Health Consultation

MERCURY TRADING, INCORPORATED

HAMMONTON, ATLANTIC COUNTY, NEW JERSEY

CERCLIS NO. NJD048595888

SEPTEMBER 29, 2000

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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HEALTH CONSULTATION

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CERCLIS NO. NJD048595888

Prepared by:

Hazardous Site Health Evaluation Program
Consumer and Environmental Health Services
Division of Epidemiology, Environmental, and Occupational Health
New Jersey Department of Health and Senior Services
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

STATEMENT OF ISSUES

In March 2000, the United States Environmental Protection Agency (USEPA) requested that the Agency for Toxic Substances and Disease Registry (ATSDR), in conjunction with the New Jersey Department of Health and Senior Services (NJDHSS), consider the following questions regarding the Mercury Trading, Inc. site:

1) Is mercury contamination of surface soils at the Mercury Trading, Inc. site at levels of public health concern?

2) What soil clean-up levels should be implemented at the site that would be protective of the public health?

BACKGROUND

The Mercury Trading, Inc. site is located at 618 Pine Road, Hammonton, Atlantic County, New Jersey (Figure 1). The site is located within the Pinelands Preservation Area, which encompasses one million acres across seven counties and includes Wharton State Forest and the Great Swamp. The Pinelands Preservation Area is home to a number of endangered and threatened species, and new construction in the area is limited (Sierra Activist 1999). Prior to 1979, the site was utilized for agricultural purposes (i.e., growing of sweet potatoes). Based on 1990 U.S. Census information, approximately 176 persons live within a 1-mile radius of the site (see Figure 2, page 17).

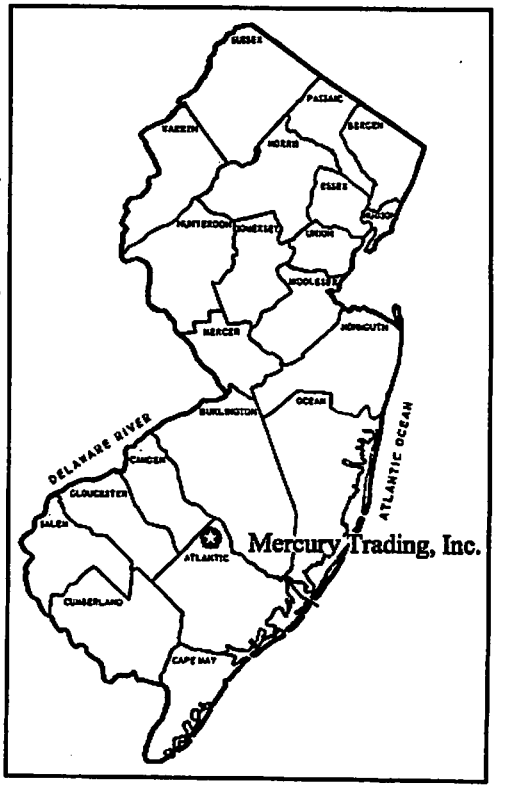

Figure 1 - Mercury Trading, Inc.
39°40.28 N; 74°47.32 W

In 1979, the approximately 3.8-acre property was purchased by Mercury Trading, Inc., a family-owned business. In 1981, Mercury Trading, Inc. began purchasing and selling scrap metals as part of a wholesale specialty and precious metals enterprise. Both hydrochloric and nitric acids were used in the cleaning of metals such as chrome, gold, nickel, tantalum, hafnium and molybdenum; caustic soda was used in the cleaning of tungsten (Briant 1989). Between 1981 and 1984, Mercury Trading, Inc. also began purifying mercury obtained from obsolete instruments and reselling the purified mercury in flasks. Buildings on the site included: a 6,500 square foot main building; a small, cinder block-walled building referred to as the mercury processing room which housed a mercury distillation unit; an open wooden structure with a metal roof used for storage; a garage that was used as a workshop/storage area; and three houses

(EEC 1990). There is also a 12 foot deep irrigation pond on the premises which was constructed in 1970 by the previous property owner.

In 1985, the New Jersey Department of Environmental Protection (NJDEP) received a citizen's complaint about the Mercury Trading, Inc. site. Upon inspection of the property, it was determined that Mercury Trading, Inc. was illegally discharging wastewater generated from its metals cleaning process. Also documented at that time was the illegal dumping of waste and the discharge of mercury into the irrigation pond. Subsequent investigations by the NJDEP documented numerous spills and releases to the ground, irrigation pond, and air at the site. Beginning in 1985 and spanning the course of over a decade thereafter, the NJDEP took enforcement action against Mercury Trading, Inc. for: failure to obtain approval for three air emissions; illegal discharge of pollutants to the ground and irrigation pond;[1] failure to obtain the appropriate NJDEP approval for installing and operating specific air pollution control equipment; and failure to properly identify, store and dispose of hazardous wastes. Results of samples collected by the NJDEP and Atlantic County Health Department at the site in 1988 and 1989 determined contaminated soil (arsenic, cadmium, copper, lead, silver, zinc, mercury, selenium, and trichlorofluoromethane), as well as contamination of the irrigation pond (water and sediment samples) with metals and volatile organic compounds. Sampling of three on-site monitoring wells and three potable wells (located both on and adjacent to the site) detected contamination of the groundwater with arsenic, beryllium, cadmium, chromium, copper, cyanide, lead, manganese, nickel, silver, zinc, 1,1,1-trichloroethane, and methylene chloride.[2]

In 1990, the Atlantic County Prosecutor's Office indicted an owner of Mercury Trading, Inc. on criminal charges that included the release and abandonment of hazardous materials, discharge of pollutants, and unauthorized disposal of hazardous materials. Later that same year, this individual was sentenced by a New Jersey Superior court to five years probation and ordered to pay $84,000 in restitution. A condition of probation was the remediation of the site under NJDEP oversight.

In 1990, a waste removal and decontamination/decommissioning plan was prepared for the Mercury Trading, Inc. by Environmental and Energy Consultants, Inc. (EEC 1990). Additionally, EEC prepared a site characterization of the property and identified areas of potential environmental concern (EEC 1991). The EEC plan for the site was never implemented by the owners of Mercury Trading, Inc. (NJDEP, personal communication, 2000). On March 9, 1993, the NJDEP executed

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[1]Water from the condenser of the mercury distillation unit located within the mercury distillation room was discharged into a 4" diameter underground PVC pipe to the irrigation pond. A search warrant investigation by the NJDEP, Atlantic County Prosecutor's Office, and the Atlantic County Department of Health determined mercury deposits on the walls of the pipe. Additionally, an underground pipe leading from the main building to the irrigation pond had been used to discharge wash water from the metals cleaning process into the irrigation pond.

[2]The site is located within the Pinelands Preservation Area, and, as such, the underlying groundwater is considered Class I-PL. The ground water quality criteria for Class I-PL is the natural quality for each constituent. Results of the potable wells did not exceed the NJ drinking water standards (Maximum Contaminant Levels) with the exception of lead and methylene chloride.

an Administrative Consent Order (ACO) with Mercury Trading, Inc. for the investigation and remediation of the site.

To comply with the ACO, a two phased clean-up plan was developed and implemented by Aqua-tex Transport, Inc. in 1994. The first phase involved the removal of non-hazardous solid waste (i.e., wood, scrap metal, empty containers, roof material, old farm debris, and construction trash) from the site. The second phase involved the removal and disposal of about 75 drums of hazardous and non-hazardous waste (45 drums of mercury and soil/debris; eight drums of virgin fuel oil and soils; 10 drums of acids/caustics; etc.). Additionally in 1994, a sister company of Aqua-tex Transport, Inc., Aqua-Tex, Inc. (an environmental consulting and remediation company) developed a remedial investigation work plan for the site (Aqua-tex 1994). The NJDEP originally found the work plan to be deficient; the plan was later conditionally approved by the NJDEP but was never implemented by Mercury Trading, Inc.

In a 1996 letter to the NJDEP, the attorney for the owners of Mercury Trading, Inc. alleged that the owners did not have the financial means to continue clean-up activities at the site but were willing to grant the NJDEP full site access. The attorney also successfully argued before the court that his client had met the financial obligations set forth as a condition for his probation. As such, the NJDEP could no longer enforce the penalty provisions of the ACO. On March 21, 1996, the owners of the by then defunct Mercury Trading, Inc. informed the NJDEP that they had permanently relocated out of state. On March 29, 1996, the New Jersey Spill Compensation Fund claimed a First Priority Lien on the property pursuant to the New Jersey Spill Compensation and Control Act in an effort to recoup expenditures incurred as of July 25, 1995. The NJDEP referred this matter to the USEPA due to Mercury Trading, Inc.'s failure to accomplish the original goals of the ACO. Since April 1999, the site has been leased to a structural steel fabricating business that manufactures and erects steel beams for commercial businesses (e.g., libraries, post offices, supermarkets).

The Mercury Trading, Inc. site is not currently on the National Priorities List (NPL) of Superfund sites.

Community Concerns

In an effort to identify community concerns related to the site, the Atlantic County Department of Health, the USEPA, and the NJDEP were contacted. At the present time, there are no identifiable community concerns or complaints regarding the site.

Site Visit

On April 14, 2000, a field inspection of the Mercury Trading, Inc. site was conducted. Representatives of the ATSDR, USEPA and NJDHSS were present at the time of the inspection. Located directly across the street (west) from the Mercury Trading, Inc. site is a commercial nursery. A 10.5 acre building lot is located directly north of the site, and an open field lies directly behind

(east) of the site. Two of the three houses located on the site (both had been used in the past by farm/migrant workers) are at the present time dilapidated. The third is a one-story ranch style house. The owner of the structural steel fabricating business who has leased the Mercury Trading, Inc. site since April 1999 leases this house as a family residence. Two adults and two children, ages 10 and 11, live at this residence. No fence or other enclosure was observed which would delineate the residential area from the industrial use of the property.

As part of the inspection, a Ludlum gross alpha detector was used to measure radiation levels at the site, specifically, a limited area described by the USEPA as to where a drum containing low level radioactive waste had been stored. No levels above background (5-7 μR/hour) were detected. In addition, a Jerome 431-X Mercury Vapor Analyzer was used to test for mercury vapor in the small building referred to as the mercury processing room which housed a mercury distillation unit. No mercury vapors were detected in this building at the time of the inspection.

A private well supplies drinking water to both the business and residence located on the site. According to the current tenant, the well has been tested and was found to be free of contamination (including mercury).

PRIOR ATSDR ACTIVITY

Staff of the NJDHSS and ATSDR conducted a joint field inspection of the site on June 8, 1998. There were no visible signs of mercury contamination at the site. Although drums were present at the time of the inspection, it could not be determined whether they were associated with current business operations or remedial activities of the site (Pasqualo 1998).

DISCUSSION

Environmental Contaminants

In January 1999, a joint site inspection of the Mercury Trading, Inc. site was conducted by the NJDEP and the USEPA. The NJDEP requested that the USEPA remove a 55 gallon drum of low level radioactive waste and approximately one dozen, five-gallon containers of unidentified materials from the site under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). During the course of the inspection, 10 surface soil samples were collected by the USEPA and analyzed for mercury contamination. Results ranged from 1 through 117 parts per million (ppm) of total mercury.[3]

[3]NJDEP interim soil clean-up criteria (NJAC 7:26:D) for mercury are 14 mg/kg for residential soils and 270 mg/kg for non-residential properties.

Subsequently, the USEPA hired Lockheed Martin, via a Response Engineering and Analytical Contract (REAC), to perform additional environmental monitoring at the site (REAC 2000). Soil, sediment, groundwater and surface water sampling was performed in late February and early March 2000. All soil, sediment, groundwater and surface water samples were analyzed for mercury. In addition, several samples for each media were collected and analyzed for metals, volatile organic compounds, semi-volatiles, polychlorinated biphenyls (PCBs), and pesticides. Results of analysis of eight groundwater samples (including one duplicate sample) collected throughout the site and three surface water samples (including one duplicate sample) from the irrigation pond determined 3.1 parts per billion (ppb) of mercury in the groundwater. Results of soil and sediment sampling at the site determined contamination of the surface soil (top 0 - 3 inches) with mercury, arsenic, and several pesticides (see Table 1). Mercury results ranged from 0.12 to 260 ppm. The highest level of arsenic detected was 6.1 ppm. The highest levels of pesticides detected included 43 ppm of 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane (more commonly referred to as DDD), 2 ppm of 1,1-dichloro-2,2-bis(chlorophenyl)ethylene (more commonly referred to as DDE), 56 ppm of 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane (more commonly referred to as DDT), 2.5 ppm of dieldrin, 0.32 ppm of alpha-hexachlorocyclohexane, 2.2 ppm of beta-hexachlorocyclohexane, 0.63 ppm of gamma-hexachlorocyclohexane (more commonly known as lindane), and 0.83 ppm of delta-hexachlorocyclohexane. Levels of other pesticides were detected as well (see Table 1). Sampling data indicate that pesticides used at the site presumably prior to Mercury Trading, Inc. operation continue to persist in the soil.

Pathways Analysis and Public Health Implications

Health Comparison Values (HCV), which include Cancer Risk Evaluation Guides (CREG), Environmental Media Evaluation Guides (EMEG), and Reference Dose Media Evaluation Guides (RMEG) are used to determine which contaminants detected may be at levels of potential health concern. The concentrations of contaminants found in various environmental media that a person might come in contact with on a daily basis are compared to a HCV. In general, if a HCV is exceeded, the exposure is of potential concern and the contaminant should be further evaluated. HVCs, however, should not be used as predictors of adverse health effects or for setting clean-up levels. On the other hand, exposures below HCV may be of concern due to the interactive effect of multiple-media exposures. Hypersensitive (i.e., allergic) individuals must be taken into consideration as well.

Sampling conducted by the USEPA through their contractor Lockheed Martin/REAC Technology Services Group at the Mercury Trading, Inc. site indicates contamination of the surface soil with mercury, arsenic, and several pesticides which may pose a pathway of exposure to individuals accessing the site (e.g., workers, residents, children, trespassers, etc.). Additionally, 3.1 ppb of mercury was detected in the groundwater.

To evaluate the toxicological effects of the pathway associated with the potential ingestion of on-site contaminated soils by both children and adults, the ATSDR and NJDHSS assumed the following

worst-case exposure scenario: exposure would occur daily over a duration greater than one year (i.e., chronic exposure), a child would ingest 200 milligrams (mg) of soil per day and have a body weight of 36 kilograms (kg); an adult would ingest 100 mg of soil per day and weigh 70 kg.[4]

Mercury - soil. According to the June 2000 REAC report, the 260 ppm of mercury detected on the site (the sample was obtained adjacent to the former mercury processing room) is located approximately 40 yards from the one-story ranch style house. Since soil samples collected from the Mercury Trading, Inc. site were determined to be contaminated with varying amounts of mercury, ingestion of mercury contaminated soil is a potential route of exposure. The potentially exposed population at the site includes those individuals working (up to 20 individuals) or living on the site, as well as those who may access the site under other circumstances.

Mercury, a naturally occurring element found in the earth's crust, exists in several forms: metallic, inorganic and organic; the form of mercury being dependent upon the valence state and various environmental factors. Metallic mercury in soils and surface water undergoes chemical and biological transformation, usually forming inorganic complexes with chloride and hydroxide ions. These in turn may, under certain conditions (usually anaerobic microbial processes), be transformed into organic mercurial compounds. The soil chemistry and conditions at the Mercury Trading, Inc. site would favor the conversion of metallic mercury to its inorganic compounds, but not organic (methylated) species. Thus, for the purposes of this Health Consultation, it is assumed that the total mercury data for soils represents metallic and/or inorganic mercury.

Metallic mercury is primarily absorbed by humans through inhalation of volatilized vapors; little (<0.01%) is absorbed through the gastrointestinal system. At the Mercury Trading, Inc. site there exists no occupied confined spaces where such vapors could concentrate. The building previously utilized for the distillation of mercury, while currently being used for the storage of household material, has been surficially decontaminated by the USEPA. In addition, mercury vapors were not detected in this structure during the site visit performed for the purpose of this Health Consultation. Therefore, it is unlikely an exposure pathway of public health significance exists with regard to this structure. Similarly, the mercury concentrations documented in on-site soils, even under the assumption that the data described metallic mercury only, would not imply a significant exposure pathway from ambient air.

Inorganic mercury compounds are most readily absorbed by humans (up to 40% efficiency) through the gastrointestinal system. Other routes of exposure are inconsequential; inorganic mercury compounds are not generally volatile, and they are not readily absorbed through the skin.

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[4]The only other scenario which might lead to higher exposures would be if the children living on-site play in the contaminated areas and/or exhibit pica behavior. Younger children weighing less who potentially may occupy the residence at a future date would be at risk of an increased exposure dose than that calculated for this scenario.

Based upon the maximum documented concentration of mercury in on-site soils (260 ppm), estimated exposure doses for children and adults (1.44×10^{-3} and 3.71×10^{-4}, respectively) were at least four orders of magnitude below the lowest observed adverse effect level (LOAEL)/no observed adverse effect level (NOAEL) (rat) cited in the ATSDR Toxicological Profile for Mercury with respect to chronic oral exposure to inorganic mercury (ATSDR 1999). The calculated exposure doses are at least one order of magnitude below the minimal risk level (MRL) cited in the Toxicological Profile with respect to acute oral exposures and approach the MRL for intermediate oral exposures. Excess cancer risk in adults could not be calculated as mercury is not classified as a human carcinogen.

Mercury - water. Of the eight (including one duplicate) groundwater samples collected for mercury analysis by the Lockheed Martin/REAC Technology Services Group, one sample result (3.1 ppb) exceeded the New Jersey Maximum Contaminant Level (MCL) for mercury in drinking water of 2 ppb. Groundwater provides on-site residents and workers with their source of potable (drinking) water. During the site visit on April 14, state and federal environmental health officials were assured by the current tenant that the on-site potable well had been tested and was determined to be free of mercury contamination. It is strongly recommended that the on-site potable well be retested to verify that there is no mercury contamination.

Arsenic. Arsenic is a metal that can be found naturally in the environment. Inorganic arsenic compounds are used to make insecticides and weed killers. It is also extensively used to preserve wood products. In addition to being a poison, it is a know human carcinogen. Most cases of human toxicity from arsenic have been associated with exposure to inorganic arsenic; some individuals developed cancer from exposures to arsenic as children or adolescents (ATSDR 1998).

Based upon the maximum documented concentration of arsenic in on-site soils (6.1 ppm), estimated exposure doses for children and adults (3.39×10^{-5} and 8.71×10^{-6}, respectively) were at least one and one half orders of magnitude below the lowest NOAEL (human) cited in the ATSDR Toxicological Profile for Arsenic with respect to chronic oral exposure to arsenic (ATSDR 1999). Similarly, the calculated exposure dose is at least three orders of magnitude below the lowest LOAEL/NOAEL (human) cited in the Toxicological Profile with respect to acute oral exposure; and two and one half orders of magnitude below the lowest LOAEL/NOAEL (mouse) cited in the Toxicological Profile with respect to intermediate oral exposure. Excess cancer risk in adults (estimated two-year exposure period for current residents) was calculated to be "insignificant or no increased risk" (3.73×10^{-7}).

DDD, DDE and DDT DDT is an insecticide that was widely used to control insects on agricultural crops. Because of significant damage to wildlife (it accumulates in plants and in the fatty tissues of fish, birds and animals), its persistence in ecosystems, and the potential harm to human health, the use of DDT in the United States was banned by the USEPA in 1972. DDT in soil usually breaks down to form DDD or DDE.

DDD. Based upon the maximum documented concentration of DDD (43 ppm), in on-site soils, estimated exposure doses for children and adults (2.39×10^{-4} and 6.14×10^{-5}, respectively), were at least three and one half orders of magnitude below the lowest NOAEL (human) cited in the ATSDR Toxicological Profile for DDD with respect to chronic oral exposure (ATSDR 1999). The calculated exposure doses are at least nearly one order of magnitude below the MRL cited in the Toxicological Profile with respect to both acute and intermediate oral exposures. Excess cancer risk in adults (estimated two-year exposure period for current residents) was calculated to be "insignificant or no increased risk" (4.21×10^{-7}).

DDE. Based upon the maximum documented concentration of DDE (2 ppm) in on-site soils, estimated exposure doses for children and adults (1.11×10^{-5} and 2.86×10^{-6}, respectively) were at least four and one half orders of magnitude below the lowest NOAEL (human) cited in the ATSDR Toxicological Profile for DDE with respect to chronic oral exposure (ATSDR 1999). The calculated exposure doses are at least one and one half orders of magnitude below the MRL cited in the Toxicological Profile with respect to acute and intermediate oral exposures. Excess cancer risk in adults (estimated two-year exposure period for current residents) was calculated to be "insignificant or no increased risk" (2.78×10^{-8}).

DDT. Based upon the maximum documented concentration of DDT (56 ppm) in on-site soils, estimated exposure doses for children and adults (3.11×10^{-4} and 8×10^{-5}, respectively) were at least three and one half orders of magnitude below the lowest NOAEL (human) cited in the ATSDR Toxicological Profile for DDT with respect to chronic oral exposure (ATSDR 1999). The calculated exposure doses are at least one half orders of magnitude below the lowest MRL cited in the Toxicological Profile with respect to acute and intermediate oral exposures, respectively. Excess cancer risk in adults (estimated two-year exposure period for current residents) was calculated to be "insignificant or no increased risk" (7.77×10^{-7}).

Dieldrin. Dieldrin was a popular pesticide for crops like corn and cotton during the 1950s, 1960s and 1970s. Due to environmental concerns as well as potential harm to human health, the USEPA banned all uses of dieldrin in 1987.

Based upon the maximum documented concentration of dieldrin in on-site soils (2.5 ppm), estimated exposure doses for children and adults (1.39×10^{-5} and 3.57×10^{-6}, respectively) were at least slightly below the MRL cited in the ATSDR Toxicological Profile with respect to chronic oral exposure to dieldrin (ATSDR 1999). The calculated exposure dose was at least one half order of magnitude below the MRL cited in the Toxicological Profile with respect to acute oral exposure, and at least two orders of magnitude below the NOAEL (rat) with respect to intermediate oral exposure. Excess cancer risk in adults (estimated two-year exposure period for current residents) was calculated to be "insignificant or no increased risk" (1.63×10^{-6}).

Hexachlorocyclohexane. Hexachlorcyclohexane (HCH), also know as benzene hexachloride (BHC), is a synthetic chemical that exists in eight chemical forms called isomers (the isomers being named according to the position of the hydrogen atoms in the chemical structure). The gamma

isomer (commonly called lindane) was produced and used as an insecticide on fruit, vegetables, and forest crops. Essentially all of the insecticidal properties reside in the gamma isomer. Since 1976, lindane has not been produced in the United States although it is imported for insecticide use that includes the control of head lice and scabies (a contagious skin disease caused by mites). People who have ingested large amounts of lindane have had seizures, with some deaths reported. Hexachlorcyclohexane is a probable human carcinogen.

Alpha-hexachlorocyclohexane. Based upon the maximum documented concentration of alpha-hexachlorocyclohexane (0.32 ppm) in on-site soils, estimated exposure doses for children and adults (1.78×10^{-6} and 4.57×10^{-7}, respectively) were, at the minimum, nearly four orders of magnitude below the MRL cited in the ATSDR Toxicological Profile for alpha-hexachlorocyclohexane with respect to chronic oral exposure (ATSDR 1999). The calculated exposure doses are at least five and one half and two and one half orders of magnitude below the MRL cited in the Toxicological Profile with respect to acute and intermediate oral exposures, respectively. Excess cancer risk in adults (estimated two-year exposure period for current residents) was calculated to be "insignificant or no increased risk" (8.23×10^{-8}).

Beta-hexachlorocyclohexane. Based upon the maximum documented concentration of beta-hexachlorocyclohexane (2.2 ppm) in on-site soils, estimated exposure doses for children and adults (1.22×10^{-5} and 3.14×10^{-6}, respectively) were at least three orders of magnitude below the lowest MRL cited in the ATSDR Toxicological Profile for beta-hexachlorocyclohexane with respect to chronic oral exposure (ATSDR 1999). The calculated exposure doses were at least four and one half and over one and one half orders of magnitude below the lowest MRL cited in the Toxicological Profile with respect to acute and intermediate oral exposures, respectively. Excess cancer risk in adults (estimated two-year exposure period for current residents) was calculated to be "insignificant or no increased risk" (1.62×10^{-7}).

Gamma-hexachlorocyclohexane (a.k.a. lindane). Based upon the maximum documented concentration of gamma-hexachlorocyclohexane (0.63 ppm) in on-site soils, estimated exposure doses for children and adults (3.50×10^{-6} and 9.00×10^{-7}, respectively) were at least six orders of magnitude below the lowest NOAEL (rat) cited in the ATSDR Toxicological Profile for gamma-hexachlorocyclohexane with respect to chronic oral exposure (ATSDR 1999). The calculated exposure doses were at least four and one orders of magnitude below the MRL cited in the Toxicological Profile with respect to acute and intermediate oral exposures, respectively. The USEPA is currently evaluating gamma-hexachlorocyclohexane for evidence of human carcinogenicity (ATSDR 1999).

Delta-hexachlorocyclohexane. Based upon the maximum documented concentration of delta-hexachlorocyclohexane (0.83 ppm) in on-site soils, estimated exposure doses for children and adults (4.61×10^{-6} and 1.19×10^{-6}, respectively) were four orders of magnitude below the MRL cited in the ATSDR Toxicological Profile for delta-hexachlorocyclohexane with respect to chronic oral exposure (ATSDR 1999). The calculated exposure doses were five and one half and nearly three orders of magnitude below the MRL cited in the Toxicological Profile with respect to acute

and intermediate oral exposures, respectively. The USEPA has not classified delta-hexachlorocyclohexane with respect to human carcinogenicity.

Child and Adult 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 (ATSDR 1997). Children are at greater risk than adults from certain kinds of exposures to hazardous substances emitted from a waste site. They are more likely to be exposed because they play outdoors and they 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.

The NJDHSS and ATSDR evaluated the likelihood for children to be exposed to mercury, arsenic, DDD, DDE, DDT, dieldrin, and hexachlorocyclohexane (alpha-, beta-, gamma-, and delta-) from the Mercury Trading, Inc. site. As previously discussed, the potential exists for children, particularly the two 10 and 11 year old children living in the leased one-story ranch style house on the property, to be exposed to these contaminants from the site. Since the Mercury Trading, Inc. site is relatively small (3.8 acres) with no fence separating the residential area from the remaining property, and there is an irrigation pond teaming with wildlife which would be of interest and curiosity to youngsters, the children and their friends potentially have access to the entire property. However, based upon available data, the likelihood of health effects from exposures would be remote, with the exception of hypersensitive individuals.

As part of the Health Consultation, exposure doses and resulting toxicological effects associated with the potential ingestion of on-site contaminated soils by both children and adults were calculated by assuming a worst-case exposure scenario. For each of the contaminants detected on-site (i.e., mercury, arsenic, and several pesticides - see Table 1) it was determined that it is unlikely that adverse health effects would occur in either children or adults.

CONCLUSIONS AND RECOMMENDATIONS

Hazard Category

Based on a review of available data and information regarding the Mercury Trading, Inc., the ATSDR and NJDHSS conclude that the Mercury Trading, Inc. site currently represents a *No Apparent Public Health Hazard.* Sampling data obtained in late February, early March 2000 do not indicate exposures to contaminants which would likely result in adverse health effects. Prudent public health policy, however, dictates that potential exposures, particularly to soil contaminants, be limited as much as practically possible. The potential public health implications of exposure to

contamination at the Mercury Trading, Inc. site should be re-evaluated if additional sampling and the preparation of a remedial plan are undertaken by the USEPA which better characterize the nature and extent of soil and other potentially contaminated media. Additionally, this Health Consultation is based on resident children who are of school age. If children of pre-school age exhibiting pica tendencies should reside at the site in the future, ATSDR and NJDHSS conclusions could change.

The NJDEP has interim soil clean-up criteria for mercury (pursuant to NJAC 7:26D). These values (14 mg/kg for residential soils and 270 mg/kg for non-residential properties) are considered by the ATSDR and NJDHSS to be protective of the public health. It is recommended that this criteria be considered during the remedial design for the Mercury Trading, Inc. site.

Cease/Reduce Exposure Recommendations

1) The owner of the structural steel fabricating business who leases the Mercury Trading, Inc. site at the present time also leases the one-story ranch style house on the property as a family residence. Site inspection activities determined that these tenants utilize the small building formerly referred to as the mercury processing room for storing primarily household items (e.g., baby furniture, rabbit feed, etc.). Although mercury vapors were not detected within this structure during the recent site visit, it is possible the structure remains contaminated. It is recommended that the storage of household items in this building be immediately discontinued, and that these items be aired outdoors before being stored elsewhere.

2) Latest groundwater monitoring data at the Mercury Trading, Inc. site indicate mercury contamination (3.1 ppb) which is above the New Jersey MCL of 2 ppb. Since groundwater provides on-site residents and workers with their potable water supply, the ATSDR and NJDHSS recommend that the Atlantic County Department of Health test the potable water source to ensure it is free of mercury contamination.

3) Although documented mercury contamination in soils is not at levels where adverse health effects would be expected, it is prudent public health practice to limit exposure to mercury by children and adults as much as is practical.

Site/Characterization Recommendation

1) The ATSDR and the NJDHSS support the Remedial Investigation being conducted by the USEPA at the Mercury Trading, Inc. site. It is recommended that the ATSDR and/or the NJDHSS review additional information and data with respect to all pertinent environmental media to determine the overall hazard posed by the site.

PUBLIC HEALTH ACTION PLAN

The Public Health Action Plan (PHAP) for the Mercury Trading, Inc. site contains a description of the actions to be taken at or in the vicinity of the site. The purpose of the PHAP is to ensure that this Health Consultation not only identifies public health hazards, but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of ATSDR and the NJDHSS to follow-up on this plan to ensure its implementation. ATSDR will provide follow-up to this PHAP, as needed, outlining the actions completed and those in progress. This report will be placed in repositories that contain copies of this Health Consultation, and will be provided to persons who request it. The public health actions taken or to be implemented are as follows:

Public Health Actions Undertaken by ATSDR/NJDHSS:

1) Available data and information have been evaluated by the ATSDR and NJDHSS to determine public health concerns regarding potential human exposure pathways.

Public Health Actions Planned by ATSDR/NJDHSS:

1) The ATSDR and the NJDHSS will work with the USEPA to provide a public health review of any future environmental sampling results obtained from the site.

2) The ATSDR and the NJDHSS will re-evaluate and revise the PHAP when additional information becomes available. New environmental, toxicological, health outcome data, changes in conditions at the Mercury Trading, Inc. site, or the results of implementing the above proposed actions may determine the need for additional actions at the Mercury Trading, Inc. site by the NJDHSS and/or the ATSDR.

3) The NJDHSS will prepare a site specific public health Citizen's Guide for Mercury Trading, Inc. which will be made available to the Atlantic County Department of Health and other interested parties.

4) In 1999, the NJDHSS published an educational pamphlet for individuals who use private wells as their source of drinking water (NJDHSS 1999). This pamphlet provides general public health information and recommendations regarding well water contamination, testing guidelines and interpretation of testing results. Another educational pamphlet discusses mercury contamination of groundwater (NJDHSS 1999). If indicated, these materials will be made available to residents and other interested parties.

5) The NJDHSS will provide copies of this Health Consultation and the site specific public health Citizen's Guide for Mercury Trading, Inc. to all interested on-site residents and workers.

Certification

The Health Consultation for the Mercury Trading, Inc., site 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 Superfund Site Assessment Branch (SSAB), Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.

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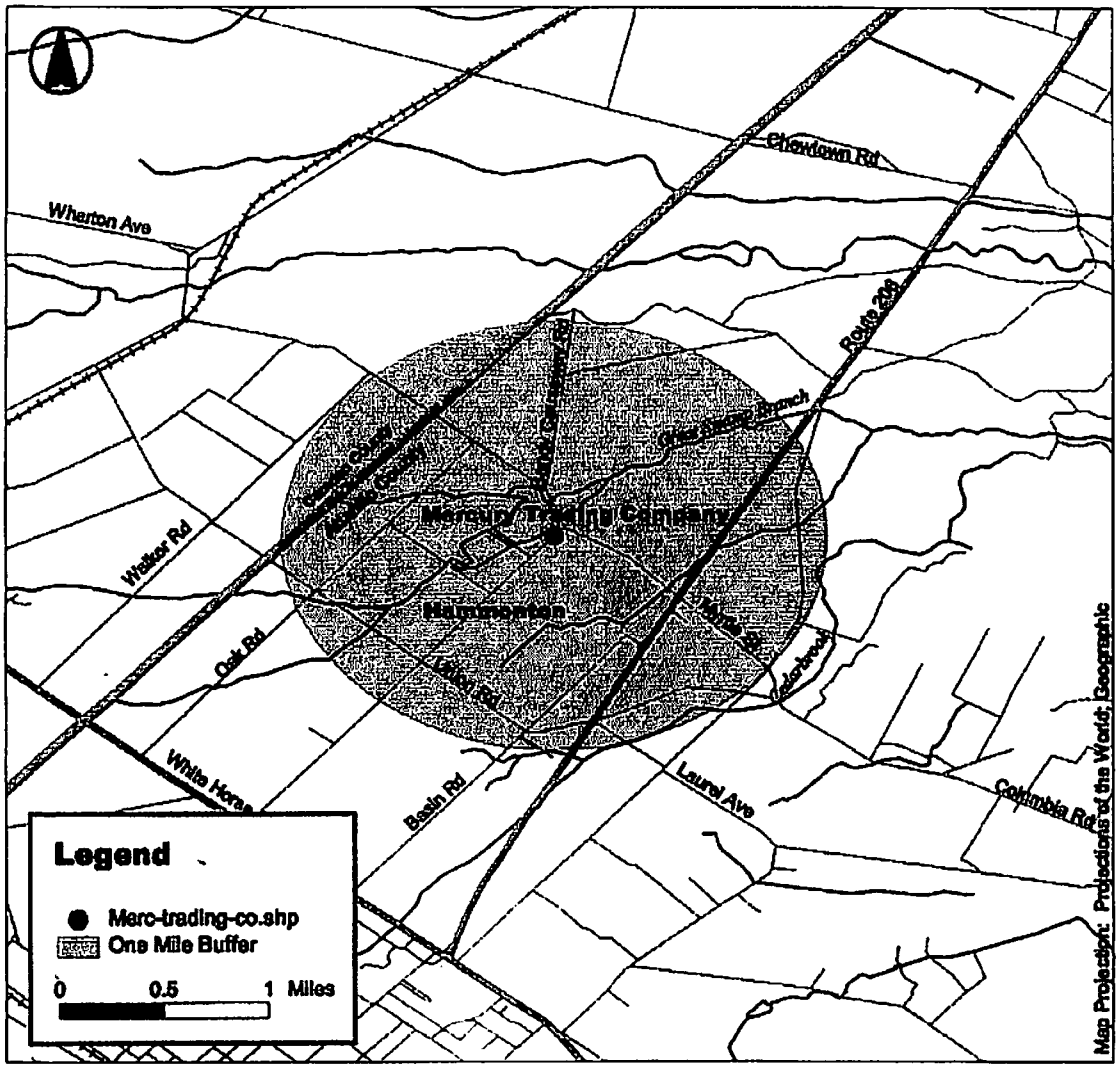

Figure 2 - Demographic information for a 1-mile radius of the Mercury Trading, Inc. site.

Total Population	176	Total Housing Units	73
White	173		
Black	1	Children ≤ 6 years	10
Hispanic*	5	Adults ≥ 65 years	33
Asian/Pacific Islander	1	Females 15 - 44 years	40
Other race	1		

*Black or White

Demographics Statistics Source: 1990 United States Census

ATSDR Plain Language Glossary of Environmental Health Terms

Absorption: How a chemical enters a person's blood after the chemical has been swallowed, has come into contact with the skin, or has been breathed in.

Acute Exposure: Contact with a chemical that happens once or only for a limited period of time. ATSDR defines acute exposures as those that might last up to 14 days.

Additive Effect: A response to a chemical mixture, or combination of substances, that might be expected if the known effects of individual chemicals, seen at specific doses, were added together.

Adverse Health Effect: A change in body function or the structures of cells that can lead to disease or health problems.

Antagonistic Effect: A response to a mixture of chemicals or combination of substances that is less than might be expected if the known effects of individual chemicals, seen at specific doses, were added together.

ATSDR: The Agency for Toxic Substances and Disease Registry. ATSDR is a federal health agency in Atlanta, Georgia that deals with hazardous substance and waste site issues. ATSDR gives people information about harmful chemicals in their environment and tells people how to protect themselves from coming into contact with chemicals.

Background Level: An average or expected amount of a chemical in a specific environment. Or, amounts of chemicals that occur naturally in a specific environment.

Biota: Used in public health, things that humans would eat – including animals, fish and plants.

CAP: See Community Assistance Panel.

Cancer: A group of diseases which occur when cells in the body become abnormal and grow, or multiply, out of control

Carcinogen: Any substance shown to cause tumors or cancer in experimental studies.

CERCLA: See Comprehensive Environmental Response, Compensation, and

Liability Act.

Chronic Exposure: A contact with a substance or chemical that happens over a long period of time. ATSDR considers exposures of more than one year to be *chronic.*

Completed Exposure Pathway: See **Exposure Pathway.**

Community Assistance Panel (CAP): A group of people from the community and health and environmental agencies who work together on issues and problems at hazardous waste sites.

Comparison Value: (CVs) Concentrations or the amount of substances in air, water, food, and soil that are unlikely, upon exposure, to cause adverse health effects. Comparison values are used by health assessors to select which substances and environmental media (air, water, food and soil) need additional evaluation while health concerns or effects are investigated.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): **CERCLA** was put into place in 1980. It is also known as **Superfund.** This act concerns releases of hazardous substances into the environment, and the cleanup of these substances and hazardous waste sites. ATSDR was created by this act and is responsible for looking into the health issues related to hazardous waste sites.

Concern: A belief or worry that chemicals in the environment might cause harm to people.

Concentration: How much or the amount of a substance present in a certain amount of soil, water, air, or food.

Contaminant: See **Environmental Contaminant.**

Delayed Health Effect: A disease or injury that happens as a result of exposures that may have occurred far in the past.

Dermal Contact: A chemical getting onto your skin. (see **Route of Exposure**).

Dose: The amount of a substance to which a person may be exposed, usually on a daily basis. Dose is often explained as "amount of substance(s) per body weight per day".

Dose / Response: The relationship between the amount of exposure (dose) and the change in body function or health that result.

Duration: The amount of time (days, months, years) that a person is exposed to a chemical.

Environmental Contaminant: A substance (chemical) that gets into a system (person, animal, or the environment) in amounts higher than that found in **Background Level**, or what would be expected.

Environmental Media: Usually refers to the air, water, and soil in which chemcials of interest are found. Sometimes refers to the plants and animals that are eaten by humans. **Environmental Media** is the second part of an **Exposure Pathway**.

U.S. Environmental Protection Agency (EPA): The federal agency that develops and enforces environmental laws to protect the environment and the public's health.

Epidemiology: The study of the different factors that determine how often, in how many people, and in which people will disease occur.

Exposure: Coming into contact with a chemical substance.(For the three ways people can come in contact with substances, see **Route of Exposure**.)

Exposure Assessment: The process of finding the ways people come in contact with chemicals, how often and how long they come in contact with chemicals, and the amounts of chemicals with which they come in contact.

Exposure Pathway: A description of the way that a chemical moves from its source (where it began) to where and how people can come into contact with (or get exposed to) the chemical.

ATSDR defines an exposure pathway as having 5 parts:

3) Source of Contamination,
4) Environmental Media and Transport Mechanism,
5) Point of Exposure,
6) Route of Exposure, and
7) Receptor Population.

When all 5 parts of an exposure pathway are present, it is called a **Completed Exposure Pathway**. Each of these 5 terms is defined in this Glossary.

Frequency: How often a person is exposed to a chemical over time; for example, every day, once a week, twice a month.

Hazardous Waste: Substances that have been released or thrown away into the environment and, under certain conditions, could be harmful to people who come into contact with them.

Health Effect: ATSDR deals only with **Adverse Health Effects** (see definition in this Glossary).

Indeterminate Public Health Hazard: The category is used in Public Health Assessment documents for sites where important information is lacking (missing or has not yet been gathered) about site-related chemical exposures.

Ingestion: Swallowing something, as in eating or drinking. It is a way a chemical can enter your body (See **Route of Exposure**).

Inhalation: Breathing. It is a way a chemical can enter your body (See **Route of Exposure**).

LOAEL: Lowest Observed Adverse Effect Level. The lowest dose of a chemical in a study, or group of studies, that has caused harmful health effects in people or animals.

Malignancy: See **Cancer**.

MRL: Minimal Risk Level. An estimate of daily human exposure – by a specified route and length of time -- to a dose of chemical that is likely to be without a measurable risk of adverse, noncancerous effects. An MRL should not be used as a predictor of adverse health effects.

NPL: The National Priorities List. (Which is part of **Superfund.**) A list kept by the U.S. Environmental Protection Agency (EPA) of the most serious, uncontrolled or abandoned hazardous waste sites in the country. An NPL site needs to be cleaned up or is being looked at to see if people can be exposed to chemicals from the site.

NOAEL: No Observed Adverse Effect Level. The highest dose of a chemical in a study, or group of studies, that did not cause harmful health effects in people or animals.

No Apparent Public Health Hazard: The category is used in ATSDR's Public Health Assessment documents for sites where exposure to site-related chemicals may have occurred in the past or is still occurring but the exposures are not at levels expected to cause adverse health effects.

No Public Health Hazard: The category is used in ATSDR's Public Health Assessment documents for sites where there is evidence of an absence of exposure to site-related chemicals.

PHA: Public Health Assessment. A report or document that looks at chemicals at a hazardous waste site and tells if people could be harmed from coming into contact with those chemicals. The PHA also tells if possible further public health actions are needed.

Plume: A line or column of air or water containing chemicals moving from the source to areas further away. A plume can be a column or clouds of smoke from a chimney or contaminated underground water sources or contaminated surface water (such as lakes, ponds and streams).

Point of Exposure: The place where someone can come into contact with a contaminated environmental medium (air, water, food or soil). For examples: the area of a playground that has contaminated dirt, a contaminated spring used for drinking water, the location where fruits or vegetables are grown in contaminated soil, or the backyard area where someone might breathe contaminated air.

Population: A group of people living in a certain area; or the number of people in a certain area.

PRP: Potentially Responsible Party. A company, government or person that is

responsible for causing the pollution at a hazardous waste site. PRP's are expected to help pay for the clean up of a site.

Public Health Assessment(s): See **PHA.**

Public Health Hazard: The category is used in PHAs for sites that have certain physical features or evidence of chronic, site-related chemical exposure that could result in adverse health effects.

Public Health Hazard Criteria: PHA categories given to a site which tell whether people could be harmed by conditions present at the site. Each are defined in the Glossary. The categories are:

1) Urgent Public Health Hazard
2) Public Health Hazard
3) Indeterminate Public Health Hazard
4) No Apparent Public Health Hazard
5) No Public Health Hazard

Receptor Population: People who live or work in the path of one or more chemicals, and who could come into contact with them (See **Exposure Pathway**).

Reference Dose (RfD): An estimate, with safety factors (see **safety factor**) built in, of the daily, life-time exposure of human populations to a possible hazard that is <u>not</u> likely to cause harm to the person.

Route of Exposure: The way a chemical can get into a person's body. There are three exposure routes:
- breathing (also called inhalation),
- eating or drinking (also called ingestion), and
- or getting something on the skin (also called dermal contact).

Safety Factor: Also called **Uncertainty Factor**. When scientists don't have enough information to decide if an exposure will cause harm to people, they use "safety factors" and formulas in place of the information that is not known. These factors and formulas can help determine the amount of a chemical that is <u>not</u> likely to cause harm to people.

SARA: The Superfund Amendments and Reauthorization Act in 1986 amended CERCLA and expanded the health-related responsibilities of ATSDR. CERCLA and SARA direct ATSDR to look into the health effects from chemical exposures at hazardous waste sites.

Sample Size: The number of people that are needed for a health study.

Sample: A small number of people chosen from a larger population (See **Population**).

Source (of Contamination): The place where a chemical comes from, such as a landfill, pond, creek, incinerator, tank, or drum. Contaminant source is the first part of an **Exposure Pathway**.

Special Populations: People who may be more sensitive to chemical exposures because of certain factors such as age, a disease they already have, occupation, sex, or certain behaviors (like cigarette smoking). Children, pregnant women, and older people are often considered special populations.

Statistics: A branch of the math process of collecting, looking at, and summarizing data or information.

Superfund Site: See **NPL**.

Survey: A way to collect information or data from a group of people (**population**). Surveys can be done by phone, mail, or in person. ATSDR cannot do surveys of more than nine people without approval from the U.S. Department of Health and Human Services.

Synergistic effect: A health effect from an exposure to more than one chemical, where one of the chemicals worsens the effect of another chemical. The combined effect of the chemicals acting together are greater than the effects of the chemicals acting by themselves.

Toxic: Harmful. Any substance or chemical can be toxic at a certain dose (amount). The dose is what determines the potential harm of a chemical and whether it would cause someone to get sick.

Toxicology: The study of the harmful effects of chemicals on humans or animals.

Tumor: Abnormal growth of tissue or cells that have formed a lump or mass.

Uncertainty Factor: See **Safety Factor.**

Urgent Public Health Hazard: This category is used in ATSDR's Public Health Assessment documents for sites that have certain physical features or evidence of short-term (less than 1 year), site-related chemical exposure that could result in adverse health effects and require quick intervention to stop people from being exposed.

Table 1: Mercury Trading, Inc., Hammonton, New Jersey
Surface (top 0-3") Soil Sampling (February and March 2000) - Partial Results

Adult

Contaminant	# Samples Analyzed	Minimum Value (mg/kg)	Maximum Value (mg/kg)	Mean Value (mg/kg)	Maximum Exposure Dose (mg/kg/day)	Health Comparison Value (mg/kg)
Arsenic	3	3.2	[illegible]	5	8.71E-06	0.5 (CREG); 200 (adult, chronic EMEG)
Cadmium	3	1.1	[illegible]	1.3	2.43E-06	100 (adult, chronic EMEG)
Chromium (total)*	3	25	[illegible]	62.7	1.23E-04	2000 (adult, intermediate RMEG)
Lead	3	160	[illegible]	166.7	2.43E-04	400 residential, 600 non-residential**
Mercury	35	0.12	[illegible]	21.6	3.71E-04	14 residential, 270 non-residential**
Zinc	3	240	[illegible]	380	6.43E-04	200,000 (adult, chronic EMEG)
p,p'-DDD	3	1.6	[illegible]	27.9	6.14E-05	3 (CREG)
p,p'-DDE	3	0.8	[illegible]	1.5	2.86E-06	2 (CREG)
p,p'-DDT	3	10	[illegible]	39	8.00E-05	2 (CREG)
Chlordane (α & γ)	3	0.0092	[illegible]	0.02	4.57E-08	2 (CREG); 400 (adult, chronic EMEG)
Dieldrin	3	0.53	[illegible]	1.7	3.57E-06	0.04 (CREG); 40 (adult, chronic EMEG)
Endosulfan (I & II)	3	0.097	[illegible]	2.6	6.43E-06	1000 (adult, chronic EMEG); 470 (USEPA RBC)
Endosulfan Sulfate***	3	0.13	[illegible]	0.2	2.86E-07	1000 (adult, chronic EMEG); 470 (USEPA RBC)
Endrin	3	0.019	[illegible]	0.5	1.16E-06	200 (adult, chronic EMEG); 23 (USEPA RBC)
Hexachlorocyclohexane, alpha-	3	0.0016	[illegible]	0.2	4.57E-07	0.1 (CREG)
Hexachlorocyclohexane, beta-	3	0.019	[illegible]	1.4	3.14E-06	0.4 (CREG)
Hexachlorocyclohexane, gamma-	3	0.0013	[illegible]	0.4	9.00E-07	0.49 (USEPA RBC)
Hexachlorocyclohexane, delta-**	3	0.0004	[illegible]	0.5	1.19E-06	0.49 (USEPA RBC)

Child

Contaminant	# Samples Analyzed	Minimum Value (mg/kg)	Maximum Value (mg/kg)	Mean Value (mg/kg)	Maximum Exposure Dose (mg/kg/day)	Health Comparison Value (mg/kg)
Arsenic	3	3.2	[illegible]	5	3.39E-05	0.5 (CREG); 0.6 (pica child, chronic EMEG); 20 (child, chronic EMEG)
Cadmium	3	1.1	[illegible]	1.3	9.44E-06	0.4 (pica child, chronic EMEG); 10 (child, chronic EMEG)
Chromium (total)*	3	25	[illegible]	62.7	4.78E-04	6 (pica child, intermediate RMEG); 200 (child, intermediate RMEG)
Lead	3	160	[illegible]	166.7	9.44E-04	400 residential, 600 non-residential**
Mercury	35	0.12	[illegible]	21.6	1.44E-03	14 residential, 270 non-residential**
Zinc	3	240	[illegible]	380	2.50E-03	600 (pica child, chronic EMEG); 20,000 (child, chronic EMEG)
p,p'-DDD	3	1.6	[illegible]	27.9	2.39E-04	3 (CREG)
p,p'-DDE	3	0.8	[illegible]	1.5	1.11E-05	2 (CREG)
p,p'-DDT	3	10	[illegible]	39	3.11E-04	2 (CREG)
Chlordane (α & γ)	3	0.0092	[illegible]	0.02	1.78E-07	2 (CREG); 1 (pica child, chronic EMEG); 30 (child, chronic EMEG)
Dieldrin	3	0.53	[illegible]	1.7	1.39E-05	0.04 (CREG); 0.1 (pica child, chronic EMEG); 3 (child, chronic EMEG)
Endosulfan (I & II)	3	0.097	[illegible]	2.6	2.50E-05	4 (pica child, chronic EMEG); 100 (child, chronic EMEG); 470 (USEPA RBC)
Endosulfan Sulfate***	3	0.13	[illegible]	0.2	1.11E-06	4 (pica child, chronic EMEG); 100 (child, chronic EMEG); 470 (USEPA RBC)
Endrin	3	0.019	[illegible]	0.5	4.50E-06	0.6 (pica child, chronic EMEG); 20 (child, chronic EMEG); 23 (USEPA RBC)
Hexachlorocyclohexane, alpha-	3	0.0016	[illegible]	0.2	1.78E-06	0.1 (CREG)
Hexachlorocyclohexane, beta-	3	0.019	[illegible]	1.4	1.22E-05	0.4 (CREG)
Hexachlorocyclohexane, gamma-	3	0.0013	[illegible]	0.4	3.50E-06	0.49 (USEPA RBC)
Hexachlorocyclohexane, delta-**	3	0.0004	[illegible]	0.5	4.61E-06	0.49 (USEPA RBC)

*assumed same tox profile characteristics as Chromium (hexavalent)
**NJDEP interim soil clean-up criteria pursuant to NJAC 7:26D
***assumed same tox profile characteristics as Endofulfan (I & II)
****assumed same tox profile characteristics as Hexachlorocyclohexane, gamma-
CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 excess cancer risk
EMEG = Environmental Media Evaluation Guide (ATSDR)
RMEG = Reference Dose Media Evaluation Guide
RBC = Risk-based concentration (residential)
Bold = Contaminants above health comparison values