Health Consultation

Franklin Township Residential Mercury Investigation

Higgins Farm

Franklin Township, Somerset County, NJ

EPA Facility ID: NJD981490261

Prepared by:
New Jersey Department of Health and Senior Services
and the
Agency for Toxic Substances and Disease Registry

Background

On October 22, 2003, the New Jersey Department of Environmental Protection (NJDEP), on behalf of the U.S. Environmental Protection Agency (EPA), contacted the New Jersey Department of Health and Senior Services (NJDHSS) regarding possible exposures related to the Higgins Farm National Priorities List site. A person living just outside of the well-restriction zone for Higgins Farm had raised concerns. The index resident (IR) advised EPA that three children in residence, two of whom had neurologic impairments, had used and currently were using a private well. The IR expressed concern that contaminants related to the Higgins Farm site were impacting the health of the family.

Contact with the IR by the NJDHSS revealed that the IR and one of the children were undergoing chelation therapy for "metals exposures." This child was 5 ½ years old and has been diagnosed with Attention Deficit Hyperactivity Disorder (ADHD). An out-of-state physician had diagnosed of metals exposure.

Both NJDHSS and EPA advised the IR to contact the Mount Sinai Pediatric Environmental Health Specialty Unit regarding the children's health and exposure concerns. NJDHSS also recommended that the IR contact the Environmental and Occupational Health Science Institute clinic regarding test results and health concerns in the adult family members.

Statement of Issues

This health consultation assists residents of a house in Franklin Township, Somerset County, in the interpreting environmental and medical test results and evaluates potential exposures to mercury and lead in the home. It also evaluates the potential impact of the Higgins Farm site on the household.

Site Visit

On October 31, 2003, Sharon Kubiak (NJDHSS) and Leah Escobar (ATSDR Region 2) visited the residence and met with the IR.

The house is a one-story structure with a basement, built around 1965. The IR and spouse moved into the residence in 1993. The household includes three children (Child A, age 5 ½ years at the time of the site visit; Child B, age 2 ½ years; Child C age one year), and an older adult. The previous owners lived in the house for 13 years, during which they replaced all of the windows, converted the garage to living space, added a new attached garage, and added a bedroom and bathroom. The former owner was a contractor and reportedly did the work himself in approximately 1987-88. The IR reported that the property was utilized by the previous owners as "just a home."

The IR family repainted when they moved in, and reported that they did not sand, strip or burn existing paint. Also in approximately 1993, the family also replaced the existing tile floor with new tile in the kitchen. The one carpet in the house is over the former garage's concrete slab. The present carpet was about a year old at the time of the site visit. The previous carpet was installed by the former owner. Otherwise, all of the rooms have either tile or hardwood flooring. A wood-burning fireplace is in the living room. The house appears to be very well maintained. The IR reports that radon was detected while they were purchasing the house, but a treatment system was installed before their real estate closing. The exterior of the house was painted before they moved in. The basement flooded when they first moved in; consequently, a rubber-based sealant and waterproofing paint were applied to the walls.

The property has a 120-foot well and a septic system, which is pumped out every two years. The IR family used the well until approximately 2001 for all of its household needs. The family currently drinks bottled water, but uses well water for bathing and cooking. The children occasionally drink well water from the bathroom faucet. The IR reports neither they nor the previous owners have ever used pesticides on the property because of the well. The only form of insect control used in the house is ant traps.

Vegetation fully covers the back yard, and a lawn covers the front yard. The family does not have a vegetable garden on the property. A wood deck that appears to be pressure-treated lumber was built by a previous owner. The IR family uses commercial sealant on the deck periodically. The IR reports that the children play on the deck or driveway but rarely in the yard. They also do not go in the basement.

The bedroom windows are inaccessible to the children.

Prior Medical Evaluations and Medical History

The IR and Child A were undergoing chelation therapy for metals exposure at the time of initial contact. The IR reportedly had an elevated urine mercury level (21 ug/g creatinine, both pre- and post provocation, 24-hour sample).

Child A's blood lead level is very low (less than 1 microgram of lead per deciliter of blood, or <1 ug/dl). Child A was diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) in April 2003, after about one year of symptoms. Child A has had a near-life long skin rash on the arms. This child also had a history of hand-to-mouth behavior as a young child.

Child B was scheduled to undergo chelation after an intestinal infection cleared. Child B had a post provocation urine mercury of 10 ug/g creatinine, blood lead level of 3 ug/dl, and urine lead of 14 ug/g creatinine (spot urine samples, see Table). At the time of the site visit, the IR was awaiting an interpretation of the children's results from the hospital. The IR's spouse's test results were not yet available.

The IR reported that Child B was born with bladder reflux, and began suffering from seizures at age 6 months, which required hospitalization. The first seizure occurred 4 weeks after Child B received diphtheria/tetanus/pertussis and influenza vaccines. Child B walked and stood on the balls of the feet most of the time. The IR also reported that Child B had a facial rash from age 4 months to one year that was diagnosed as eczema. The IR reported that glandular manipulation by a kinesiologist, who stated that the rash indicated toxic metals, resulted in the rash clearing up the following day.

Table. Urine analyses for metals.*

	IR (24-hour sample)	Reference Range (24 hour sample, adult)**	Child B (spot sample)	Reference Range (spot sample, child)**
Lead	3.3	< 15	14	< 20
Arsenic	13	< 140	23	< 200
Mercury	21	<5	10	< 5

Data Source: Doctor's Data, Inc; St. Charles, IL

* All results are provided in ug/g creatinine.
** Reference ranges provided by Doctor's Data, Inc.

Neither Child C nor the third adult in the household had been tested at the time of the site visit.

The IR reported having had headaches and sinus problems since moving to the house ten years prior but recognized that these also could result from unfamiliar pollens, molds, and similar sources. The IR also noted having had numerous amalgam fillings that were removed about 6 years ago. The IR was told she may have a genetic inability to remove mercury and other toxic metals through normal biological mechanisms and may have passed the mercury to her children during pregnancy.

Two dogs in the residence reportedly were healthy. The previous owners appeared healthy to the current residents, although the wife had asthma.

Environmental Sampling

The well water was tested in October 2003. The laboratory is not certified by the NJDEP to perform drinking water analyses. The laboratory also performed the clinical analyses provided. However, all primary drinking water metals were reported to be within the acceptable range. Lead was found at 3.4 parts per billion (ppb). Mercury was <0.5 ppb. Iron and manganese were elevated (4300 and 510 ppb, respectively) above the secondary

drinking water standards for aesthetics. The pH was 6.7. The water was sampled at the first point in the distribution system, after a ten-minute flush.

Any environmental mercury exposure could have resulted from either past spills in the house or paint manufactured before 1991. To evaluate this pathway, Sharon Kubiak and Leah Escobar surveyed the house with a Jerome Mercury Vapor Meter on January 12, 2004. All samples were taken approximately three inches above the floor surface, unless otherwise noted. The survey included:

- approximately 70 samples of the basement, including the french drains (at intervals of approximately every two feet), three crawlspaces, at gaps between the outside basement steps and the basement floor, the sump pump, a sink drain, around the furnace and hot water heater, adjacent to the water treatment system, along the floor, and at intervals of approximately every two feet in a play area and office space.

- approximately 60 samples of the living room, including along the wall at intervals of every two feet, around and inside the fireplace, along the hearth and the mantle, and throughout the floor at approximately two square foot intervals.

- approximately 20 samples in the kitchen, including along the walls, lengthwise on the floor at intervals of approximately every two feet, immediately below the fluorescent light fixture, and contiguous to the window sill and interior door frame.

- approximately 20 samples in Child C's bedroom, including along the walls at intervals of two feet, across the floor, and immediately above the crib.

- approximately 20 samples in child B's bedroom, following the same pattern as with Child C, and above and below the bed.

- approximately 20 samples in IR's bedroom, following the same pattern as with Child B.

- approximately 12 samples in the dining room, including along the walls and down the center of the room, at approximately two foot intervals.

- approximately 12 samples in the front foyer at intervals of two feet along the walls, and centrally across the floor.

- approximately 10 samples taken in the garage, along the accessible walls and in front of a closet.

Mercury was not detected in any of the samples, at an instrument sensitivity of 1 microgram per cubic meter of air (ug/m^3).

Evaluation of other potential lead and mercury exposures

Past remedial activities at the Higgins Farm site included provision of an alternate source of water for residences with wells impacted by the site and establishment of a well-restriction zone outside of that area. This household is just beyond the well-restriction zone and unlikely to have been impacted by the Higgins Farm site. On-site groundwater treatment operates to reduce contaminant levels and prevent migration of contaminated groundwater.

Other potential sources of mercury or lead were discussed with the IR and spouse. The spouse formerly worked for AT&T as an electrical engineer. The IR is a travel agent. The IR reported the following during the two site visits:

- the family does not use foreign or antique pottery, dishes or glasses (children A and B generally use plastic cups; Child C uses glass bottles; all other glasses and plates are fairly new);
- there are no mini-blinds in the home;
- mercury is not used for religious or cultural purposes;
- the family does not eat unusual foreign food;
- no thermometers were broken by the family or in the home;
- the family does not eat fish, including tuna;
- no one burns candles;
- family members do not work on their cars at home, other than routine maintenance;
- art and craft supplies are non-toxic and commercially available for children's use (e.g., Crayola paints).

No one in the family participates in any hobbies that are likely to be a source of mercury or lead exposures. No underground or above ground storage tanks are on the property, other than the septic tank. Heat is natural gas baseboard heat. The residents converted their heating system from oil about five years ago. The family has not gone on foreign vacations since the births of their children.

Medical Referral

The NJDHSS, ATSDR Region 2, and EPA Region 2 representatives each recommended that the IR discuss the children's medical issues with the Mount Sinai Pediatric Environmental Health Specialty Unit (PEHSU). Additionally, the adults were advised to contact EOHSI.

Discussions were also held between ATSDR, NJDHSS, and the ATSDR Region 3 medical toxicologist. The toxicologist recommended retesting the children. Testing after chelation typically is performed at about one month post chelation, but can be done as soon as one week after chelation. He recommended analysis of the repeat urine samples first, then air monitoring if necessary.

Discussion

The IR initially was concerned about mercury, arsenic and lead exposures among members of the household. On the basis of the blood, urine and drinking water test results reported by the IR and laboratory data made available, only mercury warranted further investigation (because of urine mercury results). However, even the urine mercury analyses are difficult to assess, because samples were analyzed after 2,3,-dimercaptopropane sulfonate (DMPS) provocation for the IR, and 2,3-dimercaptosuccunic acid (DMSA) for Child B. The American College of Medical Toxicology notes that "…many labs will analyze a urine specimen collected six hours after a chelation challenge, and then compare this result with a norm based on a non-challenged collection. This result will almost always be higher than the non-challenged test but does not reflect an abnormal body burden of the presumed toxicant. As an example, normal subjects may excrete several fold more mercury post-chelation than in their own pre-chelation test. The results then are "flagged" as abnormal when in fact the testing has done little more than document a normal response to the chelator." (1)

Child Health Considerations

ATSDR's Child Health Initiative recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination in their environment. Children are at greater risk than adults from certain kinds of exposures to hazardous substances. They are more likely to be exposed because they play outdoors and often bring food into contaminated areas. They are shorter than adults, which means they breathe dust, soil, and heavy vapors closer to the ground. Children are also smaller, resulting in higher doses of chemical exposure per body weight. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. Most important, children depend completely on adults for risk identification and management decisions, housing decisions, and access to medical care. NJDHSS/ATSDR evaluated the potential for children's exposures to mercury, lead and arsenic in a household in Franklin Township, Somerset County, New Jersey. No sources of lead, mercury or arsenic were identified.

Conclusions

Remedial activities conducted at the Higgins Farm site before the IR family's purchase of the property, as well as before the birth of the children, eliminated the potential for a completed exposure pathway to contaminants from the Higgins Farm site to the household investigated in this report. Therefore, the Higgins Farm site poses ***No Apparent Public Health Hazard*** to members of this household.

On the basis of the environmental and medical results that were provided, lead was not present at levels above the reference ranges provided. The home did not appear to contain any sources of lead. Arsenic was not present in biological samples at levels of

concern. The home did not appear to contain sources of mercury. Additionally, the biological testing for mercury was performed in a way that presented difficulties in interpretation (the reference range may not have been suitable for the sampling procedure). Therefore, the residence site represents ***No Apparent Public Health Hazard*** to the family.

Recommendations

Follow-up urine mercury tests should occur approximately 1 month post chelation. Samples should be taken without the use of a provacating agent, such as DMPS or DMSA. If urine mercury levels remain elevated, the family should consider clinical evaluation by a health-care facility specializing in environmental exposures.

This consultation will be provided to the IR, the Franklin Township Health Department, and the EPA.

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References

1. McCay C., Jr. : A call to arms for medical toxicologists: the dose, not the detection, makes the poison. [Editorial] Internet Journal of Medical Toxicology 2003; 6(1):1.

CERTIFICATION

The Health Consultation for the Higgins Farm site, Franklin Township, New Jersey, was prepared by the New Jersey Department of Health and Senior Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was initiated.

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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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