

Public Health Consultation - Diaz Chemical Corporation

Village of Holley, Orleans County, NY

EPA Facility ID: NYD067532580

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Purpose

The purpose of this Public Health Consultation is to evaluate whether the residents near the Diaz Chemical Corporation facility are exposed to chemicals in groundwater and indoor air and, if they are, explain the health risk. Based on that evaluation, state and federal health agencies conclude that currently there is no apparent public health hazard from exposure to chemicals in the groundwater and indoor air.

Summary

The Diaz Chemical Corporation (Diaz) operated in Holley, NY from 1974 until they filed for bankruptcy in June 2003. Over the years, Diaz dumped or spilled chemicals on the soil, which contaminated groundwater below the Diaz property. Chemical contamination was first found in the groundwater in 1989 when Diaz tested water-supply wells on its property. The US Environmental Protection Agency (EPA) is responsible for cleaning up the Diaz site.

The Diaz chemicals in the groundwater moved off-site, east-southeast toward South Main Street. A groundwater collection trench along the Diaz property boundary reduces the amount of chemically contaminated groundwater flowing off the site. This trench has greatly reduced the chemical contamination leaving the site. Since there are currently no wells using contaminated groundwater for drinking, there is no concern about ingesting Diaz chemicals through drinking water.

The primary concern is that Diaz chemicals evaporate from groundwater into openings, or pores, in the soil, called soil vapor, and then move into the air in buildings and homes. The indoor air in several homes near the chemically contaminated groundwater was sampled. In 1998, Diaz chemicals were found at low levels in the indoor air of a home with a sump and another home along South Main Street. The chemicals were also found in the water in the sump hole. Diaz covered the basement sump and installed filters in the basements of both homes to remove chemical contaminants from the air.

Additional indoor air samples were taken in 2005. One Diaz chemical continued to move from the groundwater into the soil vapor and then into the indoor air of two homes. However, the chemical level in the air was low and posed low risk for cancer and other types of health effects. The chemical was also found in samples taken in the air space below six other homes. These "sub-slab" vapors can move into indoor air, but levels are low and are expected to decrease as levels in the groundwater continue to decrease. More indoor air sampling at three homes in May 2006 showed that the chemical was still present in the basements of all three, and in the sub-slab vapor of two of the homes.

Recommendations

State and federal health officials made three recommendations. First, permanent solutions should be explored to prevent Diaz chemicals from moving from soil vapor into indoor air. Second, indoor air in homes and apartments above the chemically contaminated groundwater should be periodically tested. Testing should be done during the heating season because that is when homes are less ventilated, and chemical levels are likely to be higher, if present. The third recommendation is that the groundwater collection trench at the border of the Diaz property be maintained until the site is cleaned or another permanent solution is found.

Site Background

The former Diaz Chemical Corporation facility (Diaz) is at the southwestern end of the Village of Holley, Orleans County, New York. The Diaz property is bordered on the north and east by homes and by a rail yard on the southwest. The Village of Holley is a mixed residential, commercial and light industrial community. According to the 2000 Census, 1,802 people live in the village. Detailed demographics of the Village are available upon request as Appendix C.

Diaz manufactured products for the agricultural and pharmaceutical industries from 1974-2003. Groundwater contaminated with chemicals was found in 1989 when Diaz tested two existing bedrock water-supply wells on its property.

Groundwater Investigations

Diaz hired an engineering firm to determine the extent of chemicals in the groundwater. The firm conducted a Remedial Investigation and Feasibility Study from 1994 through 1999. Diaz installed monitoring wells on- and off-site (in the neighborhood) to determine the movement and extent of chemical contamination in the groundwater. Groundwater flows east-southeast off Diaz property toward a ravine roughly parallel to Batavia street (see map below). Chemicals called volatile organic compounds (VOCs) were found in groundwater on-site and off-site.

In 1996, Diaz installed a groundwater migration-control trench with a pump and treat system on the eastern end of the property to trap and remove chemically contaminated groundwater flowing off the Diaz site. The pump and treat system on the trench was first turned on in April 1996, but monitoring showed that the levels of chemicals in the groundwater off-site increased until October 1998. Modifications in October 1998 increased the pump-rate and improved the functioning of the trench effectively reducing the amount of contamination moving off-site.

Definitions

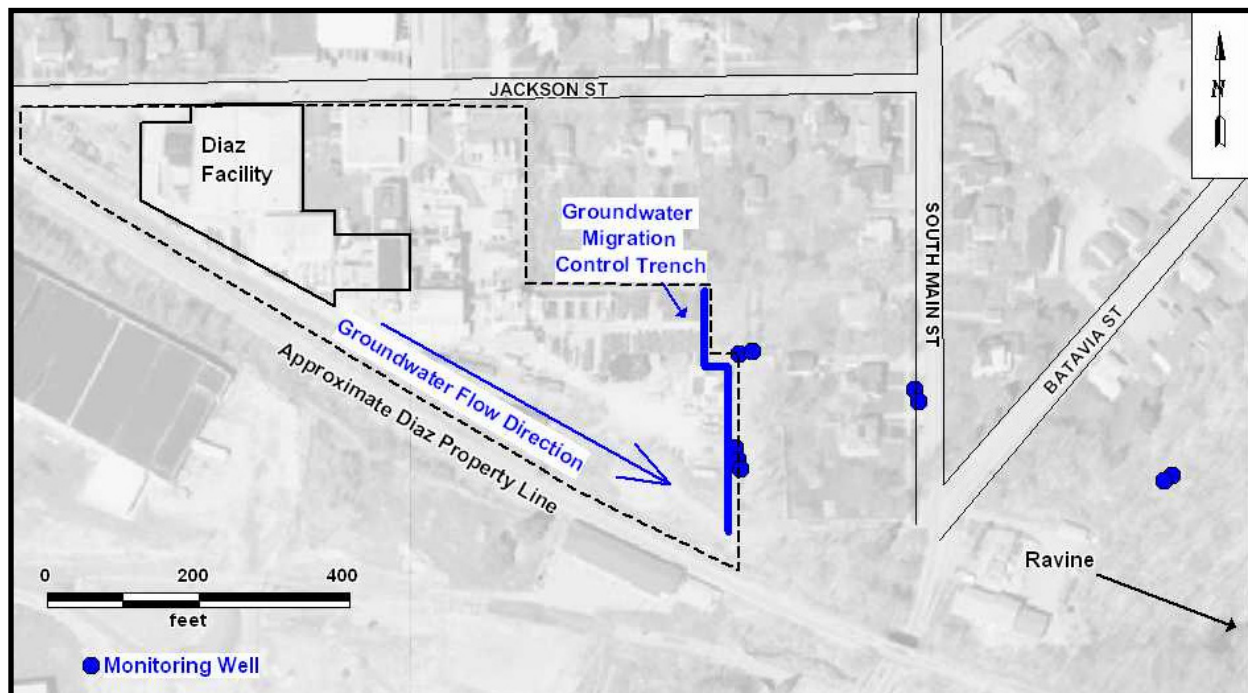
Groundwater - water beneath the earth's surface in the spaces between soil particles and between rock surfaces.

Volatile Organic Compounds (VOCs) - organic compounds that evaporate readily into the air. VOCs include substances such as benzene, toluene, methylene chloride, and methyl chloroform.

Remedial Investigation - the process of determining the type and extent of hazardous material contamination at a site.

Feasibility Study - a study by EPA to determine the best way to clean up environmental contamination. A number of factors are considered, including health risk, costs, and what methods will work well.

Figure 1



Indoor Air Investigation

Another investigation focused on indoor air. Volatile chemicals like the ones found in Diaz groundwater, can volatilize (evaporate) from chemically contaminated groundwater or soil into air pores of soil, called soil vapor. Chemically contaminated soil vapor may then move through the soil, including the space below homes (sub-slab) and can be drawn into the indoor air of homes and buildings. This is called soil vapor intrusion and typically occurs in homes that are near or above chemically contaminated groundwater or soil. (For more information, refer to the State Health Department's fact sheet on Soil Vapor Intrusion at: www.health.state.ny.us/nysdoh/gas/svi_guidance/docs/svi_faqs.pdf)

The indoor air investigation focused on homes east and southeast of Diaz because the chemically contaminated groundwater flows in this direction underneath homes. Specific homes are not identified in this document or on the map, to protect the confidentiality of the property owners. Diaz consultants, the New York State Department of Health, and the United States Environmental Protection Agency (EPA) sampled the indoor air of homes between 1995 and 2005. Twenty-seven homes were sampled at least once. About ten of these homes are east or southeast of Diaz, near the monitoring wells where chemically contaminated groundwater was found. Several homes north of Diaz were sampled because of an air release not related to chemical contamination of groundwater (see Diaz Public Health Assessment, Reference 9, Appendix A). In 2005, EPA sampled the indoor air at twelve homes, most of which had already been sampled.

Three homes along South Main Street had sump water (open water in a pit made for a sump pump) in the basement because the groundwater is close to the level of the basement. The sump water was tested for Diaz chemicals at these three homes. In 2005, the EPA also tested the sub-slab vapor (air spaces in soil below the concrete slab of the basement of homes) at eleven of the 27 homes. Sub-slab vapor is often not tested at homes with sumps because the groundwater is too close to the level of the basement.

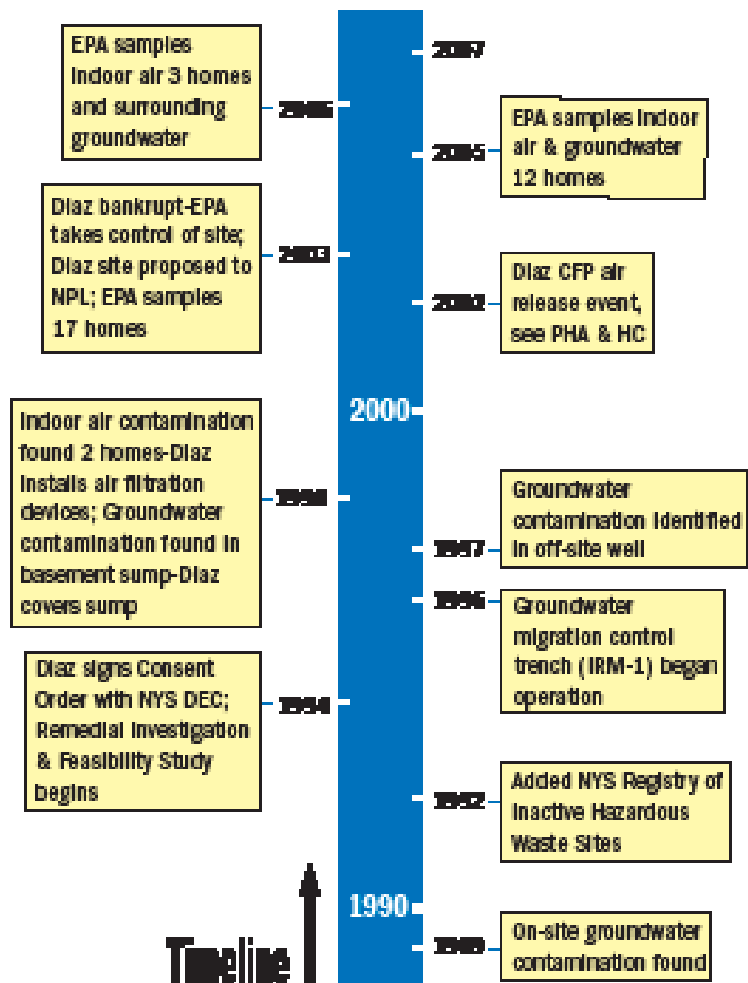
Six volatile chemicals specific to Diaz were found in on- and off-site groundwater and sump water. Four of the six were detected in indoor air and the State Health Department focused on those four chemicals: 1,2-dichloroethane, 1,2-dibromoethane, 4-chlorobenzotrifluoride, and 1-bromo-2-chloroethane. These four chemicals exceeded typical background levels and/or public health comparison values (see Public Health Implications section).

Definitions

Soil Vapor - air found in the pore space between soil particles. Soil vapor can become contaminated when chemicals evaporate from subsurface sources and enter the soil vapor.

Background Level - An average or expected amount of a substance in a specific environment, or typical amounts of substances that occur naturally in an environment.

Comparison Values (CV) - calculated concentration of a substance that is unlikely to cause harmful (adverse) health effects in exposed people. The CV is used as a screening level during the public health assessment process.



How can individuals be exposed to groundwater and indoor air contaminants from the Diaz site?

At least one of these chemicals was found in the indoor air of three homes: two homes along South Main Street (first found in 1998) and one home along Batavia (first found in 2005). Diaz chemicals were also found in the sump water of one of the two South Main Street homes (in 1998). In 2005, only one Diaz chemical, 4-chlorobenzotrifluoride, was found in the sub-slab vapor of these three homes and was still entering the indoor air of two of the three homes (the Batavia St. home and the S. Main St. home with the sump). One Diaz chemical, 4-chlorobenzotrifluoride, was found in the sub-slab vapor, but not the indoor air, of three other homes.

The table below summarizes sampling at the three homes; types of samples collected, the first date samples were collected, and actions taken to reduce indoor air exposure at each of the three homes. A detailed table of environmental sampling at these three homes is available upon request as Appendix D.

The EPA replaced the carbon in filters of each home once since they took over the site in 2003. Since the levels entering the home are low and the risks are low, the EPA does not plan to further maintain the filters at these two homes.

What is Exposure?

Diaz chemicals must have moved through the environment via an exposure pathway before a person could be exposed. Exposure requires people to come into contact with a chemical. The elements of an exposure pathway are outlined below in the diagram and on the next page in the box. All five elements of an exposure pathway must exist for exposure to occur and preventing any element will prevent exposure. The exposure pathway outlined in the diagram and box shows the only “complete” pathway that exists for exposure to groundwater contamination - breathing contaminants the migrated from groundwater to soil vapor to indoor air.

Figure 2 - Diaz Groundwater Exposure Pathway

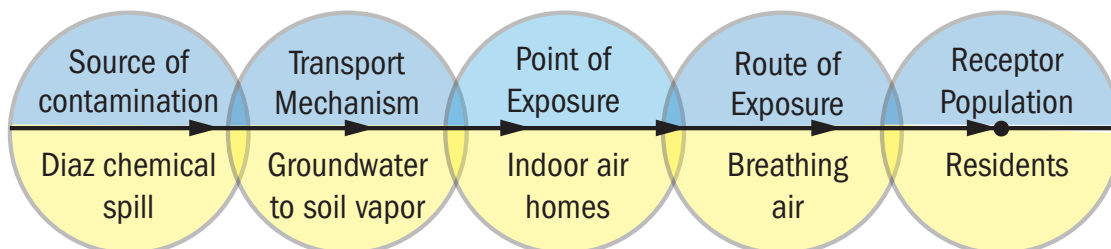


Table - Diaz Groundwater Exposure Pathway

Source of Contamination	Chemicals spill on Diaz property
Transport Mechanism	Chemicals seep into groundwater below Diaz property, which flows hydraulically downhill off the property. Chemicals evaporate from the groundwater and enter the soil vapor
Point of Exposure	Contaminated soil vapor may be drawn into the indoor air of homes above the groundwater
Route of Exposure	Inhaling (breathing) contaminated air
Receptor Population	Residents of homes breathing contaminated indoor air

Chemicals in Drinking Water

Samples of groundwater collected from on-site and off-site monitoring wells contain Diaz-related chemicals. Homes in the Diaz area are supplied by municipal water and do not use site-related groundwater for drinking water. All private wells identified in the area were inactive. The Village of Holley, including the entire neighborhood surrounding Diaz, receives drinking water from a public utility system supplied by five water-supply wells that are upgradient (hydraulically uphill) from the Diaz site. The chemically contaminated groundwater from the site cannot reach these wells. Therefore, exposure to Diaz chemicals in drinking water is not likely.

Chemicals in Surface Water

The groundwater is close to the basement bottoms in some areas near Diaz. Therefore, water from three basements near Diaz was tested and the water from one home contained Diaz-related chemicals. Diaz permanently covered the sump hole in the basement of this home to prevent residents' exposure to this water by direct contact or breathing the evaporating water. As long as the sump cover remains sealed, and the water is pumped, exposure is not likely. Surface water and sediments were tested at a local creek. Diaz chemicals were not found in any surface water samples.

Chemicals in Indoor Air and Soil Vapor

The most likely source of exposure to chemicals in the groundwater is from the movement of chemicals from groundwater to soil vapor and then into the indoor air of buildings above the groundwater. Diaz's consultants, the State Health Department, and the EPA sampled many homes likely to be affected by chemical contamination of soil vapor. The indoor air of twenty-seven homes was sampled for Diaz-related chemicals at least once; Diaz chemicals (four total) were only detected in the indoor air of three homes. The exposure pathway is complete for four Diaz chemicals, so we focussed on those four when looking at the public health implications. The EPA collected sub-slab vapor samples from twelve homes in 2005; six had detectable levels of one Diaz chemical, 4-chlorobenzotrifluoride. Three of these homes were also the ones that had site-related chemicals in the indoor air.

Measures to Reduce Exposure (Remedial Actions)

Information about the Remedial Investigation and activities is available in a series of reports produced by Haley & Aldrich, see References, Appendix A. The EPA also removed chemically contaminated soil and hazardous waste, including chemical drums, from the Diaz property. This will reduce the potential for further leaching of chemicals into the groundwater. The EPA is responsible for site cleanup, maintenance of the collection trench, and all other necessary remedial activities related to the Diaz site.

Remedial Actions	Function	Location	Date	Results
Groundwater migration-control trench & 7 pumping wells	Designed to trap and remove chemicals in the groundwater flowing off Diaz property	Diaz eastern (downgradient) property line	January 1996	Concentrations of chemicals in off-site monitoring wells were reduced by 95%
Bioventing system	Biodegrade petroleum hydrocarbon chemicals in the overburden soil & aquifer	Railroad spurs (overburden soil) south of Diaz property	December 1997	Biodegradation is working but not enough to significantly reduce high concentration of chemicals
Sump pump & airtight cover (aluminum Bilco® door & airtight neoprene seal)	Minimize potential for exposure to chemicals in sump water & vapor	Basement of home (S. Main St)	April 1998	Water is not physically accessible & airtight seal prevents vaporization
Air Filtration Devices	Remove chemicals from basement air	Two home basements (S. Main St)	April 1998	Diaz Chemicals not detected in indoor air

Duration of Exposure in Homes

The length of time residents at the three homes were exposed to Diaz-related chemicals is unclear. We do not know when contaminants were spilled or how long it took for chemicals to migrate in the groundwater off the Diaz property and then into each home. Diaz opened in 1974 and chemically contaminated groundwater was found in 1989. Diaz chemicals were first found in the indoor air of a home in 1997, but homes were not extensively sampled before then. Filters at two homes reduced indoor air exposure after 1998. Therefore, the duration of past exposure at these two homes may be as long as 24 years, but was probably shorter. Since Homes 1 and 2 still have operating filters; there is currently little exposure at either home. The third home with a Diaz chemical in indoor air was not sampled before 2005. There are currently low levels of 4-chlorobenzotrifluoride in the indoor air at this home. Therefore, the duration of past exposure at this home may be as long as 32 years, but was probably shorter.

The State Health Department summarized the available indoor air data for these three homes and focused on four chemicals.

Public Health Implications

The State Health Department assessed the risks for cancer and other (noncancer) health effects from exposure to four contaminants: 1,2-dichloroethane, 1,2-dibromoethane, 4-chlorobenzotrifluoride and 1-bromo-2-chloroethane.

Health risks depend on several factors, including the contaminant level in air, the exposure route (inhalation), and how often and for how long contact with the chemical is made. When we estimated the cancer risks, the State Health Department assumed continuous (i.e. uninterrupted) exposure for 30 years at the highest level ever detected in any home. This ensures that the estimate is tells us the highest probable risk, or “worst case” scenario. Typically a person is not exposed to the highest level continuously, especially if the air sample was collected in the basement or they spend several hours a day outside the home.

The four Diaz chemicals were selected for review because they exceeded typical background levels or health comparison values in at least one indoor air sample. We compared the highest indoor air level for each of the four chemicals to typical background indoor air levels and public health comparison values. If the level is higher than the background level, the chemical is likely not natural to the environment, i.e. not usually found at that level in indoor air. The health comparison value is the level at which a chemical is not likely to cause health effects. If the level in homes is above the health comparison value, we calculate the risks to determine whether health effects are expected to occur at that level. There are two different scales for health comparison values – one for cancer effects and another for other kinds of health effects, such as developmental effects.

Toxicological information is available to assess the potential cancer health effects for two of the four chemicals at Diaz. The estimated increased cancer risk was “low” for 1,2-dichloroethane.

The estimated increased cancer risk for 1,2-dibromoethane is “moderate”. Although the level measured in indoor air was low, the health comparison value for 1,2-dibromoethane is very low. It was detected only once in indoor air, but may exist at levels below what our laboratory can accurately measure (the detection limit). Since we cannot reliably measure the levels of this chemical in indoor air, it is an indeterminate public health hazard. Nevertheless, any exposures should have been reduced after the filters were installed in 1998. The State Health Department is asking the EPA to refine their laboratory methods to better determine whether 1,2-dibromoethane still enters the indoor air of any homes near Diaz. It was last detected in 1998 in indoor air.

The estimated risk for health effects other than cancer is “minimal” for three of the chemicals at Diaz and “low” for 4-chlorobenzotrifluoride.

The State Health Department does not expect to see health risks from exposure to Diaz chemicals in the groundwater. However, we cannot accurately determine the health risks associated with low level exposure to 1,2-dibromoethane. This was detected only once, but it may be present at levels below which the laboratory can accurately measure. Therefore, it is prudent to continue efforts to reduce actual and potential exposures to Diaz contaminants.

There is currently an indeterminate public health hazard from exposure to 1,2-dibromoethane and no apparent public health hazard from exposure to the other three chemicals detected in indoor air near the Diaz facility.

Conclusions

1. Off-site chemical levels in the groundwater decreased after Diaz installed a groundwater migration-control trench at the edge of their property.
2. Exposure to site-related chemicals is possible if chemicals in sub-slab vapor migrates into the indoor air of buildings.
3. Indoor air chemical contamination at three homes was identified in the past. Measures were taken to reduce exposure (i.e. filters and sump cover) at two of the homes. The third home had chemical levels associated with a “low” estimated risk of other types of health effects.
4. The detected levels entering homes are below health comparison values and so there is currently no apparent public health hazard from groundwater or indoor air contaminants. (Appendix G contains additional information on hazard categories).

Recommendations from the State Department of Health and federal Agency for Toxic Substances and Disease Registry

1. Operation of the groundwater-migration control trench should continue as long as it effectively reduces the levels of chemicals moving off-site or the groundwater is cleaned.
2. Sub-slab vapor and indoor air at homes above the chemically contaminated groundwater should be sampled periodically to ensure that the levels of Diaz chemicals entering the indoor air do not pose a threat to public health. Samples should be collected during the heating season. Alternatively, sub-slab depressurization mitigation systems could be installed at these homes to reduce the possibility of soil vapor intrusion.
3. For the long-term protection of public health, the remedial actions prescribed in the March 2002 New York State Department of Environmental Conservation Record of Decision should be implemented or an updated Record of Decision released from the EPA.

Next Steps

EPA will continue to oversee the Diaz site cleanup. The operation of the migration-control trench will continue. The sub-slab vapor and indoor air of homes above the area of the chemically contaminated groundwater will be sampled periodically. Results and updates will continue to be shared with the community.

Non Site-related Chemicals in Indoor Air

Indoor air samples from several homes contained some chemicals typically found in gasoline, fuel oil and/or kerosene - such as toluene, benzene, and xylenes. These chemicals were not detected in groundwater on Diaz property and therefore are not thought to be related to Diaz. There are no documented petroleum spills near Diaz that might explain these findings. However, these chemicals are often found in household products such as spray paints, paint thinner, and adhesives, as well as in fuel and fuel-powered equipment that may be stored in basements or attached garages. A product inventory was not done at each home, so we do not know which products these chemical may have come from.

This report was prepared by: The New York State Department of Health under a Cooperative Agreement with the U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry