Understanding Contamination

The following information has been prepared to explain what environmental contamination is and what is being done to limit exposure to it in the Newhall neighborhood of Hamden.

What is Exposure?

"Exposure" means that you have come into contact with a chemical or some other harmful substance, and it has gotten into your body. ***If you are not exposed to a chemical, it won't make you sick.***

How can exposure happen?

For a chemical exposure to occur, there has to be a place where the chemical comes from. In the Newhall neighborhood, chemicals have been found in the soil because of dumping of industrial and household waste that was used to fill wetlands and low spots beginning 100 years ago.

If the soil is disturbed these chemicals can also become airborne. Chemicals can also be on plants or animals, and possibly get into or on the foods you eat that have been grown in soil that is contaminated. Some chemicals from the landfill areas have gotten into the groundwater in the Newhall neighborhood. This groundwater is **NOT** used for drinking water. The Newhall neighborhood's drinking water is piped into the neighborhood by the Regional Water Authority.

How does a chemical get into your body?

The three main ways a chemical can get into your body are:

1. **Breathing** air that has the chemical in it.
2. **Eating or drinking** something with the chemical in or on it.
3. Getting it on your **skin or touching** something with the chemical on it.

If you are exposed to a chemical, will you get sick?

This depends on a lot of factors about the exposure.

- It depends on the way the chemical got into your body.
- It also depends on how much and for how long the chemical got into your body. "It's the dose that makes the poison." Not all chemicals are equally toxic. Sometimes, a small amount of a chemical could make you sick. Other times, you would have to be exposed to a large amount of the chemical to get sick.

Factors that play a part in whether you will get sick from a chemical exposure are:

- the **type** of chemical (its toxic characteristics
- the **amount** (how much of a chemical you were exposed to)
- the **duration** (how long the exposure was)
- the **frequency** (how many times you were exposed)

Also, people respond to chemicals in different ways. Some people may be exposed to a chemical, but may not get sick. Other people may be more sensitive to a chemical, and get sick from an exposure. (For example, young children are more affected by exposure to lead than adults) And some illnesses would be caused only if you were exposed to a chemical for a long time.

What is Contamination?

The kind of contamination that we are concerned about in the Newhall neighborhood is called environmental contamination. Environmental contamination means that there is something in the soil (dirt), water, or air that could be harmful to people, plants or animals. The four main kinds of environmental contamination are:

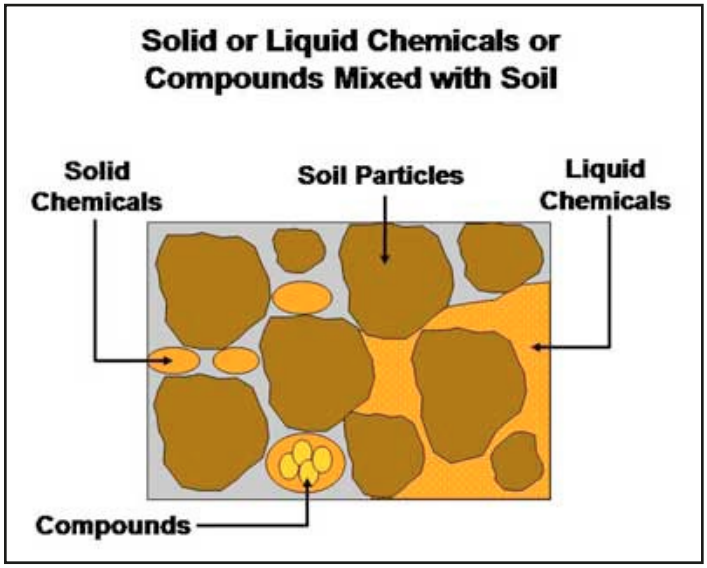
- Soil Contamination
- Groundwater Contamination
- Surface Water Contamination
- Air Contamination

The main type of contamination that has been found in the Newhall neighborhood is soil contamination. There has been limited groundwater contamination as well. Each type of contamination is described below, along with where it comes from, how it can harm people, and how to clean it up.

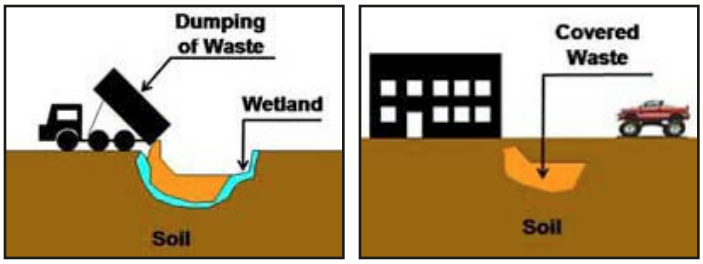
Soil Contamination

What is soil contamination?

Soil contamination is either solid or liquid chemicals or compounds mixed within the soil. Often contaminants in the soil are attached to soil particles (or grains). If they are not attached to the soil, they can be trapped in the small spaces between soil particles. **Soil can be contaminated but not harmful to health, it really depends on whether or not you are exposed and to how much.**



How did it get there?



Soil contamination in the Newhall neighborhood came from dumping of industrial and household waste in wetlands and low spots and mixing with soil. Eventually these areas were filled, covered with soil, and developed for houses, businesses, the middle school and other public area. Covering the wastes and developing the area caused soil to mix with wastes.

Can it harm people?

A lot depends on how much and for how long a person is exposed to the contamination. The presence of contaminants in the soil does not necessarily mean a person will get sick, but means there is a risk of exposure. The potential ways in which people and animals may be exposed to contaminants in the soil are: if they eat, breathe-in, or touch contaminated soil, or if they eat plants that have been affected by soil contamination. People can ingest and come into contact with contaminants when they play in contaminated soil or dig in the soil as part of their work.

Certain contaminants are absorbed into our bodies when they contact our skin, such as polycyclic aromatic hydrocarbons (PAHs), while others are not, such as lead and arsenic. When contaminants are attached to small surface soil particles they can become airborne as dust and can be breathed-in. Contaminants in the soil can hurt plants when they attempt to grow in contaminated soil and take up the contamination through their roots. People can then be hurt if they eat plants that took up the contamination or if the plants have contaminated soil on the surface. To learn more about how contaminants affect vegetables, the Connecticut Department of Public Health has prepared a fact sheet for gardening in the Newhall neighborhood. (See *Growing and Eating Fruits and Vegetables in the Newhall Neighborhood of Hamden*, Health Section, www.newhallinfo.org)

How can soil contamination be cleaned up?

Depending on the problem, there are many different ways to clean soil contamination. However, there are three main ways to cleaning up contaminated soil:

1. the soil can be excavated (dug-up) and be either treated or removed entirely from the area;
2. the soil can be left in the ground and treated in place; or
3. the soil can be left in the ground and contained to prevent the contamination from spreading and reaching plants, animals, or humans.

The Connecticut Department of Environmental Protection's 2007 cleanup plan for the neighborhood will use two methods. Contaminated soil will be removed down to a depth of four feet. Waste below four feet will be left in place, as it is at a depth where people will not come into contact with it.

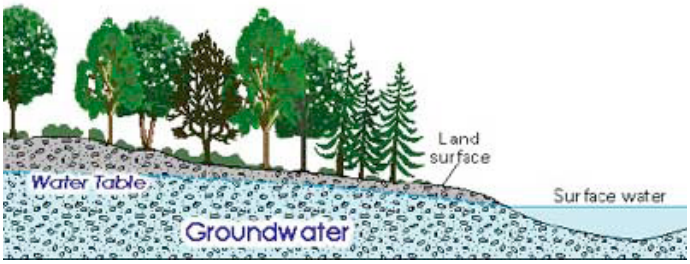
When contaminated soil is left in place, it is usually done by placing a large plastic cover or cap over the contaminated soil. At the former Hamden Middle School on Newhall Street the cap behind the auditorium is made up of a one inch geotextile barrier that rests over a plastic grid. At the bottom of the photo there are traces of the black matrix fill where contamination has been found. Above the soil cap the soil is light brown and clean. The cap helps prevent direct contact and to keep rain water from going into the soil and spreading the contamination to groundwater. It also prevents dust from forming and becoming airborne. Some other treatments can include: flushing contaminants out of the soil using water or some other liquid solution or air; burning the contaminants at special facilities; encouraging natural organisms, like bacteria, in the soil to break them down; or adding material to the soil to enclose the contaminants and prevent them from spreading. The treatment method used depends on

the specific chemicals – not all methods can be used on all chemicals.

In some locations of the Newhall neighborhood, contaminated soil has been both removed and temporarily covered with clean soil and wood chips. In the mid 1990's, the Town of Hamden put a layer of clean soil over the soccer fields behind the former Hamden Middle School and in January 2001, covered contaminated soil areas next to the middle school buildings. Between Fall 2001 and Spring 2002, the Federal Environmental Protection Agency removed highly contaminated soil at 13 private residences and replaced it with clean soil. The Connecticut Department of Environmental Protection spread wood chips in some yards where there were high levels of contaminants exposed in bare soils. At Rochford Field, the Town paved high traffic areas and replaced bare dirt areas.

Groundwater Contamination

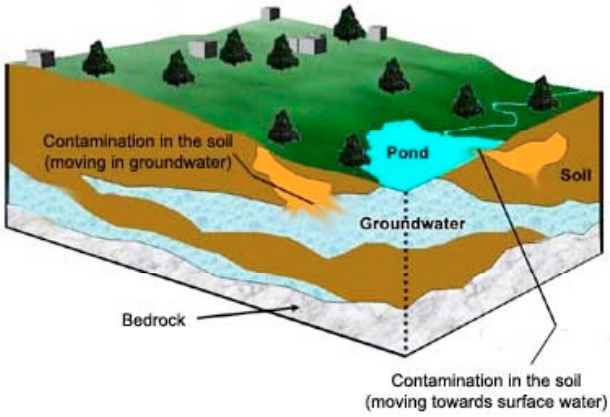
What is groundwater contamination?



Groundwater is water underneath the ground. It comes from rain water or water from surface water like lakes or streams that soaks into the soil. The water is stored underground in the tiny spaces between rocks and soil grains and can move around within the soil. Groundwater contamination occurs when the water comes into contact with contaminants. Currently there are groundwater monitoring wells installed in the Newhall neighborhood, the parks and at the schools. Additionally, two dozen more wells have been installed in the residential areas to see if the known soil contamination has moved into the groundwater.

Groundwater testing at the former Hamden Middle School found some petroleum hydrocarbons and solvents in groundwater beneath the athletic fields. These contaminants are being monitored. Residents of the Newhall neighborhood obtain their drinking water from the Regional Water Authority's reservoirs in East Haven and North Branford and do not come into contact with the groundwater.

How did it get there?



Groundwater can become contaminated through a variety of ways. Some chemicals will soak through the soil or be washed down by rain, eventually reaching groundwater. This could occur if there were chemical spills or materials dumped or buried in the ground. If groundwater flows through an area that is contaminated, some of the chemicals may be carried by the groundwater to further locations. Groundwater flow can be very, very slow, traveling in some instances just a few inches a year.

Can it harm people?

Like soil contamination, how much a person is exposed will determine whether or not it is harmful. Again, the good news here is that residents of the Newhall neighborhood are not exposed to groundwater as a drinking water source. They get their drinking and bathing water from the Regional Water Authority's water supply reservoirs.

Some test results indicate that there some VOCs are in the groundwater that flows under the former Middle School. The challenge with these types of compounds is that VOCs, even though they are in groundwater, can evaporate and turn into a gas form. Because of that, they can travel up through the tiny air spaces between soil particles. This does not happen to chemicals like lead or arsenic (they are metals and generally stay put in water).

If gases are released underground, they will seek the path of least resistance and go straight to the surface. Once they hit the surface they are released into the air. Once they hit the atmosphere they are immediately diluted into the air. If they are traveling underground and run into structures like buildings they will continue to seek the path of least resistance. Sometimes the path leads them out from under the building and sometimes it leads them up into the basement because they have a crack or leaky area in the building's foundation. This is very similar to the way radon can enter a basement. If (and there are a lot of "ifs") the gases build up inside a person's home, it's possible that the concentration of VOCs in indoor air, when breathed for many years, could pose a health risk.

How can the groundwater contamination be cleaned it up?

Different approaches are used to clean up contaminated groundwater. Sometimes groundwater is pumped from the soil or bedrock, treated to remove the contamination, then pumped back into the ground clean or discharged to a storm drain or sewage treatment plant. If contaminants are released from the soil into the groundwater slowly, large amounts of groundwater need to be pumped to remove a relatively small amount of contamination. In this case, groundwater contamination is dealt with by containing the contamination in a limited area to keep it from harming people, plants and animals. Still other types of contamination can be left in the ground without active pumping and treatment. In these cases, contaminants are reduced to non-harmful concentrations by natural biological, chemical, and physical processes before the contamination reaches the surface or flows to lakes or rivers.

Surface Water Contamination

What is surface water contamination?

Surface water is usually rainwater that collects in surface water bodies, like oceans, lakes, or streams. Another source of surface water is groundwater that comes out of the ground from springs. Surface water can become polluted when contaminants come into direct contact and either dissolve or physically mix with the water. There are no surface waters in the Newhall neighborhood and testing conducted under the direction of DEP found contaminants at this site did not move to the nearest surface waters - Beaver Ponds and a wetland west of Augur Street.

Air Contamination

What is air contamination?

The air we breathe can become contaminated if chemicals are released to the air in a gas form or if dust is generated from contaminated soil. Some chemicals can bind to soil particles and won't let go. Dust in the air is partly made up of soil particles suspended in the air.

How does it get there?

Air can be contaminated when gases or particles containing chemicals are released into it. This is often referred to as air pollution. There are many sources of air pollution including emissions from smokestacks and landfills, explosions and fires, automobile exhaust, factory equipment leaks, and commercial products, such as paints or household cleaners. In the Newhall area, we are mostly concerned with contaminated soil becoming airborne. This can occur when dry conditions, wind and/or digging activities cause contaminated soil to get into the air (airborne). Exposure to airborne contamination by Newhall residents is only likely to occur if residents dig up contaminated soil from their yards, leaving it exposed to the air where dust can be generated.

Special care will be taken by contractors during clean-up to prevent contaminants from getting into the air. When the soil is being dug up, the environmental contractors will use techniques such as misting the areas of active digging with water or by simply not digging on very windy days. Air monitoring equipment is used to make sure there are not unsafe levels of contaminants in the air during construction. Piles of soil will be covered with tarps or encased in special foams to prevent any of the soil from becoming airborne. The cleanup plan contains a detailed plan to minimize dust. (see the Dust Control Plan in the Documents (residential) Section of the Newhall Project website, www.newhallinfo.org.)

How can it harm people?

Contaminated air can harm people and animals when they breathe it in sufficient amounts. It can cause headaches, respiratory problems and other health effects if the contaminants are absorbed into the lungs and other parts of the body. While certain air contaminants can also harm people and animals when they come in contact with the skin, the majority of chemicals identified and being tested for in the Newhall neighborhood do not harm the skin on contact.

How can air contamination be cleaned up?

The most effective approach for cleaning up air pollution is to prevent contaminants from getting into the air. Because our main source of concern in the area is contaminated soil, the approach should be to prevent dust from being created.

Information provided on contamination is based on information provided by the United States Environmental Protection Agency (USEPA). Some of the text contains direct quotes while other EPA information is paraphrased.