EPA Proposes Cleanup Plan for Contaminated Ground Water

Chevron Cincinnati Facility
Hooven, Ohio April 2006

Share your opinions

EPA invites your comments on its recommended plan for cleaning up contaminated ground water. Your input helps EPA determine the best course of action. You may mail, complete an online form, e-mail or fax your comments to EPA Community Involvement Coordinator Bri Bill. Your comments must be postmarked by the last day of the comment period.
Public comment period:
April 12 – May 30

Submit written comments to:
Briana Bill
EPA (P-19J)
77 W. Jackson Blvd.
Chicago, IL 60604
Fax: (312) 353-1155
bill.briana@epa.gov

Questions? Call Briana Bill:
(312) 353-6646 or
(800) 621-8431, Ext. 36646

To access online comment form, visit:
epa.gov/region5/sites/chevron

You may also share your views by attending a public hearing and speaking for the public record. A court reporter will record the hearing. You may also submit written comments at the hearing:
Tuesday, May 9, 6:30 p.m.
Whitewater Township Senior Center and Township Hall
6125 Dry Fork Road

Review documents at the site information repository:
Cincinnati Public Library
Miami Township Branch
8 Miami Ave., Cleves

Copies of the statement of basis are available to pick up at the Hooven post office and Whitewater Township hall.

A plan proposed by U.S. Environmental Protection Agency calls for periodic high volume pumping of ground water in highly contaminated areas to clean ground water contaminated by petroleum hydrocarbons. Over time, wells within the existing well network will be shut down and ground water tested to ensure the pollution does not spread. At that time, the plan relies on natural processes such as biodegradation to break down contaminants. Restrictions will be put in place to prevent exposure to ground water in the polluted area. A system to collect contaminated vapors (gas) will continue to operate under Hooven on a periodic basis, and the riverbank will be stabilized to prevent the erosion of contaminated material into the Great Miami River.

This proposal is one of five EPA considered for addressing contaminated ground water from the former refinery. EPA will explain its recommendation and the other options at a public hearing Tuesday, May 9. The public has until May 30 to comment on EPA's proposed plan and the other options or propose other ideas for EPA to consider (see box at left). Based on public comments, EPA may modify the proposal or select another option.

The *Statement of Basis for Ground Water (March 2006)* details EPA's proposal, and the *Chevron Cincinnati Facility Ground Water Corrective Measures Study (2000)* and *Conceptual Ground Water Remedy Report (2003)* provide more background about the options available to manage ground water contamination. They will soon be posted on EPA's Web page. These and other documents supporting EPA's proposal are also in the administrative record files at the library and EPA's office in Chicago. Call the records center at (312) 886-0902 for more information.

Cleanup Options

Ground water is extremely difficult to clean up and it takes a very long time. Therefore, an effective cleanup must include a means to prevent human exposure in the short term, while long-term work is under way. The options described here all include a combination of techniques to address these challenges. Restoring ground water to pristine condition is nearly always impossible, so EPA instead develops a plan with the goal of safely managing contamination, reducing exposure to people and the environment and cleaning up as much as possible.

EPA considered five options for managing and cleaning up contaminated ground water. EPA evaluated each option against five criteria outlined in Resource Conservation and Recovery Act regulations (see box next page). The alternatives, including EPA's recommended plan, are explained below:

Alternative 1: No Action: No additional monitoring or cleanup would be done.

Alternative 2: High-grade pumping, plume containment, monitored natural attenuation and institutional controls (*EPA's preferred alternative):* Ground water in several highly contaminated areas on the Chevron site would be pumped at high volumes whenever the ground water level is lower than normal, for example in the fall or during a drought. This "high-grade" pumping removes petroleum hydrocarbons from the ground water and helps to prevent the plume of contaminated ground water from expanding. This is an efficient way to remove contaminants from between the pores of rock and soil that make up the aquifer. This pumping scheme is different than the current pumping in several ways. This proposal limits pumping to specific wells in targeted areas of the site

where contamination is highest. Although fewer wells would be in use, pumping volumes would be much higher. The pumping wells will be selected to capture the ground water contamination under Hooven and other areas and draw it into the wells. EPA expects that over time, pumps would be shut down and natural processes would take care of any remaining contamination (see box this page). To ensure the pumping system prevents further spread of contamination, the plan requires that Chevron install additional monitoring wells, monitor the ground water regularly, and have contingencies in place in case tests show the plume has expanded.

This alternative would maintain the current system to extract vapor from rock and soil that lies above the ground water on site and in Hooven. Institutional controls such as deed restrictions would be put in place to prevent use of ground water in contaminated areas and prohibit the construction of basements on the Chevron property. The riverbank at the Chevron site and Gulf Park would be stabilized to prevent erosion of petroleum-contaminated soil into the river. EPA expects this remedy to reach cleanup goals of federal drinking water guidelines in 30 years. Total cost: $26 million.

Alternative 3: Alternative 2 plus soil vapor extraction: This includes all the actions described in Alternative 2, plus an additional soil vapor extraction system to remove petroleum-contaminated gas from the soil above the ground water. Seventeen horizontal wells would be installed under the Chevron property and three or four south of Hooven. The purpose is to achieve cleanup goals sooner. EPA expects the system would operate for five to 10 years. Total cost: $47 million.

Alternative 4: Alternative 3 plus in-situ air sparging: In addition to the actions described in Alternative 3, workers would inject air into the ground water at the Chevron property through a series of 3,500 wells 50 feet apart. Aerating the subsurface would help natural processes break down contamination, and increase volatilization of contaminants into unsaturated rock and soil, where the soil vapor system would extract the vapors. Like the system described in alternative 3, the air sparging technology would operate as long as it continued to be effective in removing contaminants, estimated to be five to 10 years. Total cost: $63 million.

Alternative 5: Alternative 3 plus surfactant-enhanced aquifer remediation technology: Instead of injecting air into the ground water as proposed in Alternative 4, workers would inject a surfactant, or detergent compound. This would help strip hydrocarbons from soil and rock so they can be collected by the soil vapor extraction system. Ground water would be treated over a period of years in small blocks, and only when the water table is low. Approximately 17,000 wells spaced 10 to 15 feet apart would be drilled. Total cost: $117 million.

How do the options compare?

EPA uses the criteria on page 3 to complete its evaluation of cleanup options. Considering these, all but the "no action" alternative would likely clean ground water to federal drinking water guidelines within 30 years. They would also prevent human exposure to site contaminants. Alternative 2, however, is easier to implement, more reliable in the long term and $21million to $91 million less expensive than other alternatives.

Alternatives 3, 4 and 5, which use more aggressive cleanup methods, would likely clean greater volumes of contaminants and do so more quickly, assuming they work effectively. Of these, Alternative 3 with its addition of the site-wide soil vapor extraction system would likely provide only modest improvement over Alternative 2 in cleanup time.

Alternatives 3, 4 and 5 are harder to implement than 2 because of the large network of underground wells, piping and other equipment requiring installation on the Chevron site. In addition, these technologies have not been used at a site the size of Chevron. Their ability to meet EPA's long-term reliability criterion is uncertain, making them less attractive options. Finally, the air sparging and surfactant-enhanced technologies included in Alternatives 4 and 5, respectively, may increase dissolved concentrations of contaminants and require additional technologies to contain or collect the contaminants.

In summary, when all criteria are weighed against one another, Alternative 2's implementability, long-term reliability, and cheaper cost may provide advantages over the other alternatives' short-term effectiveness and greater reduction in contaminant volumes. Because Alternative 2 can be readily implemented, is a proven technology and is the least expensive, it is EPA's recommended option.

How do natural processes work?

In a process called *natural attenuation*, chemical, biological and physical interactions natural in the environment clean chemicals in ground water. EPA believes several processes are at work in the Hooven area ground water.

During *microbial degradation*, microbes that live in the ground water use some chemicals for food. Over time, digestion changes these chemicals into water and harmless compounds.

Volatilization occurs when liquid contaminants evaporate. The resulting vapors can escape through cracks and pores in rock and soil into outside air where they are diluted and rendered harmless.

These processes work best where the original source of contamination has been removed or contained – as is happening at Chevron with the removal of contaminated soil, sludge and ground water. Depending on the site, natural attenuation may work just as well and as fast as other cleanup methods.

Evaluation criteria

EPA uses five criteria to compare and evaluate cleanup options:

1. Long-term reliability evaluates the option's long-term effectiveness, including how safely remaining contaminants can be managed.

2. Reduction of toxicity, mobility or volume of wastes addresses how well the option reduces the toxicity, movement and amount of chemicals.

3. Short-term effectiveness is how quickly the project achieves protection, as well as its potential to be harmful to human health and the environment while it's being constructed and operated.

4. Implementability addresses how well the alternative can be implemented. It evaluates the technical feasibility and whether materials and services are available to carry out the project.

5. Cost includes estimated capital or startup costs, such as the cost of buildings, treatment systems and monitoring wells. The criterion also considers costs to implement the remedy and operate and maintain it over time. Examples include laboratory analysis and personnel to operate equipment.

Risks to people

Risk from contamination is primarily to people who drink contaminated ground water (either from residential wells drilled in contaminated areas, former Chevron property, or so-called southwest quadrant). It also could affect workers on portions of the property who inhale vapors while digging into contaminated soil, or working continuously for eight hours in a basement, if one were to be constructed as part of the redevelopment of the site. EPA estimates that for every 100 workers exposed to contaminated vapors while working in a basement, as many as two could develop cancer. This is an unacceptable risk to health.

For this reason, all the cleanup options include a requirement for institutional controls to prevent exposure to contaminated ground water and vapors. Deed restrictions to prohibit the construction of basements on-site, local ordinances, signage and fencing are examples of the types of controls that could be employed.

Since Hooven's drinking water is tapped from unaffected ground water in Whitewater Township, there is no known health risk to Hooven residents from contaminated ground water. A 2005 study of vapors found the contaminated gases break down before reaching the surface. Although an area free of petroleum contaminants exists between the ground water and surface, contamination was found in surface soil. EPA believes this is not from Chevron. See the fact sheet dated November 2005 and *Subsurface Investigation Field Activities Report and Human Health Risk Assessment (October 2005)*, available on EPA's Web page or the library.

Risks to the environment

The greatest risk would be to plants and animals that rely on the Great Miami River. Water samples from the river, which lies adjacent to the former facility on the north, east and south, have tested free of site-related contamination. Samples from the river bank show low levels of petroleum hydrocarbons, which resulted from a petroleum release to the river discovered in 1985. Effects on aquatic life are expected to be minimal. Recently, however, spots of oil have been seen on the river in several areas, due to bank erosion. The bank will need be stabilized to reduce the erosion of oily soil into the river.

Also, computer models are being developed to better predict ground water movement. Wells are being drilled and sampled near the river to ensure ground water is not releasing contaminants into the river.

About the ground-water contamination

Prior to the refinery's closure in 1986, refined petroleum products leaked onto the ground and below ground. The contaminants seeped downward into the soil. A floating layer of mostly gasoline formed on top of the ground water and spread beneath the site, a commercial area southwest of the facility (called the southwest quadrant) and portions of Hooven to the west of the Chevron property. The mass – or plume -- of hydrocarbons lies approximately 10 to 25 feet below the surface at the site, and 35 to 65 feet under Hooven.

Sixteen wells on Chevron's property have pumped out and treated more than 1 billion gallons of polluted ground water and recovered 3.5 million gallons of hydrocarbon product since the initial pumps began operating in 1985. To keep contaminated vapors from moving into residential areas at the surface, a soil vapor extraction system operates under the site and portions of Hooven.

The proposed plan is intended to manage remaining risk from ground water to people and the environment. EPA selected a cleanup plan for contaminated sludge and soil in January 2004, and Chevron has begun to carry out the work. Details can be found on EPA's Web page.

What happens next?

EPA will consider all public comments before choosing a final plan. EPA will provide a written response to comments in its final cleanup decision. EPA will then negotiate a legal agreement with Chevron for the company to do the cleanup work under EPA supervision.

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Comments Accepted through May 30, 2006

Public Hearing
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See inside for more information

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Agency

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CHEVRON CINCINNATI FACILITY:
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