LCP Chemicals Superfund Site Groundwater Monitoring Shows Plume Movements

TECHNICAL ASSISTANCE REPORT

June 2006

Overview

The LCP Chemicals Superfund Site Data Report "Results of 2005 Groundwater Monitoring Program" was received for review by the Glynn Environmental Coalition. This document presents new results of recent groundwater monitoring events, reviews older data, and provides opinions on the meaning of the information. There is a substantial amount of contamination within the groundwater at this site. The presence of this contamination impacts all possible uses for the site; however, more importantly, if the groundwater contamination is moving then it can affect properties adjacent the site, in addition to residents distant from the area.

We examined this data with the following questions in mind: What are the most toxic components? Are toxins moving horizontally towards adjacent properties? And, are toxins moving downward to threaten the drinking water aquifer?

Background

The 550-acre LCP Chemicals Superfund site along the Turtle River in Glynn County, Georgia was the location of industrial chemical plants for most of the 20th Century. Petroleum products, paint residue, and bleach by-products were discarded on-site or leaked from manufacturing processes. These operations left the area heavily contaminated with known chemical toxins such as mercury, chromium, PCB and carcinogenic hydrocarbons. Soils and groundwater are both affected. Previous cleanups removed a considerable amount of waste, but the site remains a threat. Many environmental tests were done; some were specific for certain toxic or physical parameters, others were done as part of generalized screening for toxic wastes under Federal and State guidelines.

The Site Data Report "Results of 2005 Groundwater Monitoring Program" dated May 2006 discusses the results of contamination within the aquifers (groundwater bearing soils) on the LCP site. There are two principle sources of groundwater contamination at this site. There is a sheet of contaminated groundwater flowing from the uplands. Primarily driven by rainfall, these toxins are the water-soluble chemicals from contaminated areas that were not removed or stabilized during previous soil treatments. This contamination moves from the dry uplands to the marsh and breaks up into many small plumes before entering the Turtle River estuary. The second major source is the "Caustic Brine Pool" (or "CBP") a large pool of waste that leaked during bleach production operations. The CBP includes brine, a mixture of salts in concentrations high enough to dissolve rocks, and heavy metals—some of which are highly toxic to humans and the environment. This Site Data Report is expected to be followed by a cleanup plan for the caustic brine pool.

Discussion

According to the report, 102 monitoring wells were placed at locations on-site in the mid-1990's as clusters of shallow and deeper wells for monitoring groundwater. Also, in 2002 two parallel bundles of horizontal wells were drilled beneath the area of the caustic brine pool. Since then, installation samples were taken from all of these wells, at least annually, for physical tests such as acidity, and for presence of toxins. The aquifer in the footprint of the site consists of a surficial water-bearing zone that receives water from surface areas (ponds) and rainfall. This is usually called the "upper water-bearing zone." The upper zone is divided into three intervals. This surficial aquifer sits on a layer called the cemented sand layer, below which is a second deeper aquifer called the "lower water-bearing zone." The horizontal wells are within the lower zone.

Potentially toxic substances found in significant amounts in the upper zone include antimony, arsenic, barium, beryllium, chromium, lead, mercury, nickel, selenium, and toxic hydrocarbons. It should be noted that most of the toxic hydrocarbons are found in the topmost interval of the upper aquifer zone (close to the ground surface). In the lower aquifer toxic substances include arsenic, chromium, mercury, and nickel. Some chemicals found in small amounts in the aquifers include cadmium and thallium.

In addition to toxins both aquifers show elevated levels of chemicals that indicate poor water quality. These include alkaline chemicals that alter the pH, along with chlorine, silica, and sulfur. While not necessarily toxic these chemicals reduce the usefulness of water in the aquifer making it undrinkable and can change the way that toxic chemicals move in the environment.

Also important to understand is the trend of chemical occurrence. Over the years annual groundwater monitoring provides a look at whether or not chemicals are moving, what direction they are taking, and if they are diluting out from natural processes. For example, examination of the horizontal well data from locations in the lower aquifer zone shows increases in pH and toxins such as mercury over the period of study. This indicates that some chemicals are sinking rapidly beneath the site. Each chemical has its own migration pattern based on its unique solubility in groundwater and interactions with local rock minerals. While there are exceptions, generally, chemicals in the upper aquifer away from the brine pool appear to migrate toward the marsh and Turtle River. Generally, chemicals in the brine pool appear to be moving downward. Geological processes are usually considered slow; however, at this site some chemicals increase substantially at each annual monitoring event. Therefore, the migration of some chemicals could be characterized as "rapid." There is no evidence in this monitoring data that the cemented sand layer between the upper and lower aquifers will play a major role in stopping the downward movement of toxins. Either the layer is too porous or is chemically altered by the physical nature of the caustic brine.

Most of the chemicals present in groundwater are from past industrial processes. One exception is arsenic, which is not known to be used by manufacturers that occupied the site, and can be present in small amounts in native soils. The study's authors state that the concentrations of arsenic are not "anthropogenic"—not from any human activity at the site. However, this may not be the entire case. The elevated arsenic may be from soil-bound arsenic dissolved into groundwater by changes in pH levels or arsenic mobility from other physical substances. A change in arsenic groundwater from other chemical changes at the site is still anthropogenic, regardless of whether or not arsenic was brought to the site as a process chemical. The reason this distinction may be relevant is that cleanup plans for the long-term may not include arsenic if it is removed from the list of site chemicals. Unless it can be proven scientifically that arsenic is completely unaffected by site conditions any cleanup should include arsenic reduction as a goal, rather than dismissing it as not of manufacturing origin.

In summary, chemicals—both toxic and physical—tend to be moving away from nearby properties and toward the marshlands in the upper surficial aquifer, and down toward the drinking water aquifer in the area of the caustic brine pool. The trend in the brine pool is an increase over time of chemicals in the lower aquifer, indicating there is no chemical confining layer beneath the CBP.

Without intervention the caustic brine will impact local drinking water aquifers. Finally, arsenic reduction should be an endpoint in any cleanup.

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