

# **Letter Health Consultation**

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BROOKHAVEN LANDFILL PETITION

BROOKHAVEN, SUFFOLK COUNTY, NEW YORK

**Prepared by the  
New York State Department of Health**

SEPTEMBER 30, 2009

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

## **Health Consultation: A Note of Explanation**

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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LETTER HEALTH CONSULTATION

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# STATE OF NEW YORK DEPARTMENT OF HEALTH

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September 30, 2009

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Senior Technical Project Officer  
Agency for Toxic Substance and Disease Registry  
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1600 Clifton Road, NE, M/S F58  
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re: October 29, 2008  
Brookhaven Landfill Petition  
Brookhaven, Suffolk County

Dear Dr. Ulirsch:

This Letter Health Consultation (LHC) has been prepared by the New York State Department of Health (DOH), with cooperation from the Agency for Toxic Substances and Disease Registry (ATSDR) and the Suffolk County Department of Health Services (SCDHS), for the purpose of responding to a petition to ATSDR by a resident of Suffolk County, New York in a letter dated October 29, 2008. The petitioner expressed concerns that leachate from the Town of Brookhaven Landfill (Landfill) has contaminated groundwater, thereby contaminating private and non-community wells located in an area down-gradient of the Landfill. Furthermore, the petitioner is concerned that consumption of the contaminated groundwater is causing adverse health effects.

To conduct this LHC, the DOH evaluated data from drinking water well samples collected by the SCDHS, and from monitoring well data collected by the Town of Brookhaven to fulfill its regulatory requirements as an operator of an active solid waste management facility (SWMF) in New York State.

The Landfill, one of five active SWMFs on Long Island, is approximately 532 acres in area and has been in operation since 1974. Initially, municipal solid waste and incinerator ash were accepted; however, only construction and demolition waste and incinerator ash has been accepted at the Landfill since in 1996. The New York State Department of Environmental Conservation (DEC) listed the Landfill on the Registry of Inactive Hazardous Waste Sites in 1987, and subsequently removed the Landfill from the list in 1992 when it was determined that there was no documented historical disposal of hazardous waste at the Landfill.

Questions regarding the integrity of the capped portions of the Landfill, the effectiveness of leachate collection efforts, and the overall effect of the Landfill on the surrounding community have been raised by local citizens for many years, and several investigations of groundwater contamination by leachate from the Landfill have been conducted. In particular, a formal petition was submitted to ATSDR in 1993 claiming that Landfill operations were adversely

affecting groundwater and air quality in the area. In response to that petition, a Health Consultation (HC) on the Landfill was completed in 2005 (ATSDR, 2005a).

The HC concluded that there was no apparent public health hazard associated with the Landfill, although it was noted that a groundwater contaminant plume did exist and was advancing in the direction of groundwater flow. Public health actions were needed in the past at the Brookhaven Landfill site because people had been exposed to low levels of volatile organic compounds (VOCs) in private wells, prior to being supplied by public water. Many residents down-gradient of the landfill switched from private well water to public water in the early to mid-1980's. Private well sampling was conducted on three occasions (1989-1990, 1993, 1996) to evaluate if private wells down-gradient of the landfill were contaminated and in use. By 1996, the well survey identified only one private well in use with contamination above the New York State drinking water guidelines. The public supply was available to the residence, which has since been connected to the public water supply.

### **Discussion**

The DOH evaluated the results of samples collected between 1997 and 2009 by SCDHS from about 35 locations in a study area down-gradient of the Landfill. Figure 1 depicts the SCDHS study area in relation to the Landfill, and provides a model simulation of the extent of a steady-state plume originating at the Landfill; the model simulation was included in a 1988 report on the Landfill by the U.S. Geological Survey (USGS, 1988). One of the 35 locations had two wells that were sampled, and samples from a total of 36 individual private and non-community supply wells were evaluated. A non-community water supply well serves the public but generally not the same people throughout the year; an example would be a well utilized by a restaurant. These well samples were collected at the request of the well owner, as part of an investigation being conducted by the County/State health departments, or as part of a sub-division application. DOH evaluated a total of 159 samples that were collected from the 36 water wells from sampling conducted between April of 1997 and February of 2009. Of the 36 wells sampled, 30 were private water supply wells, 4 were non-community water supply wells, and one was a well for a proposed sub-division. Twenty-three of these wells were sampled more than once, with one well sampled 48 times. Two individual private water supply wells sampled, as noted above, were located on a vegetable farm that reportedly uses the water for crop irrigation. Drinking water well samples collected by SCDHS are generally analyzed for about 350 different compounds, including aldicarb, chlorinated and dachthal pesticides, VOCs, semi-volatile organic compounds, metals, perchlorate, standard inorganics, pharmaceutical and personal care products.

The SCDHS strongly encourages all Suffolk County property owners who are still utilizing private wells for drinking water to connect to the public water supply if it is available, and discontinue use of their private well. These recommendations are communicated to property owners who have had their wells sampled by SCDHS. Because the cost of connecting to the public water supply is typically the responsibility of the property owner, these recommendations are not always followed. Not all residents whose drinking water was sampled have had their homes connected to the public water supply. SCDHS attempted to contact all property owners who may have private wells downgradient of the landfill, through home visits, notes and follow-up letters. However, not all homeowners responded to the SCDHS inquiries and some private wells that are potentially affected by the landfill may not have been sampled.

The DOH compared the data from the 159 samples to both New York State (NYS) maximum contaminant limits (MCLs) and Class GA Groundwater Standards (Class GA). MCLs are legally

enforceable standards that apply to public water systems. While these standards are not applicable to private wells, they are protective of public health and typically used as guidelines when any potable water supply is evaluated.

The locations of the 36 wells sampled were compared to the potential down-gradient extent of leachate movement as predicted by the USGS. Based on this comparison, DOH determined that 17 of the private wells sampled were located side gradient of the Landfill, and that sampling results from these wells are not directly responsive to this petition. These 17 wells were sampled as part of an investigation conducted by SCDHS to determine the extent of a perchlorate plume originating from a property north-east of the Landfill. Ten properties, considered to be within the perchlorate plume, were found to have perchlorate levels greater than the United States Environmental Protection Agency's (EPA) current Interim Drinking Water Health Advisory level for perchlorate in their well water at levels of 15 mcg/L (range of 19 mcg/L to 49 mcg/L); most of these properties have been connected to the SCWA public water supply, however, SCDHS reports that several properties are still using the wells.

The 19 remaining wells were determined to be down-gradient of the Landfill and/or within the potential extent of contamination as predicted by the USGS; 10 of these wells had concentrations of at least one compound greater than its corresponding New York State MCL or USEPA action level (copper). Table 1 summarizes these exceedances and provides appropriate comparison values.

**Table 1**  
**Water Quality Standards and/or Public Health Assessment Comparison Values Exceeded by Contaminants Detected in Private Wells Down-gradient of the Brookhaven Landfill (1997-2009 Sampling)**  
**(all values in micrograms per liter (mcg/L))**

Contaminant	Range of Levels Detected above standards	Number of Wells with Exceedances/ Wells Sampled	New York State Standards		Comparison Values			
			Ground-water	Drinking Water	Noncancer <sup>a</sup>	Basis	Cancer <sup>b</sup>	Basis
manganese	2220 - 3470	3/19	300	300 <sup>c</sup>	300	US EPA LTHA	---	---
iron	400 - 2360	7/19	300	300 <sup>c</sup>	2450	US EPA Provisional RfD	---	---
copper	1650	1/19	200	1300 <sup>d</sup>	---	---	---	---
bis(2-ethylhexyl) phthalate	7	1/19	5	6	140	US EPA RfD	3	US EPA CPF

USEPA LTHA: United States Environmental Protection Agency Lifetime Drinking Water Health Advisory

USEPA RfD: United States Environmental Protection Agency Reference Dose

USEPA Provisional RfD: United States Environmental Protection Agency Provisional Reference Dose

USEPA IDWHA: United States Environmental Protection Agency Interim Drinking Water Health Advisory

USEPA CPF: United States Environmental Protection Agency Cancer Potency Factor

<sup>a</sup>Noncancer comparison values are calculated for a 70 kg person who ingests 2 liters of water per day, assuming a relative source contribution of 0.2 for manganese and bis(2-ethylhexyl) phthalate, and 0.1 for iron.

<sup>b</sup>Cancer comparison values are calculated for a 70 kg person who ingests 2 liters of water per day, and correspond to the dose associated with an estimate lifetime cancer risk of one in one million.

<sup>c</sup>Standard based on aesthetic considerations (i.e., taste, odor and appearance).

<sup>d</sup>USEPA action level for copper in drinking water.

Since it is still active, the Landfill is required to comply with DEC Part 360 requirements for the construction and operation of a solid waste management facility. Included is a requirement for an ongoing Unified Environmental Monitoring Program (Monitoring Program) and semiannual reports on the results of the Monitoring Program. The Landfill's Monitoring Program includes sampling 27 wells that monitor the shallow, intermediate and deep aquifer zones and the Magothy aquifer up-gradient, below and slightly down-gradient of the Landfill. At this time, we do not know the how far the groundwater contamination from the landfill extends to the south of the landfill.

## Public Health Implications

### Manganese and Iron

In seven wells, iron was detected at levels greater than its New York State drinking water standard for public water systems (300 mcg/L), and was detected at levels greater than the combined standard for both manganese and iron (500 mcg/L). The manganese drinking water standard (300 mcg/L) was exceeded in three wells. However, subsequent sampling of drinking water from one of these properties by SCDHS showed manganese levels below the standard. These drinking water standards are based on preserving the aesthetic quality of the drinking water (i.e., taste, odor and appearance).

The levels of manganese also exceeded the USEPA lifetime drinking water health advisory (300 mcg/L) in these wells. Manganese occurs naturally in the environment and is an essential nutrient that is necessary to maintain good health. However, exposure to too much manganese can cause adverse health effects. Exposure to high levels of manganese in drinking water has been associated with adverse effects on the nervous system (ATSDR, 2000). In one study, people who drank water for 10 years or more with manganese at levels similar to those found in the private wells (2220 to 3470 mcg/L) seemed to have a slightly higher frequency of symptoms such as weakness, stiff muscles and trembling of the hands. However, these symptoms are not specific to manganese and might have been caused by other factors. Although this study is limited, it provides evidence (along with other studies in animals and humans) that high levels of manganese in drinking water may increase the risk for health effects, particularly after long term exposure. There is also a concern for infants fed formula that may have a higher manganese concentration than human milk. Infants absorb more manganese than adults, and therefore may be more vulnerable to manganese health effects. Measures should be taken to reduce manganese exposure when levels in drinking water are significantly elevated above the drinking water standard. Connecting to public water or use of bottled water should be considered for drinking, cooking, and making infant formula. Another option is the installation of a water treatment system to remove the manganese, which would also address problems with staining of laundry and plumbing fixtures, and improve the aesthetic quality of drinking water. If well water containing these levels of manganese is used for irrigation and only occasional drinking, exposures would be reduced and the risks for health affects would be lower.

The levels of iron were above the New York State drinking water standard (300 mcg/L) in seven of the wells. Iron occurs naturally in the environment and is also a nutrient that is essential to human health. Exposure to very large amounts of iron through ingestion is associated with effects on the gastrointestinal system (nausea, vomiting, diarrhea and stomach pain). Exposure to iron in drinking water at the levels detected in the private wells (400 to 2360 mcg/L) is about 4 to 25 times lower than exposures associated with gastrointestinal toxicity in humans. In

addition, the aesthetic quality of the drinking water is likely to be reduced, particularly at the higher iron concentrations.

### Copper

Copper was detected in one well at a level of 1650 mcg/L which is above the USEPA action level of 1300 mcg/L. This level may also reduce the aesthetic quality of the drinking water, as it is greater than the USEPA secondary standard for copper (1000 mcg/L, based on taste, odor and appearance). A common source of copper in drinking water is pipes used in household plumbing. The action level is based on preventing gastrointestinal effects (vomiting, nausea, stomach cramps, and diarrhea) that can be caused by exposure to high levels of copper (ATSDR, 2004), and is also used to determine if source reduction or treatment to control corrosion is needed. Exposure to copper in drinking water at the level found in the private well (1650 mcg/L) is about half as high as exposures associated with gastrointestinal toxicity in humans who drank water with elevated levels of copper.

### Bis(2-ethylhexyl) phthalate

Bis(2-ethylhexyl) phthalate was detected at 7 mcg/L in one private well, slightly above the New York State drinking water standard for public water systems (6 mcg/L). This level also exceeds the health-based comparison value for carcinogenic effects (3 mcg/L). Bis(2-ethylhexyl) phthalate is a widely-used chemical that is added to plastics, and can get into groundwater when it moves out of plastic products into the environment. It is also present in PVC pipe and fittings used in household plumbing. Laboratory animals exposed to high levels of bis(2-ethylhexyl) phthalate had adverse effects on the liver and their ability to have healthy offspring. Bis(2-ethylhexyl) phthalate causes cancer in laboratory animals exposed to high levels for their lifetimes (ATSDR, 2002). Whether or not bis(2-ethylhexyl) phthalate causes cancer in humans is unknown. Long-term (> 35 years) exposure to bis(2-ethylhexyl) phthalate at the level found in the private well (7 mcg/L) is estimated to pose a low increased risk for cancer (ie., the estimated increased lifetime cancer risk is about two in one million). The risk for noncancer health effects is minimal.

### Perchlorate

Although not directly responsive to this petition, perchlorate was detected in 10 private wells in the investigation area at levels ranging from 19 to 49 mcg/L, which exceed the USEPA interim drinking water health advisory of 15 mcg/L. Perchlorate or perchlorate salts are used primarily in rocket fuel, fireworks, and in military explosives. High oral doses of perchlorate reduce the production of thyroid hormones, which are essential for normal metabolism, growth, and development. Most of the information on the human health effects of perchlorate comes from people who took perchlorate medicinally to reduce or eliminate the symptoms caused by abnormally high levels of thyroid hormones. A small percentage of these people had adverse side-effects, which ranged from minor effects (rashes, fever, swollen lymph glands, or nausea) to more serious effects on the blood and immune systems (ATSDR, 2005b). In addition, high doses of perchlorate exposure may cause adverse effects in healthy people by reducing the level of thyroid hormones to below normal levels. High doses of perchlorate also have been shown to affect the thyroid gland of animals. Lifetime exposure to very high levels of perchlorate caused benign thyroid tumors in rats. Whether perchlorate causes cancer in humans is unknown. Long term exposure to perchlorate at the levels detected in the investigation area (19 to 49 mcg/L) is estimated to pose a minimal to low risk for adverse health effects.



## **Conclusion**

For the community that lives downgradient of the Brookhaven Landfill, the DOH, ATSDR and SCDHS give a high priority to making sure that the citizens have the opportunity to know the risks associated with drinking water from wells located in the area identified as being potentially downgradient of the Landfill. DOH, ATSDR and SCDHS conclude that long term drinking of groundwater with manganese at the highest levels detected in the sampled wells may harm people's health.

## **Basis for Decision**

The levels of manganese in the down gradient wells are similar to levels associated with health effects in studies of people who drank water containing manganese over long periods of time. We do not know whether leachate from the Landfill is contributing to the elevated levels of iron and manganese in some of the sampled wells. Although not related to the Brookhaven Landfill, long term exposure to perchlorate at the levels detected in the northeast portion of the investigation area is estimated to pose a minimal to low risk for adverse health effects. Although also not believed to be related to the landfill, copper and bis(2-ethylhexyl) phthalate were found in one well each at levels above health comparison values. Long-term exposure to bis(2-ethylhexyl) phthalate at the level found in one private well is estimated to pose a low increased risk for cancer, and the risk for non-cancer health effects is minimal. Copper was found in one well at a level that may reduce the aesthetic quality of drinking water, and the estimated exposure from this well is about half as high as exposures associated with gastrointestinal toxicity in humans who drank water with elevated levels of copper.

## **Recommendations**

DOH and ATSDR recommend that property owners connect to the public water supply where available and disconnect their private wells from their household system. For wells with high iron and manganese, other measures could be taken if owners cannot connect or until they connect to public water, such as use of bottled water for drinking, cooking, and making infant formula, as well as installation of a water treatment system to remove the manganese. These measures would also address problems with staining of laundry and plumbing fixtures. Property owners with private wells potentially downgradient of the landfill or in the area of perchlorate contamination who have not had their wells tested for metals or perchlorate should contact the SCDHS for possible sampling.

## **Public Health Action Plan**

1. The DOH and SCDHS will work with the Town of Brookhaven and the owners of the wells with high manganese levels to evaluate whether appropriate actions have been taken, evaluate what actions could be taken and advise the residents about ways to reduce manganese in their drinking water.
2. Although perchlorate is not directly related to this petition, the DOH and SCDHS will work with the owners of the wells with perchlorate at levels above the USEPA interim drinking water health advisory to evaluate whether appropriate actions have been taken, evaluate what actions could be taken and advise the residents about ways to reduce perchlorate in their drinking water.

3. For any private wells that are potentially impacted by the landfill or perchlorate and have not been sampled, the DOH and SCDHS will encourage owners to contact the SCDHS and discuss sampling the water from their wells.

Respectfully,



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## CERTIFICATION

The letter health consultation for the Brookhaven Landfill was prepared by the New York State 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 letter health consultation was initiated. Editorial review was completed by the cooperative agreement partner.

  
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Technical Project Officer, CAT, CAPEB, DHAC

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

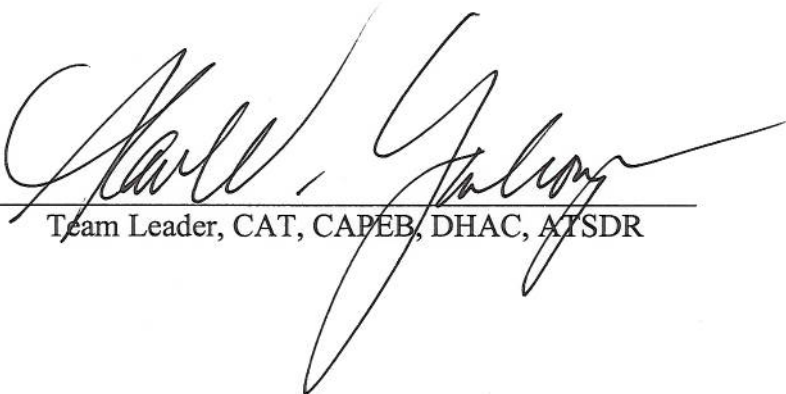
  
\_\_\_\_\_  
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Figure 1

