



CLEARING THE AIR ON HILLSIDE ELEMENTARY SCHOOL AIR QUALITY ISSUES

In the mid-1980's, the Massachusetts Department of Environmental Protection (DEP) discovered that groundwater beneath the Hillside Elementary School contained chemicals that had seeped into the ground at the Microwave Development Laboratories (MDL) property on Crescent Road, east and uphill of the school. The DEP was concerned that vapors from the chemicals could migrate through the soil and enter the school building. In 1988 and 1989, because of concern that students and teachers could be exposed to these chemicals, tests for the chemicals were conducted of the air inside the school.

The tests showed that trichloroethylene (TCE) was present at very low levels in the air inside the school, but not in the air above the playground. TCE levels were recorded in the Library/Media center, the utilities crawl space beneath the floor of the school, and in a storm drain outside the school. Although tests showed that the levels of TCE were very low, school administrators and town health officials decided to act in ways that would restore the community's confidence in the safety of children and school staff. The school was closed in January 1990 and students and staff were relocated to other schools in Needham for the remainder of the school year.

During the time that the school was closed, two ventilation/treatment systems were installed to remove TCE vapors from air beneath the school and to stop vapors from entering the school building. The school re-opened in September 1990 and has been in continuous use since that time because potential risks to students and teachers have been eliminated by the air treatment systems. During the school closure, a Hillside Advisory Committee (HAC), now referred to as the Hillside Health and Safety Advisory Committee (HSAC), was formed to determine criteria for re-opening the school and to oversee and monitor continued testing of air inside the school. Also during this time, the Microwave Site Coalition (MSC) was formed by the Needham Board of Health. This town-wide coalition was charged with reviewing all materials related to the Hillside/MDL site, confirming the determination that the school was indeed safe to re-open, and producing the original version of this fact sheet for public distribution which was January 2000.

How Did the Chemicals Get into the Groundwater and into the Air inside the School?

According to the DEP, the contaminants flowing with groundwater beneath the school came from improper disposal of chemicals that seeped into the ground at the MDL site on Crescent Road. The figure on the last page shows the location of the school in relation to MDL. The groundwater flows down the hill from this site, beneath the school, and towards Rosemary Meadow and the Town of Wellesley. The path of the chemicals moving with the natural flow of groundwater is known as a plume. The figure also shows the approximate outline of the plume where groundwater monitoring tests detected elevated levels of TCE. Highest levels of TCE are concentrated under the MDL site. Lowest levels of TCE, and “non-detect” levels, are found along the edges of the plume and at the western end of the plume, toward the Wellesley town line.

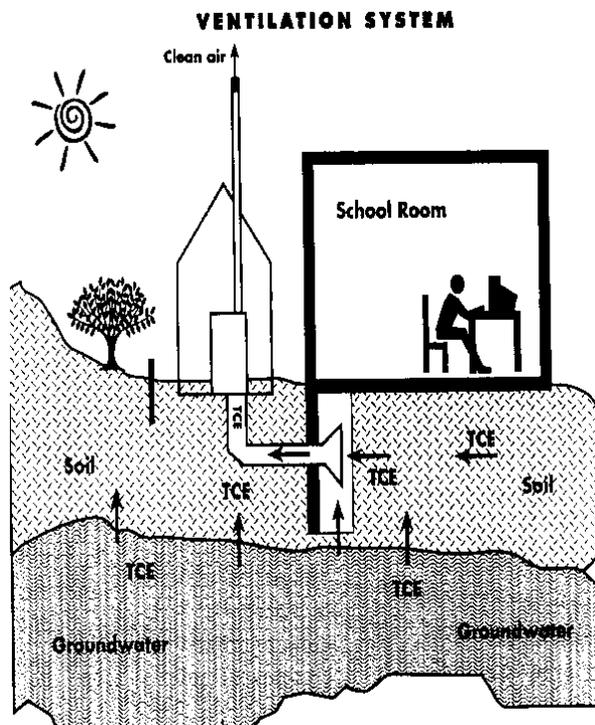
Testing showed that the primary chemical found in the groundwater plume was trichloroethylene, or TCE. Other chemicals found at lower levels were vinyl chloride, tetrachloroethylene (PCE), freon, and the breakdown products of these chemicals. The chemicals are part of a class of chemicals known as volatile organic compounds (VOCs) because they “volatilize” or evaporate when they come into contact with air. As they flow with groundwater and pass through soil, they are released from the soil into the air. Concentrations are quickly diluted when TCE is exposed to outside air.

When TCE volatilized from groundwater beneath the Hillside school, it traveled through the cracks and joints in the concrete slab under the school, entered closed areas such as crawl spaces beneath the school, and was released into classrooms at low levels. The TCE vapors entered the school similar to the way that radon gas can enter into a building. (The schematic on page 2 depicts how the ventilation/treatment systems operate and protect the school.)

How Is Air inside Hillside School Being Treated to Eliminate Exposure for Students and Teachers?

Two ventilation/treatment systems have been installed at Hillside School to prevent TCE vapors in the soil from entering the school. In April 1990, the first system -- a ventilation/control system in the crawl space -- was installed as a short-term system. This system consists of two vacuum fans that draw the air out of the crawl space and introduce fresh air. This prevents a buildup of TCE in the crawl space and prevents it from entering the school building. This system still operates as a back-up system for a second treatment system, the Sub-Slab Depressurization System (SSDS).

The SSDS, which operates the same way a radon removal system operates, was installed throughout the school in Spring 1990. It is the primary treatment system, and it removes TCE vapors directly from the soil beneath the concrete slab and foundation of the school. As TCE is released from the soil it is captured and routed through pipes into 55-gallon drums containing activated carbon located in a shed outside of the school.



How Is the Sub-slab Depressurization System Monitored and Inspected?

To ensure that the treatment system is operating properly, automatic monitoring systems have been installed by the DEP and inspection and oversight systems have been developed by the HAC. The ventilation/treatment systems are monitored every school day. Trained staff check and record pressure gauge readings to make sure the system maintains the correct vacuum pressure. A monthly check of the treatment system is performed by a contractor overseen by DEP. Air samples are collected from the tunnels and after flowing through the carbon drums in the treatment shed. When the activated carbon drums are used up, they are collected for proper disposal and replaced with new carbon. Semi-annually, in February and August, samples of the air within the school are collected and tested to confirm that levels of TCE remain below the protective limits set by the Hillside Advisory Committee and adopted by the Needham School Committee.

TCE STANDARDS AND MEASUREMENTS <i>parts per billion (ppbv)</i>	
Commonly occurring levels of TCE in outdoor air – DEP:	1 ppbv
Commonly occurring levels of TCE in indoor air – DEP:	.92 ppbv*
Acceptable level of TCE inside Hillside School -- set by HAC:	.92 ppbv*
Highest level of TCE recorded in playground in 1989:	1 ppbv
Occupational Safety and Health Administration standard for 8-hour adult exposure:	50,000 – 100,000 ppbv

* .92 ppbv replaced 2 ppbv

What Is the Hillside Advisory Committee? (Now known as the Hillside Health and Safety Advisory Committee (HSAC))

The HAC was formed in 1990 by the Needham School Committee. The HAC was comprised of parents, Hillside teachers and administrators, School Committee members, and officials from the Needham Board of Health. The committee was initially created to provide school community oversight of the installation of the ventilation and treatment systems, to set criteria for the control systems, to establish acceptable levels for TCE in air inside the school (at levels much lower than all existing standards), and to oversee the re-opening of the school. The committee met with many experts to review the issues and complete its work. The HAC continues to meet regularly to review air quality data and to assure continued safe operation of the air treatment systems; through the Town of Needham, the Health Department and the DEP, the committee continues to have access to professional advice. In 2007, HAC formally changed its name to the Hillside Health and Safety Advisory Committee (HSAC) in recognition of its current mission, which involves not only oversight of Hillside's air quality, but also of any other health and safety issues that arise within the school environment.

What Guidelines Did the HAC Set for Acceptable Levels of TCE in Air inside the School?

Although the Hillside School was determined by DEP to be safe in 1990, it was closed for half a year during installation of the SSDS to improve air quality inside the school. This conservative protective measure was taken to restore the confidence of children, parents, teachers, and the Needham community that the school was operating in a safe environment. The HAC recognized that guidelines and scientific studies used to determine levels of exposure to TCE did not sufficiently address safe levels for children or the effects of TCE exposure on children. They recognized that available studies were limited to TCE exposure for adults and animals. The HAC set its own strict guidelines and established control measures for ongoing monitoring of the system. Initially, the action level was set at 5 ppbv and shortly thereafter lowered to 2 ppbv, which remained in effect until 2003 when the HAC requested lowering the acceptable level to be consistent with the published DEP typical indoor air background value of .92 ppbv. These guidelines were formally accepted by the School Committee (see initial version of this handout for a complete set of HAC Guidelines).

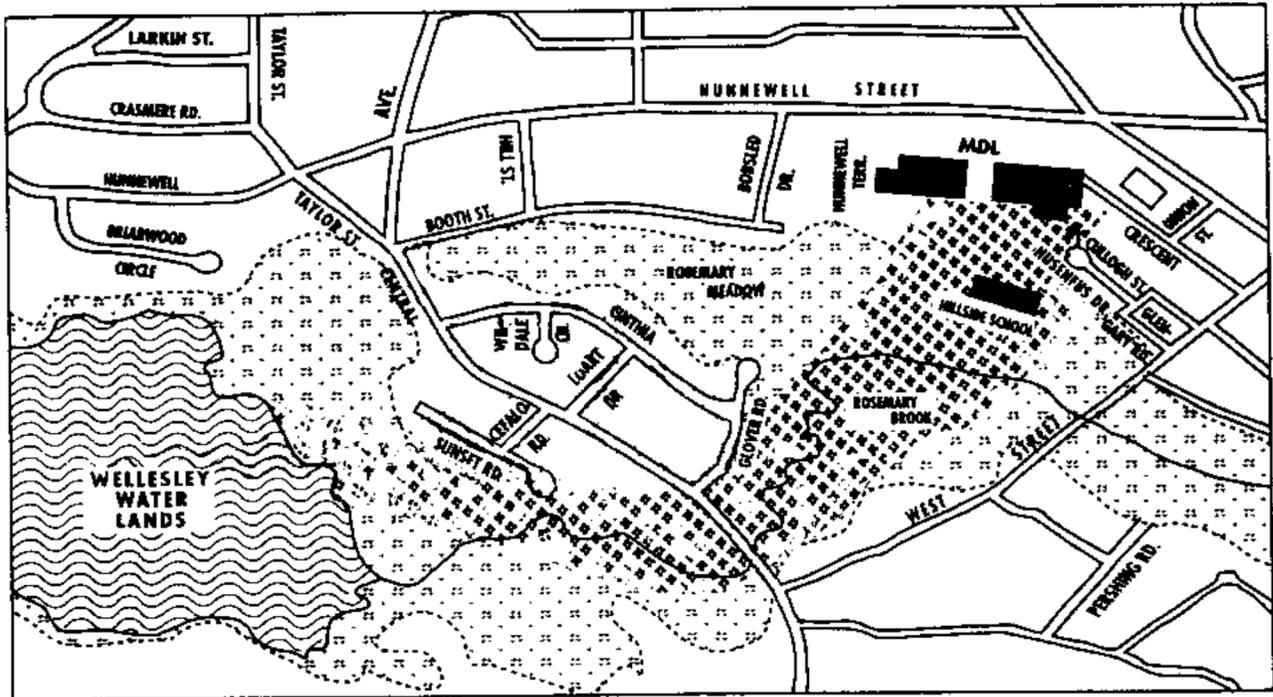
**Average levels of TCE in the
School have remained under the
HAC approved guidelines of TCE in air since
control measures were initiated in 1990.**

The 1997 Revised Operation & Maintenance Plan for the Sub-slab Depressurization and Crawlspace Ventilation System includes the following:

Action Level in ppbv of TCE and Freon 113	Action(s) To Be Taken
.92 *	1) Re-test room on a monthly basis until level is below .92. 2) Re-evaluate SSD system and make any appropriate adjustments or repairs.
40 **	1) Re-sample immediately. After two rounds of exceedances, close room. 2) Re-evaluate SSD system and make any appropriate adjustments or repairs.

* .92 ppbv replaced 2 ppbv

** TCE only



*This figure depicts the location of the MDL site, Hillside School and Rosemary Meadow. **The outline of the plume in bold is approximate and not to scale.** Maps showing actual TCE concentrations and the true limits of the plume along with updated reports are available at the Needham Public Library or directly through the MA DEP.*

This schematic map shows the approximate limits of the plume of contamination in the groundwater. The groundwater flows downhill from the Microwave Development Laboratories (MDL) site on Crescent Road, through Rosemary Meadow, and toward the Needham/Wellesley Town Line. MDL is in the upper right corner of the map. Highest levels of contamination are near the MDL Site. Lowest levels are along the edges of the plume and towards the Wellesley Water Lands.

For Further Information

- To receive further information about the MDL site, write to Rodene Lamkin, the MDL Site Manager, MA DEP Northeast Regional Office, Bureau of Waste Site Cleanup (BWSC), 205B Lowell St., Wilmington, MA 01887, or call (978) 694-3354.
- Needham Public Library, 1339 Highland Avenue, Needham, MA 02492, is a local repository for MDL site documents. Contact the Reference section of the library at (781) 455-7559, for help in locating these materials.
- The HAC, now the Hillside Health and Safety Advisory Committee (HSAC), meets regularly at the Hillside Elementary School. Parents are encouraged to participate in meetings. Contact the School Administration Office at (781) 455-0461, for meeting schedules and a list of current committee members.
- For information about the Microwave Site Coalition, or to request additional handouts on this topic, contact the Needham Health Department, 1471 Highland Avenue, Needham, MA 02492, or call (781) 455-7523.

This original fact sheet was made possible through a grant from the DEP, and developed in January 2000 by JSI Center for Environmental Health Studies, Boston, MA, in cooperation with the Needham Board of Health and the Microwave