Baytown Ground Water Contamination Superfund Site

Background Information

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Where is the Site?

The area of concern, commonly called the Baytown Site (Site), is defined by a 12.5 square-mile Special Well Construction Area (SWCA), designated by the Minnesota Department of Health (MDH). The Site is located in central Washington County between the city of Lake Elmo and the St. Croix River. The Site includes portions of eastern Lake Elmo, the portion of Baytown Township at and east of the Lake Elmo Airport, northern West Lakeland Township, and the southern two-thirds of Bayport.

The contaminant of concern at the Site is 1,1,2- trichloroethylene (TCE) that has been released to ground water. The TCE plume is located within the Site and is approximately five miles long and covers seven square miles. There are approximately 650 homes and several businesses located within the TCE plume that are served by private wells. The land use in the area is largely airport, agricultural and low-density residential.

Background

In June 1987, the MDH discovered TCE contamination while sampling residential wells in the vicinity of the Bayport Dump at the Stillwater Prison. By January 1988, the contamination was tracked to the Lake Elmo Airport.

In May 1988, the MDH created a SWCA for the Baytown Site. The SWCA informs well owners and drillers about the potential for contaminated ground water in the area and serves to prevent further degradation of the aquifer by requiring proper construction of new wells.

The Baytown Site was added to the State Superfund Permanent List of Priorities in 1988. It was also added to the Federal Superfund National Priorities List in January 1995. In May 1988, the Minnesota Pollution Control Agency (MPCA) issued a Request for Information to the Metropolitan Airports Commission (MAC) because the Lake Elmo Airport was a suspected source of trichloroethylene.

A consent agreement was signed with the MAC in 1998. MAC investigated ground water beneath the airport in phases from 1988 through 1991. TCE was found in the drinking water aquifer beneath the airport. MAC was declared a responsible party in 1991. MAC and MPCA conducted further investigations from 1992 through 1998.

MAC's 1999 feasibility study recommended installing point-of-use granular activated carbon (GAC) filters on contaminated private wells and producing annual reviews of new technologies. In May 2000, the MPCA issued a Record of Decision, which identified point-of-use of GAC filter systems as the primary remedial action together with the institutional controls in place with the SWCA. MAC began installing GAC filter systems on private wells in accordance with the TCE drinking water standard in effect at that time.

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Drinking Water Standards and GAC systems

Prior to January 2002, the MDH set the acceptable drinking water standard for TCE at 30 micrograms per liter (µg/L) for private water supply wells. In response to a draft U.S. Environmental Protection Agency (EPA) health risk assessment for TCE, MDH also issued an interim recommended exposure limit of 5 µg/L in January 2002. The change to a more stringent recommended limit required installation of many additional private well GAC filter systems and expansion of the SWCA. The MDH adopted 5 µg/L TCE as the private well Health Risk Limit in July 2007.

The MPCA monitors approximately 630 private wells affected by the Baytown Site TCE plume. The MPCA offers bottled water to residents whose wells exceed the 5 µg/L Health Risk Limit until GAC filter systems can be installed. GACs are normally changed out every two to six years, depending on the concentration of TCE and the volume of water use.

To date, in conjunction with the MAC, the MPCA has installed approximately 160 GAC filter systems. Residents have installed approximately 30 additional GAC filter systems. New residents whose properties were platted and approved after April 2002 need to provide their own GAC filter systems, maintenance and bottled water as required by township ordinance.

In 2003, low levels of TCE contamination were detected in the City of Bayport municipal well #2. By late 2006, TCE levels had exceeded the maximum contaminant level of 5 µg/l. In response, after conducting a feasibility study in 2004, the City and MPCA entered into a grant agreement to install an air stripper on this well. This municipal well treatment system is currently being constructed and is expected to be completed in 2007. MDH continues to monitor all Bayport municipal wells to ensure that levels are safe.

Subsequent Investigations

The MAC conducted investigations at the Lake Elmo Airport from 1988 to 2001. The MPCA initiated a series of additional soil and ground water investigations from 2002 to 2004 at and west of the Lake Elmo Airport to locate the primary source of contamination. This work resulted in finding and characterizing the major source of TCE contamination approximately three-quarters of a mile west of the airport beneath the property currently occupied by Hagberg's Country Market, a grocery store/gasoline station and beauty shop. The property was formerly occupied by a metal working facility from 1940 to 1968, when the suspected release is believed to have occurred. Based upon these new findings, the Baytown Superfund Site was redefined in terms of three operable units:

• Operable Unit 1 (OU1) – Monitoring and sampling of private water supply wells; installation, change out, maintenance and removal of GAC filter systems as designated in the May 2000 Record of Decision.

• Operable Unit 2 (OU2) - Installation of an air stripping treatment system at Bayport municipal well #2.

• Operable Unit 3 (OU3) - Investigation, design, containment and treatment of contaminated ground water at the primary source zone - a former metal working shop located beneath the Hagberg's Country Market property located at 11325 Stillwater Boulevard in Lake Elmo.

From 2004 to the present, the MPCA has conducted additional soil, soil gas and ground water investigations to further characterize the primary source zone.

The investigations conducted at the Lake Elmo Airport prompted the MPCA to conclude that water table TCE contamination beneath the airport was attributed to airport activities. Therefore, the MAC remains a responsible party. However, the additional investigation noted above has convinced the MCPA that the airport is neither the neither sole, nor most significant source of the Baytown contamination plume.

The original Record of Decision was amended in July 2007 to reflect the final cleanup decision and public input..

Summary of Site Risks

The chemical of concern for the Site is 1,1,2-trichloroethylene. TCE is colorless solvent with a slightly sweet odor, which is used primarily in industrial processes as a degreaser for metal parts. Since TCE is very volatile, it is not typically found in surface soil or surface water. Long-term exposure to high levels of TCE in drinking water may damage the liver, kidney, immune system, and nervous system, and may be associated with an increase lifetime cancer risk and certain birth defects. Current exposures are well below such levels, and these types of health effects are not expected to occur from this Site. Most recently, the MDH summarized potential health concerns at the Site in a Public Health Assessment dated September 2004.

Potential routes of exposure to TCE-impacted well water at the Baytown Site include direct contact during activities such as bathing and dishwashing, ingestion of drinking water, and inhalation of volatilized TCE.

The vapor intrusion exposure pathway was evaluated in a way consistent with EPA's Draft Subsurface Vapor Intrusion Guidance (November 2002). Potential exposure to contaminants via this pathway is possible with current and future development between Manning Avenue and Hagberg's Country Market in Lake Elmo. The MPCA will seek institutional controls such as property deed restrictions and vapor controls on future developments to ensure potential vapor intrusion issues are mitigated.

Although current concentrations of TCE at the site exceed the drinking water limit, the current OU1 remedy described above prevents exposure and protects human health. There are no apparent ecological exposures to contamination at this site. However, based on discovery of the primary source zone, additional containment and treatment of the source is warranted and proposed in this plan.

Remedial Action Objectives

Through containment and treatment of the source zone, the remedial action objectives are to:

- Minimize future migration of ground water contamination
- Restore the aquifer to drinking water standards within a reasonable timeframe
- Minimize the time private well owners need to remain on GAC filter systems

The goal of the proposed action will reduce the ground water concentration of TCE at Manning Avenue to 5 µg/L or less. Natural attenuation of the TCE will be monitored through down-gradient performance wells. Contamination levels higher than 5 µg/L might linger west of Manning Avenue, but risks of exposure would be low because the area is subject to a SWCA administered by the MDH. The SWCA was first established in 1988 and revised in 2006. It is an effective institutional control on the entire Site.

The first private water supply wells with TCE detections downgradient of the primary source zone are located east of Manning Avenue. After the objective of 5 µg/L TCE is met, private well owners east of Manning Avenue will no longer need GAC filter systems on the water supply wells.

Evaluation of Alternatives

The MPCA conducted an additional Feasibility Study in 2005, which identified and evaluated methods to contain contamination at OU3, the Hagberg property source zone. Remedies evaluated in this study included: (1) a permeable reactive barrier and (2) a ground-water gradient control capture system (henceforth referred to as a hydraulic barrier). The permeable reactive barrier concept involves a wall of injected iron that would span the contaminant plume. TCE would be removed as the contaminated ground water passes through and reacts with the wall.

A hydraulic barrier consists of a series of pumping wells that create a trough in the water table. TCE-contaminated ground water would be captured by the pumping system. Pumped water would be treated by an air stripping system and discharged to a nearby surface water body, injected below the surface or infiltrated at the surface. The hydraulic barrier was recommended based on long-term effectiveness, the ability to implement and lower capital cost.

Early in 2007, the MPCA plans to conduct another feasibility study to evaluate options to treat the ground water source zone beneath the Hagberg property (OU3). The feasibility study will evaluate several treatment technologies, which remove or degrade the TCE by physical, chemical or biological means. Treatment alternatives will be chosen using the criteria of effectiveness, ability to implement and cost. Some additional soil gas and ground water investigations will be conducted to assist in evaluating these options.

Summary of the Proposed Alternative

There is some evidence of TCE in soil gas (vapor) emanating from the plume to the east of the Hagberg property. There is also concern about potential vapor intrusion at the property. The proposed remedy is designed to address all of the above concerns. As stated above, the proposed remedy components include:

- Operable Unit 1 (OU1) – Continued monitoring, sampling of water supply wells, installation, change out, maintenance and removal of GAC filter systems as previously designated in the original Record of Decision issued in May 2000.

- Operable Unit 2 (OU2) – Continued installation of an air stripping treatment system at Bayport municipal well #2.

• Operable Unit 3 (OU3) – Containment and treatment of the primary source zone, a former metal working shop located beneath Hagberg's County Market Property at 11325 Stillwater Boulevard in Lake Elmo.

The MPCA proposes a two-phased remedial approach consisting of containment and source treatment.

1. Containment (Hydraulic barrier)
A hydraulic barrier to contain the TCE plume and prevent off-site migration would be installed first. The MPCA has begun construction of a hydraulic barrier near the eastern OU3 property boundary. This barrier is designed to control the ground water gradient such that high concentrations of contamination are unable to continue to migrate to the east. It will consist of four extraction wells that pump ground water to an air stripper to remove TCE from the water phase. The treated water will be injected into soils above the water table below the Lake Elmo VFW Ball Field.

2. Source treatment
Ground water beneath the source zone would be treated using an in-situ technology such as: physically extracting the volatile TCE by venting; biologically degrading the TCE by injecting nutrients; or chemically destroying the TCE by injecting additives. The optimal treatment method will be determined by pilot tests.

A pilot is underway to test the treatment zone in the field prior to installing a full-scale system. Additionally, based on further assessments currently underway, vapor control mitigation may be necessary within the Hagberg building. Successful source zone treatment will reduce the length of time needed for operation of the hydraulic barrier.

A ground water monitoring plan will be developed to evaluate the success of the remediation systems. Ground water monitoring will continue until MPCA determines the remediation objectives have been met. It is anticipated that monitoring will be conducted for a period of at least 20 years.
The costs associated with the remedial actions are estimated as follows:

Hydraulic Barrier

• Capital costs: $500,000 - $600,000 for design, construction, and system monitoring
• Operation and maintenance costs: $100,000 per year for monitoring and maintenance

Source Zone Treatment

• Capital costs: $200,000 - $750,000: The estimated cost will be refined as more information is generated by the feasibility study and additional assessment of the source zone. Depending on the remedy selected, additional operation and maintenance costs may also be incurred.

Contact Information

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