100 µg/dL in blood. These above exposures greatly exceed the expected types of exposures to lead that could potentially occur in and around the old facility in Norwood.

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Appendix B. Fact Sheets

Bureau of Environmental Health
Health Assessment Section

"To protect and improve the health of all Ohioans"

Arsenic

Answers to Frequently Asked Health Questions

What is arsenic?

Arsenic is an element found in nature. Arsenic has no smell or taste.

Where is the arsenic found in nature?

Natural arsenic is found in rocks. Ohio's rocks contain low levels of arsenic. We all have a small amount of arsenic in our bodies. Higher levels come from mining, some factories and chemical plants and wood treated products.

How do higher levels of arsenic get in the environment?

- **How does arsenic get in your body?**

1. Arsenic goes into the air when materials that contain arsenic are burned.
   - People then breathe in the smoke and arsenic (inhalation).
2. During the burning, arsenic falls from the air to the ground or into the rivers and lakes.
   - Kids play outside in the dirt (dermal-skin contact).
   - People have gardens or flower beds and have contact with the soil (dermal-skin contact).
   - People eat food that was grown in contaminated soil (ingestion-eating or drinking).
3. On the ground, arsenic will dissolve into the underground drinking water.
   - Humans then drink the water (ingestion-eating or drinking).

Who is more likely to come in contact with higher levels of arsenic?

- Private well users that live in areas with higher levels of natural arsenic in the rock.
- Kids who play outside in dirt with high levels of arsenic.
- People who have gardens or flower beds in soils with higher arsenic levels.
- People who drink water polluted by a nearby chemical plant or waste site.

Can you get sick from arsenic?

Yes, you can get sick from arsenic. But getting sick will depend on the type of arsenic and the contact (exposure) you had with this chemical.

Types of arsenic:

- Organic arsenic: This type can be found in food, especially seafood, and does not cause health problems.
- Inorganic arsenic: This type can be found in the soil, in the drinking water and in the air. This type sometimes causes health problems.

Exposure (contact) with the inorganic arsenic:

- How much you were exposed to (dose).
- How long you were exposed (duration).
- How often you were exposed (frequency).
- General Health, Age, Lifestyle
  Young children, the elderly and people with chronic (on-going) health problems are more at risk to chemical exposures.

Note that both types of arsenic occur naturally. But very high levels of inorganic arsenic in food or water can cause serious, sudden health problems or sometimes death.

How do we measure arsenic?

Arsenic is measured (counted) in parts per billion (ppb). Example: One part per billion (ppb) would be equal to one bean in a pile of one billion beans. A deadly dose of arsenic would be 60,000 parts per billion (ppb) or more. In Ohio drinking water, we normally find natural arsenic levels between 5-15 ppb.

How does arsenic harm your health?

If you were to drink water with arsenic levels of 200 parts per billion every day and over many years, you may experience some of the following:

- Nausea (upset stomach), vomiting, and diarrhea.
- The body will make less red and white blood cells which help fight disease.
- A feeling of "pins and needles" on the hands and feet.
- Long-term contact with inorganic arsenic may cause the skin to darken and the growth of small "corns" or "warts" on the palms of the hand, bottom of the feet (soles), and on the trunk of the body (torso).

Does arsenic cause cancer?

Eating or drinking (ingesting) high levels of inorganic arsenic (300 ppb, daily and over many years) increases the risk of getting skin cancer. It also increases the risk of developing tumors of the bladder, kidney, liver, and lungs. New data show contact with arsenic may cause a greater risk of getting cancer than previously thought. It is for this reason that the United States Environmental Protection Agency (U.S. EPA) lowered the Maximum Contaminant Level (MCL) of arsenic allowed in public water systems from 50 parts per billion (ppb) to 10 parts per billion (ppb).

The new Maximum Contaminant Levels (MCL) of 10 *ppb* is set at this **very** low level to be sure that the risk of getting a cancer from arsenic is very, very small. Many wells in Ohio may have levels of arsenic that go above the new MCL. The U.S. EPA said there is no extreme risk to health by drinking water with arsenic levels between 10 - 50 ppb. People with private wells above 10 ppb may wish to drink bottled water or consider a water treatment system.

Contact the Ohio Department of Health, Residential Water and Sewage Program to learn about treatment systems that remove arsenic, or for a list of registered water treatment dealers call (614) 466-1390 or visit www.odh.state.oh.us

Is there a medical test to show if you have been exposed to arsenic?

Since arsenic stays in the body a short time, you must get the test soon after contact (exposure). These tests only look for high levels of arsenic (over 150 ppb) and are not useful for low level exposures.

Types of tests:

- Urine test. This the most trusted test for arsenic exposure.
- Testing hair or fingernails. This can measure your exposure to high levels of arsenic over the past 6-12 months. It is not good for testing low levels.

Note: These tests will show the amount of arsenic in body but cannot tell you whether you will have harmful health problems. These tests also do not determine where the arsenic came from.

Where can I get more information?

Ohio Department of Health
Bureau of Environmental Health
Health Assessment Section
246 N. High Street
Columbus, Ohio 43215
Phone: (614) 466-1390
Fax: (614) 466-4556

References:

ATSDR Toxicological Profile on Arsenic, 1999.

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ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

The Ohio Department of Health is in cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), Public Health Service, U.S. Department of Health and Human Services.

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Revised: 10/28/03

Bureau of Environmental Health
Health Assessment Section

"To protect and improve the health of all Ohioans"

Lead

Answers to Frequently Asked Health Questions

What is lead?

Lead is a naturally occurring bluish-gray metal found in small amounts of the earth's crust. Prior to our current knowledge of the health hazards of lead, it was widely found in many of the products we used every day. Products such as gasoline, paints, batteries, metal products and ammunition just to name a few. Because lead is toxic, its use has been dramatically reduced since the 1980's.

Lead in the environment:

Lead does not break down in the environment. And although lead occurs naturally in the environment, most of the high levels of lead found come from human activities.

Once lead falls on to soil, it usually sticks to the soil particles. If the soil is uncovered and open to the air or becomes disturbed, lead-contaminated dust is created and carried by the wind. This dust is easily breathed in or swallowed. With construction activities, the possibility of lead-contaminated dust is an important concern.

Gardens grown in lead-contaminated soils may contain lead. Produce of fruits, grains and vegetables (especially root vegetables such as beets, carrots, parsnips, radishes, turnips, and rutabagas) absorb some of the lead through their roots. There is also the possibility of lead-contaminated dust falling onto crops.

Inside the house, lead can be found in lead-based paint, lead-contaminated dust, older lead pipes that carry water and some glazed pottery. A child can easily eat lead paint chips, breathe or ingest the dust on their fingers.

How does lead get in your body?

You may be exposed to lead by breathing (inhalation), eating/drinking (ingestion) or by skin contact (dermal contact). However, only very small amounts of lead can get into your body through dermal contact. Inhalation and ingestion of lead-contaminated dust and soil are the main health concerns.

How does lead affect your health?

The harmful effects of lead are the same whether it is breathed or swallowed. The main target for lead toxicity is the nervous system, including the brain. But lead can negatively affect every organ of the body.

Children are most vulnerable to lead poisoning because they play outside, close to the ground or in the dirt. Small children also put their fingers in their mouths. Compared to adults, a bigger proportion of the amount of lead swallowed will enter the blood in children. About 99% of the amount of lead taken into the body of an adult will leave in the waste within a couple of weeks. But only about 32% of the lead taken into the body of a child will leave in the waste.

Lead exposure in the womb, in infancy, or in early childhood may also slow mental development and lower intelligence later in childhood. Lead can cause irritability and aggressive behavior in children. If pregnant women have high levels of lead in their bodies, fetuses exposed to lead in the womb may be born prematurely and have lower weights at birth. In some cases, pregnant women with high levels of exposure to lead may have miscarriages.

Some other harmful health effects of lead include damaged kidneys, damaged male reproductive system, severe "stomachaches," a poor appetite, sleep disorders, and hearing problems. Lead can also decrease reaction time and affect the memory.

Is there a medical test to determine whether I have been exposed to lead?

Yes, there is a test to see if you have been exposed to lead. The primary screening method is the measurement of total lead in the blood. This test can tell if you have been recently exposed to lead.

Also, exposure to lead can be evaluated by measuring the erythrocyte protoporphyrin (EP) in the blood sample. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter (µg/dL). For this reason, total lead is the primary method of screening.

Lead can also be measured lead in teeth or bones by X-ray techniques. These tests can tell about long-term exposure but are not widely available..

How can families reduce the risk of exposure to lead?

The most important way a family can lower exposures to lead is to avoid exposure to lead-contaminated soil and dust sources, avoid lead-based paint chips, avoid water from lead-lined pipes and avoid some plastic products made outside the United States.

The swallowing of lead-contaminated soil or dust is a very important exposure pathway for children. This problem can be reduced in many ways. Regular hand and face washing to remove lead dust and soil, especially before meals, can lower the possibility that lead on the skin is accidentally swallowed while eating. Families can lower exposures to lead by regularly cleaning the home of dust and tracked-in soil. Door mats can help lower the amount of soil that is tracked into the home and removing your shoes before you enter the house will also help. Planting grass and shrubs over bare soil areas in the yard can lower contact that children and pets may have with soil and the tracking of soil into the home. Also, wash all produce grown in lead-contaminated soils before eating.

Families whose members are exposed to lead-contaminated soil and dust can minimize the exposure to children by changing and bagging their work clothes before they are brought into the home for cleaning. Also, they should immediately wash their hands or shower.

It is important that children have proper nutrition and eat a balanced diet of foods that supply adequate amounts of vitamins and minerals, especially a diet high in calcium and iron. Good nutrition lowers the amount of swallowed lead that passes to the bloodstream and also may lower some of the toxic effects of lead.

The Ohio Department of Health has a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), Public Health Service, U.S. Department of Health and Human Services.

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Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) considers children to have an elevated level of lead if the amount of lead in the blood is at least 10 µg/dL. Medical evaluation and environmental investigation and remediation should be done for all children with blood lead levels equal to or greater than 20 µg/dL. Medical treatment may be necessary in children if the lead concentration in blood is higher than 45 µg/dL.

The Environmental Protection Agency (EPA) requires that the concentration of lead in air that the public breathes be no higher than 1.5 micrograms per cubic meter (µg/m^3) averaged over 3 months. EPA regulations no longer allow lead in gasoline. The Clean Air Act Amendments (CAAA) of 1990 banned the sale of leaded gasoline as of December 31, 1995.

The EPA regulations also limit lead in drinking water to 0.015 milligrams per liter (mg/L). The 1988 Lead Contamination Control Act requires the Consumer Product Safety Commission (CPSC), EPA, and the states to recall or repair water coolers containing lead. This law also requires new coolers to be lead-free. In addition, drinking water in schools must be tested for lead, and the sources of lead in this water must be removed.

To help protect small children, CPSC requires that the concentration of lead in most paints available through normal consumer channels be not more than 0.06%. The Federal Hazardous Substance Act (FHSA) bans children's products containing hazardous amounts of lead.

The EPA has also developed standards for lead paint hazards, lead in dust, and lead in soil. To educate parents, homeowners, and tenants about lead hazards, lead poisoning prevention in the home, and the lead abatement process, EPA has published several general information pamphlets. Copies of these pamphlets can be obtained from the National Lead Information Center or from various Internet sites, including http://www.epa.gov/opptintr/lead.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 1997. Toxicological profile for lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Where can I get more information?

Ohio Department of Health
Health Assessment Section
246 N. High Street
Columbus, Ohio 43215
Phone: (614) 466-1390
Fax: (614) 466-4556

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