SECOND FIVE-YEAR REVIEW REPORT FOR BAYTOWN TOWNSHIP GROUNDWATER CONTAMINATION SUPERFUND SITE WASHINGTON COUNTY, MINNESOTA

Prepared by

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Region 5
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Approved by: **Date:**

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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	United States Environmental Protection Agency
CCl_4	Carbon Tetrachloride
CFR	Code of Federal Regulations
DNAPL	Dense Non-Aqueous Phase Liquid
FFS	Focused Feasibility Study
FS	Feasibility Study
GAC	Granular Activated Carbon
HBV	Health-Based Value (non-promulgated MDH value)
HRL	Health Risk Limit (promulgated MDH standard for private drinking water supplies)
IC	Institutional Control
ICIAP	Institutional Controls Implementation and Assurance Plan
ISCO	In-situ Chemical Oxidation
LTS	Long-Term Stewardship
MAC	Metropolitan Airports Commission
MCL	Maximum Contaminant Level (Federal standard for public drinking water supplies)
MDH	Minnesota Department of Health
Minn. R.	Minnesota Rule
MNA	Monitored Natural Attenuation
MN	Minnesota
MPCA	Minnesota Pollution Control Agency
MW	Monitoring Well
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PLP	Permanent List of Priorities (State of Minnesota)
PUT	Point of Use Treatment

PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
Site	Baytown Township Groundwater Contamination Superfund Site
SVOC	Semi-Volatile Organic Compound
SWBCA	Special Well and Boring Construction Area (Minnesota Department of Health)
TBC	To Be Considered
TCE	Trichloroethene
UU/UE	Unlimited Use and Unrestricted Exposure
VI	Vapor Intrusion
VOC	Volatile Organic Compound
ug/L	Micrograms per liter

Executive Summary

The Minnesota Pollution Control Agency (MPCA) conducted this statutory five-year review of the remedy implemented at the Baytown Township Groundwater Contamination Superfund Site ("Site") in Lake Elmo, Bayport, Baytown Township and West Lakeland Township, Minnesota. This is the second five-year review for the Site. Construction is not yet complete at the Site due to ongoing source control actions and due to the high likelihood of additional actions being needed to address trichloroethene (TCE) in groundwater. The purpose of this five-year review is to determine whether the selected remedy at the Site is expected to be protective of human health and the environment upon completion of remedial action.

The Site consists of a groundwater plume contaminated primarily with TCE which covers approximately seven square miles. The primary source area has been identified as a property at 11325 Stillwater Boulevard N in Lake Elmo, Minnesota, which was the site of a metal working facility from 1940 to 1968. The plume extends from this property eastward to the City of Bayport where it discharges to the St. Croix River. A municipal water supply serves the area covered by a portion of the plume, but the majority of the plume area is served by private wells.

MPCA, with the concurrence of the United States Environmental Protection Agency (EPA), signed the Record of Decision (ROD) for the Site on May 25, 2000. The objectives of the ROD are to prevent the use of groundwater that has contaminant concentrations exceeding the Minnesota Department of Health (MDH) Health Risk Limits (HRLs) and to prevent further degradation of the aquifer.

Actions implemented under the ROD included:

- Providing bottled water and installing and maintaining granular activated carbon (GAC) units on private wells;
- Groundwater monitoring;
- Establishing a Special Well Construction Area (known as Special Well and Boring Construction Area or SWBCA); and
- Removing a pump, inspecting, sampling and abandoning the unused irrigation well located on the Schiltgen property.

With EPA concurrence, MPCA amended the remedy on July 13, 2007. The amended ROD addressed the entire Site. The remedial action objectives (RAOs) of the amended remedy are to reduce migration of the contaminant plume, restore the aquifer to drinking water standards, and reduce the time for down-gradient private wells to remain on GAC filters. Actions implemented under the amended ROD include:

- Operable Unit 1 (OU 1) – Continued sampling of monitoring wells, sampling of private water supply wells, and installation, change out, maintenance and removal of GAC filter systems as previously designated in the ROD;
- Operable Unit 2 (OU2) – Design and installation of an air stripping treatment system at Bayport Municipal Well #2. The City of Bayport is responsible for O&M of the air stripper; and
- Operable Unit 3 (OU 3) – Containment of the primary source area by a groundwater capture system operated using extraction wells. The water is treated by an on-site air stripper and discharged in the vadose zone on-site. The system is operated by a MPCA contractor.

The amended remedy for OU 3 also includes in-situ treatment of source area groundwater. This portion of the remedy has not yet been fully implemented. However, a pilot in-situ chemical oxidation (ISCO) study of groundwater near the source area has been conducted and an additional Focused Feasibility Study (FFS) is underway. This FFS also addresses certain questions concerning OU 1.

The remedy at OU 1 currently protects human health and the environment in the short term because residential water wells are being treated at the point of use to acceptable levels and the plume does not cause a current vapor intrusion risk. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: (1) Identify additional wells that will require treatment following the upcoming change in Minnesota HRL for TCE and assess need to provide for interim protective measures such as bottled water and (for the long-term) installation of GAC treatment units for additional residences; (2) Update vapor intrusion assessment if conditions change; (3) Assess whether source area remedy and natural attenuation are sufficient to return plume to drinking water standards in a reasonable timeframe considering site-specific circumstances; and (4) Evaluate existing Institutional Controls (ICs) and assess whether additional ICs are needed to ensure long-term protection.

The remedy for OU 2 currently protects human health and the environment in the short-term because it treats TCE in the municipal drinking water well to acceptable levels. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: (1) Monitor TCE concentrations in Municipal Wells #3 and #4 relative to MCL and develop action plan for future protection; and (2) Evaluate existing ICs and assess whether additional ICs are needed to ensure long-term protection.

The remedy for OU 3 currently protects human health and the environment in the short-term because it contains groundwater that exceeds action levels and does not cause a vapor intrusion risk. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: (1) When HRL is revised, modify containment compliance criteria as needed; (2) Complete FFS to further assess in-situ treatment options and consider need for ARARs waiver due to DNAPL; (3) Resample subslab and indoor air at Hagberg's Country Market; and (4) Evaluate existing ICs and assess whether additional ICs are needed to ensure long-term protection.

Five-Year Review Summary Form

Site name *(from WasteLAN)*: **Baytown Township Groundwater Plume**		
EPA ID *(from WasteLAN)*: **MND982425209**		
Region: 5	**State: MN**	**City/County: Baytown Township/Washington**
NPL status: X☐ Final ☐ Deleted ☐ Other (specify)		
Remediation status (choose all that apply): X☐ Under Construction X☐ Operating ☐ Complete		
Multiple OUs?* X☐ YES ☐ NO	**Construction completion date:** ___ / ___ / _____(not CC yet)	
Has site been put into reuse? X ☐ YES ☐ NO (on-going residential use above plume and ongoing commercial use at source area)		
Lead agency: ☐ EPA ☐X State ☐ Tribe ☐ Other Federal Agency _____		
Author name: Gerald Stahnke (with contract support by AECOM)		
Author title: Project Leader	**Author affiliation: MPCA**	
Review period:** __3/29/2007 to 3/29/2012__		
Date(s) of site inspection: _2/10/2012__		
Type of review: X☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☐ 1 (first) ☐X 2 (second) ☐ 3 (third) ☐ Other (specify) _____		
Triggering action: ☐ Actual RA Onsite Construction at OU #_1 ☐Actual RA Start at OU#____ ☐ Construction Completion X☐ Previous Five-Year Review Report ☐ Other (specify)		
Triggering action date *(from WasteLAN)*: _3/29/2007__		
Due date *(five years after triggering action date)*: 3/29/2012__		

* OU" refers to operable unit.

Five-Year Review Summary Form (continued)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
n/a

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 1,2,3 (site-wide)	Issue Category: Institutional Controls			
	Issue: IC review needed to ensure effective ICs are in place and long-term stewardship is conducted			
	Recommendation: Prepare ICIAP			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	06/2013

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 1	Issue Category: Remedy Performance			
	Issue: Insufficient tracking of new wells requiring GAC systems			
	Recommendation: Develop and implement a system for notification of MPCA/MDH for GAC system installation and system performance in post-2002 homes			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	04/2013

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 1	Issue Category: Changed Site Conditions			
	Issue: Additional private wells will need treatment if HRL is revised			
	Recommendation: Identify additional wells with TCE exceeding a new HRL; assess need for interim protective measures; install GAC treatment; modify ROD as needed. This could include additional ICs.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	01/2013

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 1	**Issue Category: Remedy Performance**			
	Issue: Current groundwater remedy has not been demonstrated as sufficient to reach MCLs throughout plume (e.g., MNA)			
	Recommendation: Complete FFS; modify remedy as appropriate			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	12/2013

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 2	**Issue Category: Monitoring**			
	Issue: Increasing TCE trend in Bayport Municipal Wells #3 and #4 may require treatment in five years, or sooner if MCL is lowered			
	Recommendation: Monitor TCE concentration relative to MCL and develop action plan for future protection. This could include additional ICs.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Other	EPA/State	12/2013

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 3	**Issue Category: Remedy Performance**			
	Issue: In-situ treatment not yet fully implemented.			
	Recommendation: Complete FFS to further assess in-situ treatment and consider need for ARAR waiver due to DNAPL			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	12/2013

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 3	**Issue Category: Monitoring**			
	Issue: Modification of HRL for TCE may affect containment compliance criteria			
	Recommendation: Monitor and modify compliance criteria as needed			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	12/2013

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 1 and 3	**Issue Category: Changed Site Conditions**			
	Issue: Vapor intrusion risk evaluation needs updating			
	Recommendation: Resample subslab and indoor air at Hagberg's Country Market; re-screen VI risk throughout plume if conditions change			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	12/2012

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 3	**Issue Category: Changed Site Conditions**			
	Issue: Potential redevelopment could result in unacceptable exposures to vapor intrusion			
	Recommendation: Assess need for additional ordinances			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	12/2013

Protectiveness Statement(s)

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
1	Short-term Protective	n/a

Protectiveness Statement:
The remedy at OU 1 currently protects human health and the environment in the short term because residential water wells are being treated at the point of use to acceptable levels and the plume does not cause a current vapor intrusion risk. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: (1) Identify new wells that will require treatment following the upcoming change in Minnesota HRL for TCE and assess need to provide for interim protective measures such as bottled water and (for the long-term) installation of GAC treatment units for additional residences; (2) Update vapor intrusion assessment if conditions change; (3) Assess whether source area remedy and natural attenuation are sufficient to return plume to drinking water standards in a reasonable timeframe considering site-specific circumstances; and (4) Evaluate existing ICs and assess whether additional ICs are needed to ensure long-term protection.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
2	Short-term Protective	n/a

Protectiveness Statement:
The remedy for OU 2 currently protects human health and the environment in the short-term because it treats TCE in the municipal drinking water well to acceptable levels. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: (1) Monitor TCE concentrations in Municipal Wells #3 and #4 relative to MCL and develop action plan for future protection; and (2) Evaluate existing ICs and assess whether additional ICs are needed to ensure long-term protectiveness.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
3	Short-term Protective	n/a

Protectiveness Statement:
The remedy for OU 3 currently protects human health and the environment in the short-term because it contains groundwater that exceeds action levels and does not cause a vapor intrusion risk. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: (1) When HRL is revised, modify containment compliance criteria as needed; (2) Complete FFS to further assess in-situ treatment options and consider need for ARARs waiver due to DNAPL; (3) Resample subslab and indoor air at Hagberg's Country Market; and (4) Evaluate existing ICs and assess whether additional ICs are needed to ensure long-term protection.

Date of last Regional review of Human Exposure Indicator (from WasteLAN): __**March 2012**_____

Human Exposure Survey Status (from WasteLAN): _**Current Human Exposure Controlled**

Date of last Regional review of Groundwater Migration Indicator (from WasteLAN): __**March 2012**_____

Groundwater Migration Survey Status (from WasteLAN): __**Contaminated Groundwater Migration Not Under Control**__

Ready for Reuse Determination Status (from WasteLAN): _**Not eligible for SWRAU (groundwater site only)**

I. Introduction

The purpose of this five-year review report is to determine whether the remedy at the Site is expected to be protective of human health and the environment upon completion of remedial action. The methods, findings, and conclusions of reviews are documented in this report. In addition, this report identifies issues found during the review and identifies recommendations to address them.

EPA must conduct five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 U.S.C. § 9601 et seq., and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300 et seq. Section 121(c) of CERCLA states:

> *If a remedial action is selected that results in any hazardous substances, pollutants, or contaminants remaining at the site, the remedial action shall be reviewed no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.*

The NCP at 40 C.F.R. § 300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The MPCA conducted this statutory five-year review of the remedy implemented at the Site. This review was conducted from January 2012 through March 2012 with the support of MPCA's contractor AECOM under Master Contract ID Number 13156. This report documents the results of the five-year review.

This is the second five-year review for the Site. The triggering action for this statutory review is the completion date of the previous five-year review on March 29, 2007. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

The Site consists of three OUs (distal plume and private wells; municipal well; source area.) The RAOs for the amended remedy are to minimize migration of the source area contaminant plume; restore the aquifer to drinking water standards; and reduce the time for down-gradient private wells to remain on granular activated carbon (GAC) filters.

OU1 consists of the distal plume and private wells in that plume. Construction at this OU is considered to be on-going. Point-of-use GAC units have been installed at all existing wells where TCE exceeds the MDH HRL or federal MCL of 5 ug/L, or TCE and CCl^4 cumulatively exceed the HRL equivalence. Groundwater trends in multiple aquifers are monitored regularly. The State of Minnesota expects to issue a revised Health-Based Value (HBV, non-promulgated) or Health Risk Limit (HRL, promulgated) for TCE in the near future. When this happens, MPCA expects that it will be necessary to install additional GAC units at approximately 100 to 200 additional homes, and it may be necessary to initially supply bottled water.

OU2 consists of the City of Bayport Municipal Well #2. Construction of an air stripper to treat contaminants present in this well is complete. However, levels of TCE (1 to 3 ug/L) below the current MCL (5 ug/L) are present in two other Bayport municipal wells. If EPA lowers the MCL for TCE in the future, treatment for additional municipal wells will likely be needed.

OU3 consists of groundwater and dense non-aqueous phase liquid (DNAPL) in the source area. Construction at this OU is considered to be on-going. Construction of a hydraulic containment system is complete, but additional construction may be needed to implement in-situ treatment of DNAPL, which is currently being studied via a FFS. In March 2012, the State began an additional investigation of DNAPL at a potential second source area, and a tracer study, as recommended by a recent EPA-supported RSE-Lite optimization study.

II. Site Chronology

Table 1 – Chronology of Site Events

Event	Date
Groundwater contamination found in Baytown Township	1987
Minnesota Department of Health issues Well Advisory for Baytown area	1988
Site listed on the State Superfund Permanent List of Priorities	1988
State began adding GAC treatment to private wells	1988
Metropolitan Airports Commission (MAC) conducts investigations	1988 - 1991
Site added to Federal Superfund National Priorities List	1994
MPCA and MAC conduct further investigations	1992 - 1998
Consent Order between State and MAC	1999
MAC completed Feasibility Study for the Site	1999
MPCA published Proposed Plan for the Site outlining remedial actions	1999
Granular activated carbon units installed and water well monitoring enacted Site-wide	1999 to present
MPCA signs ROD with EPA concurrence selecting monitoring and point-of-use GAC treatment for private wells	2000
Schiltgen property irrigation well plugged	2001
MDH issues interim risk level of 5 ug/L TCE in place of previous HRL of 30 ug/L	2002
MPCA conducted investigations which identified source as Hagberg property	2003 - 2006
Baytown Township first enacts Ordinance No. 36 re water testing & GAC systems	2003
State of Minnesota enacts Minn Statute Section 1031.236 re disclosure to home buyers	2003
West Lakeland Township first enacts Rule 15 re water testing & GAC systems	2004
MDH conducts Public Health Assessment	2004
Additional source area found (Hagberg property)	2004
Remedial Action implementation responsibilities transferred from MAC to MPCA	2004

Event	Date
MPCA and MAC amend Consent Order	2005
Mini-FS completed for TCE source area plume containment	2005
MDH expands Special Well Construction Area for Lake Elmo	2005
MPCA Grant Agreement and Amendment signed with City of Bayport for municipal well #2 air stripper	2006
MPCA signs ROD Amendment with EPA concurrence to add remedies for OU2 (municipal well air stripper) and OU3 (source area groundwater containment and in-situ treatment)	2007
Pilot in-situ chemical oxidation (ISCO) study conducted	2007
City of Bayport installs air stripper on municipal Well #2	2007
Previous five-year review	2007
Hydraulic barrier remediation system begins operation on Hagberg property	2008
Vapor intrusion assessment for proposed St. Croix Preparatory Academy school	2008
MDH updates map of Special Well Construction Area	2008
MPCA conducted additional investigations on Hagberg property	2008 - 2011
Periodic O&M reports prepared by MPCA consultants on GAC systems and hydraulic barrier system	2008 - 2011
Updated site-wide vapor intrusion assessment	2009
Remedial System Evaluation completed (groundwater optimization study) by EPA contractor	2011
FFS begun for source area in-situ treatment and additional assessment of dissolved phase plume	2012

III. Background

Physical Characteristics

The Site is located in Washington County, Minnesota and includes portions of Baytown Township, West Lakeland Township, the City of Bayport and the City of Lake Elmo. The Site consists of a contaminated groundwater plume which covers approximately seven square miles and is five miles long. Land above the groundwater plume includes farmland, rural residential houses, commercial buildings, Lake Elmo Airport and developed areas of the City of Bayport. The primary release site of the TCE was identified as the Hagberg's Country Market property located at 11325 Stillwater Boulevard N in Lake Elmo, see Figure 1 in Attachment 1. The Site stretches east from the Hagberg property to the St. Croix River located five miles to the east, see Figure 6A in Attachment 1.

The general geology at the Site consists of 75 to 100 feet of unconsolidated glacial drift overlying bedrock. The water table generally is present at a depth of 35 to 65 feet. The glacial drift is directly underlain by 100 to 145 feet of the highly fractured Prairie du Chien Dolomite. Under this unit is the Jordan Sandstone with a thickness of 85 to 100 feet. The Prairie du Chien/Jordan aquifer is the primary source for water supply in the local area as well as the wider Twin Cities area. The Prairie du Chien Dolomite is not present at the source in Lake Elmo or in the City of Bayport where it has eroded away.

A public water supply is available in portions of the cities of Lake Elmo and Bayport, but most of the plume area is served by private wells. Existing older residential water wells are completed in glacial drift and bedrock aquifers. Most new water wells are installed in the Jordan Sandstone.

Land and Resource Use

The historical land use of the Site was primarily farmland and rural residential with commercial and urban residential uses associated with the municipalities of Lake Elmo and Bayport. Commercial use of the Hagberg property by a metal working facility from 1940 to 1968 is the suspected source of the release of the majority of TCE. The Hagberg property is currently occupied by a convenience store (Hagberg's Country Market), a hair salon and a gasoline filling station.

The groundwater aquifers underlying the Site are currently used as a drinking water source by rural residences in the area and by the City of Bayport. The dominant groundwater flow direction is to the east toward the St. Croix River.

History of Contamination and Investigation

TCE was discovered in groundwater in Baytown Township in 1987 during groundwater sampling near the former Bayport Dump. The Site was listed on the State Superfund Permanent List of Priorities (PLP) in 1988. The Site was also added to the Federal Superfund National Priorities List in 1994. Subsequent sampling led to expansion of the limits of the SWBCA in 2002 and 2005.

In 1988, the MPCA identified the Lake Elmo Airport as the suspected source of the TCE and requested the Metropolitan Airports Commission (MAC) to conduct an investigation of the airport property, see Figure 2A in Attachment 1. The MPCA issued a Request for Response Action (RFRA) to the MAC in August 1991. The MAC declined to undertake additional investigation and implement remedial action required by the RFRA. The MPCA then issued a Determination of Inadequate Response (DIR) to the MAC in December 1991. Subsequent

discussions with the MPCA led to an agreement that the MAC would conduct additional investigations.

The MAC and MPCA performed further investigations between 1992 and 1998 which found TCE in groundwater up-gradient (west) of the airport. The MPCA and MAC then executed a Consent Order in March 1999 under which the MAC proceeded as a volunteer to work with the MPCA for selection and implementation of a remedy. The MAC completed a Feasibility Study (FS) for the Site in April 1999 which evaluated various remedial alternatives for the Site. The MPCA published the first Proposed Plan for the Site on May 1, 1999 which outlined the remedial actions proposed for implementation at the Site. An illustration of TCE impacts to aquifers at that time are shown on Figure 1-9 in Attachment 1.

The remedy selected for the Site through the ROD issued in 2000 consisted mainly of GAC units installed on private water supply wells to remove and treat TCE in groundwater from wells that exceeded MDH HRLs. The MDH HRL for TCE was 30 µg/L at the time the ROD was issued (but is now considered to be 5 ug/L, the same as the federal MCL).

The MPCA conducted several investigations between 2003 and 2005 which identified the source area of the TCE groundwater contamination as the Hagberg property located at 11325 Stillwater Boulevard in Lake Elmo, Minnesota. The Hagberg property, site of a former metal working facility from 1940 to 1968, is approximately 3700 feet west-northwest of the Lake Elmo Airport. Monitoring results from 2005 and 2006 established that the highest concentration of TCE in groundwater is in a monitoring well located on the east side of the building on the Hagberg property, down-gradient in the direction of groundwater flow.

Initial Response

The MDH created a Special Well Construction Area for the Site in 1988. Figure 6B in Attachment 1 shows the current Special Well and Boring Construction Area (SWBCA) expanded from the 1988 configuration. The purpose of the SWBCA was to inform well owners and drillers about the potential for contaminated groundwater in the area, to prevent further degradation of the aquifers and to place special restrictions on the construction of new wells within the SWBCA boundary. The Site was listed on the State Superfund Permanent List of Priorities List in 1988 and added to the Federal National Priorities List in 1994. The MPCA assumed responsibility for regulatory oversight of the Site in 1995 through the MPCA Enforcement Deferral Pilot Project under which the USEPA deferred on-site decisions to the MPCA.

Basis for Taking Action

TCE was found in groundwater in the area of the Lake Elmo Airport up to 138 ug/l in the Prairie du Chien Dolomite aquifer and up to 62 ug/l in the Jordan Sandstone aquifer. These levels exceed the current HRL (5 µg/L) and MCL (5 µg/L) for drinking water and present an unacceptable risk to users of the aquifer. For example, TCE concentrations in the Jordan Sandstone aquifer were observed up to 86 ug/L at a residence approximately 700 feet east of the airport. The ROD also documented the presence of much lower levels of carbon tetrachloride (CCl_4) in groundwater at the Site. The suspected source of $CCl_4$is the former grain silos near 13136 40th Street North.

IV. Remedial Actions

Remedy Selection

A Record of Decision (ROD) was signed by MPCA, with concurrence of EPA, on May 25, 2000. The RAOs for this ROD are as follows:

1. Prevent the use of groundwater that has concentrations exceeding the MDH HRLs; and
2. Prevent further degradation of the aquifer.

The remedy included the following actions:

- Install and maintain GAC units on private wells that have TCE or CCl_4 concentrations that exceed MDH HRLs or the HRL additivity index;
- Conduct long-term monitoring of private water supply wells and define the edges of the plume;
- Continue to closely monitor wells with TCE concentrations approaching the HRL and prepare to install GAC units;
- Maintain ongoing evaluation of existing and emerging technologies that may provide source location and removal, or control and implement such technologies if they are feasible;
- Remove a pump, and inspect, sample and abandon an unused irrigation well;
- Evaluate the need for, and install if necessary, down-gradient monitoring points;
- Develop a groundwater model or modify an existing groundwater model, to evaluate future chemical fate and transport;
- Maintain the MDH Special Well Construction Advisory; and
- Remain current with the latest TCE health risk information and provide additional carbon filtration if needed no later than 30 days after the revised HRL is finalized;

An amended remedy was developed as a result of data collected during additional investigations conducted on the Site, changes in groundwater standards for TCE, identification of TCE exceeding groundwater standard concentrations in a City of Bayport municipal well and identification of the apparent source of the TCE impacts to groundwater. The amended selected remedy altered the response action to include three operable units (OU 1, OU 2 and OU 3) as described in the Executive Summary.

MPCA signed a ROD Amendment for the Site on July 13, 2007. The ROD Amendment addressed the entire Site and served to clarify the original remedy, in addition to other modifications. The RAOs of the amended remedy are to minimize migration of the (source area) contaminant plume; restore the aquifer (down-gradient of source area) to drinking water standards; and reduce the time for down-gradient private wells to remain on granular activated carbon (GAC) filters.

The amended remedy includes the following major components:

OU1: Continue monitoring private wells, sampling private water supply wells, and installation, change out, maintenance and removal of GAC filter systems.

OU2: Design and installation of an air stripping treatment system at Bayport Municipal Well #2. The City of Bayport is responsible for ongoing operation and maintenance of the Municipal Well #2.

OU3: Containment and treatment of the primary source area:

- Install a hydraulic barrier near the eastern OU3 property boundary to contain the portion of the TCE plume near the source area such that high concentrations of contamination are unable to continue to migrate to the east (four extraction wells, an air stripper to remove TCE and near-surface or deeper re-injection); and
- Treat groundwater beneath the source zone using a treatment train approach consisting of in-situ technologies such as multiphase extraction or chemical oxidation. Vapor control mitigation may be necessary.

The potential vapor control mitigation included in the amended remedy for OU3 was envisioned to include both air emissions from the treatment process and vapor intrusion for buildings.

Remedy Implementation

Remedy implementation is summarized by OU below:

OU 1 (Groundwater Plume)

Early phases of the remedy were implemented by the MAC under agreements with MPCA, including installation of GAC treatment systems in down-gradient homes. In 2003, township ordinances placed the responsibility for GAC installation and maintenance for homes platted after April 9, 2002 on the homeowner. Following discovery of a new primary source area not related to the MAC in 2004, the responsibility for remedy implementation overall was shifted to the State, operating under a State Superfund Contract with EPA.

MPCA samples private water supply wells, and installs, changes out, maintains, and removes GAC filter systems using a State contractor. Currently MPCA maintains GAC filters in approximately 180 homes within the SWBCA. One homeowner has refused installation of GAC treatment and MPCA supplies bottled water to this homeowner. A new owner at one home has repeatedly refused access to MPCA for change-out of the GAC filter installed with permission of the previous owner. For wells located on properties platted and approved after April 9, 2002 for development, township ordinances require property owners to test and treat their own drinking water wells (see IC Section).

The GAC systems generally consist of two 90-pound GAC canisters connected in series. The first is the lead canister and second is the polishing canister. Prior to change-out, samples are collected before the lead canister and between the lead and polishing canister. The samples are analyzed for VOCs to determine the effectiveness of the system. The lead GAC canister is changed out on a schedule based on TCE concentration and water use. At change-out the polishing canister is moved to the lead position and a new GAC canister is placed in the polishing position downstream of the lead canister.

MPCA also regularly monitors a network of groundwater monitoring wells in addition to the residential wells. The trends in the upper bedrock aquifers in the 2009 to 2011 period show that most wells have decreasing or stable concentrations of TCE in the Prairie du Chien aquifer. In just the most recent two year period (2010-2011), a sample set of 26 wells out of 140 total Prairie du Chien aquifer wells shows that TCE is decreasing in more wells than increasing. A sample set of 25 out of approximately 140 Jordan Sandstone aquifer wells shows TCE increasing and decreasing in a nearly equal number of wells compared to 2008 and 2009 concentrations. Most recent trends show that half of the 25 Jordan Sandstone aquifer well concentrations are stable or fluctuating both up and down. MPCA continues to monitor trends.

OU 2 (Bayport Municipal Well #2)

Groundwater extracted by Bayport Municipal Well #2 is now being treated prior to its entrance into the Bayport Municipal Water Supply in order to reduce the concentration of TCE. An air stripper to treat TCE from the City of Bayport Municipal Well #2 was completed in 2007. The air stripper was installed because TCE was identified at concentrations exceeding the 5 µg/L MCL. The treatment-train consists of chlorine pretreatment to prevent scaling, aeration to remove TCE and discharge of the treated water to the Bayport Municipal Water Supply. The water is treated by a low profile air stripper which treats the water to less than 1.0 µg/L TCE. The City of Bayport is responsible for operation and maintenance of the system. Effectiveness monitoring of the treatment system is performed to ensure the treatment system discharge meets the RAOs and ARARs.

OU 3 (Source Area)

Containment of the primary source on the Hagberg property is being implemented with a groundwater capture system (hydraulic barrier) using remedial extraction wells. Groundwater extracted by the wells is treated with an air stripper to reduce TCE concentrations to meet discharge criteria. The treated groundwater is discharged to horizontal infiltration pipes installed in the unsaturated soils above the water table. The infiltration pipes are located on the Hagberg property and adjacent property owned by the City of Lake Elmo, see Figure 2B in Attachment 1.

The vertical hydrogeology of the source area at the Hagberg property consists of a shallow perched water unit and middle and deeper sand units within unconsolidated sediments above bedrock, see Figure 9B in Attachment 1. The shallow perched water unit is at a variable depth from less than 10 feet to approximately 340 feet below ground surface (bgs) and is underlain by a discontinuous clay layer. The middle sand unit is located beneath the discontinuous clay layer at a depth of approximately 50 to 80 feet bgs and is underlain by a second clay layer 4 to 16 feet in thickness that appears to be continuous below the Hagberg property. The second clay layer appears to act as a confining layer for the deeper sand unit and as a barrier to downward migration of TCE impacted groundwater. The second clay layer is not believed to be continuous to the Lake Elmo Airport. Data from Site monitoring wells and residential wells down-gradient in groundwater flow from the Hagberg property suggest the unconsolidated and bedrock aquifers are hydraulically connected within 0.3 miles of the Lake Elmo Airport.

TCE impacts were found in groundwater samples from the perched groundwater and middle sand units but were not found in groundwater samples from the deeper sand unit obtained through temporary sampling locations. Permanent monitoring wells are installed in the perched and middle groundwater units. Monitoring well data and published reports suggest that the TCE may have entered the groundwater through a former well or building floor drains on the Hagberg property. Such a well or floor drains have not been identified on the property.

A hydraulic barrier groundwater extraction and treatment system installed on the Hagberg property began operating in March 2008 and continues in operation today. The hydraulic barrier system consists of four extraction wells (three located east of the apparent release site and one located to the south at depths of approximately 80 feet bgs). Water is pumped to a low-profile air stripper, solids filtration system and two 520-foot long horizontal infiltration pipes located approximately 25 feet underground. The system treats extracted groundwater to a TCE concentration of 1 µg/L or less prior to discharge to the infiltration pipes. The system treats and discharges approximately 8,000,000 to 20,000,000 gallons of groundwater per year depending on the number of extraction wells in operation and the rate of pumping.

A pilot in-situ chemical oxidation (ISCO) study using sodium permanganate treatment of groundwater near the source area was conducted in November 2007. The sodium permanganate

was injected at depths of 40 to 60 feet which corresponded to the upper half of the middle groundwater unit. TCE concentrations initially were reduced down-gradient of the apparent source area, but later rebounded. The cause of the rebound was not determined but may in part be attributable to the injection occurring down-gradient of the main mass of the source.

Institutional Controls

ICs are non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for exposure to contamination and that protect the integrity of the remedy. Compliance with ICs is required to assure the long-term protectiveness for any areas which do not allow for unlimited use or unrestricted exposure (UU/UE).

The objectives of the ROD are to prevent the use of groundwater that has contaminant concentrations exceeding the MDH HRLs and to prevent further degradation of the aquifer. The RAOs are to reduce migration of the contaminant plume, restore the aquifer to drinking water standards, and reduce the time for down-gradient private wells to remain on GAC filters.

As described below, ICs have been implemented to ensure that the remedy functions as intended. However, construction of the remedy, including ICs, has not been completed and additional studies are underway to determine if the remedy needs to be upgraded. Implementing and maintaining ICs will be required to assure protectiveness of the remedy. Furthermore, the existing ICs have not been fully evaluated. Preliminary IC evaluation activities reveal that additional review of the ICs is needed to assure that the remedy is functioning as intended with regard to the ICs and to ensure effective procedures are in-place for long-term stewardship at the Site. Long-term stewardship must be assured which includes maintaining, monitoring and enforcing effective ICs. Also, additional ICs should be explored to address any vapor intrusion pathway.

Analysis of Existing ICs:

On May 6, 1988, the MDH issued a Well Advisory, the SWBCA, for parts of Baytown Township, West Lakeland Township, and the City of Bayport. The advisory placed restrictions on the construction of new wells within the well advisory boundary, and required that well owners test for VOCs prior to completing and placing a well into service. The selected remedy for the Site includes maintenance of the SWBCA to prevent exposure to contaminated groundwater and prevent the spread of contamination due to improperly plugged wells.

In 2003, Minnesota passed Minnesota Statutes Section 103I.236, which requires a seller of real property in Washington County not served by a municipal water system or that has an unsealed well, to state in writing to the buyer, whether, to the seller's knowledge, the property is located in a SWBCA.

Minnesota Statutes Section 103I, Subdivision 5, Clause 7 grants the Commissioner of Health the authority to establish standards for the construction, maintenance, sealing, and water-quality monitoring of wells in areas of known or suspected contamination. Minnesota Rules Part 4725.3650 details the requirements for construction, repair, and sealing of wells within a designated SWBCA, including plan review and approval, water-quality monitoring, and other measures to protect public health and prevent degradation of groundwater.

The Baytown SWBCA was last revised by MDH on March 30, 2005 and the area coverage map was last updated in 2008. The revised SWBCA includes all of Section 13 of Township 29 North, Range 21 West (Attachment 2). Under the current SWBCA, a property owner and a licensed well contractor must submit a written request to construct or permanently seal a well in the SWBCA. Before permission to construct a well is granted by MDH, the well owner must agree to pay for a VOC analysis on the water and abide by conditions of the approval. Except for

certain locations, a new well in unconsolidated deposits is not allowed. The Prairie du Chien aquifer is not allowed for new potable water use in the SWBCA. Jordan Sandstone aquifer wells will be allowed with certain conditions specified in the SWBCA.

In addition, Baytown Township and West Lakeland Township have ordinances requiring installation of GAC systems if the TCE concentration of groundwater from newly installed wells exceeds 0.5 µg/L, or one-tenth the HRL for TCE (Attachment 2). MPCA is working with the City of Bayport and the City of Lake Elmo to review whether additional ordinances are needed for those cities.

The township ordinances require all wells with carbon filter systems that are covered by the ordinance to have a licensed plumber or licensed water conditioning contractor inspect the GAC system and replace the carbon filters every three years and provide proof of this replacement to the Township. The wells that currently do not have a GAC filter must be tested every two years. Reminder notices of the ordinance are sent to well owners who have not switched out their filters or tested their wells as required. Washington County currently offers VOC sample collection for residents for $230. The samples are analyzed by the MDH Public Health Laboratory and homeowners are notified of the results by letter from MDH. In addition, MDH has issues several public information sheets for carbon filter owners.

Current Site Conditions:

MPCA is not aware any wells constructed without following the conditions of the SWBCA or of any current Site uses that interfere with the remedy.

IC Follow-up Actions Needed:

Long-term protectiveness requires compliance with effective ICs. Hence, effective ICs must be implemented, monitored, maintained and enforced along with maintaining site remedy components so that the remedy will function as intended. Long-term protectiveness should be ensured by implementing effective ICs and through long-term stewardship (LTS) of ICs. To that end, an Institutional Controls Implementation and Assurance Plan (ICIAP) should be developed.

The ICIAP should include the following evaluation and planning activities:

- Conduct a survey of properties affected (or potentially affected) by the contamination and inventory of private wells that have or should have point of use filters that may not be on the existing database (e.g., properties platted after 2002);
- Ensure that existing maps showing boundaries of areas potentially subject to vapor intrusion risk associated with the Site and groundwater areas which will not allow for UU/UE are up to date;
- Evaluate these areas to see whether the existing SWBCA and applicable ordinances adequately cover all non-UU/UE areas;
- Evaluating the effectiveness of existing ICs including clarifying areas of coverage (if needed) and enforceability;
- Evaluate whether additional ICs are needed due to other routes of contamination such as vapor intrusion;
- Plan for implementation of additional ICs, as needed; and
- Plan for long-term stewardship of the ICs and the Site.

The Table below summarizes the ICs which are in place for the Site.

Table 2 – Institutional Controls Summary Table

Media, Engineered Controls, & Areas that Do Not Support UU/UE* Based on Current Conditions.	IC Objective	Title of Institutional Control Instrument Implemented (note if planned)
Groundwater – current area that exceeds 5.0 ug/L (current MCL and HRL)	Prevent exposure to contaminated groundwater from private wells and prevent spread of contaminated groundwater through improperly sealed wells	Baytown-West Lakeland Special Well Construction Area (Minn. Rules, part 4725.3650) updated 3/30/2005
Groundwater – current area that exceeds 0.5 ug/L (one tenth of HRL/MCL)	Ensure GAC treatment is installed, monitored, and maintained for private wells in portion of Town of Baytown within the Baytown-West Lakeland SWBCA	Baytown Township Ordinance No. 52, enacted September 12, 2011
Groundwater – current area that exceeds 0.5 ug/L (one tenth of HRL/MCL)	Ensure GAC treatment is installed, monitored, and maintained for private wells in portion of Town of West Lakeland within the Baytown-West Lakeland SWBCA	West Lakeland Township Town Code Section 14, enacted October 4, 2011.
Vapor Intrusion	Evaluate need for ICs to ensure no inappropriate exposures	Under review
Other Remedy Components	Protect integrity of remedy	Under review

* unlimited use/unrestricted exposure

Updated maps which depict the current conditions of the Site and areas which do not allow for UU/UE will be developed as part of MPCA's IC evaluation activities.

Long Term Stewardship:

To ensure long-term protectiveness at the Site, effective ICs must be implemented, monitored, maintained and enforced to ensure that the remedy continues to function as intended. Long term protectiveness at the Site requires compliance with remedy and use restrictions to assure the remedy continues to function as intended. LTS involves assuring effective procedures are in place to properly maintain, monitor to and enforce the ICs along with site O&M. To assure proper maintenance, monitoring and enforcement of effective ICs, LTS procedures will be reviewed and a plan developed. (This plan could be an amendment to an existing O&M plan or a part of the ICIAP). To that end, LTS procedures should be reviewed and a plan developed to document such procedures. The plan should include provisions that the ICs be evaluated regularly. The plan would include regular inspection of ICs at the site and annual certification that ICs are in place and effective. Additionally, use of a communications plan and use of one-call system should be explored to ensure for long-term stewardship of the Site.

System Operation/Operation and Maintenance

OU 1 (Groundwater Plume)

For properties platted and approved prior to April 9, 2002, GAC units are installed and maintained by an MPCA contractor. GACs are changed-out according to a schedule based on TCE concentration of the well water and metered water usage. The original schedule developed in 2003 was modified by the MPCA in a program review completed in 2010. The 2010 schedule generally increased the change-out frequency, eliminated mid-cycle sampling and reduced mailing of metering cards to homeowners. The change-out frequency is conservative to minimize the chance of breakthrough of TCE to the home water system. The MPCA contractor provides periodic reports of change-outs and sampling results during the year. The MPCA maintains a database of all sampling and maintenance results. Results indicate the GAC units are working effectively to protect water well users from TCE. Sampling and testing of individual wells follows the 2010 schedule. O&M-type activities during Remedial Action for OU1 is effective in maintaining the remedy.

OU 2 (Bayport Municipal Well #2)

Design and construction of the air stripper treatment system for the Bayport Municipal Well #2 was funded by a grant from MPCA to the City of Bayport. The treatment system began operating in the spring of 2007. The City of Bayport is responsible for the operation and maintenance of the treatment system under the terms of the grant. Water quality of the Bayport wells is monitored by the MDH based on quarterly water sampling and confirms that O&M for OU2 is effective in maintaining the remedy.

OU 3 (Source Area)

The hydraulic barrier system at the source area has operated since March 2008 with few shutdowns mainly for maintenance and repair. The system shut down in 2009 due to a high water alarm in Infiltration Pipe #1. Calcium carbonate buildup in the pipe caused it to clog. Treated groundwater discharge was rerouted to Infiltration Pipe #2 while Infiltration Pipe #1 was cleaned. Discharge water is now treated with carbon dioxide to minimize the chance for buildup of calcium carbonate. Clogged sediment filters caused multiple system shutdowns. The system was back-flushed and filters replaced prior to restarting the system.

Four extraction wells (RW-1, RW-2, RW-3 and RW-4) were initially operated at pumping rates of 5 to 10 gallons per minute each. RW-4 was taken out of service in 2010 and RW-1 was taken off-line in 2011. Pumping on RW-2 and RW-3 appears to effectively capture groundwater for the barrier system.

Costs

Costs for O&M of OU 1 and OU 3 are paid by the MPCA. The cost for O&M OU 2 is paid by the City of Bayport. Costs for OU 1 include bottled water, installation of GAC units, change-out of GAC units, water sampling, and annual reporting. Costs for OU 2 are paid by the City of Bayport and are not available at the time of this review. Costs for OU 3 include O&M of the hydraulic barrier system, monitoring well sampling, laboratory analyses, NPDES permitting, and quarterly and annual reporting.

Table 3 – System Operations/O&M Costs

	Dates		Total Cost rounded to nearest $1,000
	From	To	
OU 1	2007	2012	$422,000.00
OU 3	2007	2012	$491,000.00

V. Progress since the Last Five-Year Review

Previous Five-Year Review Recommendations and Progress Toward Implementation

The Protectiveness Statement from the first Five-Year Review conducted in 2007 was as follows:

> The remedy is functioning as intended and is protective of human health and the environment in the short-term because GAC filters are installed and maintained on private wells exceeding MDH limits as required under township ordinance or as authorized by the MPCA. Compliance with institutional controls and the use of bottled water or GAC filters on private wells that exceed MDH limits are necessary until the groundwater achieves MDH limits throughout the plume. Long-term protectiveness will be achieved when source areas are addressed and MDH limits are achieved throughout the plume.

Six recommendations for follow-up actions were listed in the 2007 Five-Year Review. The recommendations and subsequent follow-up actions are presented below:

1. Conduct remedy decision process to address need for new operable units.

Follow-up: Three operable units were created by the ROD Amendment signed in July 2007.

2. Modify the ROD to reflect the new exposure limit for TCE.

Follow-up: The MDH issued an interim recommended exposure limit (IREL) for TCE of 5 µg/L to be used in place of the HRL of 30 µg/L in the 2000 ROD. The amended ROD cites this IREL as the ARAR for drinking water in private water wells.

3. Identify the treatment system currently being installed on the Bayport well as an early action and select a final remedy through the remedy decision process.

Follow-up: An air stripper installed on the City of Bayport Municipal Well #2 is currently operating and reduces TCE concentrations to less than 1.0 µg/L prior to discharge of treated water to the municipal water distribution system. The ROD Amendment signed in 2007 did not identify the air stripper installed on the Bayport well as an early action; however, MPCA is in the process of evaluating the Site remedy in an FFS, which may result in an additional remedy modification which recognizes the goal of eventually reaching MCLs in the aquifer through natural attenuation.

4. Conduct a FS and through the remedy decision process, select a method for treating the source zone. Once the final method is selected, design and construct a treatment zone.

Follow-up: The primary source area was identified as the Hagberg property in Lake Elmo, Minnesota. A pilot ISCO study was conducted in 2007 to further explore treatment of the source zone. A focused FS for the source zone was completed in 2008. It recommended no further treatment of the source zone. Following additional monitoring in subsequent years, the US Army Corps of Engineers was invited to perform a "Remediation System Evaluation" in June of 2011. Currently, the MPCA is reviewing and implementing recommendations included in this report (see details below). The MPCA has also begun a new FFS to re-evaluate additional in-situ treatment options and answer implementation questions.

5. Complete the remedy decision process for selection of a containment method for the source area.

Follow-up: A hydraulic barrier system was installed at the source area to contain TCE impacted groundwater, as selected in a 2007 ROD Amendment.

6. Update O&M Plan to address all treatment areas and to ensure long-term stewardship that includes maintaining and monitoring effective ICs.

Follow-up:

OU 1 (Groundwater Plume)

Modifications were made to GAC change-out and sampling schedules to ensure adequate treatment of TCE impacted groundwater prior to human consumption. A "Program Review" of the residential well sampling and GAC management was completed by MPCA contractor Bay West in 2010. The recommendations of the review were implemented. The Township of Baytown and Township of West Lakeland passed amended ordinances regarding construction of new water wells within their respective jurisdictions.

OU 2 (Bayport Municipal Well #2)

VOC concentrations in City of Bayport municipal wells are monitored by the MDH on a quarterly basis.

OU 3 (Source Area)

The hydraulic barrier system has operated within design parameters controlling groundwater gradient and treating effluent to below the discharge standard concentration. The MPCA has completed groundwater capture evaluations of the hydraulic barrier system. This has allowed the rate of pumping to be reduced minimizing groundwater extraction and treatment while maintaining containment of the plume. Additional recommendations included in the "Remediation System Evaluation" prepared by the U.S. Army Corps of Engineers in 2011 are being reviewed and implemented where feasible, as discussed below.

Remediation System Evaluation Recommendations and Progress Toward Implementation

The Remediation System Evaluation conducted in 2011 by EPA's contractor, the U.S. Army Corps of Engineers, in coordination with MPCA resulted in a number of additional recommendations. These are summarized below along with a summary of progress toward implementation.

1. Implement In-Situ Chemical Oxidation (ISCO) within Source Area

Follow-up: With assistance of a State contractor, the MPCA has developed a work plan for further source definition and a FFS that will evaluate source area treatment to be prepared by June 2012. For the FFS, permanganate and activated persulfate (with hydrogen peroxide activation) are being considered as ISCO amendments. The 2011 sampling results have indicated reductions in concentrations down-gradient of the groundwater extraction system in the shallow part of the aquifer, but little response in the deeper aquifer.

2. Phased Implementation of ISCO Source Area Treatment

Follow-up: The MPCA agrees that a phased approach is likely to be useful and is evaluating it for implementation of any source area treatment remedy. The MPCA is planning to install two

additional monitoring wells down-gradient of MW-37 and RW-6 to help assess the Site hydrogeology and further refine the Conceptual Site Model.

3. Consideration of In-Situ Bioremediation

Follow-up: This is being implemented as part of the on-going updated FS preparation. The MPCA will consider various products, including lactate and vegetable oil, for injection that would have both a possible bioremediation component and a possible abiotic removal component.

4. Recommendation for Additional Source Area Assessment

Follow-up: The MPCA has prepared a work plan for further source area definition which includes additional membrane-interface probe use and angle-drilling/push-probes under the Hagberg building and push-probes in areas southwest of the building.

5. More Rigorous Evaluation of Hydraulic Barrier Capture Influence

Follow-up: The MPCA and its contractor conducted additional pumping tests in December 2010 and are incorporating additional capture analysis in the annual report.

6. Improvements to the Monitoring Program

Follow-up: The MPCA agreed that additional geochemical characterization would be useful in the source area to supplement such analysis done in the past. In addition, the MPCA has begun to assess concentration trends for wells in the Jordan Sandstone aquifer more closely, while the MPCA contractor is assessing trends in the Prairie du Chien aquifer wells.

7. Reduce Blower Airflow Rate (at the source area air stripper)

Follow-up: The MPCA contractor is in the process of evaluating this recommendation. Effluent sampling is currently being conducted to confirm that discharge criteria will be met at the reduced blower airflow rate. The MPCA and its contractor still have concerns for maintaining an adequate air/water ratio to achieve treatment goals. The RSE team believes that a reduction could be done without jeopardizing treatment.

8. Adjustments to the GAC Management Program

Follow-up: MPCA has replaced one 30-lb pair GAC residential treatment unit with a 90-lb pair. Most 90-lb units successfully treat the water used for 3-5 years without a change-out. The 90-lb units are always installed in residential homes unless space is too limited. The plumbing must be installed in such a way that exterior hose bibs do not provide treated water (since these are typically used for irrigation, swimming pools, etc.). The recommendation involving the re-piping of water at residential homes with significant outdoor water usage to segregate indoor versus outdoor water usage was not considered practical or necessary at the present time.

9. No Need for Class I Division 1 Motors

Follow-up: This recommendation will be considered in the future when equipment requires replacement.

10. Optimization of the Groundwater Monitoring Program

Follow-up: The MPCA has begun using passive-diffusion bags (PDBs) in some monitoring wells, which will result in some savings, but this may not be implemented throughout the program due to comparability concerns in some areas.

11. Use of More Rigorous Monitored Natural Attenuation (MNA) Modeling

Follow-up: MPCA is planning more detailed MNA modeling in the future and will consider the specific recommendation at that time. The MPCA will also consider use of a mass flux approach as a method of long-term trend evaluation following any future source area treatment or to monitor natural attenuation progress.

12. Continue Evaluation of Groundwater Infiltration System Plugging Problem (at source area)

Follow-up: The MPCA contractor continues to inject CO_2 to the treated water to alleviate scaling. The injection laterals are surveyed by down-hole camera and though scaling is observed, the rate of fouling is slow. Rehabilitation using jetting is effective for maintaining capacity.

13. Periodic Inspection of Electrical Controls (at source area system)

Follow-up: An inspection of the functionality of the various system controls and alarms was conducted in the fall of 2011 and is part of the routine inspection process. Routine inspection of the electrical system by a licensed electrician is not performed on a routine basis, but is performed whenever there is a need for some type of electrical maintenance or repairs.

14. Optimize Process Flow Configuration for Air Stripping System (at source area)

Follow-up: The MPCA and its contractor indicated the recommended change in the location of the filter units would require adding pumps and they are not planning to do this.

15. Preparation of an Annual Report

Follow-up: This recommendation is being implemented starting with new modifications to the 2011 report.

16. Improvement of Data Management

Follow-up: The MPCA has made some improvements and is using the EQUIS database to manage analytical data.

Document Review

This five-year review consisted of a review of relevant documents including city and township codes and ordinances, state statutes, O&M records and monitoring data (Attachment 3). Applicable state and federal soil and groundwater standards were reviewed (Attachment 4).

Data Review

OU 1 (Groundwater Plume)

Monitoring of private wells, sampling of private water supply wells, and installation, change out, maintenance, and removal of GAC filter systems continued as previously designated in the ROD except that the HRL changed from 30 µg/L to an IREL of 5 µg/L during the first Five-Year Review period which required additional residential wells to be served by GAC systems. The State of Minnesota promulgated a new HRL of 5 µg/L during this second Five-Year Review period. Review of data presented in periodic O&M reports and tracked by MPCA indicates no evidence of exposure to TCE in drinking water above 5 ug/L and that the GAC remedy is performing to protect users of the impacted groundwater.

Vapor Intrusion Assessment for OU 1

Vapor intrusion risk has also been reviewed by both MPCA and EPA. The current Minnesota Groundwater Intrusion Screening Value (GW ISV) for TCE is 20 ug/L. The shallowest aquifer in use where TCE concentrations exceed 20 ug/L is the Prairie du Chien Dolomite. TCE concentrations approaching or exceeding the GW ISV in the Prairie du Chien range from

234 ug/L in Lake Elmo to approximately 18 ug/L on Oasis Avenue in Baytown Township. There are no existing residences in Lake Elmo above the plume. Moving eastward down-gradient, the first residences occur on Neal and Norman Avenues. The highest risk residence based on TCE concentration and potential depth to the plume between Neal Avenue and Oasis Ave is 3495 Norman Avenue with a TCE concentration of 21ug/L in 2010, which is slightly above Minnesota's current GW ISV for TCE. Local well depths are approximately 110 feet and the depth to the water table is approximately 95 -100 feet, which adds protection from vapor intrusion. Because the depth to the water table is substantial and the TCE concentration is only 5% over the Groundwater ISV, based on the current Minnesota vapor intrusion assessment procedures there does not appear to be a risk of vapor intrusion with existing residences at the Site. However, the higher TCE concentrations in Lake Elmo do indicate a potential risk of vapor intrusion for any future development there.

EPA has also reviewed vapor intrusion risk in OU1 based on existing information. EPA agrees that the depth to groundwater is likely to provide adequate protection from vapor intrusion for existing residences but recommends that sampling (e.g., beginning with soil gas) be scheduled to confirm the lack of risk to current residents, especially considering the recent toxicity reassessment for TCE as discussed elsewhere in this five year review. EPA also agrees with MPCA concerning the potential for vapor intrusion risk in an undeveloped area of Lake Elmo.

OU 2 (Bayport Municipal Well #2)

The results of the groundwater monitoring of the Bayport municipal wells were obtained from the MDH. The results show that groundwater at the input to Municipal Well #2 continues to maintain a concentration of TCE above the MCL and that post-treatment drinking water is non-detect for TCE. The air stripper treatment system for Municipal Well #2 is performing as required.

Concentrations of TCE in Bayport Municipal Well #3 and Well #4 remain below the MCL but are increasing. The highest recorded TCE concentrations were recorded in samples collected in January 2012 when TCE concentrations in Wells #3 and #4 were 3.2 ug/L and 2.4 ug/L, respectively. TCE concentrations appear to be increasing in both Well #3 and Well #4 at a rate of approximately 0.5 ug/L per year. If this trend continues, TCE concentrations in both wells will exceed the MCL in the next five years. The table below provides a summary of the TCE concentrations in each of the Bayport municipal wells during the last five years, and the post-treatment results for Well #2.

Table 4 – Bayport Municipal Well TCE Results

Bayport TCE Results				
	Well #2 Before Treatment	Well #3	Well #4	Well #2 After Treatment
Date Collected	Result (ug/L)	Result (ug/L)	Result (ug/L)	Result (ug/L)
1/4/2007	4.9	0.5	0.4	Not Sampled
3/5/2007	Not Sampled	0.7	0.4	Not Sampled
4/24/2007	6.2	0.5	0.3	Non Detect
9/4/2007	6.2	0.7	0.5	Non Detect
11/7/2007	7.3	0.8	0.8	Non Detect
1/17/2008	7.8	1.2	0.9	Non Detect
4/17/2008	8.9	1.1	0.9	Non Detect
7/22/2008	7.4	1.6	1.0	Non Detect
11/20/2008	6.2	0.9	0.8	Non Detect
2/3/2009	7.8	1.3	0.7	Non Detect
4/23/2009	8.2	2.1	1.4	Non Detect
8/28/2009	8.7	1.9	1.1	Non Detect
12/2/2009	7.3	1.8	1.2	Non Detect
2/9/2010	8.7	2.3	1.5	Non Detect
4/13/2010	7.6	1.8	1.5	Non Detect
8/11/2010	6.2	1.5	1.1	Non Detect
10/7/2010	4.4	2.2	1.1	Non Detect
1/11/2011	5.8	2.2	1.9	Non Detect
4/11/2011	5.0	2.3	1.5	Non Detect
7/22/2011	7.8	2.4	1.5	Non Detect
10/12/2011	8.4	3.0	1.9	Non Detect
1/19/2012	8.3	3.2	2.4	Non Detect

OU 3 (Source Area)

Various reports of investigations, studies and O&M associated with the TCE release were reviewed. The investigations and studies were performed to identify the source of the TCE release and to determine the characteristics of the impacted groundwater plume. The investigations performed during the past five years included a passive soil gas survey at the Hagberg property, an in-situ chemical oxidation pilot study, in-situ hydraulic conductivity tests, a natural attenuation study, a vapor survey of private land located adjacent and down-gradient from the Hagberg property, regular sampling and analysis of groundwater monitoring wells and a Remedial System Evaluation. Reports of the operation and maintenance of the hydraulic barrier system were also reviewed.

A pilot ISCO study of groundwater near the source area conducted in November 2007 injected sodium permanganate at depths of 40 to 60 feet which corresponded to the upper half of the middle groundwater unit. TCE concentrations initially were reduced down-gradient of the apparent source area, but later rebounded.

Installation of the hydraulic barrier system was completed in February 2008. The hydraulic barrier system consists of four extraction wells, a low-profile air stripper, solids filtration system and two horizontal infiltration pipes. The hydraulic barrier has performed effectively to control

groundwater movement from the Hagberg property. A capture zone analysis was performed by the MPCA. As a result, it was determined that only two of the four extraction wells are needed to control the TCE plume emanating from the Hagberg property. Therefore, currently two of the four extraction wells are in operation.

In 2008, Liesch Associates, Inc. prepared a Response Action Plan/Construction Contingency Plan for a proposed 200-acre development located in the southwest quadrant of the intersection of Manning Avenue with Stillwater Boulevard. This included sampling soil gas using 27 probes on the property. TCE was detected in two soil probes located closest to the Hagberg property but not in any other of the probes. The soil vapor concentrations of TCE in the two probes exceeded the MPCA's current Intrusion Screening Value of 3 $\mu g/M^3$ by a factor of 1 and a factor of 10. No additional action was undertaken in this area because the proposed development plans were abandoned.

A natural attenuation evaluation conducted in June 2009 concluded that "the Site conditions may not be amenable to remediate TCE impacts via natural attenuation mechanisms within a reasonable time period." The report suggested that additional monitoring well data over time and rebound testing of the hydraulic barrier system conditions were needed to conduct another natural attenuation evaluation. The evaluation noted that some apparent natural attenuation was occurring at the source area, but additional monitoring will be needed to confirm this observation.

Vapor Intrusion Assessment for OU 3:

Vapor intrusion is the migration of volatile chemicals from the subsurface into overlying buildings. Volatile chemicals in contaminated groundwater can emit vapors that may migrate through subsurface soils and into indoor air spaces of overlying buildings. In extreme cases, the vapors may accumulate in dwellings or occupied buildings to levels that may pose near-term safety hazards (e.g., explosion), acute health effects, or aesthetic problems (e.g., odors).

The vapor intrusion pathway is considered complete when the vapors move from the source (or groundwater contamination) through the deep soil and subsurface soil gas, and into a structure. Each of these components must exist in order for the pathway to be considered complete. It is possible for volatile compounds to impact deep and subsurface soil gas but still not impact indoor air. In this case the pathway would not be considered complete and no mitigation would be required.

A passive soil gas survey conducted on the Hagberg property in March 2007 consisted of installing 20 screening survey modules to a maximum depth of 4.2 feet below ground surface at locations below the building floor as well as outside the building. Sub-slab sampling was also performed. The highest concentrations of TCE in passive soil gas were detected beneath the convenience store and warehouse portions of the building. MPCA determined at that time that vapor intrusion from the sub-slab did not present an unacceptable risk. The results were also used to assist in determining the locations of soil probes for additional assessment of the Site.

Soil probes performed in April 2007 were advanced at locations adjacent to the south and west of the building and inside the building on the Hagberg property. Five angle soil probes were conducted outside to reach locations under the building in an attempt to locate the TCE source. Soil samples were obtained up to a depth of 21 feet bgs. TCE was detected at a concentration of 1.43 mg/Kg in one soil sample from a depth of 20 feet taken below the southeast corner of the original (warehouse) part of the building. Groundwater samples were obtained from a maximum depth of 61 feet bgs. The highest concentration of TCE was in a groundwater sample obtained from a depth of 20 feet bgs at the southeast corner of the warehouse building. TCE concentrations ranged from below detection limit to 1180 $\mu g/L$ from various depths at other

locations and depths under the west side of the building. Four probes were advanced inside the building to a maximum depth of 28 feet bgs. No VOCs were detected in soil samples obtained from a depth of 14 to 28 feet bgs. TCE was detected in groundwater samples at concentrations ranging from 61.7 to 103 µg/L from a depth of 11 feet bgs in all four of the soil probes.

The Hagberg property is currently occupied by a convenience store (Hagberg's Country Market), a hair salon and a gasoline filling station. Indoor and outdoor air was sampled for TCE and other contaminants in 2004 and 2005. In 2008, indoor and outdoor air and subslab vapor were all sampled. The highest indoor air concentration of TCE (7.1 ug/m^3) was detected in 2004 in a back work area (produce area) of the market. No TCE or other contaminant vapors were detected in indoor air in other sampling events, including the most recent sampling in 2008.

Subslab samples collected in 2008 ranged from non-detect to 225 ug/m^3.

Subslab and indoor air data were reviewed by both MPCA and EPA. Both use very similar screening values in commercial/industrial settings to assess risk from vapor intrusion. MPCA compared the values to current Minnesota screening values. The applicable MN indoor air limit for commercial/industrial settings is 8 ug/m^3 (industrial ISV), calculated based on an indoor air HRL of 3 ug/m3 for residential settings. No indoor air data has exceeded this value. The current MN 10X Intrusion Screening Value for TCE in industrial settings in the subslab is 80 ug/m3. The subslab sample at one location exceeded this value in June 2008, but did not in December. Re-sampling of both subslab and indoor air is planned for 2012.

EPA reviewed the existing vapor intrusion data using the Region 5 Vapor Intrusion Guidebook. This guidebook suggests that because of temporal and seasonal variations, indoor air levels exceeding a 1 in 100,000 ($1x10^{-5}$) lifetime cancer risk level generally should trigger actions to reduce indoor air levels under the Remedial Program. Since the Hagberg property is a commercial property, non-residential assumptions were used by EPA to calculate in indoor air screening level. These assumptions include the fact that an employee would incur the reasonable maximum exposure on the property. It is assumed that the employee would be on site for 8 hours per day, for 5 days a week for 50 weeks out of the year. It is also assumed that the employee would work at the property for 25 years. These assumptions are EPA defaults for a commercial/industrial exposure.

Using the 2011 toxicity information for TCE from the Integrated Risk Information System (IRIS), an indoor air concentration of 30 ug/m^3 of TCE would be protective for a lifetime excess cancer risk of 1 in 100,000. However, to protect against non-cancer detrimental health effects (HI≤1) EPA's current commercial/industrial indoor air screening level from vapor intrusion to TCE is 8.7 µg/m^3. In this case, the non-cancer screening level is more protective and was used as the industrial/commercial indoor air screening level for the property. For subslab samples, this value is multiplied by 10. Therefore EPA's subslab screening value for TCE is 87 µg/m^3.

Several indoor air samples were collected at Hagberg's Country Market. Most of these samples were below the limits of detection for TCE. One sample collected on November 19, 2004 from the produce area of the market had an indoor air TCE concentration of 7.1 µg/m^3. On this same date an outdoor ambient air sample had a TCE concentration of 5.5 µg/m^3. This result brings the indoor air sample into question. It may be that a source of TCE vapors from outside the market drifted into the produce area and that the TCE vapors are not from a vapor intrusion pathway.

Subslab soil gas samples were well below the 87 µg/m^3 screening level except for one collected on June 5, 2008. Subslab soil gas concentrations can show temporal and seasonal variability. A screening level exceedance in subslab soil gas does not necessarily result in an increase in indoor air concentrations. Based upon the data reviewed, EPA agrees that at this time there does not

appear a risk for adverse health effects from the vapor intrusion scenario for workers at Hagberg's Country Market.

MPCA plans to conduct additional sampling in 2012 to confirm that vapor intrusion does not present an unacceptable risk at the property. It is recommended that future subslab and indoor air samples be collected in tandem to determine if an increase in subslab soil gas concentration leads to an increase in indoor air TCE levels.

VI. Five-Year Review Process

Administrative Components

Potentially interested parties were notified of the initiation of the Five-Year Review, including the following:

- Minnesota Department of Health - Hansen, Emily (MDH); Messing, Rita (MDH); Yingling, Virginia (MDH); Sarafolean, Patrick (MDH);
- Washington County - 'Jessica.Collin-Pilarski@co.washington.mn.us';
- West Lakeland Township Clerk – Sue Agrimson 'g.agrimson@usfamily.net';
- West Lakeland Assistant Township Clerk – Mary Rinkenberger 'maryrjc@msn.com';
- West Lakeland Township Board Chairman 'dan.kyllo@comcast.net';
- Baytown Township -- 'baytowncf@comcast.net';
- Metropolitan Airports Commission - 'Mike.Harder@mspmac.org';
- City of Lake Elmo - 'dzuleger@lakeelmo.org';
- City of Bayport - 'mberg@cibayport.mn.us'; 'staylor@ci.bayport.mn.us'
- West Lakeland Township - 'townclerk@westlakeland.govoffice2.com';
- William Hagberg II – Owner/operator of the Hagberg's Country Market (site meeting on February 10, 2012).

Community Involvement

MPCA issued a legal notice in the Stillwater Gazette on February 15 and 22, 2012 that announced the initiation of the Five-Year Review and solicited comments from the public (Attachment 5). No public comments were received.

Mr. William Hagberg II was interviewed about property conditions at the source area which could affect additional investigations which will be performed on his property.

MPCA maintains a public website with extensive information concerning the Site at:

http://www.pca.state.mn.us/index.php/waste/waste-and-cleanup/cleanup-programs-and-topics/topics/remediation-sites/baytown-township-groundwater-contamination-site.html?menuid=&redirect=1

Site Inspection

A site inspection was conducted on February 10, 2012 by the MPCA and MPCA State Contractor representatives (Attachment 6). The purpose of the inspection was to assess the protectiveness of the remedy and view parts of the SWBCA. MPCA guided the state contractor (AECOM) preparing the Five-Year Review on a tour of the Hagberg property exterior conditions and remediation shed equipment. Kurt Schroeder of the MPCA provided an overview of the remediation process including the air strippers, filter vessels, pressure tank, and treated effluent

to the baseball field. William Hagberg II led a tour of the interior of the on-site building pointing out various additions to the original building. All met to discuss future anticipated work and options for cleanup. Future work included installation of two more monitoring wells on the east side of the building, push-probe work on the west side of the building requiring the movement of semi-trailers, and possible additional soil borings inside building. Cleanup options included additional in-situ chemical oxidation, demolition of the original part of the building to access the subsurface for exploration/remediation, and removal of the entire building to facilitate cleanup. William Hagberg II requested a minimum 48 hour notice of the intent to complete work on his property. AECOM personnel toured residential areas within plume area.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The review of documents, ARARs, risk assumptions, and the results of the site inspection indicates that the implemented remedies in OU 1 and OU 2 currently are functioning as intended by the ROD. However, the remedy for OU3 is not yet fully implemented and therefore is only partially operating as intended in the ROD.

OU 1 (Groundwater Plume)

For approximately 180 homes in the plume area on properties platted prior to April 9, 2002, MPCA-lead monitoring and maintenance of GAC filters has protected individual water well users from TCE impacted groundwater. For approximately 20 properties platted after April 9, 2002, township ordinances require individual home-owners to install and maintain GAC units. MPCA has no information which indicates that this requirement is not effective, but tracking and reporting improvements are needed for these residences.

OU 2 (Bayport Municipal Well #2)

An air stripper installed on City of Bayport Municipal Well #2 has decreased the TCE concentration of water delivered to the municipal distribution system to less than 1 µg/L and is functioning as intended by the ROD.

OU 3 (Source Area)

The hydraulic barrier system has controlled groundwater gradient at the TCE source to limit contaminant migration. However, the in-situ treatment of the source area required by the ROD has not yet been fully implemented.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Changes in Standards and "To Be Considered"

The Minnesota IREL of 5 ug/L for TCE was promulgated as a new HRL during the review period of 2007 to 2012. The Minnesota HBV (non-promulgated) for CCl_4 was lowered from 3 to 1 ug/L during the review period. However, this change did not affect implementation or protectiveness of the remedy because CCl_4 concentrations have decreased throughout the Site and are below the HBV of 1 ug/L. The indications are that there is no ongoing source of CCl_4.

The HRL for TCE is presently under review by MDH, due in part to the IRIS re-assessment for TCE. A revised HBV (non-promulgated) or HRL (promulgated) is expected in the near future.

The MCL for TCE is also being reviewed by EPA. A revised MCL is expected to be promulgated in the future. At this time, the cleanup levels are still considered protective.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

There have been no changes in the physical conditions of the Site that would affect the exposure pathways or protectiveness of the remedy.

EPA released the final Integrated Risk Information System (IRIS) risk assessment for TCE in September 2011 which is expected to lead to a change in the MCL for TCE. The MDH is also reviewing risks associated with TCE and expects to issue a revised TCE HRL in the very near future. If the MCL or HRL for TCE is lowered, the protectiveness of the remedies for OU 1, OU 2 and OU 3 could be affected as follows:

- OU 1 – The action level in Baytown Township and West Lakeland Township ordinances for installing GAC systems on residential water well systems is a TCE concentration of
- 0.5 µg/L. The action level was chosen as one-tenth the HRL to be protective of human health. If the HRL is changed, the ordinances may require changes. Thus, additional residential wells may exceed the HRL for TCE and require treatment.
- OU 2 – A lowering of the MCL for TCE could require that water from Municipal Wells #3 and #4 be treated.
- OU 3 – Lowering of the HRL for TCE could impact performance requirements of the hydraulic barrier system and methods to reduce TCE concentrations at the source because a lower concentration of TCE would need to be met at the compliance boundary of Manning Avenue.

In addition, the 2011 IRIS risk assessment for TCE may affect considerations for vapor intrusion risk in OU 1 and OU 3. The latest vapor intrusion assessment for the Site was conducted prior to the IRIS change for TCE. It is currently unknown whether a reassessment will affect protectiveness of the remedy for this pathway. At the source area and at the down-gradient plume, the potential for vapor intrusion risk should be re-assessed. In addition, at the source area in-situ treatment may require vapor controls.

The above-mentioned may also require additional ICs to ensure the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No.

Technical Assessment Summary

According to the data reviewed and the site inspection, the remedies at OU 1 and OU 2 area currently are functioning as intended by the ROD. The containment portion of the remedy for OU 3 also is functioning as intended by the amended ROD; however, the in-situ treatment component has not yet been fully implemented. An FFS is underway which will further assess the overall groundwater plume and in-situ treatment for OU 3.

VIII. Issues

Table 5 – Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Site-wide - IC review needed to ensure effective ICs are in place and long-term stewardship is conducted	N	Y
OU 1 – Insufficient tracking of new wells requiring GAC systems	N	Y
OU 1 – Additional private wells will need treatment if HRL is revised	N	Y
OU1 – Current groundwater remedy has not been demonstrated as sufficient to reach MCLs throughout plume (e.g., MNA)	N	Y
OU 2 – Increasing TCE trend in Municipal Wells #3 and #4 may require treatment in 5 years, or sooner if MCL is lowered	N	Y
OU 3 – In-situ treatment of source area not yet fully implemented.	N	Y
OU 3 – Modification of the HRL for TCE may affect the containment compliance criteria	N	Y
OU 1 & 3 – Vapor intrusion risk evaluation needs updating	N	Y
OU 3 – Potential redevelopment could result in unacceptable exposures to vapor intrusion	N	Y

IX. Recommendations and Follow-Up Actions

Table 6 – Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Site-wide -- IC review needed to ensure effective ICs are in place and long-term stewardship is conducted	Prepare Institutional Controls Implementation and Assessment Plan	MPCA, in coordination with MDH	EPA	December 2012	N	Y
OU 1 – Insufficient tracking of new wells requiring GAC systems	Develop a tracking system for notification of MPCA/MDH for GAC system installation and system performance in post-2002 homes	MPCA, in coordination with MDH	EPA	April 2013	N	Y
OU 1 – Additional private wells will need treatment if HRL is revised	Identify additional wells with TCE exceeding new HRL; assess need for interim protective measures; install GAC treatment; modify ROD as needed	MPCA, in coordination with MDH	EPA	January 2013	N	Y
OU 1 – Current groundwater remedy has not been demonstrated as sufficient to reach MCLs throughout plume (e.g., MNA)	Complete FFS; modify remedy as appropriate	MPCA	EPA	December 2013	N	Y

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
OU 2 – Increasing TCE trend in Bayport Municipal Wells #3 and #4 may require treatment in five years, or sooner if MCL is lowered.	Monitor TCE concentration relative to MCL and develop action plan for future protection	City of Bayport, in coordination with MDH and MPCA	MPCA/EPA	December 2013	N	Y
OU 3 – Modification of HRL for TCE may affect containment compliance criteria	Monitor and modify compliance criteria as needed	MPCA	EPA	December 2013	N	Y
OU 3 – In-situ treatment not yet fully implemented.	Complete FFS to further assess in-situ treatment and consider need for ARAR waiver due to DNAPL	MPCA	EPA	July 2012	N	Y
OU 1 & 3 – Vapor intrusion risk needs updating	Resample subslab and indoor air at Hagberg's Country Market; re-evaluate VI risk throughout plume if conditions change	MPCA	EPA	December 2012	N	Y
OU 3 - Potential redevelop-ment could result in unacceptable exposures to vapor intrusion	Assess need for additional ordinances	MPCA	EPA	December 2013	N	Y

X. Protectiveness Statements

OU 1 (Groundwater Plume)

The remedy at OU 1 currently protects human health and the environment in the short term because residential water wells are being treated at the point of use to acceptable levels and the plume does not cause a current vapor intrusion risk. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: (1) Identify additional wells that will require treatment following the upcoming change in Minnesota HRL for TCE and assess need to provide for interim protective measures such as bottled water and (for the long-term) installation of GAC treatment units for additional residences; (2) Update vapor intrusion assessment if conditions change; (3) Assess whether source area remedy and natural attenuation are sufficient to return plume to drinking water standards in a reasonable timeframe considering site-specific circumstances; and (4) Evaluate existing ICs and assess whether additional ICs are needed to ensure long-term protection.

OU 2 (Bayport Municipal Well #2)

The remedy for OU 2 currently protects human health and the environment in the short-term because it treats TCE in the municipal drinking water well to acceptable levels. However, in order for the remedy to be protective in the long-term, the following actions need to be taken:

(1) Monitor TCE concentrations in Municipal Wells #3 and #4 relative to MCL and develop action plan for future protection; and (2) Evaluate existing ICs and assess whether additional ICs are needed to ensure long-term protection.

OU 3 (Source Area)

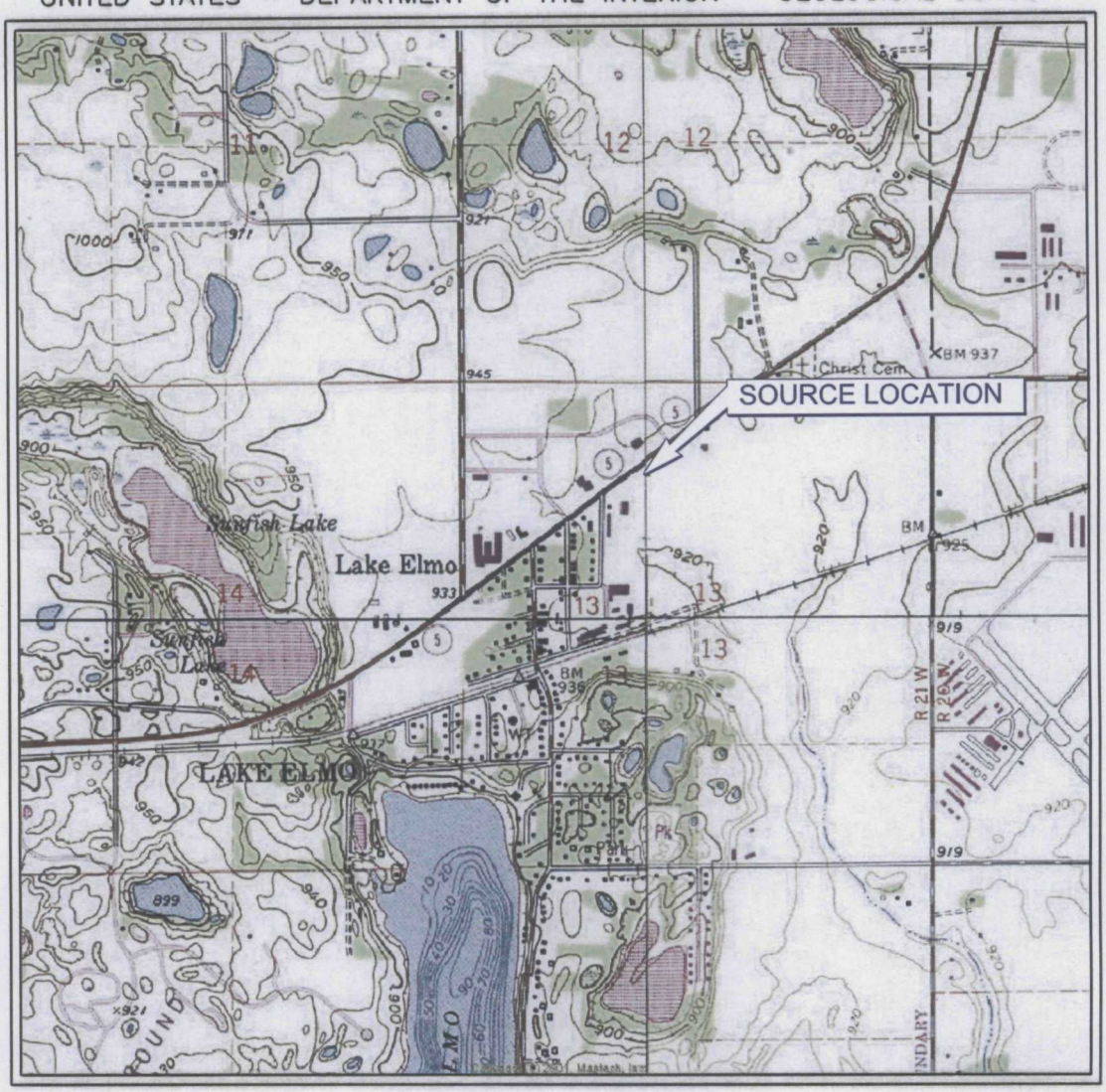
The remedy for OU 3 currently protects human health and the environment in the short-term because it contains groundwater that exceeds action levels and does not cause a vapor intrusion risk. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: (1) When HRL is revised, modify containment compliance criteria as needed; (2) Complete FFS to further assess in-situ treatment options and consider need for ARARs waiver due to DNAPL; (3) Resample subslab and indoor air at Hagberg's Country Market; and (4) Evaluate existing ICs and assess whether additional ICs are needed to ensure long-term protection.

XI. Next Review

The next Five-Year Review report for the Site is required five years from the completion date of this review.

Attachment 1

UNITED STATES – DEPARTMENT OF THE INTERIOR – GEOLOGICAL SURVEY



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1 .5 0 1

MILES

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CONTOUR INTERVAL 10 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

WHITE BEAR LAKE EAST QUADRANGLE
MINNESOTA - WASHINGTON COUNTY
1993
7.5 MINUTE SERIES (TOPOGRAPHIC)

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr:	BJS
Drawn By:	JLM (41)
Checked By:	BJS
Approved By:	BJS

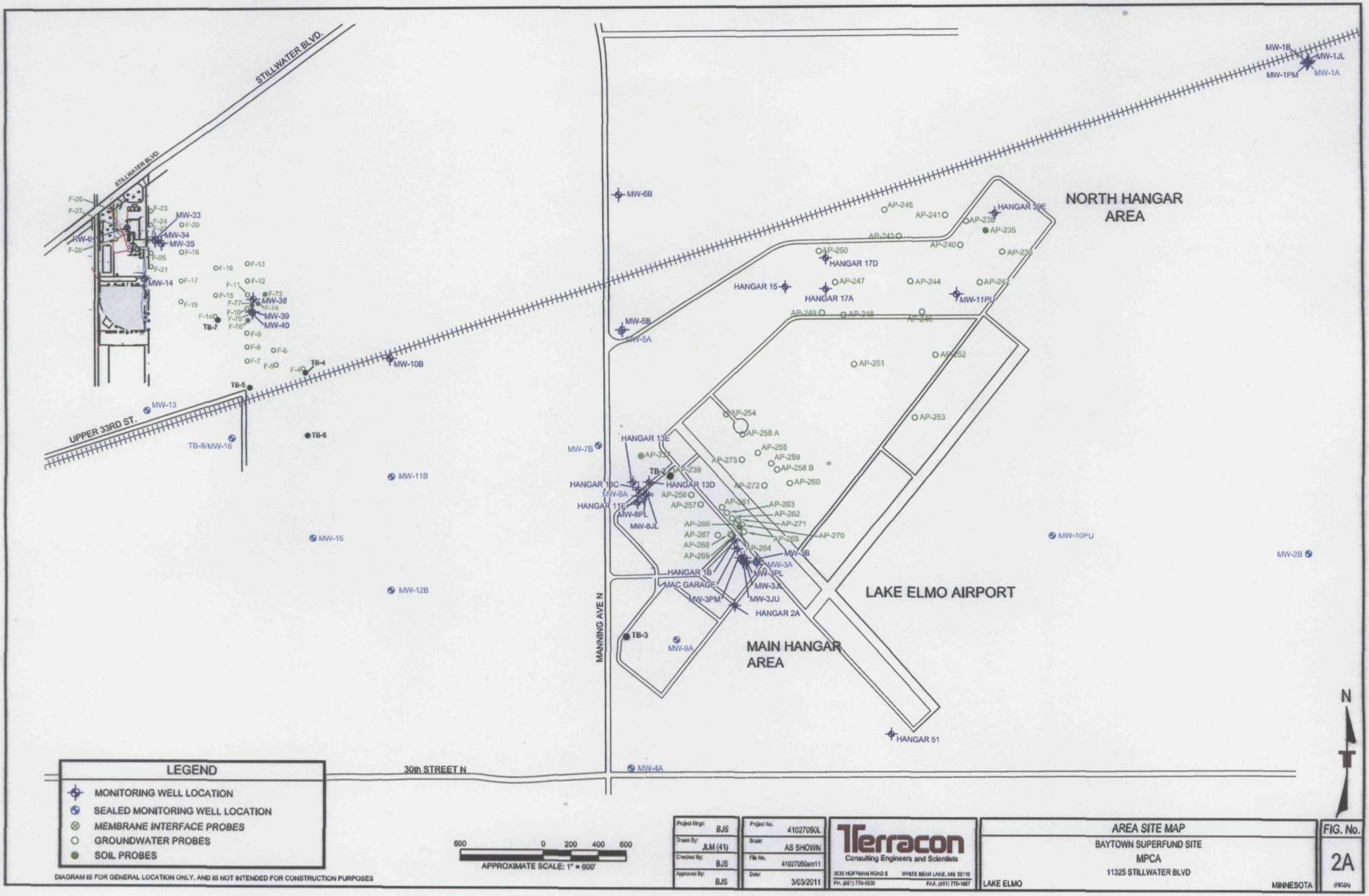
Project No.	41027050
Scale:	AS SHOWN
File No.	41027050sl
Date:	4/28/2010

Terracon
Consulting Engineers and Scientists
3535 HOFFMAN ROAD EAST WHITE BEAR LAKE, MN 55110
PH. (651) 770-1500 FAX. (651) 770-1657

SITE LOCATION MAP

BAYTOWN SUPERFUND SITE
MPCA
11325 STILLWATER BLVD.
LAKE ELMO MINNESOTA

FIG. No. 1



Project Mngr:	BJS
Drawn By:	JLM (41)
Checked By:	BJS
Approved By:	BJS
Project No.	41027050L
Scale:	AS SHOWN
File No.	41027050sm11
Date:	3/03/2011

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AREA SITE MAP
BAYTOWN SUPERFUND SITE
MPCA
11325 STILLWATER BLVD
LAKE ELMO MINNESOTA

FIG. No. 2A (FIG2A)

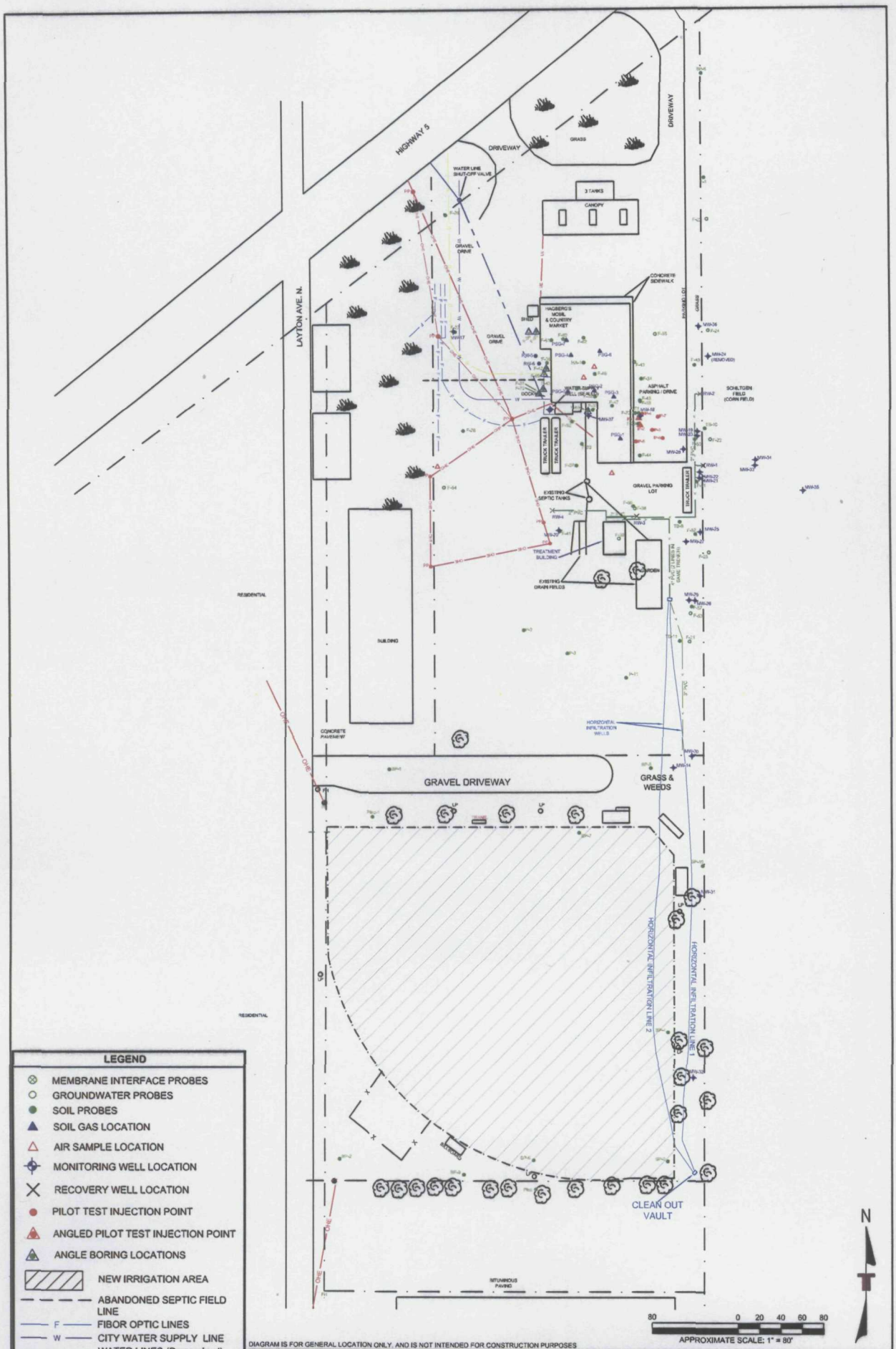

DIAGRAM IS FOR GENERAL LOCATION ONLY. AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr:	BJS
Drawn By:	JLM (41)
Checked By:	BJS
Approved By:	BJS
Project No.	41027050M
Scale:	AS SHOWN
File No.	41027050sm11
Date:	3/02/2011

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SITE MAP

BAYTOWN SUPERFUND SITE
MPCA
11325 STILLWATER BLVD.
LAKE ELMO MINNESOTA

FIG. No. 2B

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr:	BJS
Drawn By:	JLM (41)
Checked By:	BJS
Approved By:	BJS
Project No.	41027050L
Scale:	NOT TO SCALE
File No.	41027050sm.01.dwg
Date:	6/30/2011

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Consulting Engineers and Scientists
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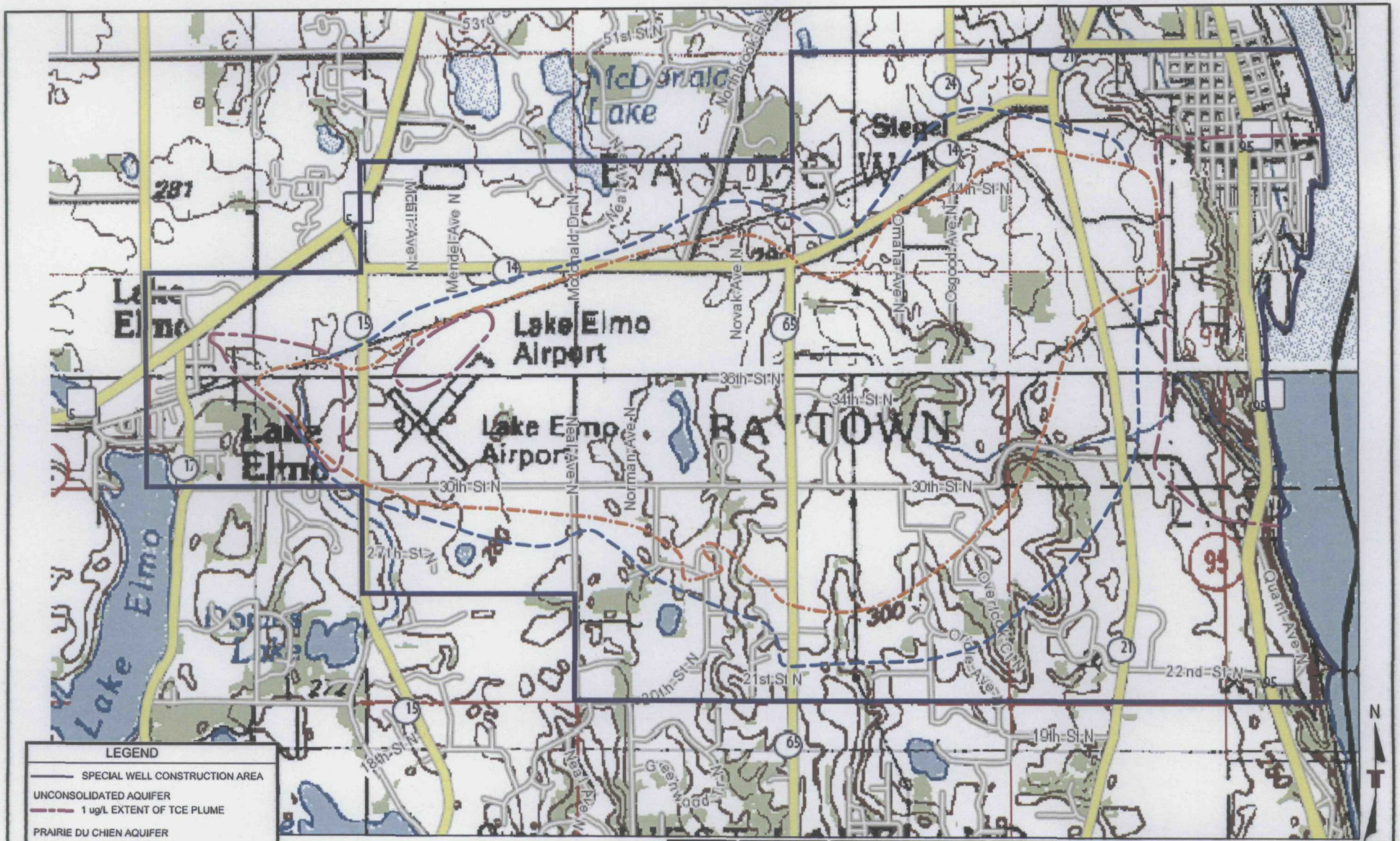
EXTENT OF TCE PLUME - AERIAL

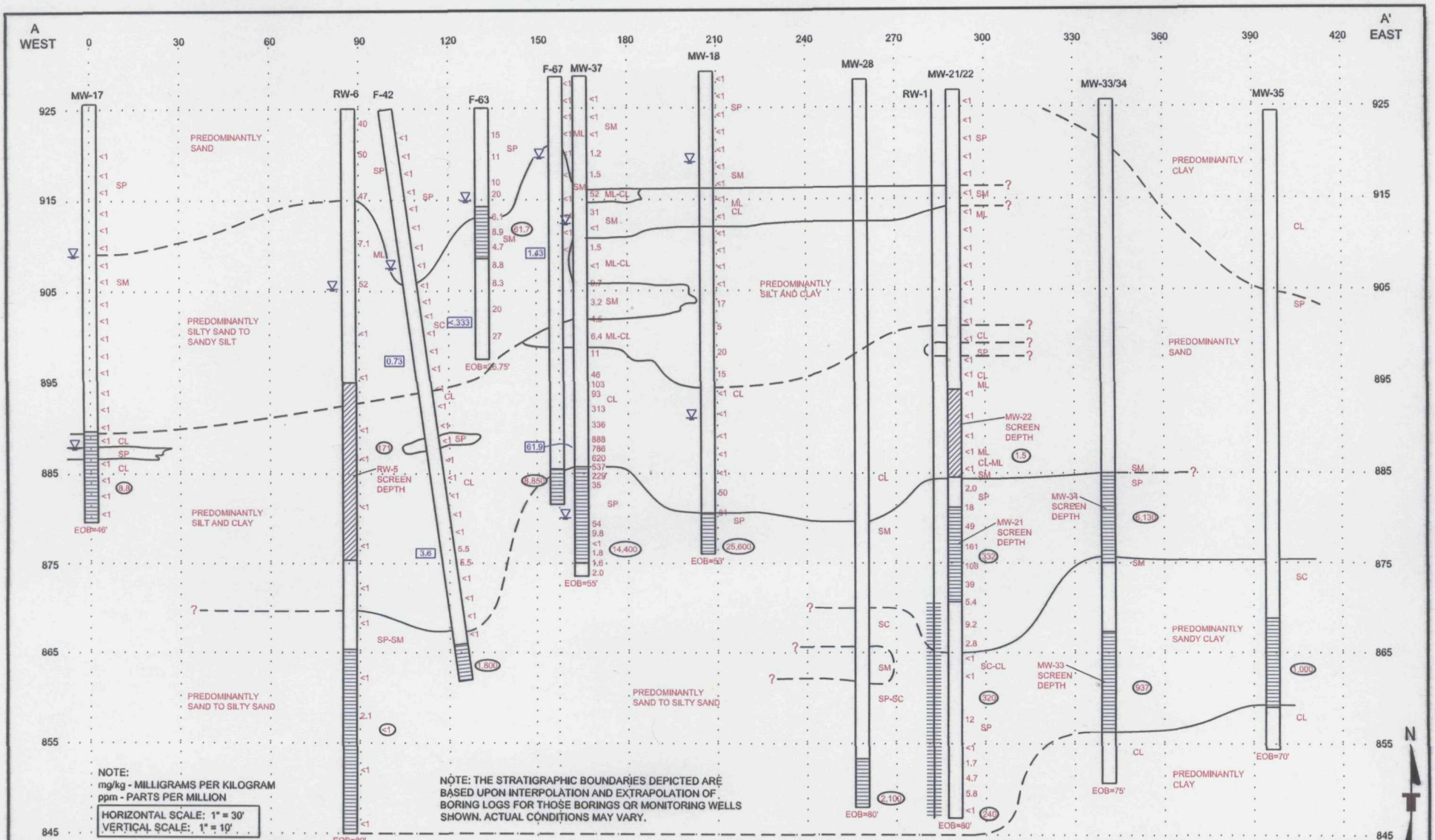
BAYTOWN SUPERFUND SITE
MPCA
11325 STILLWATER BLVD
LAKE ELMO MINNESOTA

FIG. No. 6A (FIG6A)



Project Mngr: BJS	Project No. 41027050L	Terracon Consulting Engineers and Scientists	EXTENT OF TCE PLUME - USGS
Drawn By: JLM (41)	Scale: NOT TO SCALE	3535 HOFFMAN ROAD E WHITE BEAR LAKE, MN 55110	BAYTOWN SUPERFUND SITE
Checked By: BJS	File No. 41027050sm01.dwg	PH. (651) 770-1500 FAX. (651) 770-1667	MPCA
Approved By: BJS	Date: 6/30/2011		11325 STILLWATER BLVD
			LAKE ELMO MINNESOTA

FIG. No. 6B



NOTE:
mg/kg - MILLIGRAMS PER KILOGRAM
ppm - PARTS PER MILLION

HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 10'

NOTE: THE STRATIGRAPHIC BOUNDARIES DEPICTED ARE BASED UPON INTERPOLATION AND EXTRAPOLATION OF BORING LOGS FOR THOSE BORINGS OR MONITORING WELLS SHOWN. ACTUAL CONDITIONS MAY VARY.

LEGEND

- CL — LEAN CLAY
- SP — SAND, POORLY GRADED
- SM — SILTY SAND
- ML — SILT
- 0.73 — SOIL SAMPLE TCE CONCENTRATION IN MILLIGRAMS PER KILOGRAM
- (61.7) — WATER SAMPLE TCE CONCENTRATION IN MICROGRAMS PER LITER
- GROUNDWATER ELEVATION (WHILE DRILLING)
- GROUNDWATER ELEVATION (AFTER DRILLING)
- <1 — PID (PHOTOIONIZATION DETECTOR READING) IN PARTS PER MILLION (PPM)
- SCREENED PORTION OF MW

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr:	BJS
Drawn By:	JLM (41)
Checked By:	BJS
Approved By:	BJS
Project No.	41027050L
Scale:	AS SHOWN
File No.	41027050sm09
Date:	01/21/09

Terracon
Consulting Engineers and Scientists
3535 HOFFMAN ROAD E WHITE BEAR LAKE, MN 55110
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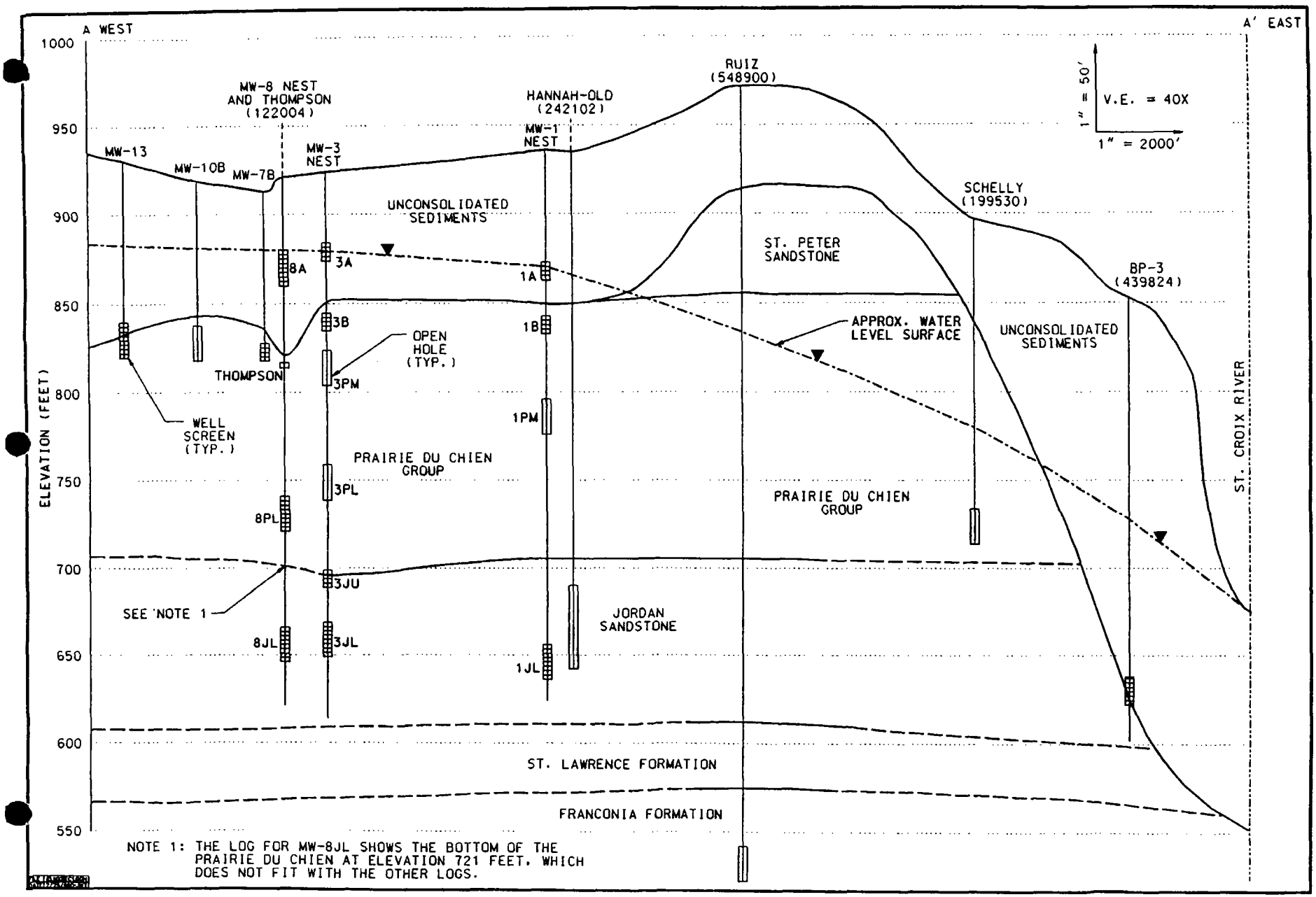
GEOLOGIC CROSS - SECTION A - A'

BAYTOWN SUPERFUND SITE
MPCA
11325 STILLWATER BLVD
LAKE ELMO MINNESOTA

FIG. No. 9B



BAYTOWN TOWNSHIP GROUNDWATER CONTAMINATION SITE

Wenck

Attachment 2

MINNESOTA
MDH
DEPARTMENT OF HEALTH

Protecting, maintaining and improving the health of all Minnesotans

Baytown Special Well Construction Area Update

Date: March 30, 2005

To: Baytown Township Board, West Lakeland Town Board, City of Bayport, City of Lake Elmo, Residents, Washington County Department of Public Health and Environment, Well Contractors, Realtors, Developers, and Building Contractors

From: Patricia A. Bloomgren, Director
Environmental Health Division
P.O. Box 64975
St. Paul, Minnesota 55164-0975

Subject: Expansion of Boundary and Update of the Special Well Construction Area for Portions of Baytown Township, West Lakeland Township, the City of Bayport, and the City of Lake Elmo, Washington County, Minnesota

On May 6, 1988, the Minnesota Department of Health (MDH) issued a "Well Advisory" now known as a "Special Well Construction Area," (SWCA) for parts of Baytown Township, West Lakeland Township, and the city of Bayport in response to the discovery of volatile organic chemical (VOC) contaminants in several private wells in the area. The contaminants initially detected included trichloroethylene, carbon tetrachloride, tetrachloroethylene, and cis-1,2, dichloroethylene. The advisory placed special restrictions on the construction of new wells within the well advisory boundary, and required that well owners conduct additional water testing prior to completing and placing a well into service. The additional construction and water testing requirements were established to assure that persons are not exposed to levels of contamination that exceed health exposure guidelines. The SWCA has been revised as investigation has proceeded and conditions have changed. This update of the SWCA provides current details on the recently-discovered source in northeast Lake Elmo, contamination extent, well construction requirements, the water testing and carbon filter ordinances of Baytown and West Lakeland Townships, and recently passed legislation concerning disclosure at property transfer.

The primary contaminant now present in the groundwater within the SWCA is trichloroethylene (TCE). TCE was most commonly used as a degreasing agent for washing metal parts and also as a dry-cleaning solvent. Exposure to high levels of TCE in drinking water can damage the liver, kidneys, immune system, and nervous system. Exposure to low levels of TCE over a long period of time, may be linked to an increased risk of several types of cancer. TCE may also harm a developing fetus if consumed in high concentrations by an expectant mother. The recommended interim exposure limit for TCE in drinking water is 5 micrograms per liter (μ g/L).

Low levels of carbon tetrachloride have been infrequently detected in some water samples collected in the northern portion of the SWCA. Recent detections have been below the health risk limit of 3 µg/L. Tetrachloroethylene and cis-1,2, dichloroethylene have been detected at low concentrations in some wells in the past, but have not been detected for several years.

The Minnesota Pollution Control Agency (MPCA) conducted additional investigation during 2004 northwest of Lake Elmo Airport and discovered high concentrations of TCE in the shallow groundwater on property currently occupied by Hagberg's Country Market in northeast Lake Elmo. TCE is suspected to have been used by a metal-working business, known as Neilsen Products Company, that previously occupied this property during the 1950-60's. MPCA is currently considering the feasibility of various remedial options at this site.

The plume of TCE contamination is approximately 5 miles long, and 2 miles wide, extending from northeast Lake Elmo to the St. Croix River. Groundwater movement is generally to the east, toward the St. Croix River, but is complicated due to the fracture flow in the Prairie du Chien aquifer, and other hydrogeologic conditions, some of which are not fully characterized. TCE has been detected in glacial sediments in northeast Lake Elmo, at the Lake Elmo Airport, and in the city of Bayport. The highest concentrations of TCE detected to date are present in the glacial deposits in northeast Lake Elmo, exceeding 50,000 µg/L. The largest aerial extent of TCE contamination is in the underlying Prairie du Chien limestone and the Jordan sandstone. Highest concentrations in the bedrock exceed 50 µ g/L in the Prairie du Chien limestone underneath the Lake Elmo Airport and in the Jordan sandstone northeast of the airport. Recently, TCE has been detected in the Franconia sandstone in the eastern portion of the SWCA near Stagecoach Trail, and in Bayport Municipal Well Number 2. Only one deeper aquifer, the Mt. Simon-Hinckley sandstone, exists below the Franconia-Ironton-Galesville aquifer. There are no known wells within the SWCA completed in the Mt. Simon-Hinckley aquifer and therefore the water quality is not known.

A public water supply is only available in portions of the cities of Bayport and Lake Elmo. The remainder of the SWCA is served by private wells. A groundwater remediation system has not been installed.

Baytown Township enacted Ordinance No. 36 on September 8, 2003, pertaining to water testing, and installation, testing, and maintenance of whole-house granular activated carbon (GAC) filters. West Lakeland Township enacted a similar ordinance, No. 15, on March 1, 2004. The ordinances require residents to install an approved GAC filter when TCE or carbon tetrachloride is detected in a well at concentrations exceeding exposure limits. All filter installation, testing, and maintenance costs are the responsibility of the well owner. The ordinances also require periodic testing and reporting of results. Some requirements of the ordinances do not apply if the MPCA is monitoring and maintaining a whole house GAC filter for the well owner.

Currently, the MPCA will install, maintain, and test a whole house, GAC filter for an existing well within the SWCA that exceeds the interim exposure limit of 5 µg/L TCE, only if the well is located on property approved for development on or before April 9, 2002.

A new law, Minnesota Statutes, section 1031.236, passed during the 2003 legislative session, requires a seller of real property in Washington County not served by a municipal water system or that has an unsealed well, to state in writing to the buyer, whether, to the seller's knowledge, the property is located within a SWCA.

The construction requirements for new wells in the SWCA will be dependent on the well location, known extent of the contamination plume, hydrogeology, well use, and regulatory status. Where feasible, the MDH requires that water be obtained from a safe source, rather than using a contaminated source and relying on individual treatment systems to remove contaminants. However, the presence of TCE in the Prairie du Chien, Jordan, and Franconia aquifers in the eastern portion of the SWCA, the lack of a groundwater remediation system, the lack of a public water-supply system, and the technical and cost challenges of drilling wells deeper to the Mt. Simon aquifer, may mean that in some locations within the eastern portion of the SWCA, construction of an uncontaminated private well may not be reasonably possible. In these cases, a GAC treatment system that is installed, maintained, and monitored, may be an option.

A property owner and a licensed well contractor must submit a written request to construct or permanently seal a well in the SWCA. The request must include a plan describing how the well will be constructed or sealed. The MDH will review the plan and reply in writing. Before permission to construct a well is granted, the well owner must agree to pay for a VOC analysis on the water, and abide by conditions of the approval. The MDH will review the water-test results and determine if the well can be completed, if the well must be drilled deeper, or if the well must be permanently sealed. Copies of analytical results will be forwarded to the well owner, MPCA, Washington County Department of Public Health and Environment, and the local city or township.

With the MPCA investigation finding groundwater contamination in northeastern Lake Elmo, the MDH is now expanding the SWCA to now include all of Section 13 of Township 29 North, Range 21 West (see figure). The construction requirements for new wells in the SWCA will be dependent on the well location, known extent of the contamination plume, hydrogeology, well use, and regulatory status. However, the following general requirements commonly apply:

1. Except for some locations at the northern, southern, and eastern boundaries of the SWCA, a well in unconsolidated deposits will not be allowed. The glacial deposits will not provide an adequate supply of water, or the water will exceed the TCE interim exposure limit, in most areas of the SWCA. Full length cement grouting will be required for all wells completed in glacial deposits within the SWCA. Requests for wells completed in glacial deposits will be evaluated on a case by case basis.

2. The Prairie du Chien aquifer will not be allowed for potable water use in the SWCA. The Prairie du Chien aquifer shows the greatest plume extent and the highest concentrations of TCE. The aquifer is susceptible to contamination due to generally thin geologic materials overlying the formation and the unfiltered fracture flow in the aquifer. Nitrate levels are elevated.

3. Jordan aquifer wells will be allowed outside the contaminant plume, and may be allowed inside the plume where the Franconia is affected and an approved monitoring and treatment regulatory program is in effect. In the Jordan aquifer, TCE levels exceed 5 µg/L in a plume that is approximately 4 miles long and up to 1½ miles wide, extending from the Lake Elmo Airport to Bayport.

4. Franconia or Ironton-Galesville aquifer wells will be permitted throughout the SWCA. Where the Franconia aquifer exceeds the TCE maximum concentration, a whole house GAC filter must be installed, maintained, and monitored under an approved program.

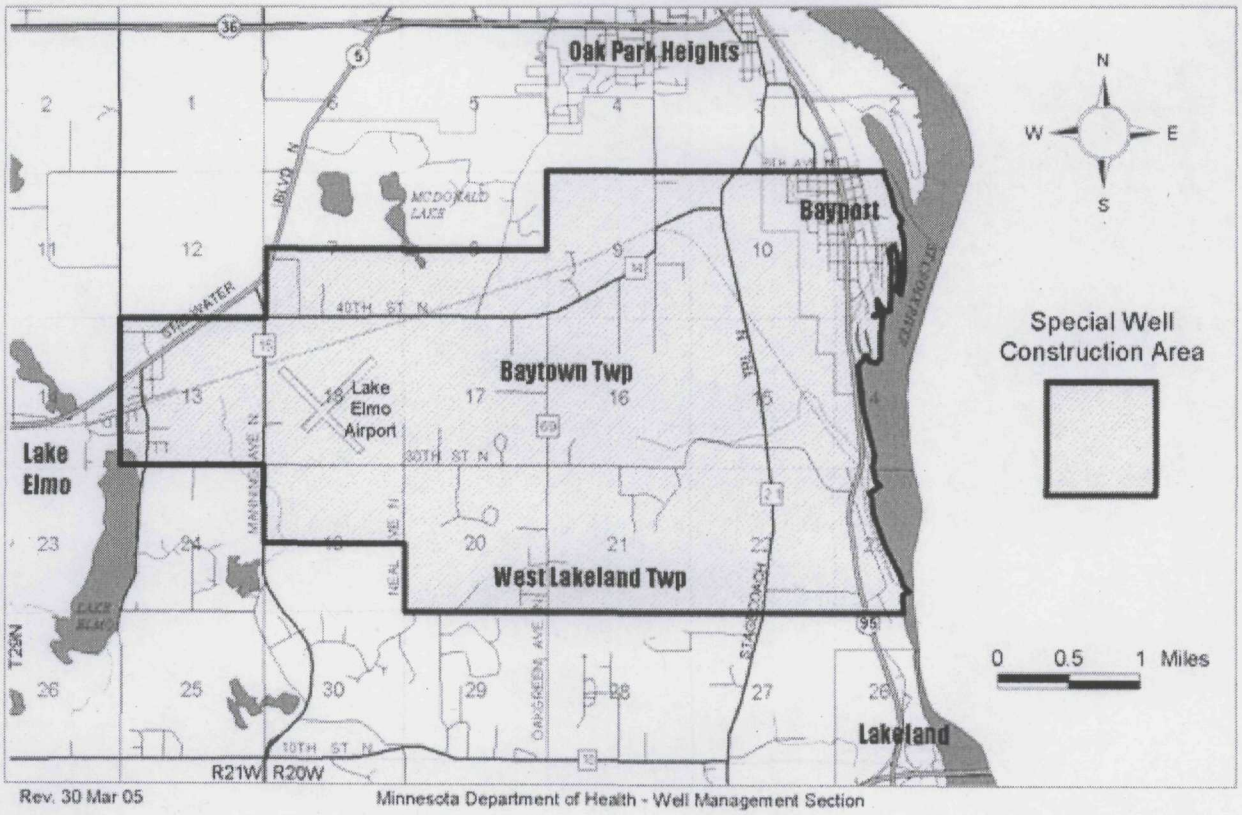
5. The MDH supports and will consider requests for public water-supply wells (wells that serve 15 or more homes or service connections) on any property within the SWCA, regardless of the property development approval date. Public water-supply wells are regulated under the federal and state Safe Drinking Water Act and must comply with drinking water standards and management, testing, inspection, and oversight requirements.

Additional information is available on the internet: http://www.health.state.mn.us/divs/eh/well/specialwell.html or http://www.pca.state.mn.us/, or you may contact:

Patrick Sarafolean, MDH at 651/643-2110
Ronald Thompson, MDH at 651/643-2108
Richard Baxter, MPCA at 651/297-8471
Kurt Schroeder, MPCA at 651/296-8593

PAB:MPC:RDT:PTS:jmw

Special Well Construction Area
Covering Portions of Baytown and West Lakeland Townships
and Portions of the Cities of Bayport and Lake Elmo



Rev. 30 Mar 05

Minnesota Department of Health - Well Management Section

ORDINANCE NO: 52

AN ORDINANCE OF THE TOWN OF BAYTOWN WASHINGTON COUNTY, MINNESOTA ESTABLISHING REGULATIONS FOR THE MAINTENANCE OF WELL WATER TREATMENT IN THE SPECIAL WELL AND BORING CONSTRUCTION AREA, AND REPEALING ORDINANCE NO. 36 AND 38

The Town Board of the Town of Baytown does ordain:

1. **PURPOSE**. The purpose of this Ordinance is to monitor wells within the Town of Baytown's portion of the Baytown–West Lakeland Special Well and Boring Construction Area (SWCA), to identify those wells where trichloroethene (TCE) and/or carbon tetrachloride (CCl4) are present, to ensure granular activated carbon (GAC) filter systems are installed for these wells and to establish requirements for monitoring, maintenance and repairs of GAC filter systems. This Ordinance applies only to private drinking water wells on properties platted and approved after April 9, 2002. This Ordinance will not apply to wells not intended for human consumption such as monitoring wells, irrigation wells, or to community public water supply wells, or to wells on property that was platted and approved prior to April 9, 2002.

2. **DEFINITIONS.**

   a. CCl4 means: carbon tetrachloride. The MDH Health Risk Limit for CCl4 is 1 microgram per liter (µg/L); however, for added protection, this Ordinance defines the action level for CCl4 at 0.5 µg/L.

   b. County means: Washington County.

   c. EPA means: the United States Environmental Protection Agency.

   d. GAC filter system means: a granular activated carbon system suitable to recover trichloroethene (TCE) and CCl4 from well water sufficient to meet the MDH Health Risk Limit.

   e. MDH means: the Minnesota Department of Health.

   f. MPCA means: the Minnesota Pollution Control Agency

   g. SWBCA means: Special Well and Boring Construction Area, an area within the township defined by boundaries established by the Minnesota Department of Health ("MDH") and as changed, modified or expanded from time to time by MDH, delineating the area where special well and boring construction , repair, and sealing requirements are in effect to minimize or eliminate the public's exposure to contaminants present in groundwater aquifers.

h. TCE means: Trichloroethene. The MDH Health Risk Limit for TCE is 5 µg/l, however, for added protection, this Ordinance defines the action level for TCE at 0.5 µg/l.

i. VOC means: volatile organic compound.

3. **GAC FILTER SYSTEM SPECIFICATIONS**: All GAC filter systems must meet or exceed the following specifications:

a. Two GAC filter system vessels must be connected in series so that all water flows through one vessel first and then through the second vessel. Vessels shall not be equipped to provide automatic backwashing.

b. Each vessel must have continuously–wound high–strength fiberglass outer shell and a non–corrosive high density polyethylene inner shell and a black rubber base; minimum carbon capacity of 90 pounds; approximate dimensions of 15–inch diameter by 4–foot height; minimum pressure rating of 150 psi; rated flow rate of up to 10 gpm; rated pressure drop of less than 4 psi at 10 gpm (with new carbon). Inside the vessel, the outlet of the vessel head shall be fitted with a 1–inch diameter PVC down tube that shall extend to the bottom of the vessel. An appropriately sized screen basket must have been installed on the bottom of the down tube.

c. Carbon specification: 8 x 30 mesh virgin granular activated carbon with minimum iodine number of 1,000. Carbon must meet NSF/ANSI Standards 61 and 53, to avoid arsenic leaching and ensure VOC removal, and be manufactured entirely from raw materials and not from regeneration of any previously used carbon.

d. Piping: copper and PVC braided tubing; cam–lock–quick–connect fittings used with PVC tubing to facilitate carbon filter change–out; piping diameter equal to existing piping at installation location, except 3/4 inch is minimum size; minimum pressure rating of 125 psi.

e. Valves: brass; ball type providing watertight shut–off; minimum pressure rating of 150 psi; size to match installed piping diameter; valve handle orientated for ease of operation.

f. Sample Ports: brass; ball type providing watertight shut–off; minimum pressure rating of 150 psi; valve handle orientated for ease of operation. Alternatively, the sample ports may be integral to vessel head but in either case, the outlet of the sample port must be directed downward towards the floor.

g. Flow Meter: Badger RCDL Series disc meter, Model M25 with brass housing, or equivalent and installed upstream of the lead carbon filter orientated for ease of readability.

h. Sample ports must be located before and between the two filter vessels.

i. A bypass valve must not be installed around the filter vessels.

4. **GAC FILTER SYSTEM MAINTENANCE AND CHANGE–OUT:** The GAC Filter system must be changed out using the following standards:

a. Verify that there are no appliances running or other active water uses occurring.

b. Close the inlet and outlet valves for the GAC filter system.

c. Disconnect and remove the lead GAC filter system (vessel with spent carbon).

d. Disconnect the second GAC filter system and reinstall it in the lead position.

e. Replace the used vessel with a new or reused vessel filled with at least 90 pounds of virgin GAC meeting the same specification as cited for new GAC filter systems under this Ordinance. If the vessel is reused, it must first have been properly rinsed and disinfected prior to refilling with carbon.

f. Install the replacement GAC filter in the secondary position.

g. Re–open the inlet and outlet valves for the GAC filter system and check for water leaks. Repair any observed water leaks immediately.

h. Return the GAC filter with spent carbon to the vendor for proper disposal of the carbon in accordance with applicable laws and regulations.

5. **GAC FILTER SYSTEMS INSTALLATION:** A GAC filter system may only be installed under the supervision of a licensed plumber or licensed water conditioning contractor. A GAC filter system must be installed on the water supply system at a point of entry such that it provides for treatment of all water that travels to faucets and fixtures inside the house and other potable outlets on the system. Nonpotable outside faucets should not be treated. After each system is installed, it must be filled and pressurized to verify that there are no water leaks. Any water leaks observed must be immediately repaired.

6. **NEW WELL CONSTRUCTION.**

a. New well construction is regulated by MDH pursuant to Minnesota Statutes, Chapter 1031 and Minnesota Rules, Chapter 4725. New wells may only be constructed with the written approval of MDH. Persons interested in constructing a new well within the boundaries of the SWBCA should contact a Minnesota licensed well contractor and submit a request for permission to construct a new well, with proposed plans for well construction, to the MDH Well Management Section.

7. **WELL SAMPLING REQUIREMENTS WITHIN THE SWCA.**

a. Within six (6) months of the effective date of this Ordinance each well owner must contact the Washington County Public Health Department and arrange to have a well water sample collected and tested by the Minnesota Public Health Laboratory for VOCs, at the owner's expense.

b. A written notice must be sent by the Town Clerk to any owner that has not complied with the test required by Section 7.a informing the owner of the delinquency. If the owner does not comply within sixty (60) days of the Notice, the Town is authorized to contract with the County to sample and conduct an analysis of the samples. In this event, the Town is authorized to spread the costs associated with testing as a service charge under Minn. Stat. §429.101, and to certify the amount as a special assessment against the property, payable in a single installment.

c. The Public Health Laboratory will forward the test results to the MDH Environmental Health Division for review. MDH will send the results and their analysis to the well owner, with copies to the Town Clerk, County, and MPCA. Based upon the analysis provided by MDH:

(i) Wells with TCE or CCl4 concentrations greater than or equal to 0.5 µg/l will be allowed, provided that within sixty (60) days a granular activated carbon (GAC) filter is installed, and then maintained and changed out according to the requirements of this Ordinance. If it is a newly constructed house, the Certificate of Occupancy will not be issued until the GAC filter has been installed and demonstrated to work in accordance with Section 5 of this Ordinance.

(ii) Wells that contain TCE or CCl4 at concentrations less than 0.5 µg/l may be used without GAC filter system, however, the well owner must have the well water tested for VOCs at least every two (2) years. If TCE or CCl4 concentrations reach or exceed 0.5 µg/l a GAC filter system must be installed, maintained and changed out by the well owner according to the requirements of this Ordinance.

(iii) Testing required by this Section (c) is mandatory, however, well owners may voluntarily test their water at more frequent intervals. If the additional samples are collected by the County, the results will be sent to the homeowner, township, and county as described in Section (c). If the additional samples are collected by another entity, homeowners are encouraged to send copies of the analytical results to the Town Clerk.

d. Well owners whose wells existed before April 9, 2002, need not comply with Sections 7. a and b. This includes well owners whose well is being monitored by the MPCA, or whose home has been provided with a GAC filter system that is regularly monitored by the MPCA.

8. **MAINTENANCE REQUIREMENTS**. All pre-existing individual GAC filter systems, as well as those installed under this Ordinance, must be operated according to the provisions of this Section.

a. The GAC filter system must be maintained and changed out in accordance with the requirements of this Ordinance.

b. The owner of any GAC filter system or the owner's agent shall regularly, but in no case less frequently than every three (3) years from the date of the filter installation or prior change-out, have the GAC filter system inspected and changed out by a licensed plumber or licensed water conditioning contractor. Proof of the inspection and change-out must be provided to the Town Clerk.. The Town Clerk or designated agent must then distribute a copy of this proof to MDH and MPCA.

c. The Town Clerk must send a written Notice to any owner that has not complied with the actions required by Section 8.b informing the owner of the delinquency. If the owner does not comply within sixty (60) days of the Notice the Town is authorized to contract with a licensed plumber or licensed water conditioning contractor to complete the inspection and change out. In this event, the Town is authorized to assess the costs associated as a service charge under Minn. Stat. §429.101, and to certify the amount as a special assessment against the property, payable in a single installment.

d. On property platted and approved prior to April 9, 2002, which has an existing well that is being monitored by the MPCA and a GAC filter system that is regularly maintained and changed out under their auspices, the owner or the owner's agent need not comply with Section 8.b.

e. The owner or occupant of a property is responsible to provide access, during normal business hours (Monday – Friday, 8:00 am – 4:30 pm), to the Town, or its agents, for the purpose of performing inspections and tests required under this Ordinance.

9. **ADMINISTRATION**.

a. To enforce this Ordinance the Town or its agents may enter a building, property or place for the purpose of sampling well water where there is reason to suspect a GAC filter system is failing to properly function, has been tampered with or modified, or a well exists with TCE or CCl4 concentrations greater than or equal to 0.5 µg/L. All samples must be taken by a technician trained in the collection of samples and the samples must be analyzed by the Minnesota Public Health Laboratory.

b. Prior to executing the Town's right of entry, the Town Attorney, upon approval of the Town Board, must obtain an Administrative Search Warrant from the District Court of Washington County for that purpose. The Town Attorney must also make reasonable efforts to discuss entry with any owner in order that any entry without consent be avoided if reasonably possible.

c. If, in the opinion of the Town Board, compliance with this Ordinance is not achieved and, therefore, the health and safety of Town residents is at risk, the

Town Board is authorized to contract with a qualified consultant to act as the Town's agent with authority to administer this Ordinance.

d. The Town Board is also authorized to enter into joint power agreements with other governmental units or State agencies for the purpose of administering the provisions of this Ordinance.

10. **SAVING.** In all other ways the ordinances of the Town will remain in effect.

11. **EFFECTIVE DATE.** This Ordinance will be in full force and effect from and after its passage and publication according to law.

Enacted by the Town Board of the Town of Baytown this –12th- day of --September, 2011--

TOWN OF BAYTOWN

By ***Kent Grandlienard***
Kent Grandlienard, Chair
Board of Supervisors

By ***Constance Fredkove***
Constance Fredkove, Town Clerk

GAC FILTER SYSTEM SPECIFICATIONS:

All GAC filter systems must meet or exceed the following specifications (see figure on reverse side of this page):

1. Two GAC filter system vessels must be connected in series so that all water flows through one vessel first and then through the second vessel. Vessels shall not be equipped to provide automatic backwashing. [NOTE: To extend the life of the carbon filters, it is strongly recommended that the system be plumbed so that outside taps are not filtered. Typical outdoor uses (such as watering lawns and gardens, growing vegetables, filling pools, etc.) of water with low TCE concentrations will not result in exposures of health concern.]

2. Each vessel must have continuously–wound high–strength fiberglass outer shell and a non–corrosive high density polyethylene inner shell and a black rubber base; minimum carbon capacity of 90 pounds; approximate dimensions of 15–inch diameter by 4–foot height; minimum pressure rating of 150 psi; rated flow rate of up to 10 gpm; rated pressure drop of less than 4 psi at 10 gpm (with new carbon). Inside the vessel, the outlet of the vessel head shall be fitted with a 1–inch diameter PVC down tube that shall extend to the bottom of the vessel. An appropriately sized screen basket must have been installed on the bottom of the down tube.

3. Carbon specification: 8 x 30 mesh virgin granular activated carbon with minimum iodine number of 1,000. Carbon must meet NSF/ANSI Standards 61 and 53, to avoid arsenic leaching and ensure VOC removal, and be manufactured entirely from raw materials and not from regeneration of any previously used carbon.

4. Piping: copper and PVC braided tubing; cam–lock–quick–connect fittings used with PVC tubing to facilitate carbon filter change–out; piping diameter equal to existing piping at installation location, except 3/4 inch is minimum size; minimum pressure rating of 125 psi.

5. Valves: brass; ball type providing watertight shut–off; minimum pressure rating of 150 psi; size to match installed piping diameter; valve handle orientated for ease of operation.

6. Sample Ports: brass; ball type providing watertight shut–off; minimum pressure rating of 150 psi; valve handle orientated for ease of operation. Alternatively, the sample ports may be integral to vessel head but in either case, the outlet of the sample port must be directed downward towards the floor.

7. Flow Meter: Badger RCDL Series disc meter, Model M25 with brass housing, or equal and installed upstream of the lead carbon filter orientated for ease of readability.

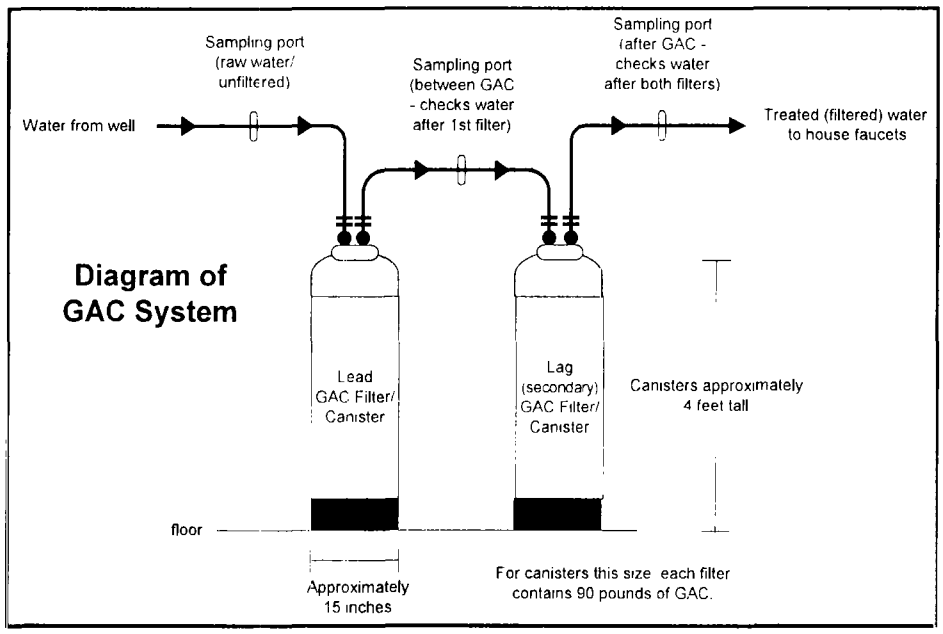
8. Sample ports must be located before and between the two filter vessels.

9. A bypass valve must not be installed around the filter vessels.

GAC FILTER SYSTEMS INSTALLATION:

A GAC filter system may only be installed under the supervision of a licensed plumber or licensed water conditioning contractor. A GAC filter system must be installed at a point of entry on the well supply system that will provide for treatment of all water that travels to faucets and fixtures inside the house and other potable outlets on the system. After each system is installed, it must be filled and pressurized to verify that there are no water leaks. Any water leaks observed must be immediately repaired.

An initial "verification" water sample must be collected from a sampling point between the two filter vessels by Washington County. In the unlikely event that any TCE or CCL4 breakthrough is detected, the installer must determine the cause of the detection. The water supply may not be used until the GAC filter system is functioning properly.



14. Special Well Areas

14.1. Purpose and Intent

14.1.1.1. The purpose is to monitor wells with the town of West Lakeland's portion of the Baytown-West Lakeland Special Well Construction Area (SWCA) to identify those wells at or exceeding 0.5 ug/l of TCE , to ensure whole house GAC treatment systems are installed for these wells and to establish requirements for monitoring, maintenance and repairs of GAC filters. This ordinance will not apply to wells not intended for human consumption such as monitoring wells, irrigation wells, to community public water supply wells, or to wells on property that was platted prior to April 9, 2002.

14.2. GAC Filter System Specifications:

14.2.1. All GAC filter systems meet or exceed the following specifications

14.2.2. Two GAC vessels must be connected in series so that all water flows through one vessel first and then through the second vessel. Vessels shall not be equipped to provide automatic backwashing.

14.2.3. Each vessel must have continuously wound high-strength polyethylene inner shell and a black rubber base; minimum carbon capacity of 90 pounds; approximate dimension of 15 inch diameter by 4 foot height; minimum pressure rating of 150 psi; rated flow rate of up to 10 gpm; rated pressure drop of less than4 psi at 10 gpm (with new carbon). Inside the vessel, the outlet of the vessel head shall be fitted with a 1-inch diameter PVC down tube that shall extend to the bottom of the vessel. An appropriately sized screen basket must be installed at the bottom of the down tube.

14.2.4. **Carbon Specification**: 8x30 mesh virgin granular activated carbon with minimum iodine number of 1,000. Carbon must be carbon that is manufactured entirely from raw materials and not from regeneration of any previously used carbon.

14.2.4.1. **Piping**: copper and PVC braided tubing; cam lock quick connect fittings used with PVC tubing to facilitate carbon filter change-out; piping diameter equal to existing piping at installation location, except ¾ inch is minimum size; minimum pressure rating of 125 psi.

14.2.4.2. **Valves**: brass; ball type providing watertight shut-off; minimum pressure rating of 150 psi; valve handle orientated for ease of operation.

14.2.4.3. **Sample Ports**: brass; ball type providing watertight shut-off; minimum pressure rating of 150 psi; valve handle oriented for ease of operation. Alternatively, the sample ports may be integral to vessel head but in either case, the outlet of the sample port must be directed toward the floor.

14.2.5. **Flow Meter:** Badger RCDI series disc meter, model M25 with brass housing, or equal and installed upstream of the lead carbon filter orientated for ease of readability.

14.3. GAC Filter Maintenance And Change Out

14.3.1. The GAC filter must be changed out using the following standards:

14.3.1.1. Verify that there are no appliances running or other active water uses occurring.

14.3.1.2. Close the inlet and outlet valves for the GAC filter system.

14.3.1.3. Disconnect and remove the lead GAC filter (vessel with spent carbon)

14.3.1.4. Disconnect the second GAC filter and reinstall it in the lead position.

14.3.1.5. Move the GAC filter with the spent carbon outside for removal of the spent carbon by specialized on-site carbon change-out equipment. The equipment should utilize high vacuum equipment for the extraction of the spent carbon with piping that directly transfers the spent carbon into a container that is suitable for spent carbon transport.

14.3.1.6. Rinse the vessel, disinfect, and refill with at least 90 pounds of virgin GAC meeting the same specification as cited for new GAC filter systems under this ordinance. Containerize the rinse/disinfect ion water for transport to licensed facility for proper disposal.

14.3.1.7. Install the refilled GAC filter in the secondary position.

14.3.1.8. Re-open the inlet and outlet valves for the GAC filter system and check for water leaks. Repair any observed water leaks immediately.

14.4. GAC Filter Systems Installation

14.4.1. A GAC may only be installed under the supervision of a licensed plumber or licensed water conditioning contractor. A GAC system must be installed at a point of entry on the well supply system that will provide for treatment of all water that travels to faucets and fixtures inside the home and other potable outlets on the system. After each system is installed, it must be filled and pressurized to verify that there are no water leaks. Any water leaks observed must be immediately repaired.

14.4.2. An initial "verification" water sample must be collected from a sampling point between the two filter vessels by a neutral third party such as laboratory staff or consultant under authority of the town, following installation, and tested for VOCs by a laboratory certified by Minnesota Department of Health under Minn rule 4740.2040 for analysis of VOCs. The analysis must meet the requirements promulgated by the EPA in methods 502.2, 524.2, or 551.1. In the unlikely event that any TCE or CCl4 breakthrough is detected, the installer must determine the cause of the

detection. The water supply may not be used until the GAC is functioning properly.

14.5. New Well Construction

14.5.1. New well construction is regulated by Minnesota Department of Health pursuant to Minnesota Statutes, Chapter 1031 and Minnesota Rules, Chapter 4725 and may only be constructed with the written approval of the Minnesota Department of Health.

14.6. Well Sampling Requirements Within The SWCA.

14.6.1. Within six (6) months of the effective date of this ordinance each well owner must obtain, at the owner's expense, a VOC test on the well water and forward the test results to the town clerk. This test and periodic maintenance tests required by section 8 must be completed by a laboratory certified by Minnesota Department of Health under Minn. Rules 4740.2040 for analysis of VOCs. If, however, the Minnesota Department of Health determines, in writing, based on historic sampling, that a well will likely not be contaminated, the sampling described herein need not occur.

14.6.2. A written notice must be sent by the town clerk to any owner that has not complied with the test required by section 7.a informing the owner of the delinquency. If the owner does not comply within sixty (60) days of the notice, the Town is authorized to contract with a consultant trained in sample collection procedures and a Minnesota Department of Health certified laboratory to conduct an analysis of the samples. In this event, the town is authorized to spread the costs associated with testing as a service charge under Minn statute 429.101, and to certify the amount as a special assessment against the property, payable in a single installment.

14.6.3. The Town or its authorized agent will forward the test results to the Minnesota Department of Health for analysis. Based upon the analysis provided by Minnesota Department of Health:

14.6.3.1. Wells with TCE concentrations equal to or greater than 0.5 ug/l or CCl4 concentrations equal to or greater than 3 ug/l will be allowed, provided that within sixty (60) days a "whole house" granular activated carbon (GAC) filters are installed, maintained and changed out by the well owner according to the requirements of this ordinance.

14.6.3.2. Wells with TCE concentrations less than 0.5 ug/l or CCl4 concentrations less than 3 ug/l may be used without GAC filters, however, a VOC test of the well's status must be submitted to the Town Clerk at least every two years, according the rules set forth in Section 8.b. If TCE concentrations reach or exceed 5 ug/l a "whole house" GAC filter must be installed, maintained and changed out by the well owner according to the requirements of this ordinance.

14.6.3.3. If, however, a test reveals that a Minnesota Department of Health interim exposure limit or health risk limit of TCE or CCl4 has not been

reached, but because of predictive patterns it is likely that in the near future to be reached, and if recommended by Minnesota Department of Health, annual tests may be required. Written notice must be sent by the Town to the owner advising of this requirement.

14.6.3.4. The testing required by this section is mandatory; however, if more frequent testing is done by a well owner voluntarily at lesser intervals, copies of the tests must be submitted to the Town Clerk.

14.6.4. For an existing well that is being monitored by the Metropolitan Airports Commission through their consultant Wenck Associates or by an authorized State agency, or maintains a "whole home" GAC filter that is regularly monitored under their auspices, the owner or the owner's agent need not comply with sections 7(1) or 7(b). Written evidence of this status must, however, be submitted to the Town clerk every two years.

14.7. Maintenance Requirements.

14.7.1. Each individual GAC currently existing, as well as those installed under this ordinance, must be operated and maintained according to the provisions of this section.

14.7.1.1. The GAC must be maintained and changed out in accordance with the requirements of this ordinance.

14.7.1.2. The owner of any GAC or the owner's agent shall regularly, but in no case less frequently than every two years from the date of the prior test, have the GAC inspected, tested and changed out by a licensed plumber or licensed water conditioning contractor. A sample must be taken from a sampling point between the two filter vessels. Copies of all analytical test results must be provided to the Town Clerk or an agent designated by the Town to collect samples and compile data. The Town Clerk or designated agent must then distribute all analytical test results and data to the MPCA, Washington County Department of Health, Minnesota Department of Health and Metropolitan Airports Commission, through their consultant Wenck Associates.

14.7.1.3. A written notice must be sent by the Town Clerk to any owner that has not complied with the test required by this section of the code informing the owner of the delinquency. If the owner does not comply within sixty (60) days of the notice, the Town is authorized to contract with a licensed testing agent to complete the test. In this event, the Town is authorized to spread the costs associated with testing as a service charge under Minn Statute 429.101, and to certify the amount as a special assessment against the property, payable in a single installment

14.7.1.4. If an existing well that is being monitored by the Metropolitan Airports Commission through their consultants Wenck Associates or by an authorized State agency, or maintains a "whole home" GAC filter

that is regularly maintained and changed out under their auspices, the owner or the owner's agent need not comply with Section 14.7.1.2 Written evidence of this status must, however, be provided to the Town Clerk at least every two years.

14.7.1.5. The owner or occupant of a property is responsible to provide access, at reasonable times, to the Town or its agents, for the purpose of performing inspections and tests required under this ordinance.

14.8. Administration

14.8.1.1. To enforce this ordinance, the Town or its agents may enter a building, property or place for the purpose of sampling well water where there is reason to suspect a GAC is failing to properly function, has been tampered with or modified, or a well exists with TCE concentrations grater than 5 ug/l or with CCl4 concentration of greater than 3 ug/l. All samples must be taken by a technician trained in the collection of samples and the samples must be analyzed by a Minnesota Department of Health-certified laboratory.

14.8.1.2. Prior to executing the Town's right of entry, the Town Attorney, upon approval of the Town Board, must obtain an Administrative Search Warrant from the District Court of Washington County for that purpose. The Town Attorney must also make reasonable efforts to discuss entry with any owner in order that any entry without consent be avoided if reasonably possible.

14.8.1.3. If in the opinion of the Town Board, compliance with this ordinance is not achieved and, therefore, the health and safety of the Town residents is at risk, the Town Board is authorized to contract with a qualified consultant to act as the Town's agent with authority to administer this ordinance.

14.8.1.4. The Town Board is also authorized to enter into joint power agreements with other governmental units or State agencies for the purpose of administering the provisions of this ordinance.

14.9. Payment to Township.

14.9.1. In order to defray the costs to the town of administering the provisions of this section, any applicant for a building permit for a new residence within the SWSA shall pay to the town a fee of $500 at the time of application for the building permit. The amount of the fee may be modified by the town board from time to time by resolution to reflect that actual costs to the town of administering the provisions of this code section.

Attachment 3

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Attachment 4

Applicable or Relevant and Appropriate Requirements (ARARs)

Medium/ Authority	ARAR	Status	Requirement Synopsis	Action to be taken to Attain ARAR
Groundwater/ Federal	Maximum Contaminant Levels (MCLs) (40 CFR Part 141 – 146)	Relevant and Appropriate	Standards (MCLs) have been adopted as enforceable standards for public drinking water systems.	Remediation of contaminated source will eliminate ongoing discharges of contaminants to groundwater. Applies to OU 2.
Groundwater/ State	Minnesota Department of Health (MDH) – Minnesota Health Risk Limits; Minnesota Rules, Chapter 4717	Applicable	State groundwater quality standards have been promulgated for a number of contaminants. When the state levels are more stringent than federal levels, the state levels will be used.	The selected remedy will attain State standards in the groundwater at the point of compliance after completion of remedial activities.
Soil/State	Minnesota Department of Health – Health Risk Values; Minnesota Rules Chapter 4717	Applicable	Intrusion Screening Values adopted for VOC compounds are used to interpret soil vapor concentrations relative to potential to impact human health.	Soil vapor control may be required to limit intrusion of chlorinated VOCs into site buildings and future adjacent buildings.

Attachment 5

AFFIDAVIT OF PUBLICATION

STATE OF MINNESOTA

COUNTY OF WASHINGTON

Julie Athey,
being duly sworn on oath, says: that she is, and during all times herein states has been,
Clerk of Sun Newspapers
Publisher of the newspaper known as the Stillwater Gazette, a newspaper of general circulation within the City of Stillwater and the County of Washington.

That the notice hereto attached was cut from *the columns of said newspaper and was* printed and published therein on the following date(s):

15th & 22nd of February 2012
Newspaper Ref./Ad #1092445

Julie Athey

Subscribed and sworn to before me this 22nd day of February 2012

Mark Berriman

NOTARY PUBLIC

Washington County, Minnesota

My commission expires January 31, 2016

MARK E. BERRIMAN
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2016

Public Notice

(Official Publication)

Baytown Township Groundwater Contamination Superfund Site/ Baytown Township, Minnesota

The US Environmental Protection Agency and the Minnesota Pollution Control Agency (MPCA) are reviewing the effectiveness of the cleanup at the Baytown Township Groundwater Contamination Superfund Site in Baytown Township, Minnesota. Superfund law requires five-year reviews of sites where the cleanup is either completed or in progress, but hazardous waste remains on-site. These five-year reviews are completed to ensure that the cleanup remains effective and protects human health and the environment. This is the second five-year review for this site.

The first five-year review was completed in 2007. The five-year review concluded that the cleanup actions at the site created conditions protective of human health and the environment. Five-year reviews look at:

- Site information
- How the cleanup is done
- How well the cleanup is working
- Future actions needed

Site records are at the MPCA, 520 Lafayette Road North, St. Paul, Minnesota. The MPCA is open Monday through Friday from 8:00AM to 4:00PM. To review the records, please contact Dianne Mitzuk, MPCA Records Manager at (651)-757-2573. Comments and questions will be accepted until February 24, 2012. Please direct your comments or concerns regarding the cleanup to: Gerald Stahnke, Project Manager, MPCA, 520 Lafayette Road North, St. Paul, Minnesota 55155, (651)-757-2753, gerald.stahnke@state.mn.us

(Feb. 15 & 22, 2012) Baytown Township Groundwater

Public Notice

(Official Publication)

Baytown Township Groundwater Contamination Superfund Site/ Baytown Township, Minnesota

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(Feb. 15 & 22, 2012) Baytown Township Groundwater

Attachment 6

Client:	Minnesota Pollution Control Agency
Project Name:	Baytown Township Groundwater Contamination
AECOM Project Number:	60241970
Date:	2/10/12
Location:	Hagberg Property in Lake Elmo
Meeting Purpose:	Site Inspection for Five-Year Review
Prepared By:	Gary Rathbun

In Attendance			
Name	**Company**	**Telephone**	**E-mail Address**
Kurt Schroeder	MPCA	651-757-2753	gerald.stahnke@ state.mn.us
Jerry Stahnke	MPCA	651-757-2703	kurt.schroeder@state.mn.us
Bill Hagberg	Hagberg's Country Mkt.	651-777-2888	None available
Robert DeGroot	AECOM	763-852-4217	robert.degroot@aecom.com
Chad Donnelly	AECOM	763-852-4220	chad.donnelly@aecom.com
Gary Rathbun	AECOM	763-852-4244	gary.rathbun@aecom.com

Summary

- MPCA guided AECOM on tour of Hagberg property exterior conditions and remediation shed equipment. Kurt Schroeder provided an overview of the remediation process including the air strippers, filter vessels, pressure tank, and treated effluent to the baseball field.
- Bill Hagberg pointed out several locations of previous soil borings and vapor probes inside the building. Several attempts were made, but unsuccessful, to mobilize a drill rig inside the building. Current technology may now be available to attain greater depths below the building from the inside. More discussion on this issue may occur.
- Bill Hagberg pointed out the change in floor elevation from the old building to the new and where the market and offices were expanded (Phase 1). The meats department (Phase II).
- Donnelly performed a visual observation of the sub-floor mechanical room. It was commented that the existing sump in the mechanical room was tested for contaminants. Nothing was observed. A comment was also made by Schroeder that water was continually draining into the sump which may have dissolved any elevated concentration of TCE.
- Bill Hagberg led a tour of the interior of the on-site building pointing out various additions to the original building.
- All met to discuss future anticipated work and options for cleanup. Future work included installation of two more monitoring wells on the east side of the building, geoprobe work on the west side of building requiring move of semi-trailers, possible additional soil borings inside building.
- Cleanup options included additional in-situ chemical oxidation, demolition of the original part of the building to access subsurface for exploration/remediation, removal of the entire building to facilitate cleanup.
- Bill Hagberg commented that the drainline to the west was struck by several contractors during the performance of subsurface work on this area of the property.
- Bill Hagberg requested a minimum 48 hour notice of the intent to complete work on his property.
- AECOM personnel toured residential areas within plume area.