



Minnesota
Pollution
Control
Agency

MPCA Closed
Landfill Program,
Remediation Division

Investigating PFCs in groundwater near the Washington Co. Landfill

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This fact sheet describes testing of groundwater and private wells for perfluorochemicals (PFCs) near the former Washington County Landfill. The fact sheet also discusses PFCs, why state agencies tested for them, how the testing was done, and what was found. Links to more information follow.

Site history

The 40-acre Washington County Landfill accepted wastes from 1969 to 1975. Site operations were discontinued in 1975 and a clean soil cap was placed on the landfill. In 1981, ground-water monitoring found elevated concentrations of a class of chemicals called volatile organic compounds (VOCs) and some heavy metals in on-site monitoring wells and residential wells near the site. Alternate drinking-water supplies were provided to affected residences in 1983-84, and Ramsey and Washington counties installed a pump-and-treat system to address the groundwater contamination.

The site was added to the federal and state Superfund lists in 1984. After the MPCA's Closed Landfill Program (CLP) was created in 1994, the site was removed from the Superfund programs and the state took over its long-term care.

At that time, the CLP took additional steps to address groundwater contamination by improving the landfill cover and ground-water treatment system. Groundwater contamination related to the site appeared to be under control. But in 2004, PFCs were detected at the landfill.

What are PFCs?

PFCs are proprietary chemicals made by the 3M Company that have been used for decades to make products that resist heat, oil, stains, grease, and water. Common uses include nonstick cookware, stain-resistant carpets and fabrics, fire-fighting foam, coating for photographic film, industrial applications, and coatings for packaging such as milk cartons, cosmetic additives, and other personal products. PFC use was not regulated in the past.

The chemical structure of PFCs make them extremely long-lasting and mobile in the environment. There are more than a dozen PFCs. Currently, three of them -- perfluorooctane sulfate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanoic acid (PFBA) -- are of concern. PFOS and PFOA are "bioaccumulative," i.e. they build up in the tissues of humans and animals. Less is known about PFBA.

How did PFCs in the environment become a concern?

As scientific studies and testing methods improve, chemicals that could not be detected before are now detectable at low concentrations, and some are emerging as potential health and environmental concerns. The U.S. Environmental Protection Agency (EPA) performed a preliminary risk assessment on PFOA in 2003 indicating that PFOA is widely distributed in the global environment, even in the arctic. Studies on lab animals have found that exposure to high levels of

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**Exhibit
3223**

State of Minnesota v. 3M Co.,
Court File No. 27-CV-10-28862

3M_MN01535036

PFOA can have adverse developmental impacts, may be toxic to the liver, and could be associated with an increased risk of certain type of cancer.

Following the EPA risk assessment, the Department of Health (MDH) and other laboratories developed methods to measure PFCs in groundwater.

Where are PFCs from the landfill found?

The MPCA first checked for PFCs during routine groundwater sampling at the landfill during 2004. The chemicals turned up in monitoring wells on the landfill property in both shallow and deeper groundwater. Those findings led the MPCA and MDH to sample groundwater in the areas south and southeast of the landfill, downgradient (i.e., in the direction of groundwater flow) from the landfill. It became apparent that some PFC contamination appeared to be coming from the nearby 3M Oakdale Disposal site, located west of the Washington County Landfill.

In mid-2004 the two agencies focused PFC sampling on private wells south and southeast of the landfill. The sampling area was expanded in 2005 to the Tablyn Park and Lake Elmo Heights neighborhoods after PFCs were detected in the city of Oakdale's municipal wells. Sampling expanded to the Stonegate, Parkview, Whispering Pines and other neighborhoods north of Interstate 94.

In the spring of 2007, the agencies realized they had insufficient data to the east of the landfill, and sampled homes in a development called Hamlet on Sunfish Lake to fill in the data gap. PFBA was found there in 12 homes above the MDH's drinking-water advisory levels. These homes are being supplied with bottled water and will receive in-home treatment units. Maps showing the extent of PFC plumes in the area of the landfill are available on the MDH Web site at www.health.state.mn.us/divs/eh/hazardous/topics/pfcs/index.html.

How did PFCs get into the groundwater?

During its years of operation, the Washington County Landfill accepted both municipal and industrial solid waste. PFC wastes, primarily PFBA from 3M's Chemolite manufacturing plant in Cottage Grove, were disposed of there in the early 1970s.

Over the years, PFCs leached into the groundwater on the site and moved with the groundwater flow. They have also migrated downward to the deeper bedrock

aquifer, where PFCs are found at low levels. The aerial map on page 4 of this fact sheet shows where monitoring wells are located around the landfill.

At what level do PFCs pose a risk in drinking water?

The MDH has established Health Risk Limits of 0.5 parts per billion (ppb) for PFOA and 0.3 ppb for PFOS in drinking water. HRLs are criteria that MDH considers safe for human consumption over a lifetime. Due to limited toxicological research, the MDH has not established an HRL for PFBA. Until enough information is available to develop one, the MDH recommends an advisory guideline of 1.0 ppb for PFBA in drinking water.

In monitoring wells at and near the Washington County Landfill, PFOA has been detected at concentrations ranging from 82 ppb at the landfill itself to 0.3 ppb downgradient from it. PFOS has been detected in monitoring wells at the landfills at 0.2 to 1.7 ppb but has not been found away from the landfill. PFBA has been detected at a range of 0.2 to 461 ppb in the monitoring wells at and near the landfill. PFBA concentrations downgradient of the landfill in residential wells have ranged from non-detect to 12 ppb.

To date, the MDH and MPCA have sampled over 400 private wells as part of this ongoing investigation. PFCs have been detected in over 300 of them. The MDH advised residents whose well water has PFCs above HRLs and/or the PFBA guideline to not drink or cook with the water. Since then, many of the affected homes have been connected to municipal water; over 50 residences are currently being provided bottled water or granular activated carbon (GAC) filters, which are effective at removing PFCs from water.

What's being done about the PFC contamination at the landfill?

By the time of the PFC investigations it was becoming apparent that previous efforts to address VOCs at the landfill may have inadvertently played a role in the spread of groundwater contaminated with PFCs. For example, the water table under the discharge area was raised artificially by the discharge, and this may have given PFCs, which are much more mobile in groundwater than VOCs, a pathway to move offsite. Also, it has come to light recently that the pumpout discharge at one time went into a storm sewer which drained to Eagle Point Lake. At any rate, we know that

some PFCs have moved offsite despite the groundwater pumpout system which was designed to prevent, and *does* prevent, migration of VOCs.

Accordingly, the MPCA moved the discharge location of groundwater that is pumped and treated for VOCs to a new location that has decreased “mounding” of the water table. The new location has received the discharge since November 2006. This system does not provide treatment of PFCs, i.e. it doesn’t remove them from the groundwater.

In addition the agency is evaluating alternatives for a permanent remedy to the PFC contamination at the landfill. The alternatives include various methods of treating groundwater to remove PFCs, as well as removing the PFC wastes from contact with the water table, i.e. removing the wastes completely or putting them in a lined cell or vault. The MPCA plans to have the evaluation of alternatives completed and ready for public review soon.

What’s next?

The MPCA and MDH will continue to monitor private wells that have been affected and will sample other wells the agencies have reason to believe may be affected. When permanent remedies are installed at the site, the agencies will continue to monitor PFC-contaminated groundwater which has left the site, in some cases possibly long ago.

Meanwhile, investigation and cleanup of the other three 3M PFC waste sites – the Oakdale, Woodbury, and Cottage Grove sites -- continues under the state Superfund program. Additionally, the MPCA is pursuing a number of other investigations aimed at

discovering and defining the possible extent of PFCs in the wider environment.

If you receive this fact sheet or live in the area of interest and have any questions, please contact these MPCA staff:

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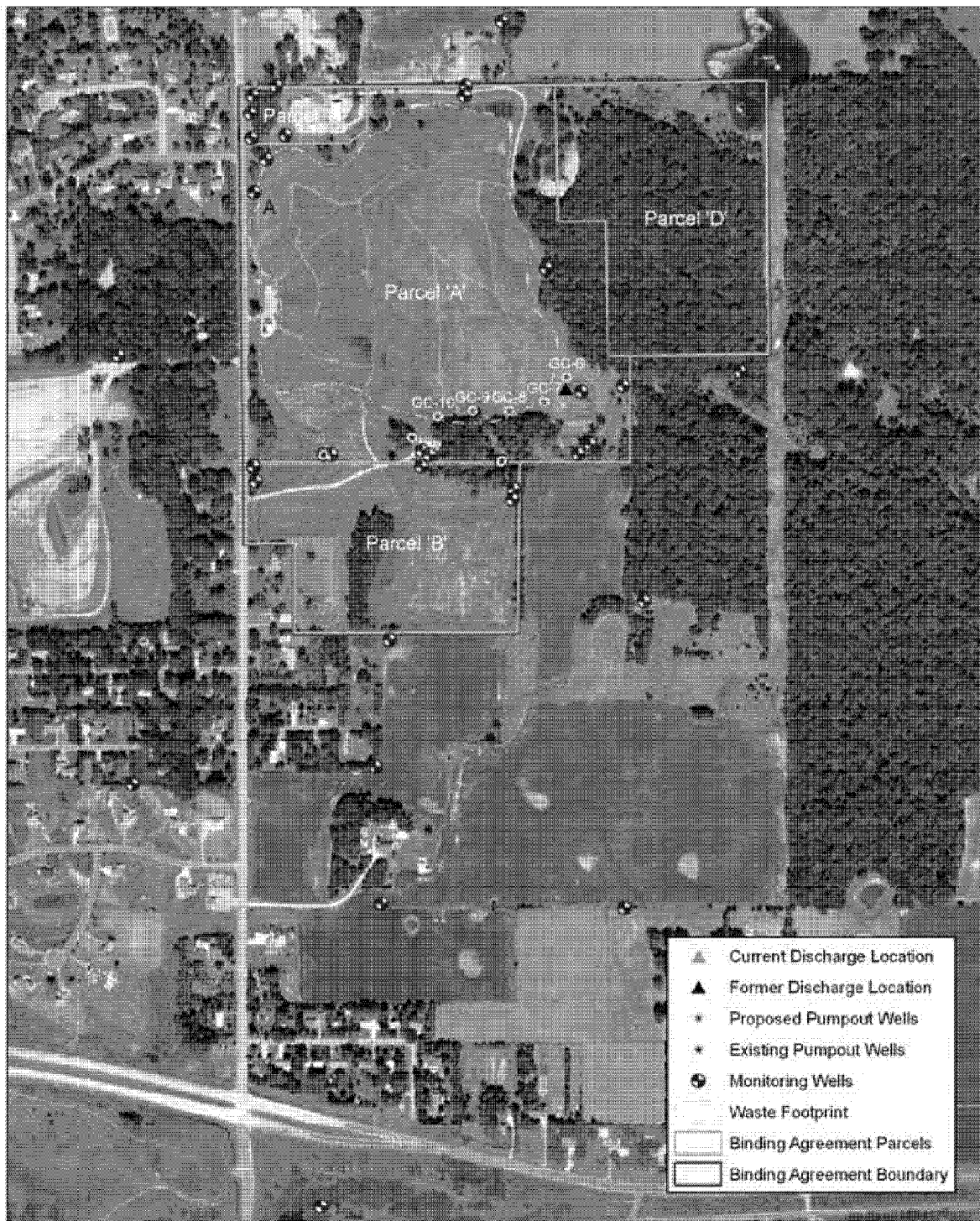
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Where can I find out more?

The EPA’s draft health risk assessment for PFOA can be found at www.epa.gov/opptintr/pfoa/pfoafacts.pdf. The MDH Web site includes information about health risk and exposure at www.health.state.mn.us/divs/ch/hazardous/index.html



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