Five-Year Review Report

Third Five-Year Review Report

For the

Long Prairie Groundwater Contamination Superfund Site

Long Prairie

Todd County, Minnesota

August 2012

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Five-Year Review Report

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List of Acronyms

Agencies	MPCA and EPA
AMR	Annual Monitoring Report
ARAR	Applicable or Relevant and Appropriate Requirements
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CFR	Code of Federal Regulations
DCE	cis-1,2-Dichloroethene
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
GAC	Granular Activated Carbon
HAA	Health Advisory Area
HUD	Housing and Urban Development
IC	Institutional Control
ISV	Intrusion Screening Value
MCL	Maximum Contaminant Level
MDH	Minnesota Department of Health
MOA	Memorandum of Agreement
MPCA	Minnesota Pollution Control Agency
MSCA	Multi Site Cooperative Agreement
MSL	Mean Sea Level
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCE	Tetrachloroethene
PCOR	Preliminary Close Out Report
PLP	Permanent List of Priorities
PRP	Potentially Responsible Party
RA	Remedial Action
RAL	Recommended Allowable Limits
RAO	Remedial Action Objective
RD	Remedial Design
RFRA	Request for Response Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SVE	Soil Vapor Extraction
SWCA	Special Well Construction Area
TBC	To Be Considered
TCE	Trichloroethene
TCL	Target Cleanup Levels
TCLP	Toxic Characteristic Leaching Potential
ug/Kg	Micrograms per Kilogram
ug/L	micrograms per Liter
ug/m^3	Micrograms per Cubic Meter
UU/UE	Unlimited Use or Unrestricted Exposure
VC	Vinyl Chloride
VIA	Vapor Intrusion Assessment
VOC	Volatile Organic Compounds
WasteLAN	Regional Database related to CERCLIS

Executive Summary

The Long Prairie Groundwater Contamination Superfund Site (Site) is located in Long Prairie, Minnesota. The Site includes a 0.16-acre (approximately 7,000 square foot) area of tetrachloroethene (also known as perchloroethene [PCE]) impacted soil. The groundwater plume extends approximately 2100 feet to the north east and was approximately 1000 feet in width. The PCE impacted soil was located in the back of a former dry cleaning facility located at 243 Central Street in the commercial district of Long Prairie, Minnesota (City). The PCE impacted soil area has served as a continuous source of contamination to the downgradient groundwater aquifers underlying a portion of the City of Long Prairie.

The Site consists of three operable units (OU): OU1 – Groundwater; OU2 –Soil; and OU3 – Alternate Water Supply, The specific remedy for each OU consists of the following components:

OU1:

- Installation of groundwater extraction wells in the contamination plume;
- Treatment of contaminated groundwater; and
- Discharge treated groundwater to the Long Prairie River;
- Groundwater monitoring to evaluate the contaminant plume.

OU2

- Treat contaminated soil in the back lot of the former dry cleaner with an active soil venting system.

OU3

- Provide an alternative water supply including water main extensions and service connections to the municipal water supply for those residences in the health advisory areas or with a threatened water supply.

At the time of this Five-Year Review, the remedial objectives in the 1988 ROD for OU2 and OU3 have been completed and are protective of human health, and the environment. Because the soil contamination was found to be more extensive than previously thought near the former dry cleaner, a soil vapor extraction (SVE) system was installed in 2010 to reduce vapor intrusion risk to nearby receptors. The levels of contamination in the soil gas have been reduced and the most recent vapor intrusion samples for spring 2012 met MPCA's Intrusion Screening Value guidelines. The remedy for OU1 continues to operate and is functioning as designed to protect human health and the environment in the short-term. All private wells currently meet Minnesota Health Risk Limits (HRLs) for private wells.

Overall, the remedy at the site is functioning as designed and is currently protective of human health and the environment in the short-term. There is no evidence of current exposure to contaminated soil or groundwater. However, in order for the remedy to be fully protective in the long-term, the following actions need to be performed:

- Evaluation of existing and potential ICs and evaluation of long-term stewardship programs for development of an IC plan. Components of the developed IC plan should be addressed through revisions to the Site decision documents, as appropriate.

- Continue O&M of the selected remedy until cleanup goals and Remedial Action Objectives (RAO) have been met.

- Formal evaluation of cleanup goals for vapor intrusion and cleanup objectives of the new SVE system.

All private wells, where access has been granted, within the area of the plume are being monitored by the MPCA. Property owners that have refused access in the past are periodically contacted to request permission to collect groundwater samples by the MPCA. To be best of MPCA's knowledge, groundwater exceeding the HRLs is not being ingested within the area of the plume.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Long Prairie Groundwater Contamination Superfund Site		
EPA ID: MND980904072		
Region: 5	**State:** MN.	**City/County:** Long Prairie, Todd County

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: Minnesota Pollution Control Agency (MPCA)
Author name (Federal or State Project Manager): Nile Fellows
Author affiliation: MPCA Project Leader
Review period: October 2011 to August 2012
Date of site inspection: November 7, 2011
Type of review: Policy
Review number: 3 (Third)
Triggering action date: Previous Five-Year Review, September 21, 2007
Due date *(five years after triggering action date)*: September 21, 2012

Issues/Recommendations				
Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 1,2,3	**Issue Category:** Institutional Controls			
	Issue: Evaluation of existing and potential ICs and long-term stewardship programs is being conducted by the MPCA and EPA.			
	Recommendation: Complete evaluation of existing and potential ICs and long-term stewardship programs and development of an IC plan to assure long-term protectiveness for the Site.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	*Yes*	*MPCA/EPA*	*MPCA/EPA*	*December 2013*
	Issue Category: Cleanup Objectives			
	Issue: Potential revisions to the site decision documents incorporating changes to cleanup standards and implementation of ICs are being evaluated by the MPCA and EPA.			
	Recommendation: Complete evaluation of potential revisions to decision documents incorporating changes to Site cleanup goals and ICs, as appropriate.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	MPCA/EPA	MPCA/EPA	June 2014
OU(s): 1,2,3	**Issue Category:** Vapor Intrusion			
	Issue: Formal evaluation of site specific clean up goals for vapor intrusion and the new SVE system is being conducted.			
	Recommendation: Complete formal evaluation of soil vapor intrusion cleanup goals as associated with the new SVE system, evaluation should consider incorporating remedial objectives into revised Site decision documents.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	MPCA/EPA	MPCA/EPA	December 2013
OU(s): *OU1*	***Issue Category:*** *Remedy Performance*			
	Issue: Evaluation of modification to the groundwater extraction wells by removing select recovery wells from service and installing an additional well is being conducted. The additional well is being installed closer to the source area. Some of the groundwater extraction wells and surrounding monitoring wells have met their groundwater cleanup goals.			
	Recommendation: Complete evaluation of proposed groundwater extraction system modifications.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	MPCA	MPCA	June 2013

Protectiveness Statement(s)	
Operable Unit: OU1	*Protectiveness Determination:* Short-Term Protective

Protectiveness Statement:
The remedy at OU 1 currently protects human health and the environment in the short-term because the selected remedy is functioning to remove VOC impacted groundwater from the affected aquifer(s) and contain the groundwater plume. Plume containment is functioning to protect the City of Long Prairie municipal wells. However, in order for the remedy to be protective in the long-term, the following actions need to be taken:

- Evaluation of existing and potential ICs and evaluation of long-term stewardship programs for development of an IC plan. Components of the developed IC plan should be addressed through revisions to the Site decision documents, as appropriate.
- Modify the existing Record of Decision document to include updated groundwater and surface water cleanup values.
- Continue O&M of the selected remedy until cleanup goals and RAO have been met.

Operable Unit:	*Protectiveness Determination:*
OU2	Short-Term Protective

Protectiveness Statement:

The remedy for OU2 currently protects human health and the environment because the soil venting system operated full time from 1997 through 1999 and was removed in 2000 when the soil Remedial Action Objectives were met. Contaminant concentrations in the soils were reduced to ROD cleanup levels in the originally-defined source area. Since that time, PCE impacted soil has been found to be more extensive than previously thought. Soil contamination within the expanded source investigation area is being addressed through operation of a second, more extensive, SVE system, which was installed in 2010 and extended in 2011. The second SVE system is also addressing soil vapor intrusion pathways in the vicinity of the Site. Operation of the second SVE system is controlling potential receptor pathways and is assuring protectiveness of human health and the environment for OU2. However, for the remedy to be protective in the long-term, the following actions need to be taken:

- Evaluate soil vapor intrusion risks and cleanup goals
- Evaluate the effectiveness of the new SVE system
- Consider incorporating remedial objectives into Site decision documents

Operable Unit:	*Protectiveness Determination:*
OU3	Protective

Protectiveness Statement:
The remedy for OU3 is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. This has been accomplished by offering an alternate water supply to all private wells and extension of the municipal water supply to properties in the groundwater contamination area. The MPCA continues to sample the existing water supply wells where property owners have granted access to collect samples and to monitor their water quality. The MPCA routinely seeks

permission from property owners who have refused access in the past.

The MPCA anticipates completion of an updated well receptor survey to verify private well use for the immediate plume area during the State of Minnesota 2013 fiscal year.

Sitewide Protectiveness Statement
Protectiveness Determination: Short-Term Protective
Protectiveness Statement: The remedy at the Site is functioning as designed and is currently protective of human health and the environment in the short-term. The groundwater extraction system is functioning to recover VOC impacted groundwater at the Site and control the contaminant plume. The initial SVE system achieved ROD required cleanup goals for soil in the small area thought to be the extent of the source area. At the time of this review an expanded source investigation area was evaluated through further investigation and a second, more extensive SVE system was installed in 2010 and is in operation. The new SVE system was extended by two additional locations in 2011. Additional short-term protectiveness is being assured by operation of the new SVE system to address soil vapor intrusion pathways and soil contamination within the expanded source investigation area. Long-term protectiveness will be achieved upon verification that the vapor intrusion pathways and contaminant sources are being adequately controlled. Long-term protectiveness will also be assured by formal evaluation of cleanup goals for vapor intrusion and the cleanup objective of the new SVE system. Municipal water connections have been made, extending an alternate water supply to properties in the groundwater contamination area. Additional long-term protectiveness will be assured upon evaluation of an IC plan incorporating a long-term stewardship program.

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Five-Year Review Report

I. Introduction

The Purpose of the Review

The purpose of Five-Year Reviews is to determine whether the remedy at the Long Prairie Groundwater Contamination Site (Site) is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and recommendations to address them.

Authority for Conducting the Five-Year Review

The Minnesota Pollution Control Agency (MPCA), in cooperation with the United States Environmental Protection Agency (EPA), Region five, is preparing this Five-Year Review pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action 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. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

This requirement is interpreted further in the National Contingency Plan (NCP); 40 CFR §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.*

Who Conducted the Five-Year Review

The MPCA, on behalf of the EPA (collectively as the Agencies), has conducted a Five-Year Review, as required by EPA policy, of the remedial actions implemented at the Long Prairie Groundwater Contamination Site in Long Prairie, Minnesota. The MPCA conducted the review from October 2011 through June 2012. This report documents the results of the review conducted with the assistance of MPCA contractor, Antea™Group, of St. Paul, Minnesota. The MPCA is the lead environmental regulatory agency for the implementation and oversight of response actions at the Site.

Other Review Characteristics

This is the third Five-Year Review for the Long Prairie Groundwater Contamination Site. The triggering action for this policy review is the date of the previous Five-Year Review, as shown in EPA's WasteLAN database: September 21, 2007. This Five-Year Review is required due to the fact that hazardous substances, pollutants, or contaminants will remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE) beyond five years after construction completion has been reached.

II. Site Chronology

Table 1: Chronology of Site Events

Event	Date
Dry cleaning facility operated at the Site.	1949 – 1984
Minnesota Department of Health (MDH) discovers tetrachloroethene (PCE) contamination in two of the five Long Prairie municipal water supply wells.	1983
MDH issues a Health Advisory Area (HAA) for residential wells in a 15-block area of the city	1983
Bottled water provided to affected residents by MPCA.	1983
Granular activated carbon (GAC) treatment system installed for the two affected municipal wells by MPCA	1984
Federal Housing and Urban Development (HUD) grant for new municipal well, water mains, and water treatment plant improvements.	1984
Cooperative agreement with multiple amendments	September 1984
Added to MPCA Permanent List of Priorities (PLP)	October 1984
Proposed for National Priorities List (NPL)	October 15, 1984
State Notice to Potentially Responsible Parties (PRP) to do Remedial Investigation/Feasibility Study (RI/FS).	May 25, 1985
NPL listing	June 10, 1986
RI/FS study complete	April 4, 1988
MPCA/EPA notice to PRPs to reimburse past, future costs.	April to May, 1988
Record of Decision (ROD) signed.	June 27, 1988
Remedial Design (RD) start	September 19, 1988
Remedial Design complete – Remedial Action (RA) Start	April 11, 1991
First Explanation of Significant Differences (ESD) signed to change the treatment of recovered groundwater from air-stripping to GAC.	June 20, 1991

Table 1: Chronology of Site Events

Event	Date
Second ESD signed to clarify Remedial Action Objectives (RAO) and cleanup goals.	May 25, 1994
Extended Heath Advisory Area established.	1994
Construction on OU1, subsurface and above ground OU2 start	January 26,1995
Superfund State Contract signed	June 1996
Construction OU3, municipal water hookup start	November 1996
Construction on OU2, above ground soil vapor extraction system (SVE) complete	April 23, 1997
Construction on OU3, municipal water hookup complete	May 1997
Construction on OU1, subsurface OU2 complete	August 14, 1997
Construction complete date	September 19, 1997
Ongoing operation and maintenance (O&M) efforts	September 1997 - Present
Well receptor survey completed by MPCA	July 1998
OU2, soil vapor extraction demobilization complete	March 2000
OU2, partial remedial action completion report	August 2000
Construction Documentation Report, Conveyance System	October 2000
SVE system closure letter by MPCA	December 13, 2001
First Five-Year Review completed	September 30, 2002
Receptor Survey submitted by MPCA Contractor	June 2003
MPCA and MDH sign Memorandum of Agreement (MOA) for a Special Well Construction Area (SWCA)	July 27, 2005
Special Well Construction Area becomes effective	January 1, 2007
Periodic residential well sampling and verification	2003 through Present
Pilot study area one injection of organic substrate (EOS®) to aquifer	March 2007
Second Five-Year Review completed	September 2007
Pilot study injection areas two and three	September 2007
Pilot study injection area four	March 2008
Second SVE system start up (extended by two additional locations in 2011)	August 2010

III. Background

Physical Characteristics

The Long Prairie Groundwater Contamination Site includes a 0.16-acre (approximately 7,000) square foot area of tetrachloroethene (also known as perchloroethene (PCE)) impacted soil. The PCE impacted soil was located in the back of a former dry cleaning facility located at 243 Central Street in the commercial district of Long Prairie, Minnesota (City). The PCE impacted soil area serves as a continuous source of contamination to the downgradient groundwater aquifers underlying a portion of the City of Long Prairie. The City is situated at an elevation of approximately 1,300 feet above Mean Sea Level (MSL). A groundwater plume of PCE and its degradation products extends approximately 2100 feet to the north east and was at one time approximately 1000 feet in width.

The hydrogeology underlying the City consists of an upper and lower sand aquifer, separated by a clay till aquitard. The upper and lower sand aquifers average 25 and 20 feet in thickness, respectively. The clay aquitard decreases in thickness to the west and gradually pinches out approximately 440 feet east of the Long Prairie River. The aquitard is completely absent in the river valley, where the two sand aquifers are hydraulically connected. In the center of the river valley, the combined sand aquifers are approximately 70 feet thick. The sand aquifers are recharged by precipitation and inflow from the Long Prairie River. Generally, groundwater flow within both aquifers is to the north-northeast; however, locally influenced groundwater flow due to groundwater pumping and the fluctuating Long Prairie River elevations has been observed. Groundwater not withdrawn via production or recovery wells eventually discharges to the Long Prairie River. However, during high stages of the River, the groundwater discharge to the river can be temporarily reversed to be a losing stream. Based on the modeling conducted as part of the Second Five-Year Review, the groundwater flow reversals are not of sufficient duration to cause a concern for impacts to the City wells CW-3 and CW-6.

The former dry cleaning facility and suspected source area is located above the edge of the till aquitard. Historic investigation results indicate that the contaminant plume has been detected within both the upper and lower sand aquifers beneath the city's commercial district and under an older residential area. The Long Prairie River flows through the city and passes within approximately 500 feet of the contaminant plume.

Land and Resource Use

The City of Long Prairie is the county seat of Todd County, and is located approximately 120 miles northwest of Minneapolis/St. Paul in central Minnesota (Figure 1). Long Prairie is a small farming community with a population of 3,458 residents according to the 2010 census. Land use in the vicinity of the Site consists of light industrial and commercial establishments and residential neighborhoods. The former dry cleaner is located in the downtown, commercial district. The groundwater plume extends from the vicinity of the source area to the north through a residential and adjacent commercial/light industrial area. Beyond the commercial/light industrial area the groundwater plume continues through a wooded natural area and wetlands adjacent to the Long Prairie River. The remainder of the City is mostly residential and commercial properties.

The City obtains its potable water supply from the groundwater of the Long Prairie sand aquifers underlying the city and the surrounding region. The municipal water supply system currently consists of five wells. City wells CW-3 and CW-6 are located slightly east of the contaminated groundwater plume and are screened within the deeper sand aquifer. An additional three city wells; CW-7, CW-8 and CW-9 are located south of Long Prairie.

At the present time, only one known resident is utilizing a private well for drinking water and refuses to connect to the municipal water supply. However, VOC concentrations detected at this well have been below site cleanup goals since 2006. The most recent sampling results from 2011 indicate concentrations below laboratory method detection limits. The well is located on the eastern edge of the plume. One former business could not be connected to the municipal supply due to building foundation problems. Formerly, the business utilized bottled water for drinking and well water for toilets and hand washing. The building that contained this business is currently unoccupied and the well is not being used. The MPCA continues to monitor the use of this building. Two other businesses utilize private wells for non-potable needs. Some residential properties also utilize private wells for irrigation purposes only. The MPCA continues to monitor the water quality of the existing water supply wells where property owners have granted access to collect samples. The MPCA routinely seeks permission from property owners who have refused access in the past.

The MPCA anticipates completion of an updated well receptor survey to verify private well use for the immediate plume area during the State of Minnesota 2013 fiscal year.

History of Contamination

The source of groundwater contamination is a former dry cleaning facility located at 243 Central Street in the commercial area of Long Prairie. The facility changed ownership three times during the course of its operation from approximately 1949 through 1984. According to supply records, during the time period from 1978 to 1984 approximately 2,200 gallons of the dry cleaning solvent, tetrachloroethene, was used in the dry cleaning operation. The PCE wastes were disposed of utilizing a perforated 55-gallon drum buried up to its rim in the alley behind the facility. Since 1983, an old, and currently inoperable, incinerator is also present near the original location of the buried drum. The original use and purpose of the incinerator is not known. The contamination was discovered during a national initiative by EPA in conjunction with the State Public Water Supply agencies, i.e., the Minnesota Department of Health (MDH), to investigate the occurrence of synthetic volatile organic chemicals (VOC) in public water supplies utilizing groundwater sources. During this initiative, two of the five city groundwater supply wells (CW- 4 and CW-5) were found to contain PCE, trichloroethene (TCE) and cis-1,2-dichloroeythene (cis-1,2-DCE). Further, eight of the 21 residential wells sampled around these wells were also contaminated with PCE. Based on concentrations which exceeded EPA Maximum Contaminant Levels (MCLs) and other risk-based levels the MDH recommended that the city wells be removed from service.

Initial Response

A drinking water Health Advisory was issued by MDH in 1983 for the area of northeastern Long Prairie, and the MPCA issued a Determination of Emergency in 1983 to provide drinking water for residents within the Health Advisory area. At that time, approximately 350 private residential

wells were in use in the area. An activated carbon treatment system was subsequently installed to treat water from CW-4 and CW-5 from June to October 1984 to eliminate the need for providing bottled drinking water. In May 1984, a Housing and Urban Development (HUD) grant was awarded to the City to install a new municipal well (CW-6). Wells CW-4 and CW-5 were retired from service at that time. The grant also funded installation of water transmission lines and improvements to the municipal water treatment plant. Results of groundwater monitoring from monitoring and private supply wells indicated that the groundwater plume extended approximately 2,100 feet to the north east and was approximately 1,000 feet in width. The contamination appeared to extend throughout the saturated thickness of both sand aquifers to a depth of approximately 55 feet below ground surface (bgs). Enforcement activities conducted from 1983 through 1988 did not result in identification of a viable Potentially Responsible Party (PRP) to undertake the necessary response actions. A Multi-Site Cooperative Agreement (MSCA) was signed on September 4, 1984, between MPCA and EPA, to begin a Remedial Investigation and Feasibility Study (RI/FS) at the Site. An Extended Health Advisory area was established in 1994 when additional MPCA sampling outside of the original advisory area found additional residential wells impacted with PCE (Figure 2).

Basis for Taking Action

Previous site operations and disposal practices have been identified as the cause of PCE impacts to soil and groundwater. Hazardous substances have been detected in soil and groundwater at concentrations in excess of risk of exposure limits to human health and the environment and are the basis for taking action at the Site. Site contaminants posed unacceptable risks to human health via ingestion of contaminated groundwater through drinking and cooking and via exposure to contaminated soils from direct contact and ingestion. Potential exposure risk via exposure to soil vapor intrusion pathways has also been identified during the past five years.

Soil

Concentrations of PCE, TCE, trans-1,2-dichloroethene (trans-1,2-DCE), and 1,1,1-trichloroethene have been identified within soils in the vicinity of the back lot of the former dry cleaning facility. The Toxic Characteristic Leaching Potential (TCLP) of these contaminated soils indicated that they would act as a continuous source of groundwater contamination if not remediated.

Potential human health risk by dermal exposure to impacted soils was determined to be the most prominent exposure pathway with regard to impacted soils at the Site.

Groundwater

Concentrations of PCE, TCE, cis-1,2-DCE, and vinyl chloride (VC) were detected in two of the Long Prairie municipal wells. Further investigation indicated that private wells were also impacted by VOCs found within the groundwater plume.

The actual and potential threats to human health resulted from potable water use. Exposure pathways to VOC impacted potable water include ingestion, dermal contact and inhalation. Ingestion of impacted potable groundwater presented the highest

carcinogenic human health risk pathway.

Soil Vapor

Since the previous Five-Year Review potential soil vapor exposure pathways have been identified in the vicinity of the former dry cleaning facility. Concentrations of VOC exceeding MPCA Industrial Intrusion Screening Values (ISV) have been observed in soil vapor samples collected from the alley behind the former dry cleaning facility. Concentrations of PCE, TCE, methylene chloride, benzene, 1,2,4-trimethylbenzene and dichlorodifluoromethane exceeding Industrial ISV have been detected in various soil vapor probes advanced during this review period. Further evaluation of soil vapor intrusion pathways by sub-slab and indoor air sampling have indicated that potential vapor intrusion exposure pathways exist at properties in the vicinity of the Site.

The MPCA Industrial ISV, which are MPCA guidance values for indoor air contaminants at commercial/industrial settings, were determined to be the most appropriate screening value based on the property use in the vicinity of the former dry cleaner. The properties immediately adjacent to the former dry cleaner are utilized for commercial purposes and are not continuously occupied as a residential property would be. In 2010, based on the presence of complete vapor intrusion pathways the MPCA installed a soil vapor extraction (SVE) system in the alley behind the former drycleaner and has conducted further study to determine the extent of soil vapor intrusion in the Central Avenue area of the City of Long Prairie. The SVE system was extended by two locations in 2011.

IV. Remedial Actions

Remedy Selection

The Record of Decision (ROD) for the Site was signed on June 27, 1988. Two subsequent Explanations of Significant Difference (ESD) were signed to clarify the site remedy and remedial action objectives (RAOs) in 1991 and 1994. The selected remedy for the Site consists of separate operable units for groundwater (OU1), soil (OU2) and for providing an alternative drinking water supply (OU3), as identified in the September 1997 Preliminary Close Out Report (PCOR). Remedy selection and RAOs are described in the ROD, 1991 ESD and 1994 ESD (collectively as the Site Decision Documents) and summarized with regard to OU in the PCOR. The specific remedy for each OU consists of the following components:

OU1:

- Installation of groundwater extraction wells in the contamination plume;
- Treatment of contaminated groundwater; and
- Discharge treated groundwater to the Long Prairie River;
- Groundwater monitoring to evaluate the contaminant plume.

OU2

- Treat contaminated soil in the back lot of the former dry cleaner with an active soil venting system.

OU3

- Provide an alternative water supply including water main extensions and service connections to the municipal water supply for those residences in the health advisory areas or with a threatened water supply.

The Site Decision Documents identify remedial action objectives for the Site. The Description of the Selected Remedy section of the Declaration statement of the ROD included RAOs which were further clarified in the two subsequent ESDs. The identified, media specific RAOs for the Long Prairie Site included:

Groundwater

- To provide a safe drinking water supply for present and future users of the two sand aquifers;
- To prevent the spread of contaminated groundwater to wells presently unaffected, including the City of Long Prairie municipal supply well number 6 (CW-6).

Soil

- To prevent future impact on drinking water due to the leaching and migration of contaminants from soils to groundwater;
- To prevent ingestion of, and contact with, contaminated soils.

Air and Surface Water

- To prevent chronic and acute adverse impacts on human health during implementation of groundwater and soil remedial technologies;
- To prevent adverse effects on aquatic organisms due to implementation of the remedial action.

The ROD also specified Target Cleanup Levels (TCLs) that provide a basis upon which to evaluate the RAO progress for the Site. The TCLs established in the ROD were evaluated based on cancer risk to human health. Total potential lifetime cancer risk at the Site exceeded $1x10^{-4}$. This risk level is representative of an exposure that could result in one excess (beyond the normal background cancer rate) cancer case per ten-thousand people exposed. Generally a lifetime incremental cancer risk between $1x10^{-4}$ and $1x10^{-6}$ is considered by EPA to be an acceptable risk for human health and the environment.

OU1 – Groundwater

The total potential risk for ingestion of groundwater, as stated in the ROD, is an average of $3.8x10^{-4}$ and a maximum of $5.5x10^{-3}$. The TCLs specified in the ROD for groundwater ensure that human health is protected against the average and worst case risk levels observed at the time of the ROD signing. These TCLs were translated into federal maximum contaminant levels (MCL) or other To Be Considered (TBC) criteria, when MCLs were not available. The ROD utilized the Minnesota Department of Health (MDH) Recommended Allowable Limits (RALs) as additional TBCs. The MDH RALs were non-promulgated health based values which have since been replaced by the MDH with

Health Risk Limits (HRL). The use of HRL as applicable or relevant and appropriate requirements (ARAR) for the site is discussed in Section VII of this Five-Year Review. The TCL values established by the ROD are as follows:

Tetrachloroethene	6.6 micrograms per liter (ug/L)(RAL)
Trichloroethene	5.0 ug/L (MCL)
Cis-1,2-dichloroethene (DCE)	70.0 ug/L (RAL)
Vinyl Chloride	2.0 ug/L (MCL)

Remedial clean up objectives for treatment and discharge of VOC impacted groundwater from the Site is also addressed by RAO discussed in the Site Decision Documents. The ROD specified that treated groundwater be discharged to the Long Prairie River. The ROD specified that effluent discharged to the river would not exceed five ug/L for PCE as a worst case scenario. The worst case scenario was calculated to produce a risk level of $1.6x10^{-7}$ for drinking water and a lifetime cancer risk level of $1.5x10^{-8}$ based on fish consumption.

The selected remedy identified by the ROD initially was for groundwater treatment by air stripping. The first ESD, signed on June 13, 1991, modified the ROD to support the use of granular activated carbon (GAC) units in place of air stripping. The change from air stripping to GAC treatment eliminates the transfer of contamination from water to air.

Monitoring of the extent and magnitude of groundwater conditions as part of the selected remedy is described in the second ESD, signed on May 25, 1994.

OU2 – Soil

The ROD specified cleanup value for soil in the source area of the groundwater plume was 1,200 ug/kg or to achieve a level of 100 ug/L as measured in leachate. This leachate-based level was below the soil health based ingestion level of 1,400 ug/Kg; corresponding to a $1x10^{-6}$ lifetime cancer risk.

OU-3 – Alternative Drinking Water Supply

The second ESD, signed May 25, 1994, modified the ROD to provide for an alternate water supply via water mains and service connections to the municipal water lines.

Remedy Implementation

The MPCA performed the Remedial Design/Remedial Action (RD/RA) for the Site. The RD was completed on April 11, 1991. The RA was formally initiated in April 1991, and construction was separated into OU1 for groundwater, OU2 for soils, and OU3 for an alternate water supply.

OU1 Groundwater

Construction of the OU1 groundwater recovery system began in April 1995 and was completed November 18, 1996. The system originally consisted of seven extraction wells (RW-1A, RW-1B, RW-1C, RW-3, RW-4, RW-6 and RW-7). City of Long Prairie

CW-5, which was closed due to contamination from the groundwater plume, was re-purposed to become RW-5. Extracted groundwater was to be processed through carbon adsorption vessels in a treatment building and discharged to the Long Prairie River. The ROD initially selected groundwater treatment by air stripping; however, the 1991 ESD documented the use of GAC for treatment to prevent the transfer of contamination from one media to another (water to air).

In 1997, the system began pumping and treating the VOC impacted groundwater with GAC. Groundwater pumping and treatment has continued at the Site since 1997.

Recovery wells RW-1A, RW-1B and RW-1C only operated until 1997 during the early phase of the remediation. Operation of these wells was discontinued after sampling results indicated concentrations of VOC too low to significantly contribute to remediation of the aquifer. Recovery well RW-4 was removed from service in 1998 because it was located outside the defined plume boundary. In 2000, recovery wells RW-8 and RW-9 were installed to protect the adjacent wetland and the Long Prairie River. Currently six recovery wells (RW-3, RW-5, RW-6, RW-7, RW-8 and RW-9) are in operation at the Site.

The selected groundwater treatment remedy was modified by the first ESD, signed June 13, 1991, to substitute treatment by air stripping for treatment by GAC adsorption vessels. The GAC water treatment system is designed and constructed to achieve the TCLs for groundwater remediation.

In 2007 and 2008 multiple pilot studies were conducted to evaluate enhanced bioremediation of the plume by injection of emulsified vegetable oil and sodium lactate at four different areas of the plume. Soil vapor sampling conducted to evaluate the success of the pilot tests indicated that soil vapor intrusion pathways in the vicinity of the former dry cleaner should be further investigated. Evaluation of soil vapor intrusion pathways is discussed in Section VI of this report. The pilot test results are discussed in Section VI of this report. At this time, with the exception of the source area, groundwater contaminant concentrations have declined substantially and are continuing to trend downward with many wells no longer exceeding the groundwater cleanup standards.

OU2 Soil

The first active soil venting system or soil vapor extraction (SVE) system was installed in two phases. Installation of the subsurface portion (vent wells, piping, and monitoring points) of the SVE system was completed in 1995. The above ground portion of the system, including piping, remediation equipment and enclosure were installed in July 1997. The system was installed in phases in order to reduce disruption to local businesses and to economize costs. The SVE system was installed in the vicinity of the perforated drum in the alley behind the facility.

The SVE system consisted of nine SVE wells which were configured to form three separate flow control zones. The SVE wells were constructed above the water table in order to address vadose zone (above the water table) soil contaminant concentrations. The SVE system operated full time from 1997 through 1999. The system was

determined to be operational and functional according to RD requirements and achieved the ROD TCL for PCE in soil. The soil clean up goal of 1,200 ug/kg for PCE was achieved by the SVE system in less than three years. In 2000 the SVE system was removed since the TCL identified in the ROD had been met.

OU3 – Alternate Water Supply

The 1994 ESD identified the extension of water mains and service connections, for those individuals utilizing private wells within the MDH Health Advisory Area, as part of the selected remedy for the Site. Emergency connections to existing water mains were completed in 1994. Additional remedial activities connecting the remaining residents to the municipal water supply took place in the fall of 1996. The MPCA and EPA conducted a pre-final inspection of the remedy on September 4, 1997. The pre-final inspection determined that the following RA activities were completed according to the ROD design specifications:

- Construction of an alternate water supply, including water main extensions, in the expanded health advisory area; and
- Complete the provision of an alternate water supply by installing service connections to the municipal water supply for the remaining residences utilizing private wells.

Institutional Controls

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

Institutional controls generally fall into four major types. Governmental controls are ICs implemented and enforced by a state or local government, such as zoning restrictions, ordinances or other provisions that restrict resource use at a site. Different types of controls can be utilized complimentary to each other to provide additional protection; this is called layering. Often ICs are more effective if they are layered or implemented in series. Layering can involve using different types of ICs at the same time to enhance the protectiveness of the response action. Governmental controls are currently in place with regard to the Site. The institutional controls in place are identified in Table 2.

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	Provide notification of groundwater contamination to properties with the affected area. Notification also provides recommendation to affected properties to *limit use of groundwater* and provides groundwater monitoring within the affected area.	In 1983, a MDH Health Advisory Area (HAA) was issued covering private wells within northeastern Long Prairie. In 1994, the HAA was extended based on results of additional testing of residential wells.
Groundwater	Limit Well Installation	The MDH designated a Special Well Construction Area (SWCA) effective January 2007. The SWCA prevents new wells from being drilled or otherwise installed within the area without plans and permission of the MDH in consultation with the MPCA (Minn. Chapters 1031 and 4725).
Groundwater	Requires utilization of public water system, where feasible, for new developments.	City of Long Prairie Municipal Ordinance 16.745
Groundwater	Inform new property owners of the number and location of each well on the property.	Minnesota Statute 1031.235 requires sellers of properties to disclose, to potential buyers, the location and status of all wells on the property being sold.

Decision Documents

Institutional controls are not specifically addressed in the Site Decision Documents; however, due to the potential and actual risk to human health, ICs were implemented at the Site to protect human health. The MPCA and EPA will review existing ICs for the site and evaluate the need for additional ICs. Following evaluation of ICs and development of an IC Plan, the MPCA and EPA will revise the site decision documents to address ICs, as appropriate. The areas where groundwater contamination currently prohibits UU/UE are identified in Figures 4 through 5. Figure 2 identifies the location of the HAA and SWCA.

The Site decision documents identify the use of MDH HAA prior to the signature date of the ROD and further identify expansion of the HAA in the second ESD. The Site Decision Documents do identify the use of ICs with regard to the Site; however, they are not presented as a component of the selected remedy.

Groundwater

Groundwater ICs are implemented in the form of the MDH Special Well Construction Area (SWCA) and the MDH Health Advisory Areas (HAA).

Health Advisory Areas

In 1983, the MDH issued a HAA for residential wells in an area in the north east portion of the City (Figure 2). A health advisory is a recommendation by the MDH Commissioner not to drink water withdrawn from within the designated advisory area. Those residents within the advisory area, except for water supply wells for the one resident who refused access and one former business, were connected to the municipal water supply. The HAA was extended in 1994 when additional MPCA testing outside of the original advisory area indicated additional residential wells were impacted with PCE. Residents with threatened water supplies were connected to municipal water in January 1994. Since 1994 one residential property has returned to utilizing a private well for their water supply after the connection to the municipal water supply was broken. This resident refuses reconnection to the municipal supply.

The resident that refuses access likely has contaminant concentrations below HRLs based on groundwater monitoring results indicating the extent of the plume. This resident continues to refuse access.

The resident that refuses municipal connection has contaminant concentrations below HRLs based on analytical results. Recent sampling indicated contaminant results below laboratory method detection limits. The MPCA continues to monitor this well.

The well at the former business is not in use at this time as the building is vacant. The status of this well continues to be monitored by the MPCA.

All private wells, where sampling access has been granted, within the area of the plume are being monitored. Property owners that have refused access in the past are periodically contacted to request permission to collect groundwater samples by the

MPCA. To be best of MPCA's knowledge, groundwater exceeding the HRLs is not being ingested within the area of the plume.

Special Well Construction Area

Designation of a SWCA prevents new wells from being drilled or otherwise installed within the area without plans and permission of the MDH Commissioner working in consultation with MPCA site staff (Figure 2). A SWCA is a governmental mechanism which controls drilling or alteration of water supply wells, monitoring wells, and boreholes within an area where groundwater contamination has, or may, result in risk to public health. A SWCA protects human health and the environment through: informing the public of potential health risks of utilizing private drinking water wells in areas of groundwater contamination; requiring well construction methods and techniques assuring safe water supplies; and preventing further spread of the contaminant plume by limiting groundwater withdrawal from the aquifer.

A SWCA was designated by the MDH on January 1, 2007 as a result of a 2004 MPCA staff request. The area of the SWCA encompasses both the contaminant plume and the HAA (Figure 2).

Current Compliance

Conditions observed at the Site during the Site inspection are consistent with the objectives of ICs implemented for the Site. There was no evidence of groundwater use at the site that exceeds acceptable levels of risk, other than the groundwater treatment system and monitoring wells. *Interviews with the MPCA and City of Long Prairie indicate that there have been no* compliance issues with ICs in place for the Site. The City owns the alley behind the facility and does not allow digging without first consulting with the MPCA.

Those residents within the HAA were connected to the municipal water supply in 1984. Additional municipal water connections were extended in 1994, when the MPCA identified additional threatened residential wells outside the original HAA. Based on the most recent groundwater data all private residential wells within the HAA are below HRL. Additionally one business was not able to be connected to the municipal supply due to problems with the building foundation. This business utilized bottled water for drinking and well water for non-potable uses. At the time of the site inspection the business had closed and the building was vacant. Two other businesses also utilize private wells for non-potable uses. The MPCA, through their contractor, Terracon, Inc., assesses the site for any changes in well use and permission to sample for those who have refused at least once a year. Any changes are recorded in the Annual Report. Private wells are periodically sampled by Terracon.

Current compliance with the SWCA in place at the site is monitored through MDH and MPCA permitting and approval of all water-supply wells (domestic, public, irrigation, and commercial/industrial, heating/cooling, remedial), monitoring wells, dewatering wells and borings including environmental bore holes, elevators, and vertical heat exchangers proposed for completion within the SWCA. The permitting and approval applies to construction of new wells and modifications to existing wells within the SWCA.

Long-Term Stewardship

Long term protectiveness at the Site requires compliance with remedy and use restrictions to assure the remedy continues to function as intended. Since compliance with ICs assures the protectiveness of the remedy, planning for long-term stewardship is required. Long-term stewardship involves assuring effective procedures are in place to properly maintain and monitor the site. The operations and maintenance for the Site is conducted under the oversight of the MPCA. To assure proper maintenance, monitoring and enforcement of effective ICs, long term stewardship procedures will be reviewed during the MPCA/EPA IC evaluation and incorporated into the IC plan, as determined to be appropriate by the IC evaluation. Long-term stewardship components of the developed IC plan will be incorporated into revised decision documents by the MPCA and EPA as appropriate.

Additional evaluation of ICs and long-term stewardship activities is in progress. Once the IC evaluation activities have been completed, the agencies will develop an IC plan by December 2013 to incorporate the results of the evaluation and plan for additional IC activities as needed, including planning for long- term stewardship.

System Operations and Maintenance

During this review period long-term monitoring and maintenance activities were performed by Terracon in accordance with the system operations manual, and ROD as amended by the Site ESDs. Activities conducted associated with the O&M of the selected remedial actions includes the following:

- Operation, maintenance and monitoring of six groundwater recovery wells;
- General maintenance and repair of the groundwater treatment system including backflushing, line cleaning (pigging) and carbon replacement, as necessary;
- Carbon replacement (one vessel in 2009 and the second in 2010)
- Collection of groundwater elevations from recovery and monitoring wells on a quarterly basis;
- Inspect and repair monitoring wells and recovery wells for damage and repair as necessary;
- Semi-annual sampling from recovery wells and City wells CW-3 and CW-6;
- Discharge permitting and associated monitoring;
- Monitoring well sampling, generally on an annual or semi-annual basis (select wells are sampled more frequently).

During this review period monitoring and maintenance activities were performed by Terracon, which are not required by the system operations manual or ROD as amended by the Site ESDs. Activities conducted which are not associated with the O&M of the selected remedy include the following:

- Bioremediation Pilot Test Activities;
    - Injection of emulsified vegetable oil and sodium lactate to enhance bioremediation within the plume;
    - Pilot test performance monitoring;

- Soil Vapor Intrusion Assessment (VIA);
    - Installation and sampling of permanent and temporary VIA sampling points in the vicinity of the Site source area;
- Soil Vapor Extraction System Installation, Operation and Maintenance;
    - Advancing probes/borings for soil and groundwater sampling in the vicinity of the source area;
    - Compiling data for the SVE system design and installation;
    - Installation of SVE wells, piping and installation of the SVE system enclosure;
    - Collecting and compiling system operational data (i.e. system pressures and temperatures, flow rates, etc.);
    - Collecting and compiling analytical samples and data from the SVE system;
    - Implementing final installation and operation of the SVE system.

A summary of the MPCA's annual O&M costs associated with the Site remedial actions was provided by the MPCA and is included in Table 3. These costs do not include the injection activities or the vapor intrusion assessments and remedy.

Table 3: Annual System Operations/O&M Costs

Dates (corresponds to State of Minnesota Fiscal Year)		Total Cost rounded to nearest $1,000 including utility costs
From	To	
July 2007	June 2008	$167,000
July 2008	June 2009	$175,000
July 2009	June 2010	$170,000
July 2010	June 2011	$170,000
July 2011	June 2012	$170,000 (estimate)

V. Progress Since the Last Review

The previous Five-Year Review concluded that the site remedy is protective in the short-term. The protectiveness statement(s) from the Second Five-Year Review Report are included below.

OU1 (Groundwater)

The remedy for OU1 currently protects human health and the environment because the groundwater extraction and treatment system has resulted in containment of the groundwater plume at the Site and a decline in contaminant concentrations. Since contaminant concentration declines have been minimal since the Five-Year Review in 2002, MPCA initiated an In-Situ Anaerobic Bioremediation pilot test in May 2007. Results thus far show a decrease in PCE levels. A report on the pilot test is expected in October 2007. Additionally, although not required by the ROD a Health Advisory Areas was identified by the MDH in 1983 and an Extended Health Advisory Area was identified by MDH in 1994 (residents are informed and apprised by the State of Minnesota of the Health Advisories on a continuing basis via public notices and in the Five-Year Review process). Also, in 2007 MDH designated a SWCA which provides for controls on the

drilling or alteration of public and private water supply wells, and monitoring wells in an area where groundwater contamination has, or may result in risks to the public health.

Long-term protectiveness requires compliance with effective ICs. Compliance with effective ICs will be ensured by implementing, maintaining and monitoring effective ICs in addition to the Site remedy components. To that end, the following actions need to be taken: An IC Plan will be developed to incorporate the results of IC evaluation activities and evaluate the adequacy of the existing ICs to assure they are functioning as intended and, if necessary, plan for additional IC activities such a implementing additional corrective measures, along with strategizing to ensure long-term stewardship of the Site that includes maintaining, monitoring and certifying the ICs at the Site.

OU2 (Soils)
The remedy for OU2 currently protects human health and the environment because the soil venting system operated full time from 1997 through 1999 and was removed in 2000 when the soil Remedial Action Objectives were met. Because the contamination concentration in the soils was reduced to ROD cleanup levels, this portion of the remedy offers long-term protection from contaminant leaching to the aquifer and from human health exposure to the PCE in the source area.

OU3 (Alternate Water Supply)
The remedy for OU3 is expected to be or is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. This has been accomplished by offering an alternate water supply to all private wells in the groundwater contamination area.

Site Wide
(OU1 and OU2 construction completed August 14, 1997; OU3 construction complete May 1997). Because the remedial actions at all OUs are protective, the Site is currently protective of human health and the environment. Long-term protectiveness requires compliance with effective ICs. Compliance with effective ICs will be ensured by evaluating the current ICs, determining their effectiveness, determining if other ICs need to be added, and developing a strategy to ensure long-term stewardship of the Site. Ensuring long-term stewardship requires maintaining, monitoring, and certifying ICs at the Site in conjunction with the other Site remedy components.

The previous FYR also identified issues and recommendations to help ensure long-term protectiveness of the remedy. The current status of these is summarized in Table 4.

Table 4: Actions Taken Since the Last Five-Year Review

Issues from Previous Review	Recommendations/ Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Compliance with effective ICs needs to be ensured by evaluating the current ICs, determining their effectiveness, determining if other ICs need to be added and developing a strategy to ensure long-term stewardship of the Site.	An IC Plan will be developed. The Plan will incorporate the results of the evaluation activities and plan for additional IC activities as needed. These activities shall include: evaluating the effectiveness of the SWCA designation and implementation; evaluating the effectiveness of the MDH Health Advisories; determining whether additional ICs are needed and, if so, whether an ESD is required to memorialize them; and, strategizing for long-term stewardship.	MPCA/EPA	IC Plan Date March 31, 2008	IC Plan development and evaluation is ongoing at the time of this review.	Not yet complete
An agency decision document is needed to evaluate potential new cleanup levels for groundwater and surface water	Prepare appropriate decision document to evaluate potential new cleanup levels for groundwater and surface water.	EPA	June 30, 2009	Evaluation of a new decision document for the Site, with regard to cleanup objectives has not been completed at the time of this review.	Not yet complete

Issues from Previous Review	Recommendations/ Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Additional information is needed about the future conditions under which capture would need to be reassessed and about the time needed to achieve cleanup levels.	Groundwater modeling is underway to better understand the dynamics of the contamination and the effects of pumping on the long-term cleanup goals for the Site. MPCA/EPA's recommended approach is to install a nested monitoring well near CW-3; and, install water level transducers in this nested well, and in an appropriate nested well close to CW-6.	MPCA/EPA	Modeling completion : October 2007 Monitoring well completion : September 2008	Groundwater modeling was completed by EPA and MPCA contractors during this review period. The modeling indicated that the selected remedy was functioning to contain the portion of the groundwater plume which exceeds Site cleanup goals. Well installation was completed in October 2007	March 2008 and June 2008 October 2007

Issues from Previous Review	Recommendations/ Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Groundwater remediation rate has slowed considerably since the last Five-Year Review.	An *in-situ* bioremediation pilot test was conducted to determine if natural attenuation can be enhanced. The test results need to be evaluated in order to propose another pilot test location.	MPCA	October 2007	Additional pilot testing was completed during this review period. Data collection and analysis is ongoing in order to further evaluate the enhanced bioremediation.	Pilot test injections in March 2007, September 2007, and March 2008
One resident will not connect to municipal water and is using a private well containing contaminant levels that are currently below their MCLs and have continued to decrease.	Continue to monitor this well and track private well use.	MPCA/EPA	Ongoing	Continued monitoring and evaluation of private supply wells is conducted at the Site. Contaminant levels have continued to be detected below MCL or laboratory method detection limits.	Ongoing Last conducted in 2011. Monitoring scheduled for 2012.

Recommendations from the previous Five-Year Review and actions taken to address issues described in the previous Five-Year Review are detailed below.

Previous Recommendation #1

An IC Plan will be developed. The Plan will incorporate the results of the evaluation activities and plan for additional IC activities as needed after evaluating the existing ICs.

These activities shall include: evaluating the effectiveness of the SWCA designation and implementation; evaluating the effectiveness of the MDH Health Advisories; determining whether additional ICs are needed and, if so, whether an ESD is required to memorialize them; and strategizing for long-term stewardship.

An overall IC Plan has not been developed for this Site. Institutional Controls for the Site include the SWCA and HAA established by the MDH. The SWCA limits exposure to VOC impacted groundwater based on exposure risk due to well and boring construction or modification within the vicinity of the Site and groundwater plume. The HAA addresses groundwater exposure risk due to human consumption from existing groundwater supply wells in the vicinity of the Site. During this review period, there have been no new issues identified which affect the protectiveness of the ICs in place for the Site or would indicate that additional ICs are necessary.

This Five-Year Review recommends continued IC evaluation. Evaluation of the existing and potential ICs will also include evaluation of potential long-term stewardship procedures. Following the IC evaluation the MPCA and EPA will review the need for additional ICs and revise the remedy decision document, as appropriate.

Previous Recommendation #2

Prepare appropriate decision document to evaluate potential new cleanup levels for groundwater and surface water.

The Second Five-Year Review Report identified changes in chemical specific ARAR for groundwater and surface water for the Site. The changes identified included updates to the federal MCL and MDH HRL which were promulgated in 1993/1994 after the ROD for the Site was signed.

Changes to chemical specific ARARs for surface water were also identified in the Second Five-Year Review Report. The changes identified in the previous Five-Year Review addressed the permitted outfall limits for the Site groundwater treatment system discharge to surface water. The system discharge is regulated by a National Pollutant Discharge Elimination System (NPDES) permit issued by the MPCA. The NPDES permit requirements identified are more stringent than those identified in the ROD. Analytical results from the system effluent indicate VOC concentrations below laboratory method detection limits and below the NPDES permit requirements during this review period.

This Five-Year Review recommends that an evaluation of revisions to decision documents be conducted for the Site and consider data and issues identified by both the Second Five-Year Review and Third Five-Year Review. It is anticipated that the MDH HRLs for PCE and TCE will be lowered in the near future and this change in standards will be part of the evaluation.

Previous Recommendation #3

Groundwater modeling is underway to better understand the dynamics of the contamination and the effects of pumping on the long-term cleanup goals for the Site. A recommended approach is to install a nested monitoring well near CW-3; and, install

water level transducers in this nested well, and in an appropriate nested well close to CW-6.

Further modeling and analysis with regard to the extent of contamination and effectiveness of the selected remedy were performed during this reporting period. Modeling was performed by EPA contractor S.S. Papadopoulos and Associates and MPCA contractor Terracon. Modeling results and conclusions by both contractors concurred that the groundwater extraction remedy is functioning to capture the groundwater plume exceeding cleanup goals for the Site.

During this review period additional investigation of the capture of CW-3 and CW-6 was also conducted. In October 2007, monitoring well MW-23C was installed to evaluate capture in the vicinity of CW-3. The Second Five-Year Review recommended installing pressure transducers into wells near CW-3 and CW-6 to better understand the effects of pumping on the long-term cleanup goals for the Site. Updated modeling results incorporating pumping data from the city wells indicates that under current pumping conditions the capture zones from CW-3 and CW-6 do not intersect the groundwater plume for the Site.

Previous Recommendation #4

An in-situ bioremediation pilot test was conducted to determine if natural attenuation can be enhanced. The test results need to be evaluated in order to propose another pilot test location.

The in-situ bioremediation pilot test was conducted in four areas of the Site. The pilot tests consisted of injections of emulsified vegetable oil (EOS®) and sodium lactate solution in select areas of the groundwater plume. Injections were conducted in area one in March 2007 (discussed in the Second Five-Year Review). During this review period additional pilot tests utilizing the EOS® and sodium lactate solution were conducted in areas two and three in September 2007 and area four in March 2008. Pilot study areas are identified in Figure 6. Initial evaluation of pilot test results for area one was submitted by Terracon on April 3, 2008 in the *Final In-Situ Bioremediation Pilot Test Summary Report.* Initial evaluation of pilot test result for area two, area three and area four was submitted by Terracon on September 23, 2008 in the *FINAL in-Situ Bioremediation Pilot Test Summary Report- Areas 2, 3 and 4.* Further evaluation of the pilot test results have also been conducted and submitted in the *Draft In-Situ Anaerobic Bioremediation Pilot Test Update Report,* dated June 8, 2009. Additional evaluation of the pilot test areas is evaluated annually in Annual Monitoring Reports (AMRs) submitted for the Site. Pilot test results are discussed further in Section VI of this report.

Previous Recommendation #5

Continue to monitor [the remaining in-use residential] *well and to track private well use.*

Private supply well monitoring is conducted annually in accordance with the MPCA approved groundwater monitoring schedule (Appendix A1). Results of private supply well sample analysis are reported in AMR submitted for the Site. Results of private supply well sampling conducted during this review period is discussed further in Section VI of this report.

VI. Five-Year Review Process

Administrative Components of the Five-Year Review Process

The Site Five-Year Review was prepared by the MPCA in cooperation with the EPA with assistance from MPCA contractor Antea™Group. The Five-Year Review consisted of the following components:

- Community Involvement
- Local Interviews
- Document Review
- Data Review
- Site Inspection
- Five-Year Review Report Development and Review

Site Inspection

A Site Inspection was conducted at the Long Prairie Groundwater Contamination Superfund Site on November 7, 2011. Team members present during the Site Inspection from MPCA were Nile Fellows and Barb Gnabasik, Karen Mason-Smith from EPA, Brett Staeden from Terracon and Jacob Knapp from Antea™Group. A Site Inspection Checklist is included as Appendix B. Photographs from the site inspection are included as Appendix C. The procedure was to meet briefly with the inspection team in the morning, tour/inspect the site and wells and discuss items on the inspection checklist, and regroup in the afternoon for interviews and further discussion and inspection of the Site infrastructure.

The team members inspected as many wells as possible during the site visit. The Site's carbon treatment facility was visited during the November 2011 Site Inspection. The carbon treatment facility was operating and appeared to be in good condition. Observed sampling ports were properly marked and functional. Electrical panels, storage vessels, discharge structures, and treatment buildings appeared to be in good condition.

All wells observed during the November 2011 site inspection appeared to be in good condition and operating properly. Records and permits were available electronically. Observed buildings and wells were properly secured.

Soil vapor extraction wells and system components observed were also operating and appeared to be in good condition. The paved surface in the source area was also in good condition, including the area where asphalt was replaced to accommodate the SVE system piping installation.

Community Involvement

A public notice announcing this Five-Year Review was published in the Long Prairie Leader on December 14, 2011. A copy of the notice is included in Appendix C. No comments or concerns were received from the public regarding the Site. A copy of the completed report will be placed in the community information repository.

An interview was conducted with Dan Speiker, the City of Long Prairie Public Works Director at the time of the November 2011 site inspection. During the interview, the City indicated that there were no planned changes regarding groundwater use in the area of the Site. Interview discussion included progress since the last Five-Year Review, planned site activities, potential groundwater and soil vapor risks to nearby properties and the use of ICs. Notes from the interview and discussion with the City of Long Prairie and the review team members is included with the site inspection Checklist in Appendix B.

Document Review

All relevant documents associated with the Site were reviewed during this Five-Year review period. A complete list of documents reviewed is included in Appendix D. Documents reviewed include Site decision documents, AMRs, the previous Five-Year Review reports, and other reports which address modeling, pilot test results and O&M activities.

Data Review

Groundwater Monitoring

Groundwater monitoring is conducted at the Site and is consistent with the Site Decision Documents including the ROD and two ESDs. The groundwater monitoring schedule for the Site is included in Appendix A1.

The monitoring well network consists of wells classified with "A", "B" and "C" designations depending on the depth of the well screen. Monitoring wells designated as "A" wells are screened at the water table. Monitoring wells designated as "B" wells are screened at the base of the upper outwash. Monitoring wells designated as "C" wells are completed in the lower outwash.

Groundwater elevations observed during this review period were within historic ranges except during July 2010 when historic groundwater lows were recorded in "A", "B" and "C" horizon wells in the southern portion of the Site and "C" wells in the northern portion of the Site. Groundwater elevations also indicated groundwater generally flows to the north east from the source area and then north, northwest toward the Long Prairie River from the vicinity of the MW-4 well nest. Groundwater flow observed during this review period was generally consistent with historic observations and groundwater modeling results.

The extent and magnitude of groundwater contamination continues to decrease. Many of the monitoring wells are below the MCLs for PCE and TCE. Monitoring wells where VOC concentrations exceeded their respective MCLs at the start of and during this review period, from 2007 through 2011, include: MW2B, MW2C, MW4B, MW4C W6B, MW6C, MW10A, MW13C, MW14B, MW14B2, MW16B, MW17B, MW21B, MW21C, MW22B, MW22C (TCE), and RW1C (DCE). At the end of the review period, based on spring 2012 sample results, only the following wells had MCL exceedences: MW2B, MW6B, MW6C, MW10A, MW13C (TCE), MW16B, MW22B, and MW22C (TCE). PCE concentrations above MCLs were also detected at new monitoring wells MW24A, MW26A and MW27A in 2012. These wells are near and within the source area Figure 8. Monitoring wells MW6B and MW6C were outside the bioremediation pilot areas and are indicating stable to decreasing concentration trends. Monitoring well MW-

10A is located in the source area. Concentrations detected at monitoring wells MW16B, MW22B and MW22C have decreased during this review period and are expected to continue to decrease. Table 5 presents a summary of wells with MCL exceedences during this reporting period. Appendix A2 contains concentration trend figures for wells exceeding MCL for PCE and/or TCE through December 2011. Data collected after January 1, 2012 was reviewed for this Five-Year Review and will be included in the 2012 Annual Monitoring Report. Well locations are identified on Figure 2 and the new well locations on Figure 8. Current MCL and HRL for PCE is 5 ug/L (MCL/HRL) and TCE is 5 ug/L (MCL/HRL).

Table 5: Monitoring Well MCL Exceedences Summary (PCE/TCE)

Year	Monitoring Well
2007	MW2B, MW2C, MW4B, MW4C, MW6B, MW6C, MW10A, MW14B, MW14B2, MW16B, MW17B, MW21B, MW21C, MW22B, MW22C (TCE)
2012	MW2B, MW6B, MW6C, MW10A, MW13C (TCE), MW16B, MW22B, MW22C (TCE), MW24A, MW26A, MW27A

Note: Where noted as TCE exceedences PCE was not above MCL.
DCE exceedences were also noted above MCL (70 ug/L) at MW4C, MW10A, MW21B and MW21C during this review period; however, no DCE exceedences were present in monitoring wells at the end of this review period.

Tables summarizing historic analytical data for all monitoring wells are included in annual and quarterly reports submitted for the Site. Maximum concentrations downgradient of the source area are 14.0 ug/L for PCE, 10.7 ug/L for TCE, 48.1 ug/L for cis-1,2-DCE, 7.6 ug/L for trans-1,2-DCE and not detected for vinyl chloride. Inside the source area, additional geoprobe work conducted in 2010 revealed that concentrations of PCE were detected as high as 636 ug/L.

Groundwater analytical results prior to the pilot tests conducted at the Site indicate stable or slowly decreasing PCE concentration trends since construction of the groundwater extraction and treatment system. During this review period groundwater concentration trends have exhibited that reductive dechlorination is occurring at a greater rate in the vicinity of pilot test areas one, three, and four. Groundwater concentration trends in the vicinity of pilot test area two indicate that reductive dechlorination may have been enhanced based on an increase in VOC concentrations indicative of PCE degradation (TCE, cis DCE); however, PCE concentrations have remained relatively stable in the vicinity of pilot test area two (located in the source area). The stable PCE concentrations observed are likely due to the proximity to the source area as there likely is a significant volume of PCE impacted soil remaining in the source area. The other three pilot test areas are downgradient locations in the contaminated groundwater plume only. Fluctuating VOC concentrations with regard to the pilot test areas is discussed later in this section.

Bioremediation Pilot Tests

During this review period bioremediation pilot test activities were conducted including; EOS® and sodium lactate injections in area 2, area 3 and area 4 and follow up pilot test performance

monitoring. Bioremediation pilot test studies included injecting a patented solution of emulsified vegetable oil, EOS®, augmented with sodium lactate into the pilot test area at targeted depths. The EOS® solution provides a long-term fermentation source and the sodium lactate provides a short-term boost to the existing microbial population. The EOS® solution also contains yeast, vitamins and trace minerals formulated to stimulate microbial activity. The objective of pilot test injections is to determine whether reductive dechlorination of the chlorinated VOC compounds can be enhanced at the Long Prairie Site.

Reductive dechlorination of chlorinated solvents is dependent on subsurface environmental factors including; anaerobic conditions, presence of fermentable substrates, and appropriate microbial populations. The degradation pathway identified at the Long Prairie Groundwater Contamination Site is from PCE to TCE to DCE to VC and finally to ethene. Degradation compounds (TCE, DCE and VC) are commonly referred to as daughter products. Both PCE and TCE are more susceptible to dechlorination because they are more oxidized. Degradation compounds including DCE and VC are less susceptible to reductive dechlorination and potential exists that increasing trends of DCE and VC may appear in cases where the rate at which daughter products are generated is greater than the rate at which daughter products are degraded.

Increasing concentration trends for daughter products, most commonly for DCE, were observed in monitoring wells at the Site during this review period. Typically when an increase in daughter products was observed the increase was temporary indicating that further reductive dechlorination was occurring in the pilot test areas. Additionally, increasing daughter product concentrations coincided with decreasing PCE and/or TCE concentrations, except study area two where PCE concentrations were relatively stable. Pilot test area two is located in the vicinity of the source area, which was a buried perforated drum area located in the alley behind the former dry cleaner. A significantly larger source area of PCE contamination is the likely cause for stable concentrations observed following the pilot test in the vicinity of the former location of the buried perforated drum. At the time of this Five-Year Review, evaluation of an expanded source area is in progress. The expanded source area investigation includes the back alley area between Second and Third Street, northward across Central Avenue and includes properties to the north of Central Avenue (Figure 8). Pilot test performance follow up monitoring is conducted in conjunction with routine groundwater monitoring and confirms that reductive dechlorination is occurring to some extent in all pilot test study areas. Discussion of concentration trends in individual wells is included in the Groundwater Monitoring portion of this section.

Laboratory analysis of groundwater from pilot test study area two indicates that there is an increase in concentration of daughter products while concentrations of PCE remain relatively stable. These concentration trends are specifically observed at MW10A, which is considered one of the source area wells and has the highest PCE concentrations at the Site at 38.4 ug/L, down from 70.1 ug/L. TCE and cis-1,2-DCE concentrations in this well have increased from <1.0 for both parameters to highs of 7.5 and 87.8 ug/L, respectively. The observed increase in daughter products and relatively stable PCE concentrations may indicate that reductive dechlorination is occurring in the vicinity of MW10A; however, the presence of a significant PCE source is contributing to ongoing groundwater and soil vapor concentrations in the vicinity of the Site.

Groundwater Extraction and Treatment

The groundwater extraction and treatment system is inspected twice monthly. Regular inspection allows for proactive maintenance. Six groundwater recovery wells were operated during this review period including: RW-3, RW-5, RW-6, RW-7, RW-8 and RW-9. Based on data from the MPCA O&M contractor from January 2007 through December 2011 the groundwater treatment system treated approximately 458 million gallons during this review period. Analytical samples are collected from individual extraction wells and from lead and lag carbon vessels to determine treatment system effectiveness and to evaluate the need for carbon replacement. During this review period, the GAC treatment vessels functioned to remove VOC impacts from extracted groundwater. Analytical samples indicate that VOCs were not present above laboratory MDL in system effluent during this review period.

Contaminant concentrations detected from individual groundwater recovery wells were reported in AMRs submitted during this review period. Recovery well PCE concentrations reported through December 2011 for each recovery well are included in Appendix A2. Historic recovery well concentrations are contained in AMRs submitted for the Site. Currently, only RW-7 has contaminant concentrations that exceed cleanup values. The concentrations in RW-7 are 9.4 ug/L for PCE, 8.5 ug/L for TCE, and 9.2 ug/L for cis-1,2-DCE. Recovery wells RW-3, RW-5, RW-6, RW-8, and RW-9 do not exceed the cleanup values for any of these contaminants.

The MPCA is currently evaluating a proposal to install a new groundwater extraction well in an alley to the north of Central Avenue, north of the source area. The proposed location would provide groundwater capture from a location between the source area and the nearest operating extraction well. New monitoring wells to monitor performance of the proposed well were installed in Spring 2012 (MW24A, MW-25A, MW26A and MW27A). The MPCA is also evaluating a proposal to shut down three downgradient extraction wells where groundwater has achieved site cleanup goals. The proposed extraction system modifications are being evaluated for completion during State of Minnesota fiscal years 2013 and 2014.

Vapor Intrusion Assessment

As indicated above, injection area two did not show the same level of VOC reduction or breakdown products as the other three injection areas. Because of this concern, the MPCA requested that Terracon further investigate pilot test area two.

Initial soil gas sampling in December 2008 indicated that PCE concentrations found in soil vapors in the vicinity of the source area warranted further investigation and were 10 times greater than the MPCA Intrusion Screening Value (ISV). The MPCA utilizes ISV and multiples of ISV as screening tools to evaluate whether further evaluation of a soil vapor receptor pathway is warranted. The ISV is a health based value utilized for comparison directly to human exposure in indoor air, while multiples of ISV are utilized to support further evaluation of the contaminant transport pathway. The ISV for PCE is 60 micrograms per cubic meter ug/m^3.

Follow-up VIA sampling conducted in February 2009 further identified areas where additional vapor intrusion investigation was warranted. Soil gas samples collected within the alley behind the former dry cleaner indicated potential vapor intrusion risk to buildings on the north side of the alley. Soil vapor concentrations of PCE identified in February 2009 ranged from 40,900

ug/m^3 at PSG-5 to below laboratory MDL at PSG-8. Figure 7 identifies VIA sample locations and concentrations.

Additional vapor intrusion assessment conducted in the spring of 2009 included soil vapor samples, sub-slab samples (soil vapor samples from below a building) and indoor air and ambient (outdoor) air sampling in order to fully assess nearby vapor intrusion pathways. Vapor intrusion samples collected indicated the presence of PCE above the ISV in four of four soil vapor samples, 12 of 12 sub-slab samples and five of 15 indoor air samples collected.

Confirmation sub-slab and indoor air samples were collected in August 2009. Concentrations of PCE were detected above ISV in both confirmatory sub-slab samples. None of the additional indoor and ambient air samples indicated concentrations above ISV in August 2009.

Further soil gas assessment to the north of Central Avenue was conducted in 2011. Analytical results indicate that additional investigation of vapor intrusion pathways is necessary for properties immediately north of Central Avenue. At the time of this Five-Year Review, the MPCA has been in the process of securing access to properties on the north side of Central Avenue to further assess soil vapor intrusion pathways.

Based on the extent and magnitude of soil vapors found in the vicinity of the source area and the potential vapor intrusion risk, as indicated by sampling results, the MPCA determined that design, installation and operation of a SVE system in the vicinity of the source area was warranted. Vapor intrusion concentration data tables are included as Appendix A3.

Soil Vapor Extraction System

Soil vapor extraction wells SVE-1 through SVE-8 were installed in March 2010 within the vicinity of the source area. The SVE wells and piping were installed adjacent to buildings where potential vapor intrusion risk was exhibited during the VIA activities. Two additional SVE extraction wells, SVE-9 and SVE-10, were installed in November 2011. The original eight wells were connected to the SVE system that began operation in August 2010 and the two new SVE wells began operation in December 2011. Figure 8 identifies the location of the SVE components and wells installed in the vicinity of the source area.

Data collected following SVE system start up indicate decreasing concentration trends occurring over time. Figure 9 presents individual SVE well (SVE 1 through SVE-8) analysis from system start up through April 2011 and indicates decreasing PCE concentration trends.

Overall, the SVE system has removed approximately 7.5 pounds of VOC contaminant mass from the subsurface in the vicinity of the source area. The SVE system is also functioning to reduce vapor intrusion risk at buildings near the Site. Operation of the SVE system will also reduce remaining residual PCE source concentrations associated with the original release and therefore reduce any ongoing groundwater impacts. Concentration and SVE parameter data collected is included as Appendix A3. All sub-slab samples collected in the spring of 2012 were below MPCA ISV. Sub-slab soil vapor monitoring will continue during State of Minnesota fiscal year 2013.

VII. Technical Assessment

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

Yes, the remedy is functioning as intended by the decision documents for the Site. The selected remedy consists of the following general components:

- Groundwater extraction, treatment and discharge to the Long Prairie River
- Groundwater monitoring to evaluate the contaminant plume.
- Treat contaminated soil in the back lot of the former dry cleaner with an active soil venting system.
- Provide an alternative water supply including water main extensions and service connections to the municipal water supply for those residences in the health advisory areas or with a threatened water supply.

The groundwater extraction and treatment system is functioning to contain the contaminant plume downgradient of the source area. Approximately 458 million gallons of groundwater was extracted and treated during this review period. Groundwater modeling and monitoring data indicates that pumping from groundwater extraction wells is functioning to protect City of Long Prairie municipal Wells CW-3 and CW-6. The treatment system is functioning to remove VOC from groundwater and meet discharge requirements prior to discharge to the Long Prairie River.

Bioremediation pilot testing conducted at the Site has indicated that reductive dechlorination is occurring within the groundwater plume at the Site. Pilot tests that have been conducted have reduced PCE concentrations in the downgradient plume. Reduction in PCE concentrations within the downgradient plume is also functioning to enhance the protectiveness of the selected remedy. Reducing VOC concentrations in the downgradient plume will also decrease the time needed to reach Site cleanup goals. The PCE levels in the down gradient wells are at their lowest levels since the treatment system began operating in 1997.

The groundwater monitoring component of the selected remedy is also functioning as intended by the Site decision documents. The groundwater monitoring conducted at the Site is effectively monitoring the plume and effectiveness of the groundwater extraction system. Groundwater monitoring of private wells in the area is also continuing as a component of the selected remedy.

Initial operation of an SVE system to address soil impacts in the back lot of the former dry cleaner was completed between 1997 and 1999. The original SVE system was removed in 2000 upon reaching the clean up goals established by the Site decision documents.

Soil clean up in the back lot and alley adjacent to the former dry cleaner is also being addressed by the installation of a second SVE system which is being utilized to address soil vapor intrusion pathways. The second SVE system is further functioning to enhance and address residual soil cleanup in the source area at the Site.

The 1994 ESD identified connection of residences within the HAA to the Long Prairie municipal water supply as a component of the selected remedy. Municipal water supply connections were completed between 1994 and 1996. Currently only one residential well is still in use for potable

water supply purposes and groundwater samples indicate PCE concentrations below MCL during this review period. One other commercial property is also connected to a private well; however, at the time of the Site inspection this property was vacant.

Institutional controls, while not selected by the decision documents as part of the Site remedy, are in place at the Long Prairie Site. The MDH has issued and extended a HAA for the area immediately surrounding the Site. The HAA provides protection to human health by prohibiting consumption of groundwater from within the HAA. Human health and the environment are also protected by a SWCA issued by the MDH. The SWCA limits access to impacted groundwater by providing specific restrictions against wells and borings in the vicinity of the Site and contaminant plume. An evaluation of these institutional controls will be conducted. Additionally, long-term protectiveness will be assured upon evaluation of existing ICs to determine if ICs have been adequately implemented, and implementing an IC plan which includes planning for long-term stewardship.

Opportunities for Optimization

Groundwater concentration trends observed in recovery wells at the Site indicate decreasing contaminant concentrations are occurring. Specifically PCE concentrations at RW-3 and RW-6 have been below MCL during this review period and more recently, RW-9 no longer has any exceedences of the MCLs for PCE and its degradation products. Evaluation is being conducted to determine whether select recovery wells can be removed from service. Evaluation should consider the following: a contingency plan to restart recovery wells if necessary, protection of the municipal supply wells and bioremediation occurring (either natural or enhanced) within the recovery well area.

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

Yes, exposure assumptions, toxicity data and remedial action objectives used at the time of remedy selection are still valid. General land use and exposure pathways for soil and groundwater have not changed since the development of the decision documents and selected remedy. The selected remedy is functioning as intended to address the Site cleanup objectives.

Groundwater cleanup ARAR; however, have been revised since the ROD signature date. Soil vapor intrusion pathways have also been identified and are currently being addressed at the Site.

Groundwater ARAR

As identified in the Second Five-Year Review Report for the Site changes have been implemented to promulgated cleanup goals which affect the Site. These changes do not affect the protectiveness of the selected remedy. The selected remedy is functioning to contain the groundwater plume and protect the municipal water supply, treat impacted groundwater recovered by extraction wells to below Site cleanup goals and discharge limits and reduce groundwater concentrations within the plume.

The ROD identifies that MCLs are the selected clean up criteria for the Site and are considered as ARARs for the Site. Since MCLs were not available for PCE and DCE at the time of the ROD, the MDH RALs were considered as the groundwater cleanup goals. Since the ROD the MDH has promulgated HRLs in lieu of the RALs. Table 5 below, which was also presented in the Second Five-Year Review, provides a comparison of changes regarding the chemical specific standards for groundwater.

Table 6 - Changes in Chemical-Specific Groundwater ARARs

Contaminant	Media	ROD Cleanup Level	ARAR		Citation/Year
PCE	Groundwater	6.6 ug/L	Previous	6.6 ug/L (RAL)	ROD, 1988
			New	5.0 ug/L (MCL, HRL)	EPA 1989 MDH, 2007
TCE	Groundwater	5 ug/L	Previous	31.2 ug/L (RAL)	ROD, 1988
			New	5 ug/L (HRL)	MDH, 2009
Cis-1,2-DCE	Groundwater	70ug/L	Previous	70 ug/L (RAL)	ROD, 1988
			New	70 ug/L (HRL)	MDH, 2007

Note: The RAL for TCE was a To Be Considered value in the ROD. The MCL of 5 ug/L was indicated as ARAR by the ROD

Soil Vapor Intrusion

Soil vapor intrusion pathways have been identified in the vicinity of the former dry cleaner and are being evaluated. Current efforts to reduce soil vapor intrusion risk near the Site include: the operation of an SVE System, soil vapor sampling, sub-slab sampling and indoor air sampling. These sampling efforts provide data for evaluation of potential vapor intrusion pathways. Additional study is also ongoing to evaluate the complete extent and magnitude of the soil vapor impacts. The SVE system in place is functioning to remove vapor phase VOC contamination from within soils and reduce vapor intrusion risk at the Site.

Vapor intrusion receptor pathways at properties immediately adjacent to the former dry cleaner have been fully evaluated and are now being addressed. However, the need for further study of properties downgradient (based on groundwater) is also being evaluated at the time of this Five-Year Review.

The existing Record of Decision document should be modified to include vapor intrusion cleanup goals and objectives.

Soil

The first SVE system operated full time from 1997 through 1999. The system was determined to be operational and functional according to ROD requirements and achieved the ROD TCL for PCE in soil. The soil clean up goal of 1,200 ug/kg for PCE was met.

In 2008, evaluation of soil conditions within the alley behind the former dry cleaner following the area two pilot study and during the second SVE system installation indicates that PCE impacted soils extend beyond the initial source area. Evaluation of the extent and magnitude of PCE impacted soil is ongoing at the time of this five-year review. The extended source area is being addressed through operation of the second SVE system which is also addressing soil vapor pathways identified in the vicinity of the Site.

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

No information has come to light that could call into question the protectiveness of the selected remedy. Regulatory changes or additional receptor pathways addressed by the selected remedy that might call protectiveness into question have not been identified during this review period.

Soil and soil vapor intrusion pathways are currently being evaluated and addressed in the vicinity of the Site. During follow-up investigation regarding pilot test area two, PCE impacted soil and soil vapor were identified within the alley behind the former dry cleaner between Second and Third Streets. Further investigation identified that PCE concentrations were detected in soil vapor samples on the north side of Central Avenue. A second SVE system consisting of eight soil vapor extraction locations was installed in 2010 and was extended following additional investigation by two additional locations. Additional receptor pathways that have been identified are currently being addressed by the operation of the second SVE system. Recent sub-slab and indoor air samples have not exceeded Minnesota ISVs.

Continued evaluation of soil and soil vapor conditions, and operation of the second SVE system are not negatively affecting the protectiveness of the remedy selected for the Site.

VIII. Issues

Issues identified during the Five-Year Review process are included in Table 7.

Table 7: Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Evaluation of existing and potential ICs and long-term stewardship programs needs to be conducted by the MPCA and EPA.	N	Y
Potential revisions to the site decision documents incorporating changes to cleanup standards and implementation of ICs needs to be evaluated by the MPCA and EPA.	N	Y
Formal evaluation of site specific clean up goals for vapor intrusion and the new SVE system should be conducted.	N	Y
Evaluation of modification to the groundwater extraction wells by removing select recovery wells from service and installing an additional well is being conducted.	N	Y

IX. Recommendations and Follow-up Actions

Recommendations and follow up actions regarding issues identified in Section VIII are included in Table 8.

Table 8: Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Milestone Date	Affects Protectiveness (Y/N)	
				Current	Future
1	Complete evaluation of existing and potential ICs and long-term stewardship programs and development of an IC plan to assure long-term protectiveness for the Site.	MPCA/EPA	December 2013	N	Y
2	Complete evaluation of potential revisions and make the revisions to decision documents incorporating changes to Site cleanup goals and ICs, as appropriate.	MPCA/EPA	June 2014	N	Y
3	Complete formal evaluation of soil vapor intrusion cleanup goals as associated with the new SVE system, evaluation should consider incorporating remedial objectives into revised Site decision documents.	MPCA/EPA	December 2013	N	Y
4	Complete evaluation of proposed groundwater extraction system modifications.	MPCA	June 2013	N	Y

X. Protectiveness Statement(s)

OU1 (Groundwater)

The remedy at OU 1 currently protects human health and the environment in the short-term because the selected remedy is functioning to remove VOC impacted groundwater from the affected aquifer(s) and contain the groundwater plume. Plume containment is functioning to protect the City of Long Prairie municipal wells. However, in order for the remedy to be protective in the long-term, the following actions need to be taken:

- Evaluation of existing and potential ICs and evaluation of long-term stewardship programs for development of an IC plan. Components of the developed IC plan should be addressed through revisions to the Site decision documents, as appropriate.
- Modify the existing Record of Decision document to include updated groundwater and surface water cleanup values.
- Continue O&M of the selected remedy until cleanup goals and RAO have been met.

OU2 (Soils)

The remedy for OU2 currently protects human health and the environment in the short-term because the soil venting system operated full time from 1997 through 1999 and was removed in 2000 when the soil Remedial Action Objectives were met. Contamination concentrations in the soils were reduced to ROD cleanup levels. Since that time, PCE impacted soil has been found to be more extensive than previously thought. Soil contamination within the expanded source investigation area is being addressed through operation of a second, more extensive, SVE system, which was installed in 2010 and extended in 2011. The second SVE system is also addressing soil vapor intrusion pathways in the vicinity of the Site. Operation of the second SVE system is controlling potential receptor pathways and is assuring protectiveness of human health and the environment for OU2.

However, for the remedy to be protective in the long-term, the following actions need to be taken:

- Evaluate soil vapor intrusion risks and cleanup goals
- Evaluate the effectiveness of the new SVE system
- Consider incorporating remedial objectives into Site decision documents

OU3 (Alternate Water Supply)

The remedy for OU3 is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. This has been accomplished by offering an alternate water supply to all private wells and extension of the municipal water supply to properties in the groundwater contamination area. The MPCA continues to monitor private well use to ensure protectiveness and for those owners who have granted permission, MPCA routinely collects groundwater samples from their wells. The MPCA continues to monitor the water quality of the existing water supply wells where property owners have granted access to collect samples. The MPCA routinely seeks permission from property owners who have refused access in the past.

The MPCA anticipates completion of an updated well receptor survey to verify private well use for the immediate plume area during the State of Minnesota 2013 fiscal year.

Site Wide

The remedy at the Site is functioning as designed and is currently protective of human health and the environment in the short-term. The groundwater extraction system is functioning to recover VOC impacted groundwater at the Site and control the contaminant plume. The initial SVE system achieved ROD required cleanup goals for soil in the small area thought to be the extent of the source area. At the time of this review an expanded source investigation area was evaluated through further investigation and a second, more extensive SVE system was installed and is in operation. The new SVE system was extended to two additional locations in 2011. Additional short-term protectiveness is being assured by operation of the new SVE system to address soil vapor intrusion pathways and soil contamination within the expanded source investigation area. Long-term protectiveness will be achieved upon verification that the vapor intrusion pathways and contaminant sources are being adequately controlled. Long-term protectiveness will also be assured by formal evaluation of cleanup goals for vapor intrusion and the cleanup objective of the new SVE system. Municipal water connections have been made, extending an alternate water supply to properties in the groundwater contamination area. Additional long-term protectiveness will be assured upon evaluation of an IC plan incorporating a long-term stewardship program.

XI. Next Review

Hazardous substances or contaminants will remain at the Site and will not allow for unlimited use or unrestricted exposure (UU/UE). The presence of hazardous substances will require additional policy Five-Year Reviews of the Site. The next Five-Year Review is scheduled for completion five years from the signature date of this review.

Figures

Figure 1 – Site Location Map (Figure 1 from Draft 2010 AMR)

Figure 2 – Site Map (Figure 2A from Draft 2010 AMR)

Figure 3 – Extent of PCE Contamination – Water Table (Figure 7A from Draft 2010 AMR)

Figure 4 – Extent of PCE Contamination – Middle Aquifer (Figure 7B from Draft 2010 AMR)

Figure 5 – Extent of PCE Contamination – Lower Aquifer (Figure 7C from Draft 2010 AMR)

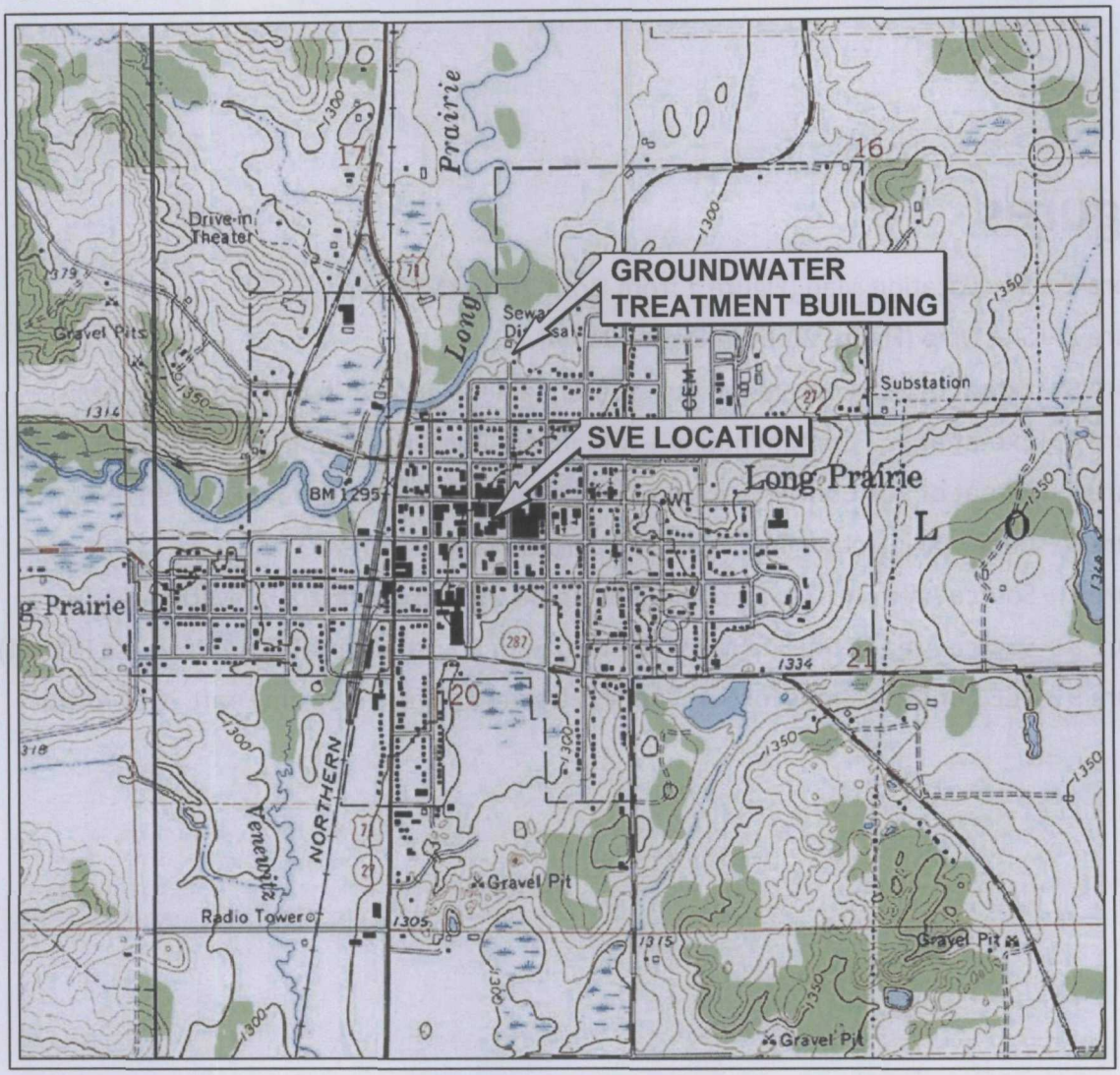
Figure 6 – Chemical injection areas (Figure 13 from Draft 2010 AMR)

Figure 7 – Source Area Soil Gas Sample Map (Figure 21 from Draft 2010 AMR)

Figure 8 – Source Area Detail Site Map (Figure 1 from Fourth Quarter 2011 Progress Report)

Figure 9 – PCE Concentrations for Soil Vapor Extraction (Figure 22 from Draft 2010 AMR)

UNITED STATES – DEPARTMENT OF THE INTERIOR – GEOLOGICAL SURVEY



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FEET

CONTOUR INTERVAL FEET FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

LONG PRAIRIE QUADRANGLE
MINNESOTA - TODD COUNTY
1993
7.5 MINUTE SERIES (TOPOGRAPHIC)

Project Mngr:	BJS
Drawn By:	BJS
Checked By:	BJS
Approved By:	BJS
Project No.	41037012
Scale:	AS SHOWN
File No.	41037012sln-11
Date:	1/05/2011

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

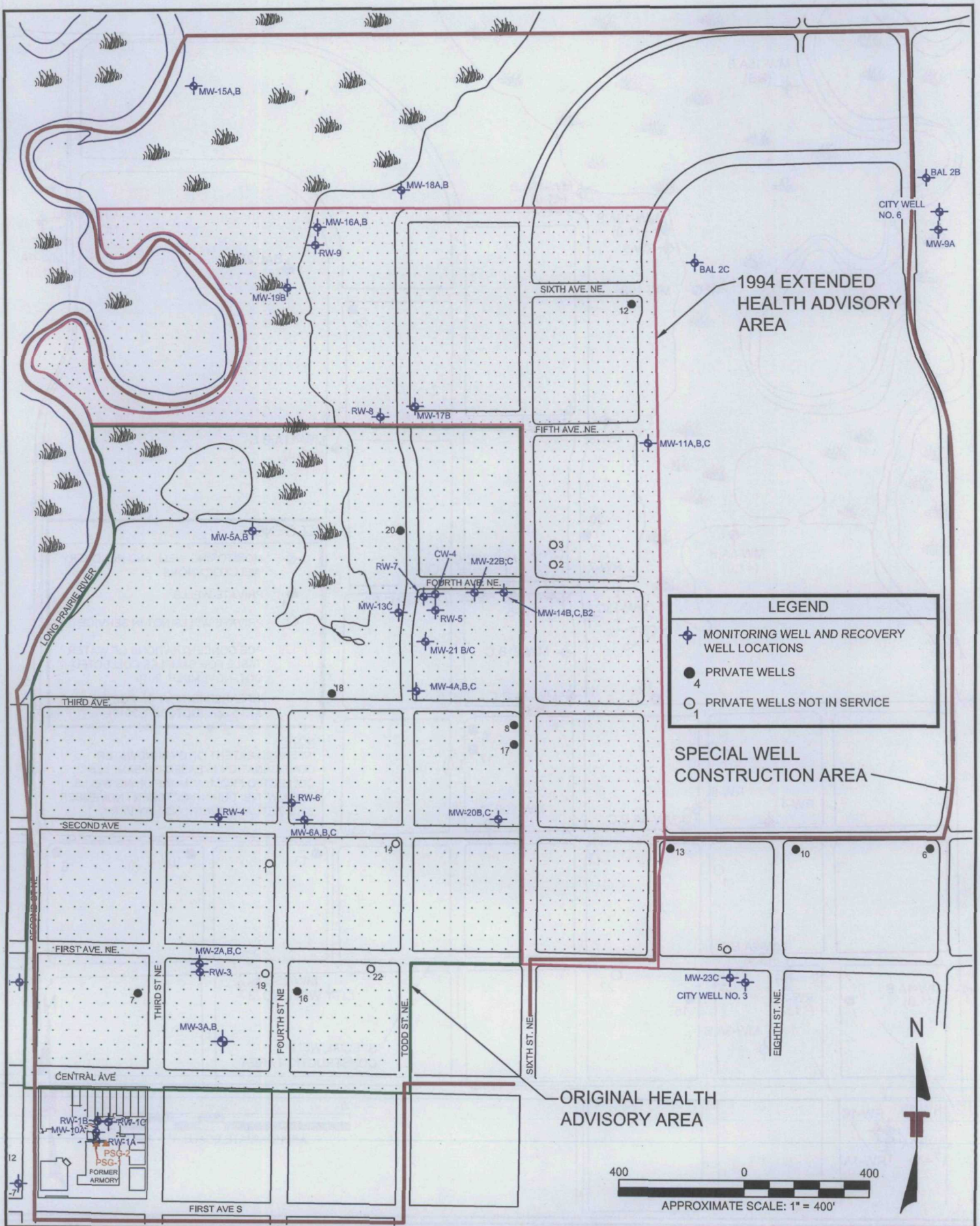
SITE LOCATION MAP

LONG PRAIRIE GROUNDWATER CONTAMINATION SUPERFUND SITE

MPCA

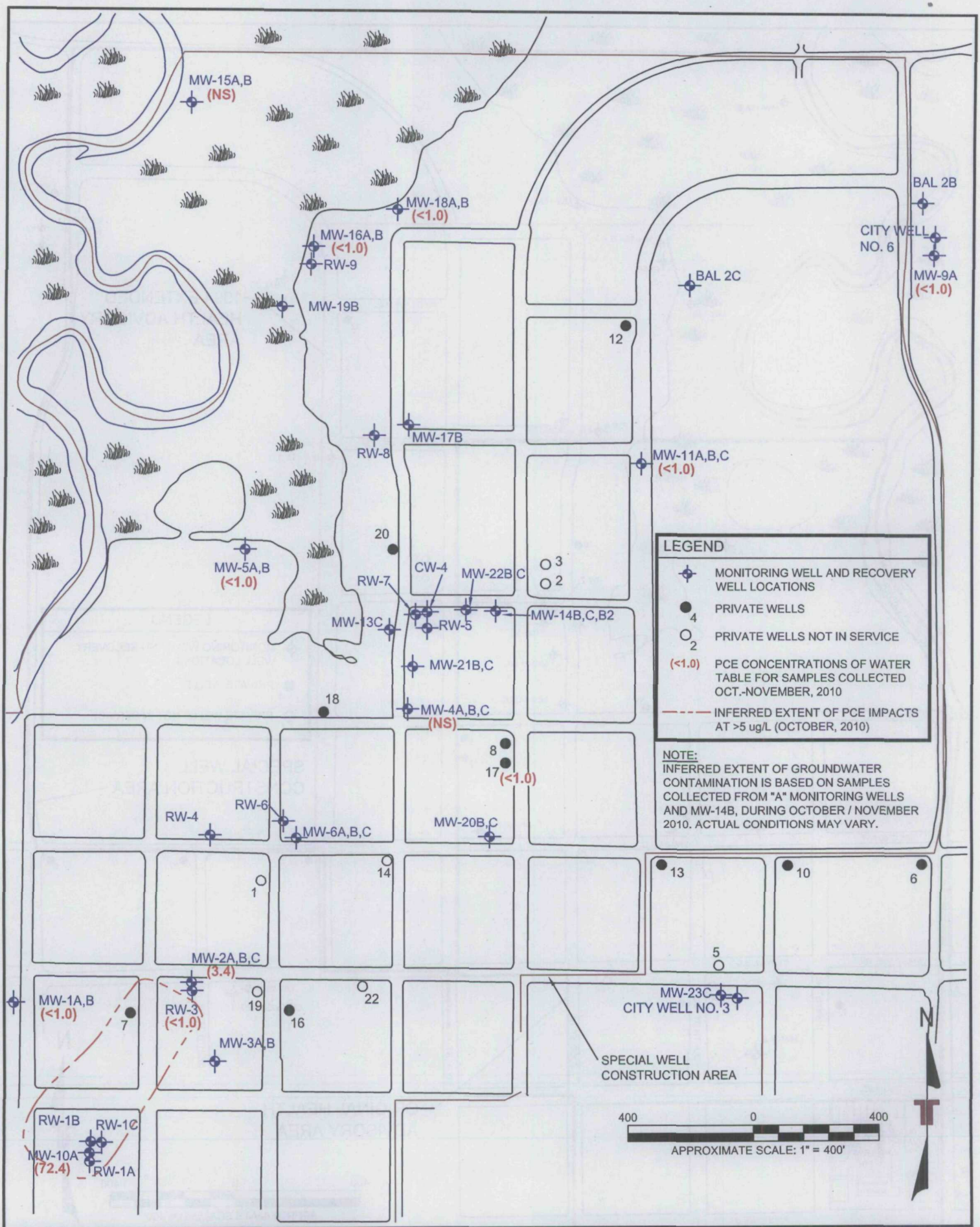
LONG PRAIRIE MINNESOTA

FIG. No. 1



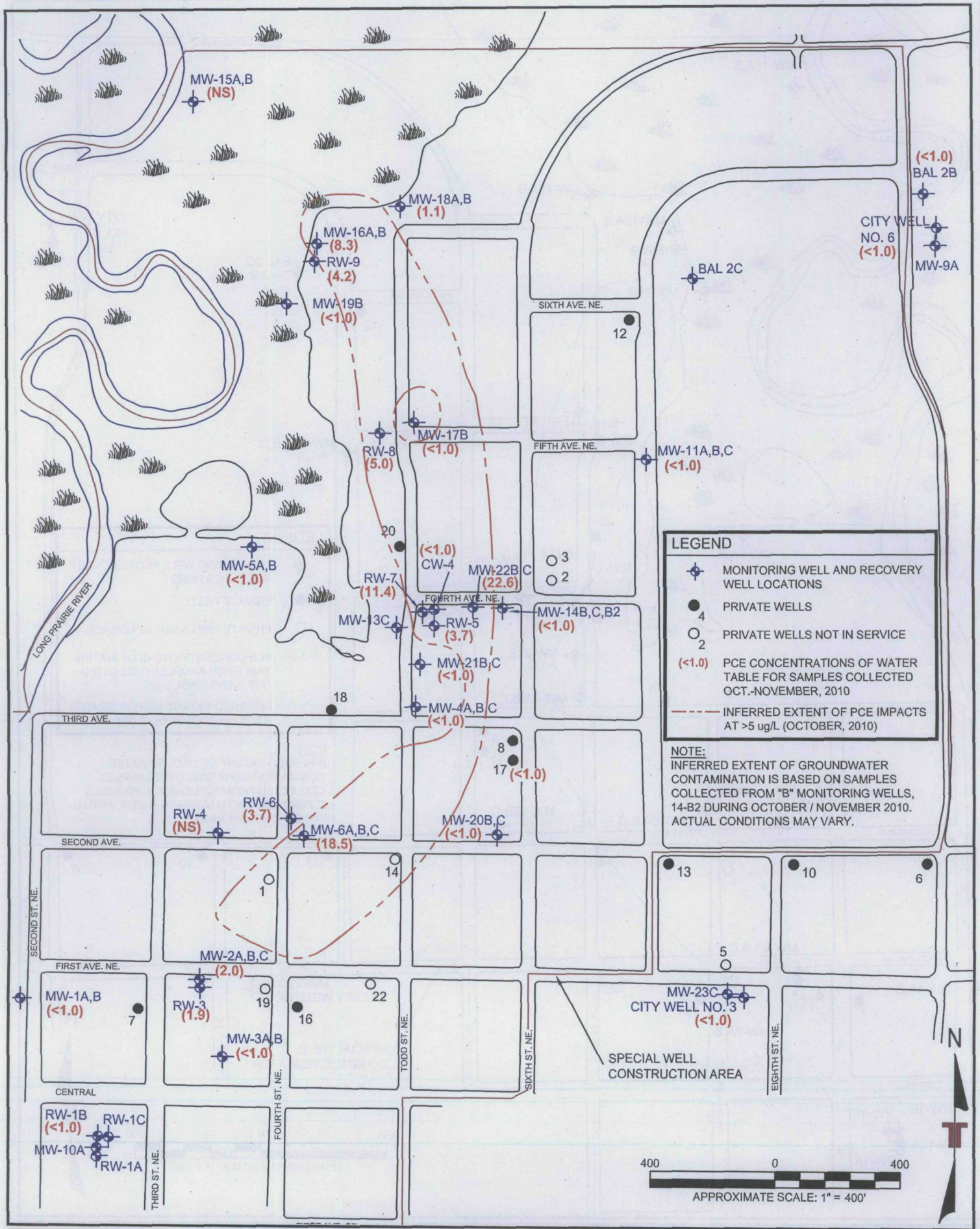
Project Mngr: BJS	Project No. 41037012	Terracon Consulting Engineers and Scientists	SITE MAP / HEALTH ADVISORY AREA
Drawn By: JLM (41)	Scale: AS SHOWN	3535 HOFFMAN ROAD EAST WHITE BEAR LAKE, MN 55110	LONG PRAIRIE GROUND WATER REMEDIATION SYSTEM
Checked By: BJS	File No. 41037012-11car	PH. (651) 770-1500 FAX. (651) 770-1657	MPCA
Approved By: DJW	Date: 1/18/2011		LONG PRAIRIE MINNESOTA

FIG. No. 2A



Project Mngr: BJS	Project No. 41037012	Terracon Consulting Engineers and Scientists	EXTENT OF PCE CONTAMINATION
Drawn By: JLM (41)	Scale: AS SHOWN	3535 HOFFMAN ROAD EAST WHITE BEAR LAKE, MN 55110	WATER TABLE (A WELLS)
Checked By: BJS	File No. 41037012con.01	PH. (651) 770-1500 FAX. (651) 770-1657	LONG PRAIRIE GROUND WATER REMEDIATION SYSTEM
Approved By: BJS	Date: 4/29/2011		MPCA
			LONG PRAIRIE MINNESOTA

FIG. No. 7A



Project Mngr:	BJS
Drawn By:	JLM (41)
Checked By:	BJS
Approved By:	DJW
Project No.	41037012
Scale:	AS SHOWN
File No.	41037012con.01
Date:	4/29/2011

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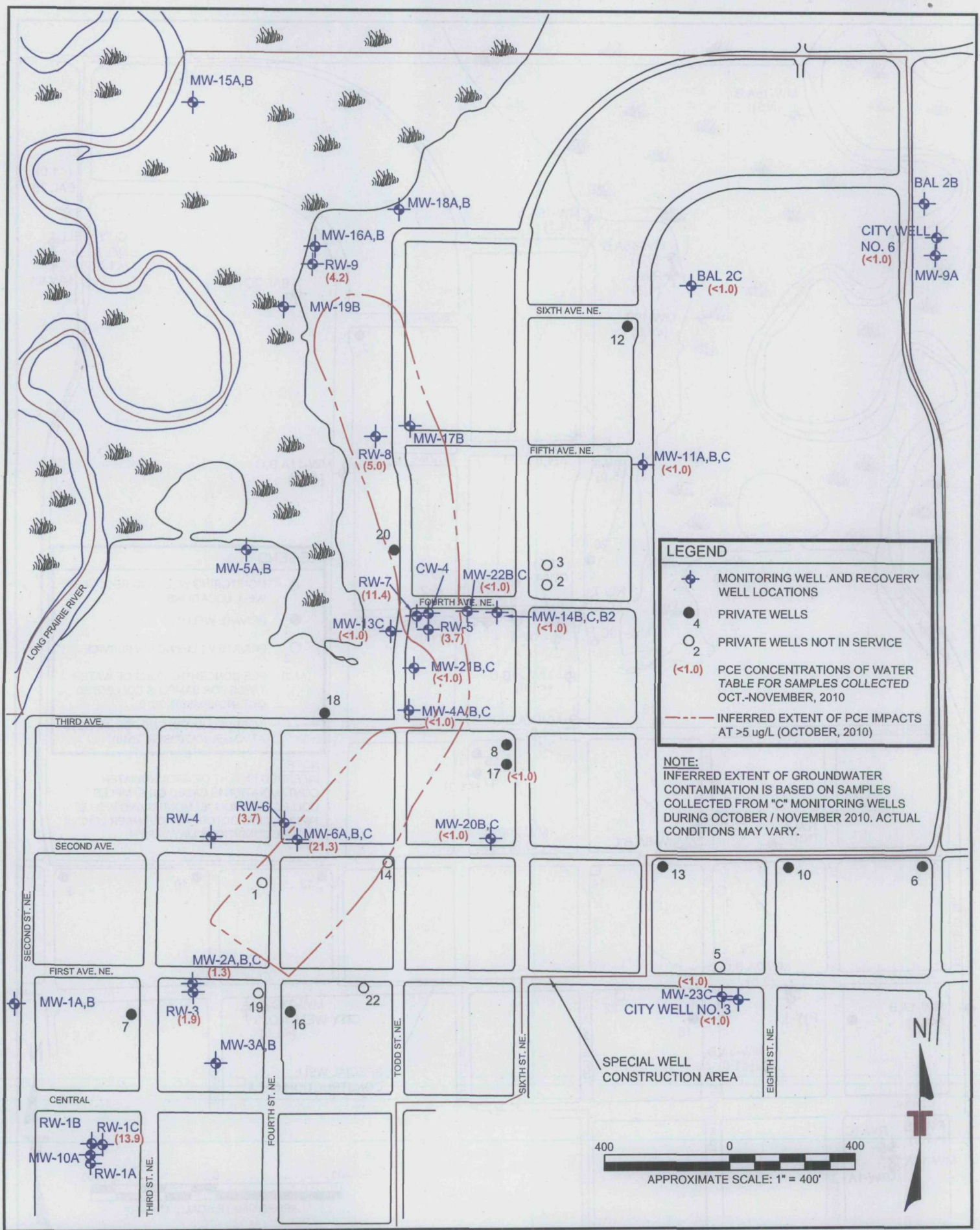
EXTENT OF PCE CONTAMINATION
MIDDLE AQUIFER (B WELLS)
LONG PRAIRIE GROUND WATER REMEDIATION SYSTEM
MPCA
LONG PRAIRIE

FIG. No. 7B

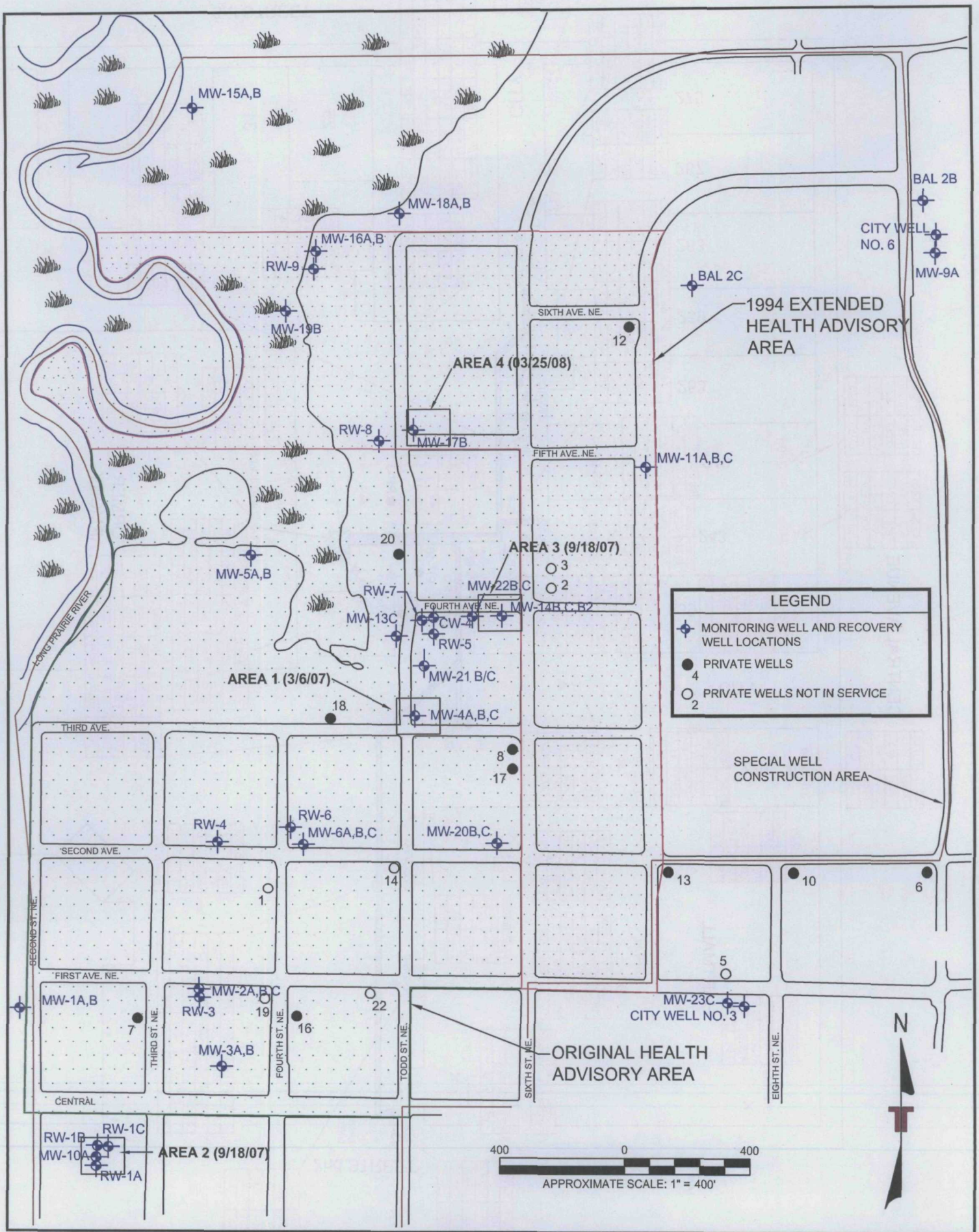


Project Mngr:	BJS
Drawn By:	JLM (41)
Checked By:	BJS
Approved By:	DJW
Project No.	41037012
Scale:	AS SHOWN
File No.	41037012con.01
Date:	4/29/2011

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

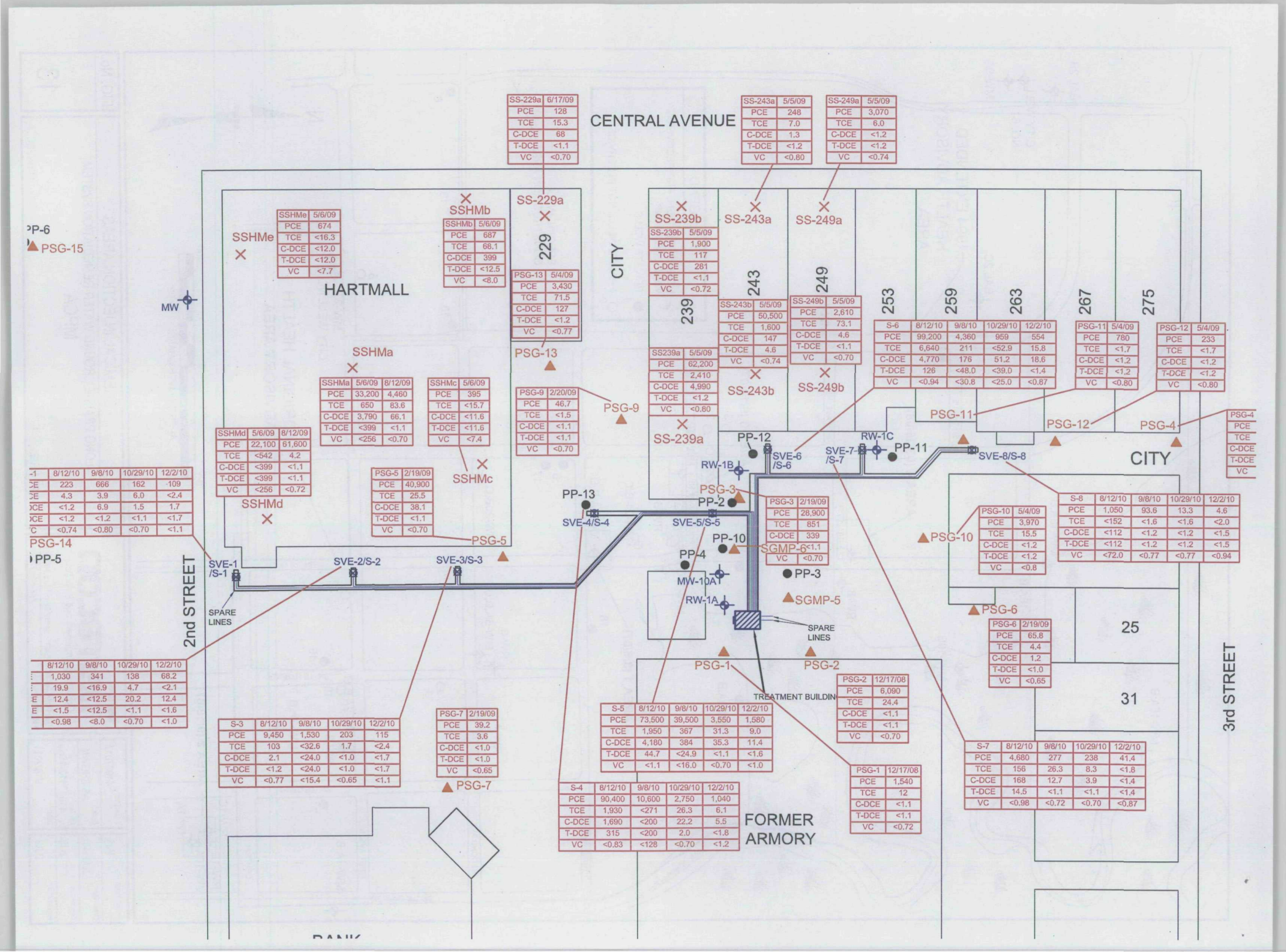
EXTENT OF PCE CONTAMINATION
LOWER AQUIFER (C WELLS)
LONG PRAIRIE GROUND WATER REMEDIATION SYSTEM
MPCA
LONG PRAIRIE

FIG. No. 7C



Project Mngr: BJS	Project No. 41037012	Terracon Consulting Engineers and Scientists	CHEMICAL INJECTION AREAS
Drawn By: JLM (41)	Scale: AS SHOWN	3535 HOFFMAN ROAD EAST WHITE BEAR LAKE, MN 55110	LONG PRAIRIE GROUND WATER REMEDIATION SYSTEM
Checked By: BJS	File No. 41037012-11cia	PH. (651) 770-1500 FAX. (651) 770-1657	MPCA
Approved By: DJW	Date: 1/18/2011		LONG PRAIRIE MINNESOTA

FIG. No. 13


CENTRAL AVENUE
HARTMALL
CITY
2nd STREET
3rd STREET
FORMER ARMORY
SPARE LINES
SPARE LINES
TREATMENT BUILDIN
SS-229a 6/17/09 PCE 128 TCE 15.3 C-DCE 68 T-DCE <1.1 VC <0.70
SS-243a 5/5/09 PCE 248 TCE 7.0 C-DCE 1.3 T-DCE <1.2 VC <0.80
SS-249a 5/5/09 PCE 3,070 TCE 6.0 C-DCE <1.2 T-DCE <1.2 VC <0.74
SSHMe 5/6/09 PCE 674 TCE <16.3 C-DCE <12.0 T-DCE <12.0 VC <7.7
SSHMb 5/6/09 PCE 687 TCE 68.1 C-DCE 399 T-DCE <12.5 VC <8.0
PSG-13 5/4/09 PCE 3,430 TCE 71.5 C-DCE 127 T-DCE <1.2 VC <0.77
SS-239b 5/5/09 PCE 1,900 TCE 117 C-DCE 281 T-DCE <1.1 VC <0.72
SS-243b 5/5/09 PCE 50,500 TCE 1,600 C-DCE 147 T-DCE 4.6 VC <0.74
SS-249b 5/5/09 PCE 2,610 TCE 73.1 C-DCE 4.6 T-DCE <1.1 VC <0.70
SS239a 5/5/09 PCE 62,200 TCE 2,410 C-DCE 4,990 T-DCE <1.2 VC <0.80
SSHMa 5/6/09 8/12/09 PCE 33,200 4,460 TCE 650 83.6 C-DCE 3,790 66.1 T-DCE <399 <1.1 VC <256 <0.70
SSHMc 5/6/09 PCE 395 TCE <15.7 C-DCE <11.6 T-DCE <11.6 VC <7.4
PSG-9 2/20/09 PCE 46.7 TCE <1.5 C-DCE <1.1 T-DCE <1.1 VC <0.70
SSHMd 5/6/09 8/12/09 PCE 22,100 61,600 TCE <542 4.2 C-DCE <399 <1.1 T-DCE <399 <1.1 VC <256 <0.72
PSG-5 2/19/09 PCE 40,900 TCE 25.5 C-DCE 38.1 T-DCE <1.1 VC <0.70
PSG-3 2/19/09 PCE 28,900 TCE 851 C-DCE 339 T-DCE <1.1 VC <0.70
S-6 8/12/10 9/8/10 10/29/10 12/2/10 PCE 99,200 4,360 959 554 TCE 6,640 211 <52.9 15.8 C-DCE 4,770 176 51.2 18.6 T-DCE 126 <48.0 <39.0 <1.4 VC <0.94 <30.8 <25.0 <0.87
PSG-11 5/4/09 PCE 780 TCE <1.7 C-DCE <1.2 T-DCE <1.2 VC <0.80
PSG-12 5/4/09 PCE 233 TCE <1.7 C-DCE <1.2 T-DCE <1.2 VC <0.80
PSG-4 PCE TCE C-DCE T-DCE VC
PSG-10 5/4/09 PCE 3,970 TCE 15.5 C-DCE <1.2 T-DCE <1.2 VC <0.8
S-8 8/12/10 9/8/10 10/29/10 12/2/10 PCE 1,050 93.6 13.3 4.6 TCE <152 <1.6 <1.6 <2.0 C-DCE <112 <1.2 <1.2 <1.5 T-DCE <112 <1.2 <1.2 <1.5 VC <72.0 <0.77 <0.77 <0.94
PSG-6 2/19/09 PCE 65.8 TCE 4.4 C-DCE 1.2 T-DCE <1.0 VC <0.65
PSG-2 12/17/08 PCE 6,090 TCE 24.4 C-DCE <1.1 T-DCE <1.1 VC <0.70
PSG-1 12/17/08 PCE 1,540 TCE 12 C-DCE <1.1 T-DCE <1.1 VC <0.72
S-5 8/12/10 9/8/10 10/29/10 12/2/10 PCE 73,500 39,500 3,550 1,580 TCE 1,950 367 31.3 9.0 C-DCE 4,180 384 35.3 11.4 T-DCE 44.7 <24.9 <1.1 <1.6 VC <1.1 <16.0 <0.70 <1.0
S-7 8/12/10 9/8/10 10/29/10 12/2/10 PCE 4,680 277 238 41.4 TCE 156 26.3 8.3 <1.8 C-DCE 168 12.7 3.9 <1.4 T-DCE 14.5 <1.1 <1.1 <1.4 VC <0.98 <0.72 <0.70 <0.87
S-4 8/12/10 9/8/10 10/29/10 12/2/10 PCE 90,400 10,600 2,750 1,040 TCE 1,930 <271 26.3 6.1 C-DCE 1,690 <200 22.2 5.5 T-DCE 315 <200 2.0 <1.8 VC <0.83 <128 <0.70 <1.2
S-3 8/12/10 9/8/10 10/29/10 12/2/10 PCE 9,450 1,530 203 115 TCE 103 <32.6 1.7 <2.4 C-DCE 2.1 <24.0 <1.0 <1.7 T-DCE <1.2 <24.0 <1.0 <1.7 VC <0.77 <15.4 <0.65 <1.1
PSG-7 2/19/09 PCE 39.2 TCE 3.6 C-DCE <1.0 T-DCE <1.0 VC <0.65
8/12/10 9/8/10 10/29/10 12/2/10 1,030 341 138 68.2 19.9 <16.9 4.7 <2.1 12.4 <12.5 20.2 12.4 <1.5 <12.5 <1.1 <1.6 <0.98 <8.0 <0.70 <1.0
8/12/10 9/8/10 10/29/10 12/2/10 223 666 162 109 4.3 3.9 6.0 <2.4 <1.2 6.9 1.5 1.7 <1.2 <1.2 <1.1 <1.7 <0.74 <0.80 <0.70 <1.1
SS-229a
SS-239b
SS-243a
SS-249a
SSHMe
SSHMb
SSHMa
SSHMc
SSHMd
SS-239a
SS-243b
SS-249b
PSG-13
PSG-9
PSG-5
PSG-3
PSG-11
PSG-12
PSG-4
PSG-10
PSG-6
PSG-2
PSG-1
PSG-7
PSG-14
PSG-15
PP-5
PP-6
PP-2
PP-3
PP-4
PP-10
PP-11
PP-12
PP-13
RW-1A
RW-1B
RW-1C
MW-10A1
SGMP-5
SGMP-6
SVE-1 /S-1
SVE-2/S-2
SVE-3/S-3
SVE-4/S-4
SVE-5/S-5
SVE-6 /S-6
SVE-7 /S-7
SVE-8/S-8
MW
229
239
243
249
253
259
263
267
275
25
31

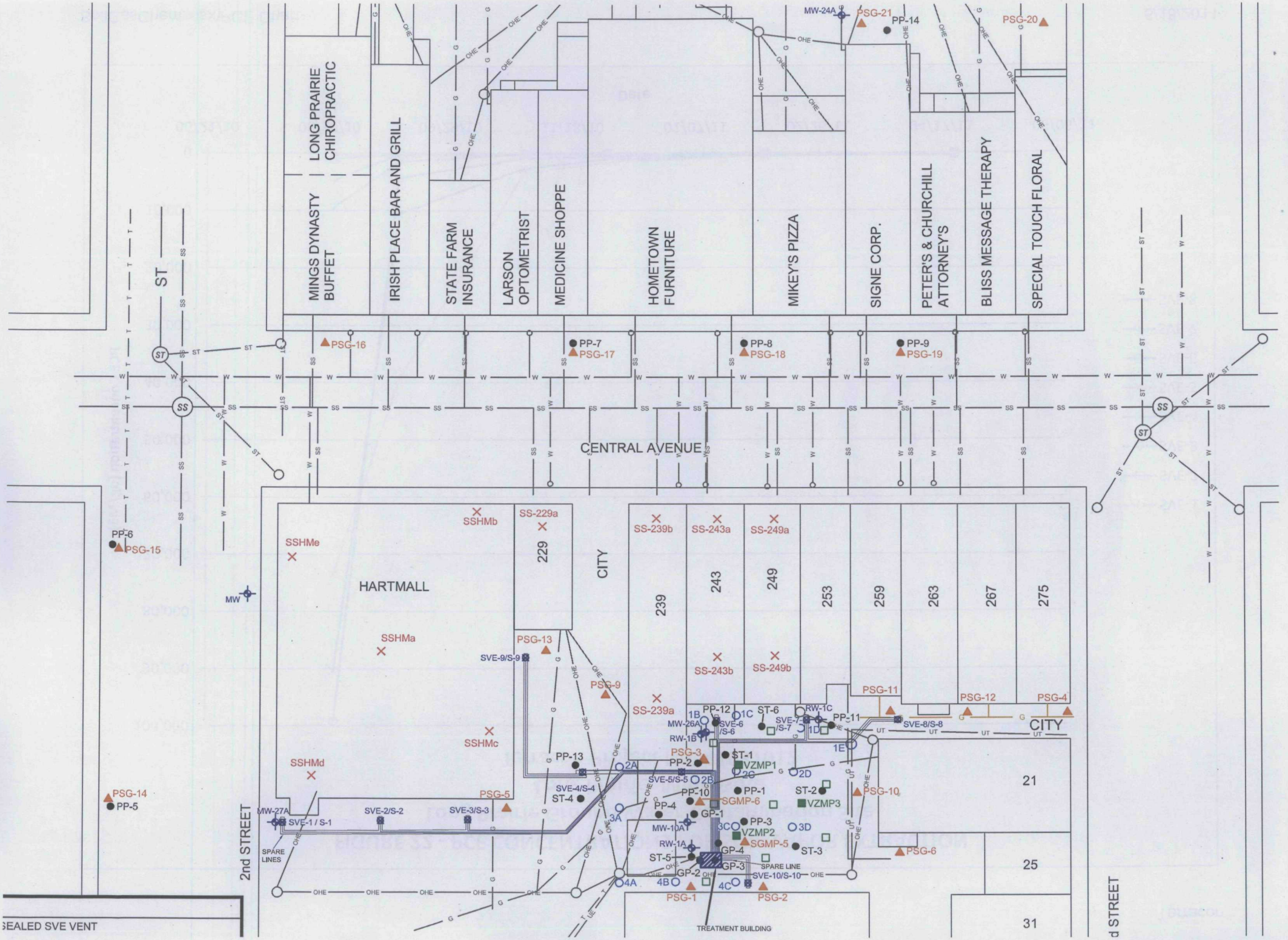
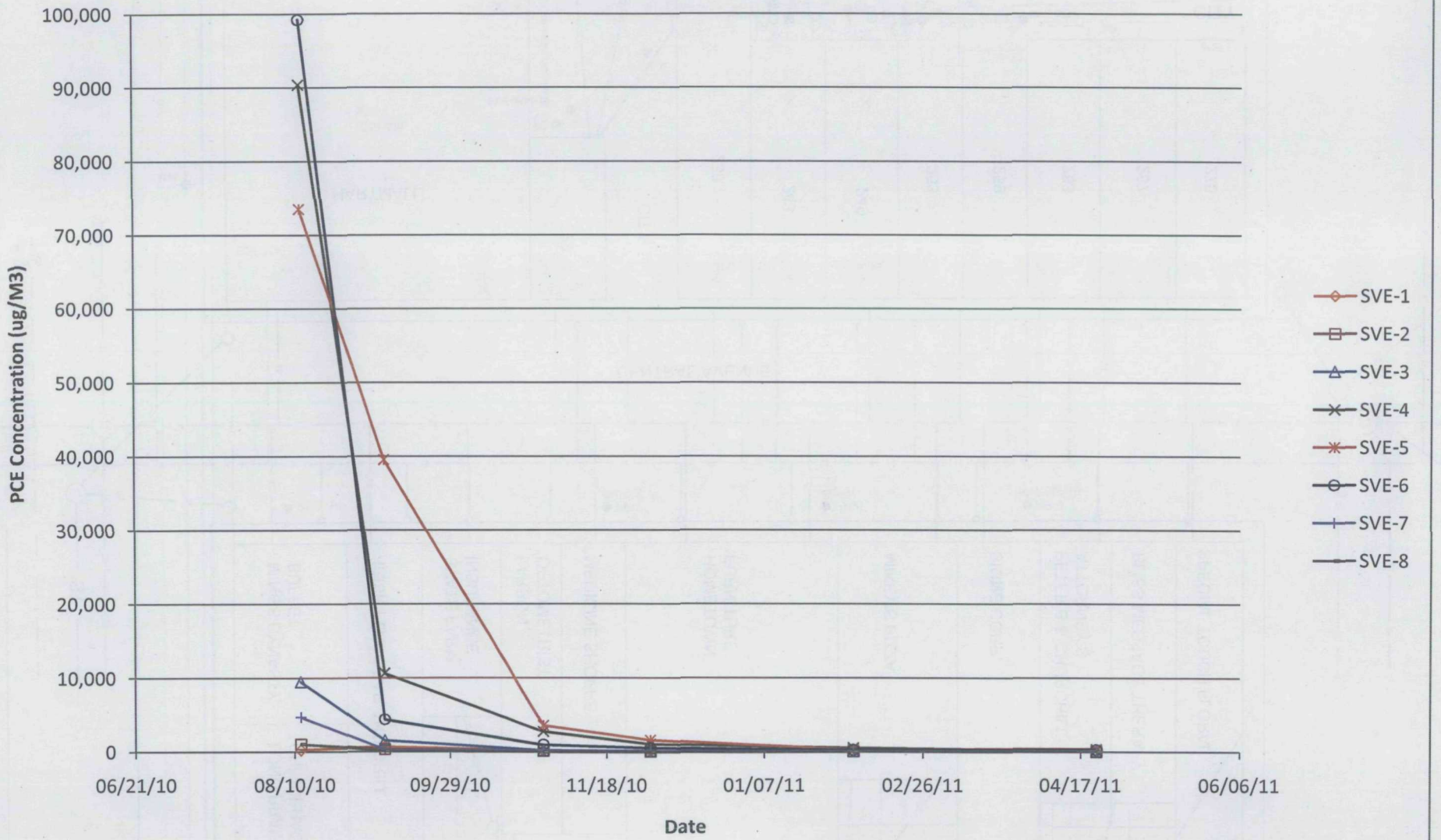

LONG PRAIRIE CHIROPRACTIC
MINGS DYNASTY BUFFET
IRISH PLACE BAR AND GRILL
STATE FARM INSURANCE
LARSON OPTOMETRIST
MEDICINE SHOPPE
HOMETOWN FURNITURE
MIKEY'S PIZZA
SIGNE CORP.
PETER'S & CHURCHILL ATTORNEY'S
BLISS MESSAGE THERAPY
SPECIAL TOUCH FLORAL
CENTRAL AVENUE
HARTMALL
CITY
2nd STREET
TREATMENT BUILDING
SEALED SVE VENT
SPARE LINES
SPARE LINE
MW-24A
PSG-21
PP-14
PSG-20
PSG-16
PP-7
PSG-17
PP-8
PSG-18
PP-9
PSG-19
PP-6
PSG-15
MW
SSHMb
SS-229a
SSHMe
SSHMa
SSHMc
SSHMd
SS-239b
SS-243a
SS-249a
SS-243b
SS-249b
SS-239a
229
239
243
249
253
259
263
267
275
21
25
31
PSG-13
SVE-9/S-9
PSG-9
PSG-11
PSG-12
PSG-4
PSG-14
PP-5
PSG-5
MW-27A
SVE-1 / S-1
SVE-2/S-2
SVE-3/S-3
PP-12
MW-26A
SVE-6/S-6
ST-6
RW-1C
SVE-7/S-7
PP-11
SVE-8/S-8
RW-1B
PSG-3
PP-2
SVE-5/S-5
PP-13
SVE-4/S-4
ST-4
PP-10
PP-4
GP-1
MW-10A
RW-1A
ST-5
GP-4
GP-3
GP-2
ST-1
VZMP1
PP-1
SGMP-6
ST-2
VZMP3
PP-3
VZMP2
SGMP-5
ST-3
SVE-10/S-10
PSG-10
PSG-6
PSG-1
PSG-2
1A
1B
1C
1D
1E
2A
2B
2C
2D
3A
3C
3D
4A
4B
4C

FIGURE 22 - PCE CONCENTRATIONS FOR SOIL VAPOR EXTRACTION
Long Prairie Ground Water Contamination Site
Long Prairie, Minnesota
Terracon Project No. 41037012



Appendix A

Data Tables

A1 – Groundwater Monitoring Schedule

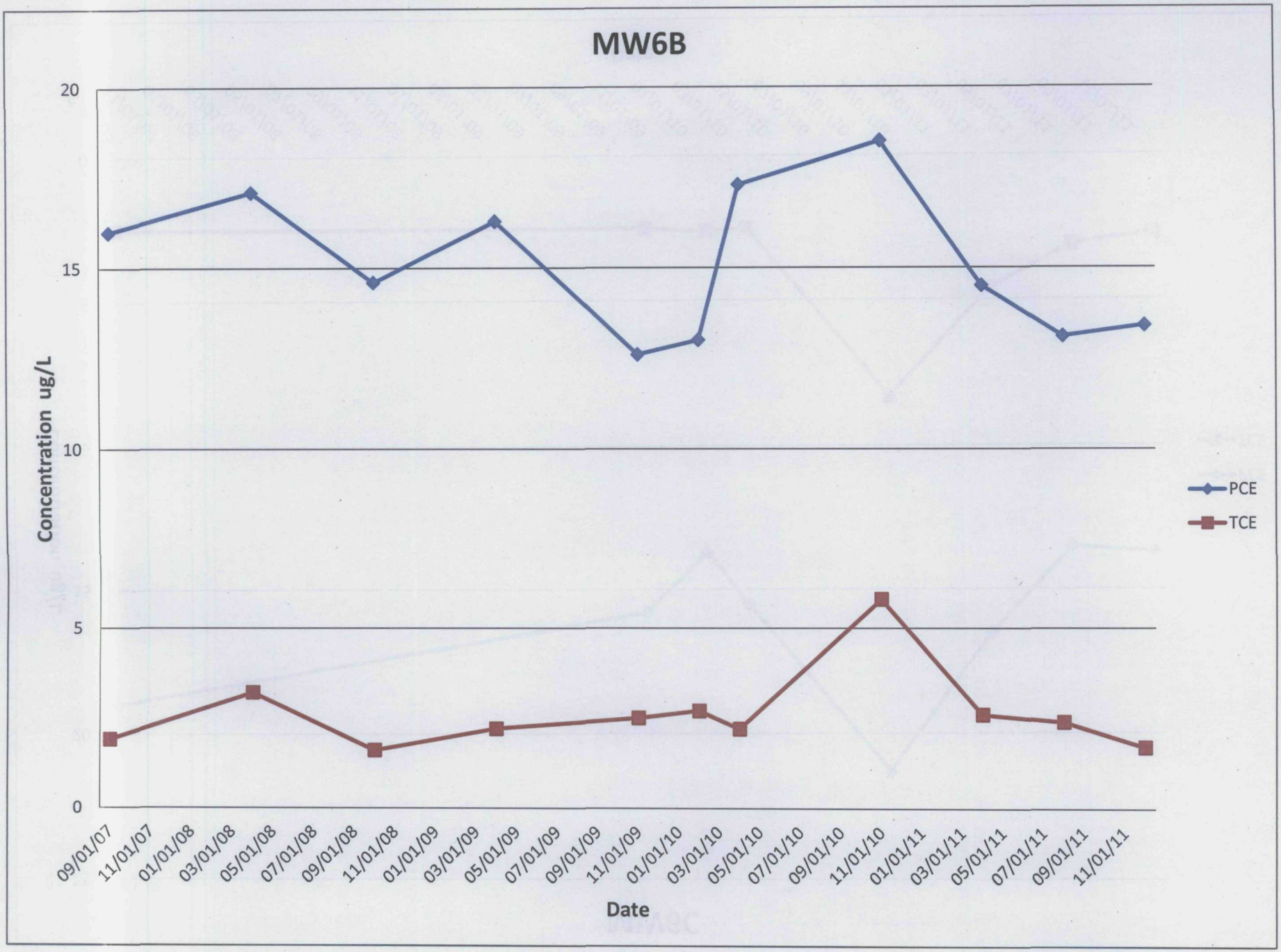
A2 – Historic Groundwater Analytical Data

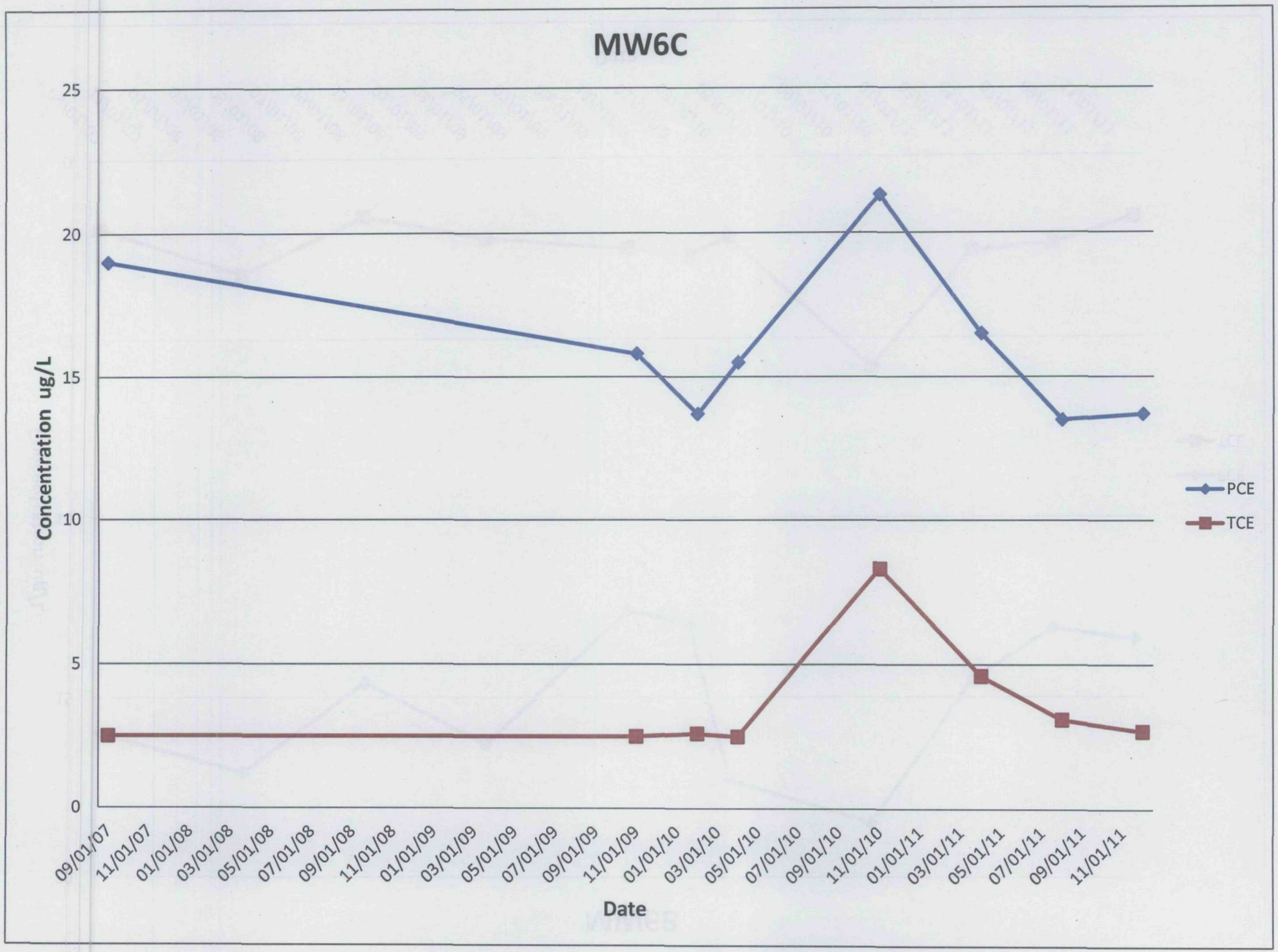
A3 – Vapor Intrusion Concentration and SVE Concentration Data Tables

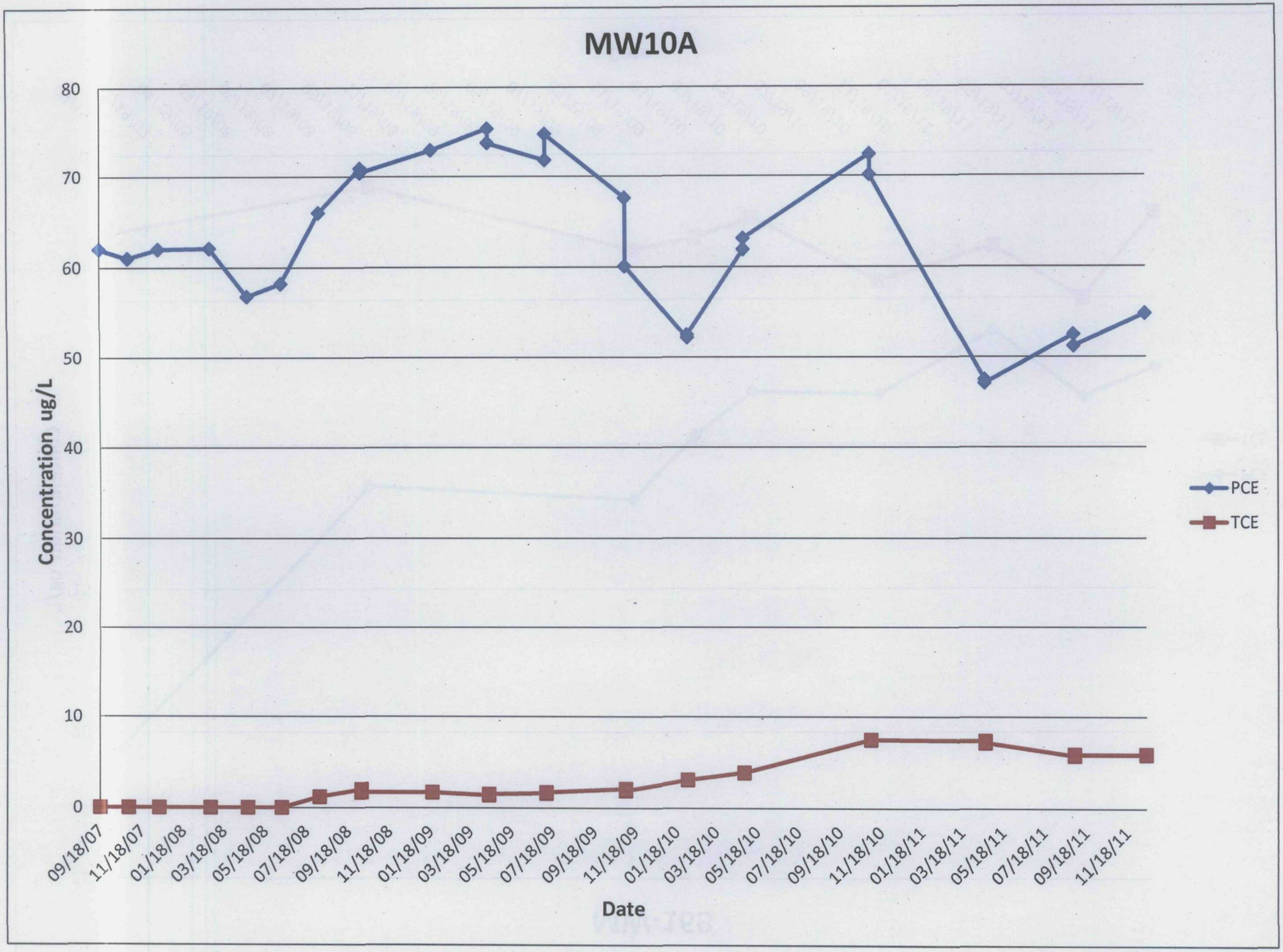
Table 1
2010 Monitoring Schedule
Long Prairie Groundwater Remediation
Long Prairie, Minnesota
Terracon project No. 41037012

	Calendar Year 2011											
Station	Jan-10	Feb-10	Mar-10	April-10	May-10	June-10	July-10	Aug-10	Sept-10	Oct-10	Nov-10	Dec-10
O&M												
Lead Tank Influent	Flow Field VOC's	Flow	Flow	Flow Field VOC's	Flow	Flow	Flow Field VOC's	Flow	Flow	Flow Field VOC's	Flow	Flow
Lead Tank Effluent	Flow Field VOC's	Flow Field VOC's	Flow Field VOC's	Flow Field VOC's	Flow Field VOC's	Flow Field VOC's	Flow Field VOC's	Flow Field VOC's	Flow Field VOC's	Flow Field VOC's	Flow Field VOC's	Flow Field VOC's
Lag Tank Effluent	Flow Field VOC's	Flow	Flow	Flow Field VOC's	Flow	Flow	Flow Field VOC's	Flow	Flow	Flow Field VOC's	Flow	Flow
GROUNDWATER MONITORING												
RW-3, RW-5, RW-6, RW-7, RW-8, RW-9	Level	--	--	Level Field VOC's	--	--	Level	--	--	Level Field VOC's	--	--
Group A: MW-2B, MW-6B, MW-6C, MW-14B, MW-16B, MW-17B, MW-18A, MW-10A, RW-1A, RW-1B, RW-1C, MW-18B, MW-20B, MW-20C, MW-21B, MW-21C	Level	--	--	Level Field VOC's	--	--	Level	--	--	Level Field VOC's	--	--
Group B: RW-4, MW-2A, MW-2C, MW-3A, MW-4A, MW-4B, MW-4C, MW-6A, MW-11B, MW-13C, MW-14B2, MW-14C, MW-15A, MW-15B, MW-16A, MW-16B, MW-19B, MW-22B, MW-22C, MW-23C	Level	--	--	Level	--	--	Level	--	--	Level Field VOC's	--	--
Group C: MW-1A, MW-1B, MW-3B, MW-5A, MW-5B, MW-9A, MW-11A, MW-11C, CW-4, BAL-2C, BAL-2B	Level	--	--	Level	--	--	Level	--	--	Level Field VOC's	--	--
City Well #3, City Well #6	--	--	--	VOC Field	--	--	--	--	--	VOC Field	--	--
PRIVATE WELL SAMPLING												
Residential Wells	--	--	--	--	--	--	--	--	--	VOC Field	--	--
LONG PRAIRIE RIVER	DO	--	--	DO	--	--	DO	--	--	DO	--	--
BIOREMEDIATION MONITORING*												
MW-4A, MW-4B, MW-4C, MW-10A, MW-14B, MW-14B2, MW-14C, MW-17B, MW-21B, MW-21C, MW-22B, MW-22C, RW-1A	--	--	--	--	--	--	--	--	--	*	--	--
Area 1												
MW-4A, MW-4B, MW-4C, MW-21B, MW-21C	Level Field VOC's	--	--	Level Field VOC's	--	--	--	--	--	--	--	--
Area 2												
MW-10A, RW-1A	Level Field VOC's	--	--	Level Field VOC's	--	--	--	--	--	--	--	--
Area 3												
MW-14B, MW-14B2, MW-14C, MW-22B, MW-22C	Level Field VOC's	--	--	Level Field VOC's	--	--	--	--	--	--	--	--
Area 4												
MW-17B	Level Field VOC's	--	--	Level Field VOC's	--	--	--	--	--	--	--	--
PIGGING RECOVERY WELL PIPELINES	X				X					X		

* Bioremediation Sampling will include field (Iron) and Laboratory (VOCs, Sulfate, Methane, Ethane, Ethene and TOC) testing.


MW6B
20
15
10
5
0
Concentration ug/L
PCE
TCE
09/01/07
11/01/07
01/01/08
03/01/08
05/01/08
07/01/08
09/01/08
11/01/08
01/01/09
03/01/09
05/01/09
07/01/09
09/01/09
11/01/09
01/01/10
03/01/10
05/01/10
07/01/10
09/01/10
11/01/10
01/01/11
03/01/11
05/01/11
07/01/11
09/01/11
11/01/11
Date


MW6C
25
20
15
10
5
0
Concentration ug/L
09/01/07
11/01/07
01/01/08
03/01/08
05/01/08
07/01/08
09/01/08
11/01/08
01/01/09
03/01/09
05/01/09
07/01/09
09/01/09
11/01/09
01/01/10
03/01/10
05/01/10
07/01/10
09/01/10
11/01/10
01/01/11
03/01/11
05/01/11
07/01/11
09/01/11
11/01/11
Date
PCE
TCE


MW10A
80
70
60
50
40
30
20
10
0
Concentration ug/L
PCE
TCE
09/18/07
11/18/07
01/18/08
03/18/08
05/18/08
07/18/08
09/18/08
11/18/08
01/18/09
03/18/09
05/18/09
07/18/09
09/18/09
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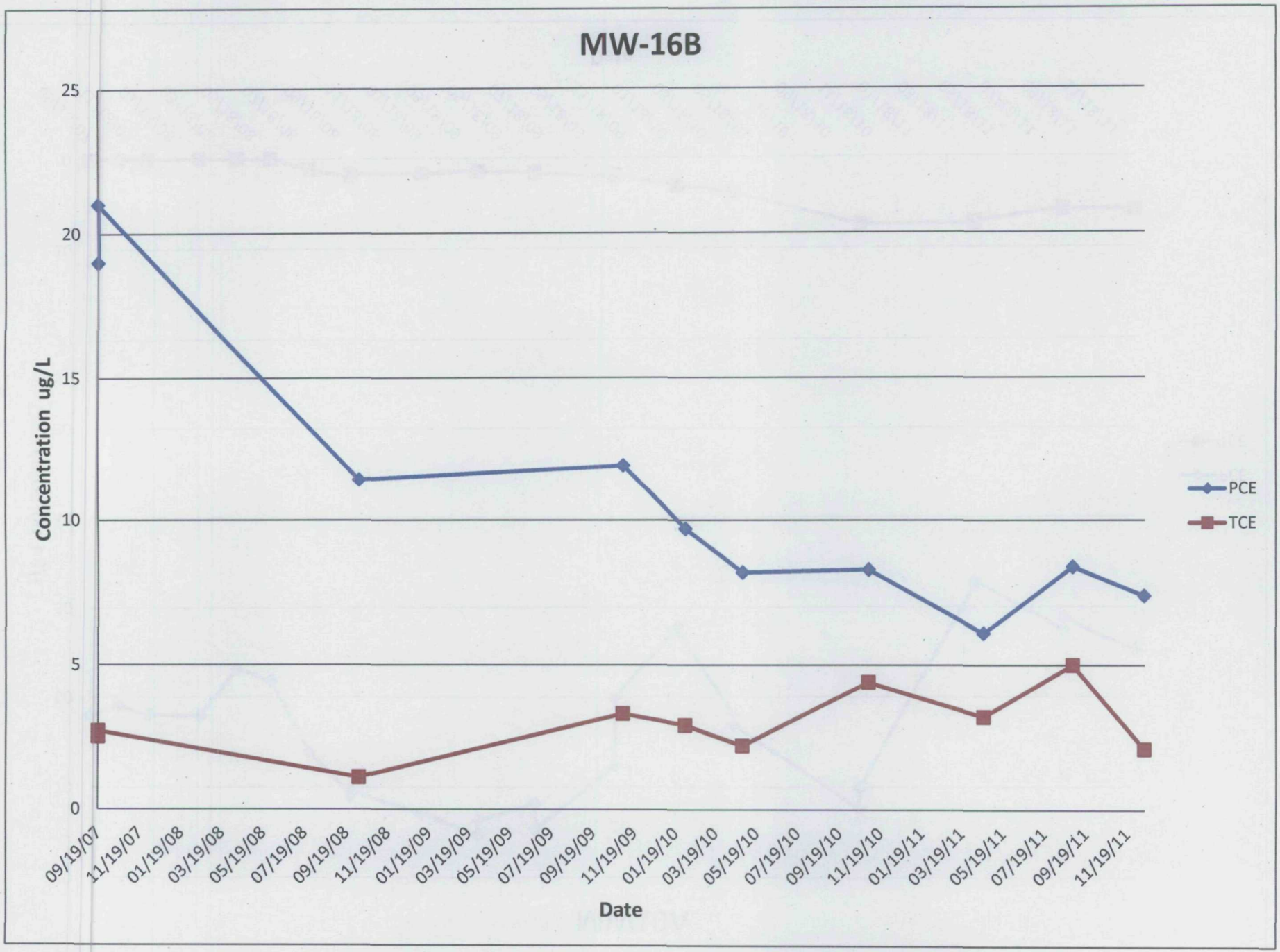
05/18/10
07/18/10
09/18/10
11/18/10
01/18/11
03/18/11
05/18/11
07/18/11
09/18/11
11/18/11
Date


MW-16B
25
20
15
10
5
0
Concentration ug/L
PCE
TCE
09/19/07
11/19/07
01/19/08
03/19/08
05/19/08
07/19/08
09/19/08
11/19/08
01/19/09
03/19/09
05/19/09
07/19/09
09/19/09
11/19/09
01/19/10
03/19/10
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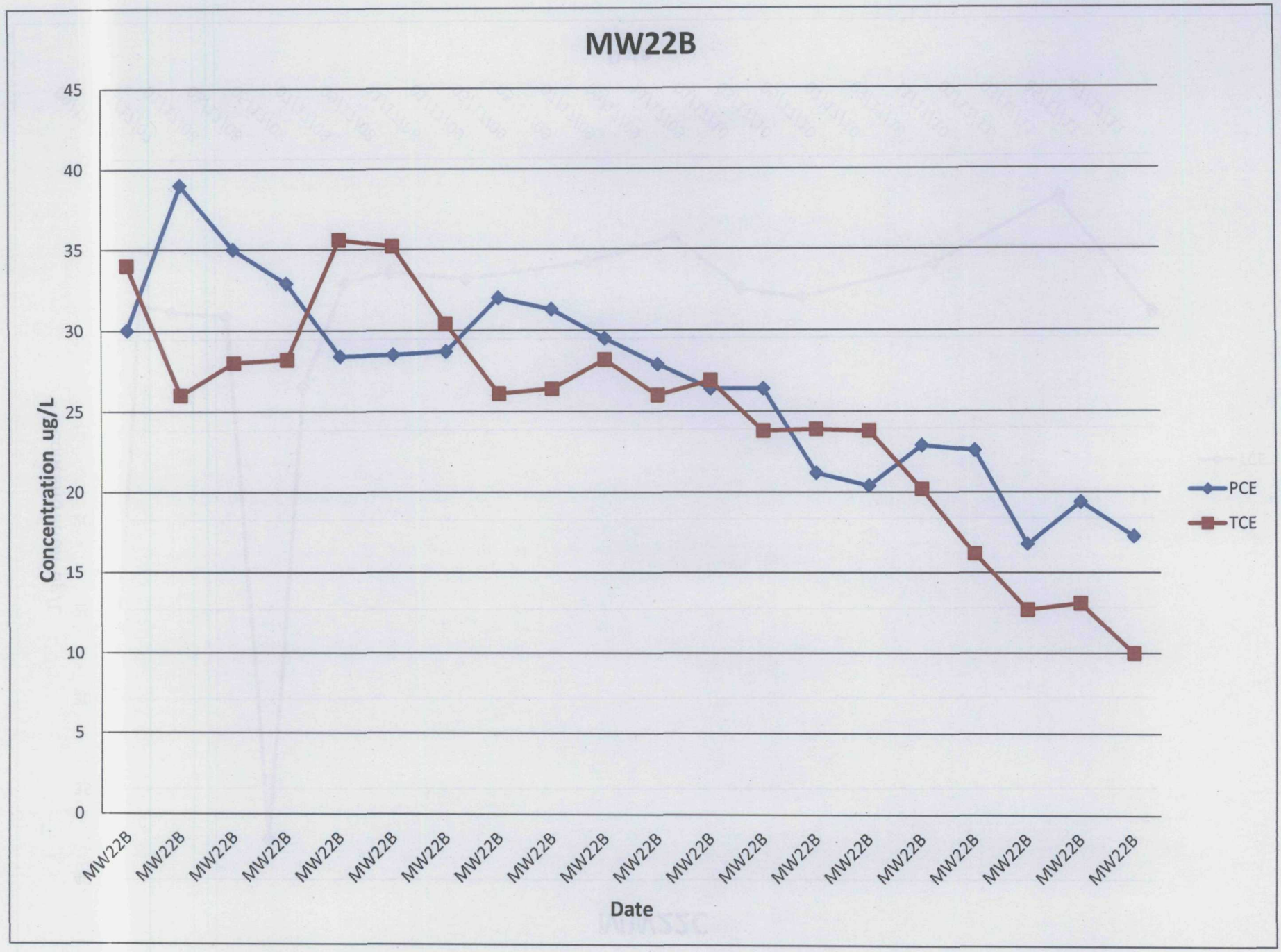
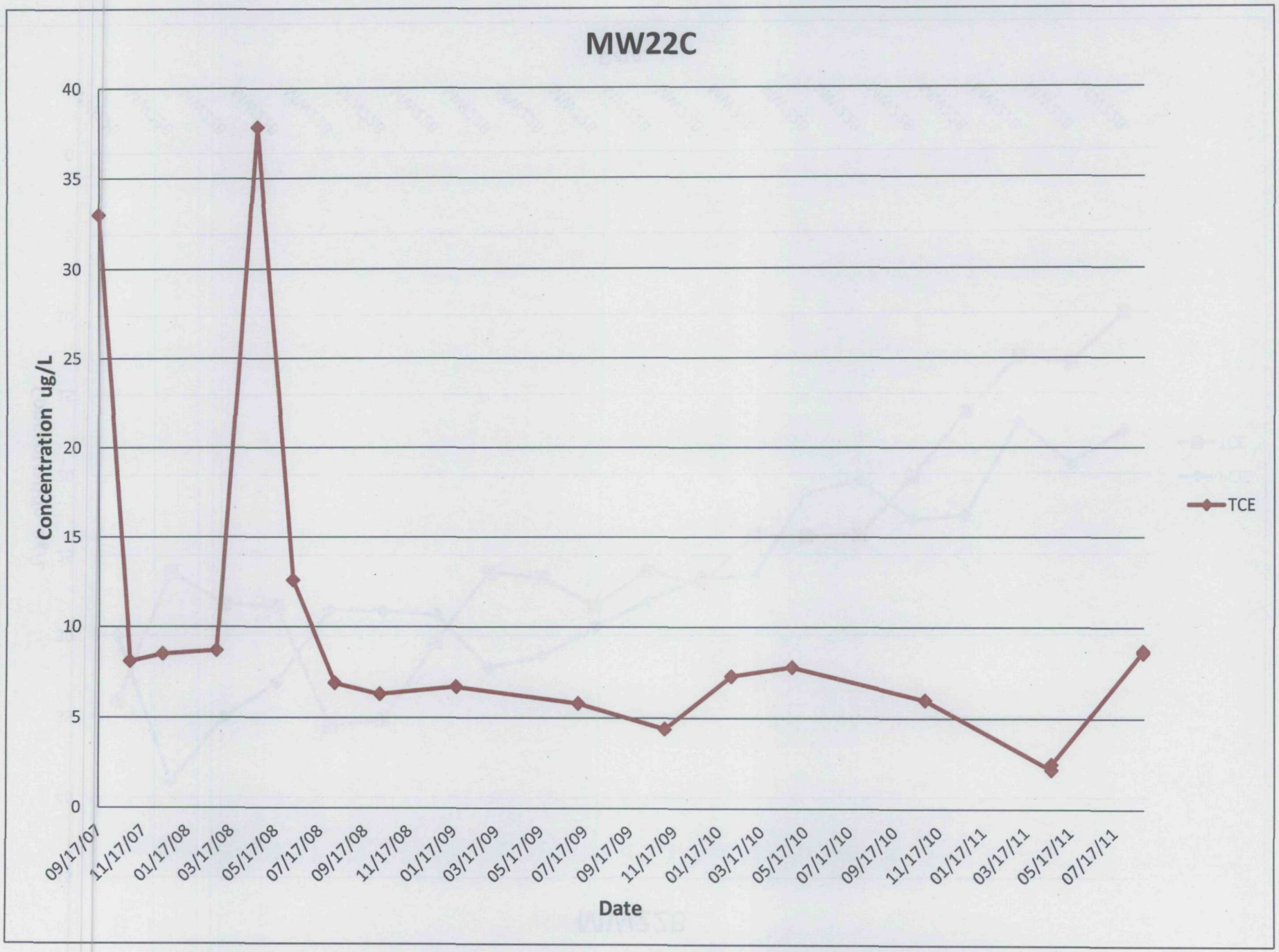
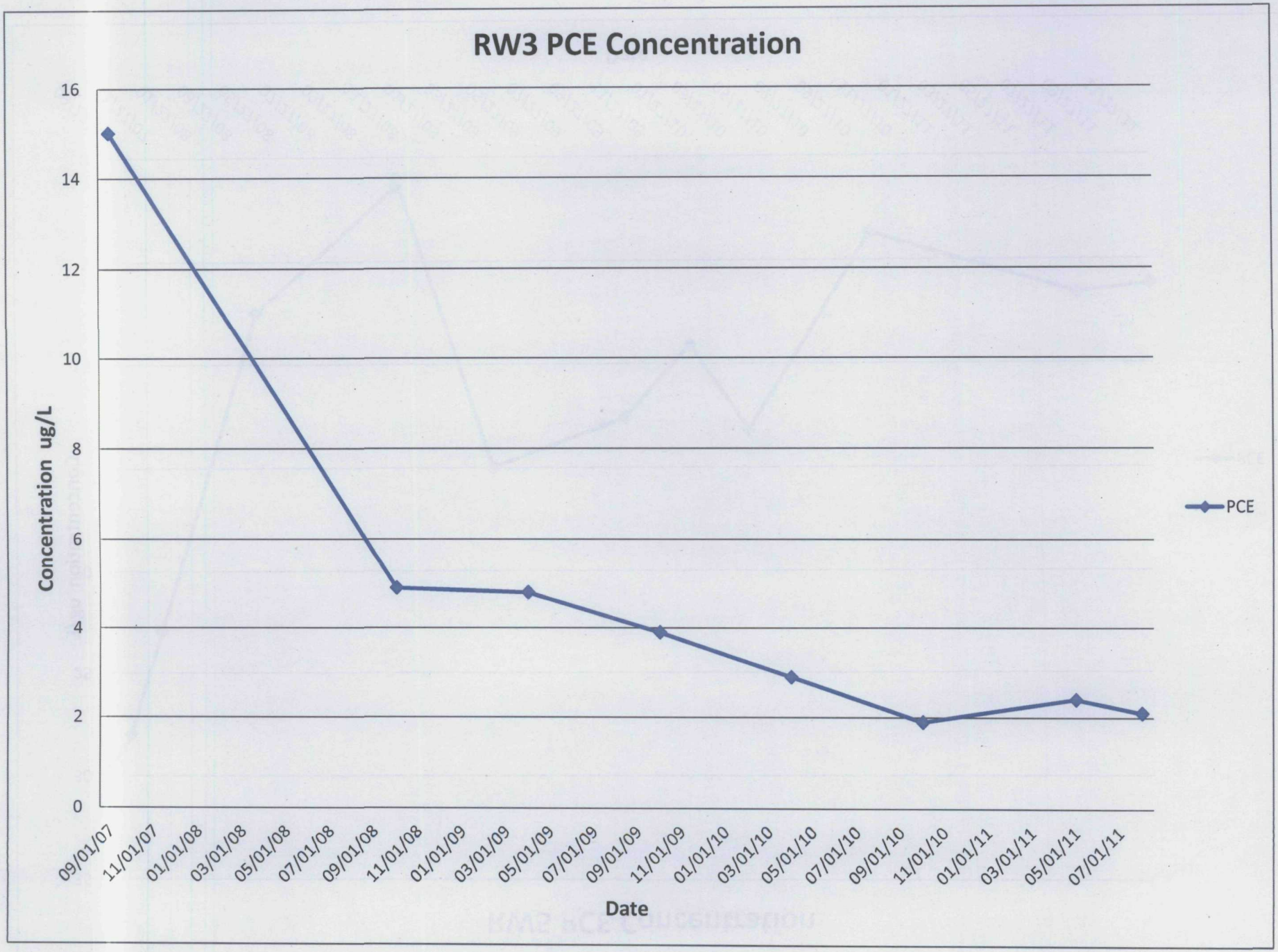
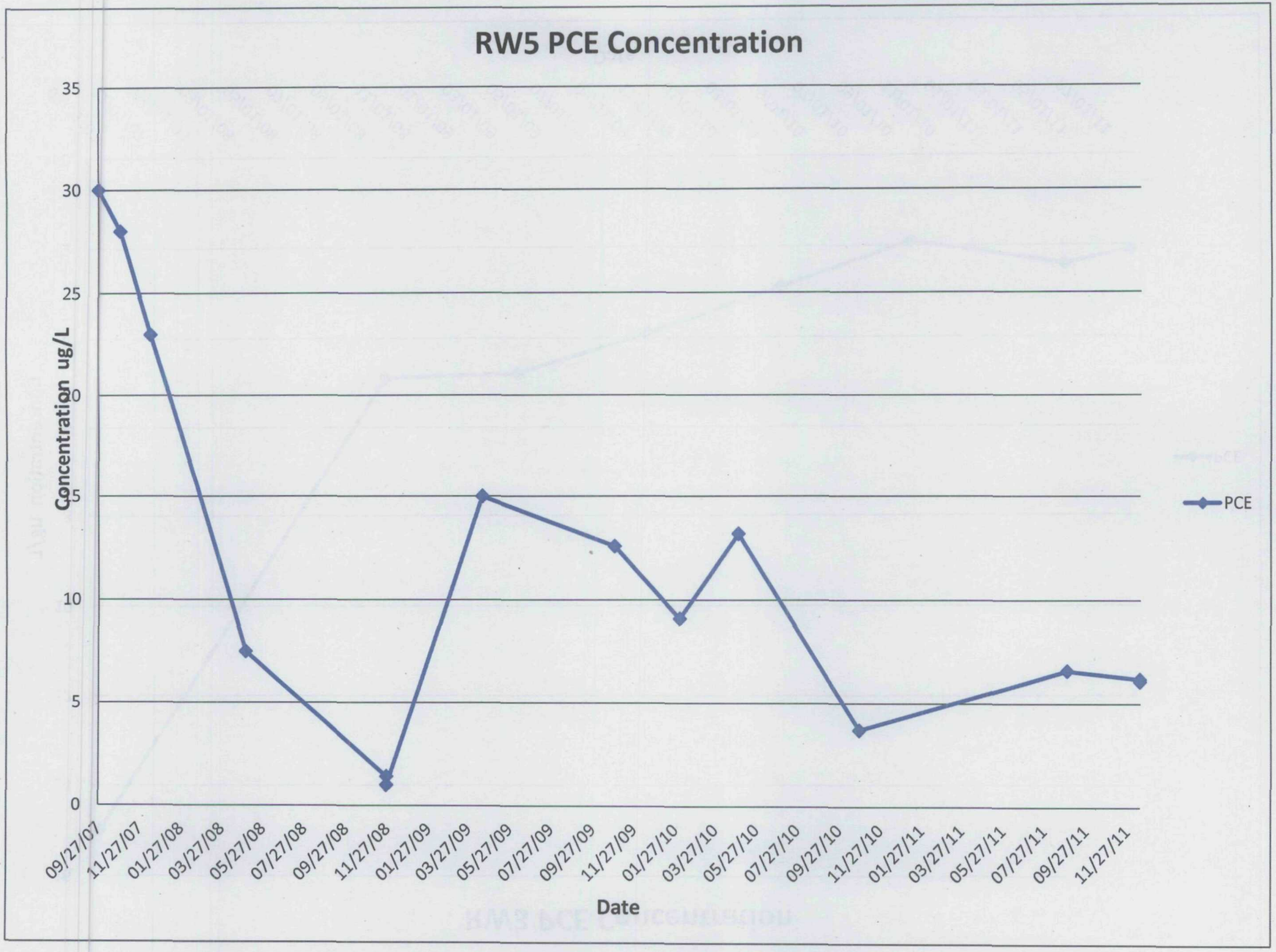
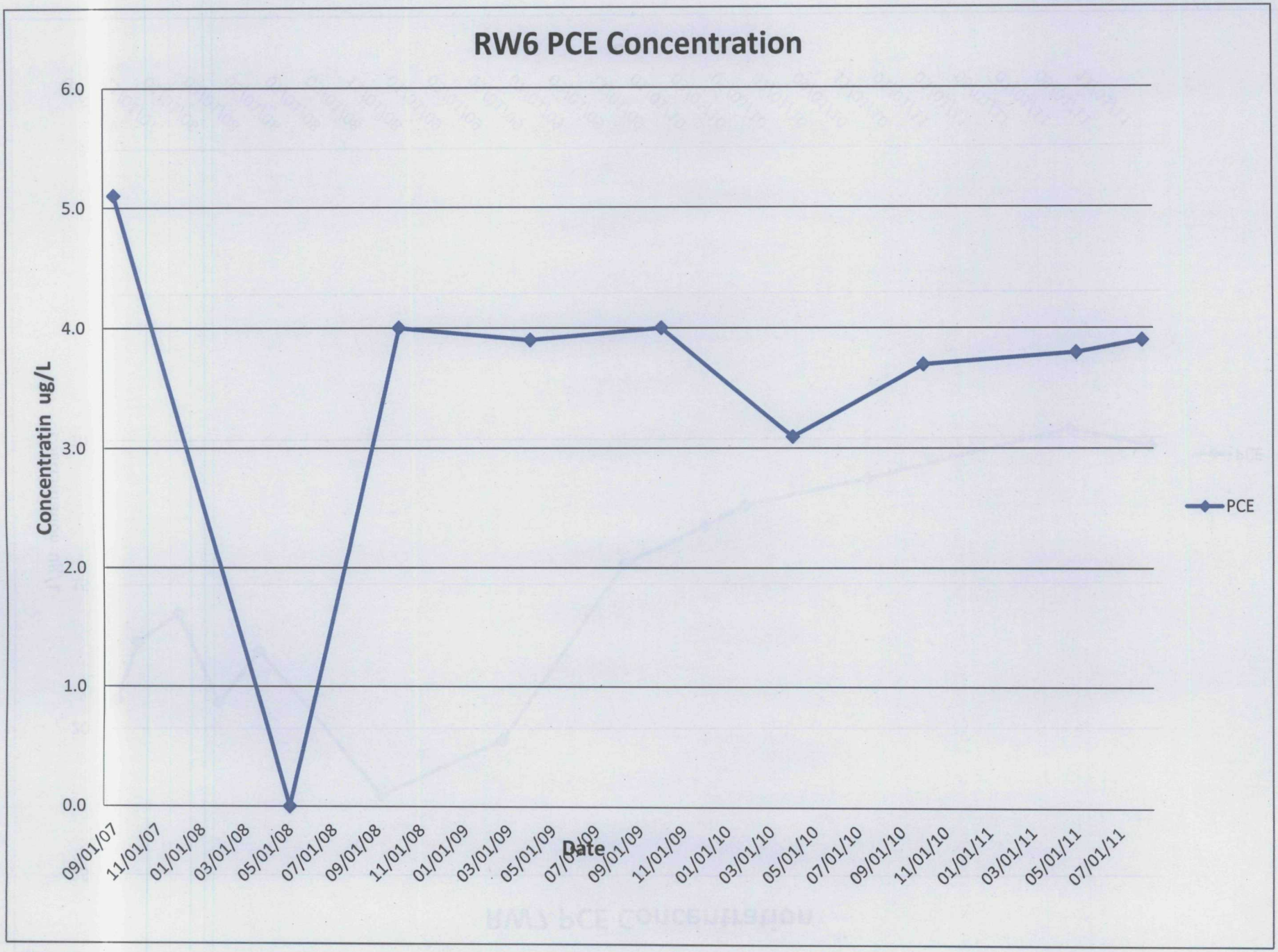
07/19/10
09/19/10
11/19/10
01/19/11
03/19/11
05/19/11
07/19/11
09/19/11
11/19/11
Date

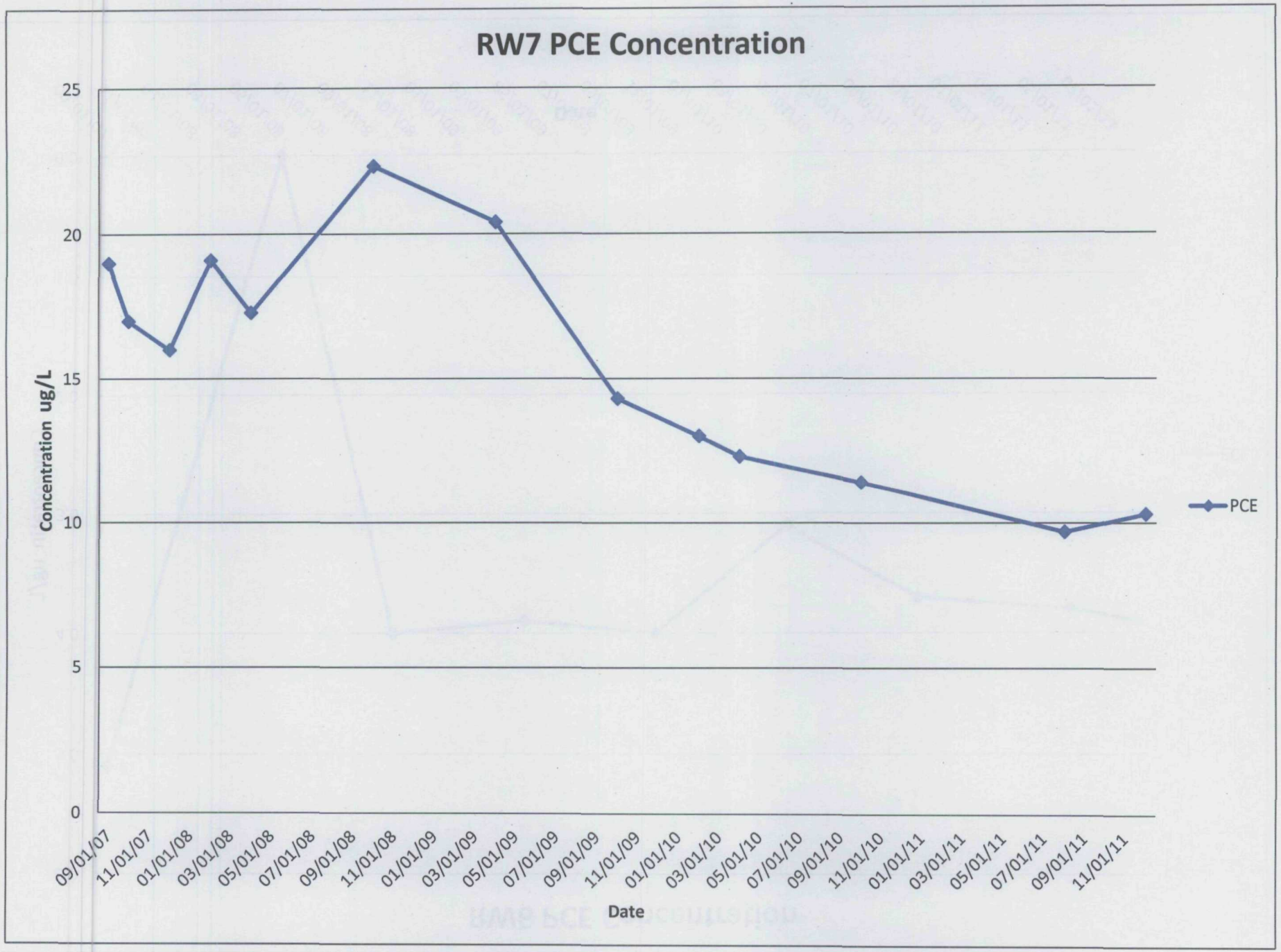

MW22B
45
40
35
30
25
20
15
10
5
0
Concentration ug/L
MW22B
Date
PCE
TCE

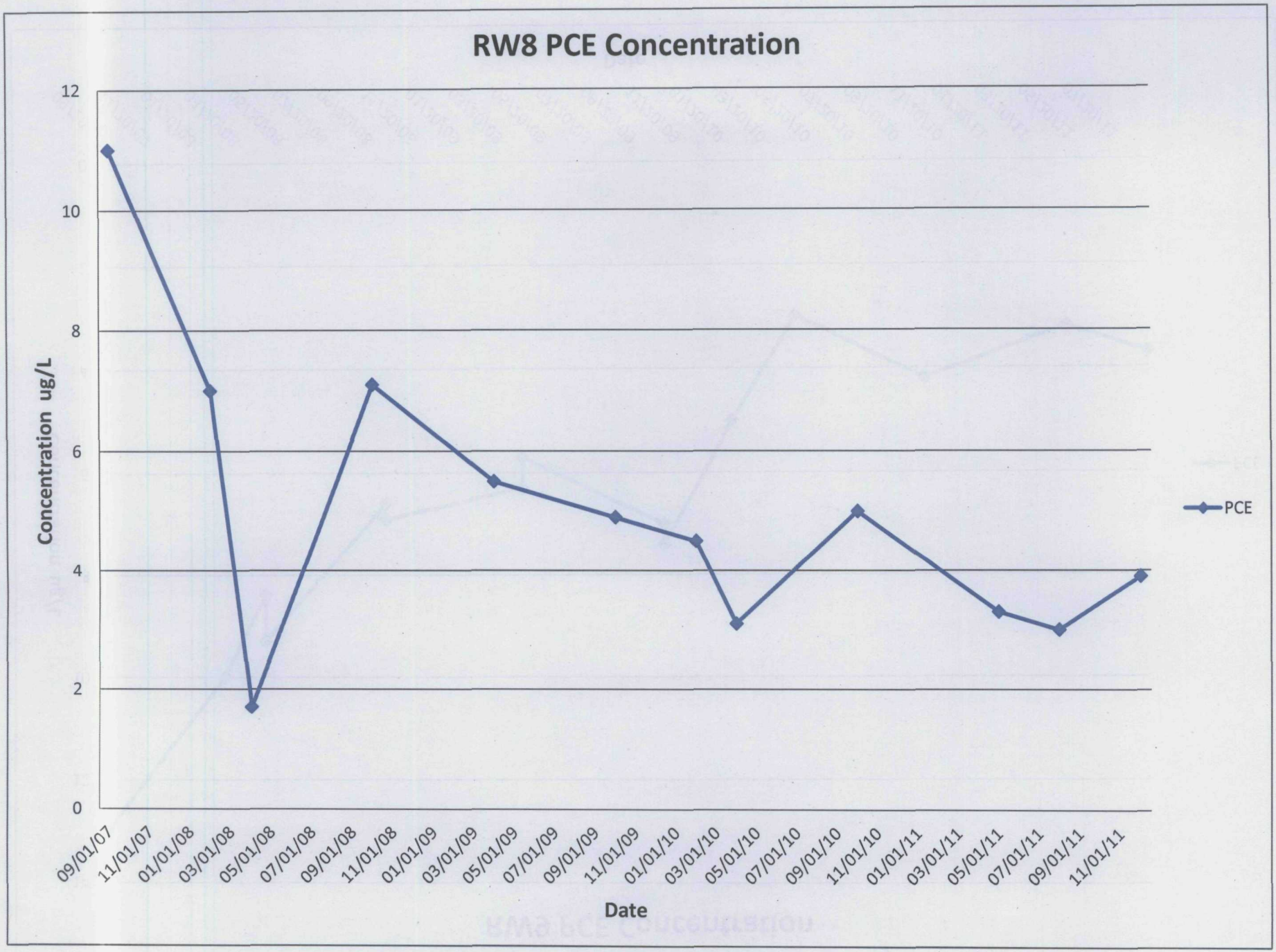

MW22C
Concentration ug/L
40
35
30
25
20
15
10
5
0
09/17/07
11/17/07
01/17/08
03/17/08
05/17/08
07/17/08
09/17/08
11/17/08
01/17/09
03/17/09
05/17/09
07/17/09
09/17/09
11/17/09
01/17/10
03/17/10
05/17/10
07/17/10
09/17/10
11/17/10
01/17/11
03/17/11
05/17/11
07/17/11
Date
TCE


RW3 PCE Concentration
Concentration ug/L
16
14
12
10
8
6
4
2
0
09/01/07
11/01/07
01/01/08
03/01/08
05/01/08
07/01/08
09/01/08
11/01/08
01/01/09
03/01/09
05/01/09
07/01/09
09/01/09
11/01/09
01/01/10
03/01/10
05/01/10
07/01/10
09/01/10
11/01/10
01/01/11
03/01/11
05/01/11
07/01/11
Date
PCE


RW5 PCE Concentration
35
30
25
20
15
10
5
0
Concentration ug/L
09/27/07
11/27/07
01/27/08
03/27/08
05/27/08
07/27/08
09/27/08
11/27/08
01/27/09
03/27/09
05/27/09
07/27/09
09/27/09
11/27/09
01/27/10
03/27/10
05/27/10
07/27/10
09/27/10
11/27/10
01/27/11
03/27/11
05/27/11
07/27/11
09/27/11
11/27/11
Date
PCE


RW6 PCE Concentration
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Concentratin ug/L
09/01/07
11/01/07
01/01/08
03/01/08
05/01/08
07/01/08
09/01/08
11/01/08
01/01/09
03/01/09
05/01/09
07/01/09
09/01/09
11/01/09
01/01/10
03/01/10
05/01/10
07/01/10
09/01/10
11/01/10
01/01/11
03/01/11
05/01/11
07/01/11
Date
PCE


RW7 PCE Concentration
Concentration ug/L
25
20
15
10
5
0
09/01/07
11/01/07
01/01/08
03/01/08
05/01/08
07/01/08
09/01/08
11/01/08
01/01/09
03/01/09
05/01/09
07/01/09
09/01/09
11/01/09
01/01/10
03/01/10
05/01/10
07/01/10
09/01/10
11/01/10
01/01/11
03/01/11
05/01/11
07/01/11
09/01/11
11/01/11
Date
PCE


RW8 PCE Concentration
12
10
8
6
4
2
0
Concentration ug/L
09/01/07
11/01/07
01/01/08
03/01/08
05/01/08
07/01/08
09/01/08
11/01/08
01/01/09
03/01/09
05/01/09
07/01/09
09/01/09
11/01/09
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03/01/10
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07/01/10
09/01/10
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01/01/11
03/01/11
05/01/11
07/01/11
09/01/11
11/01/11
Date
PCE

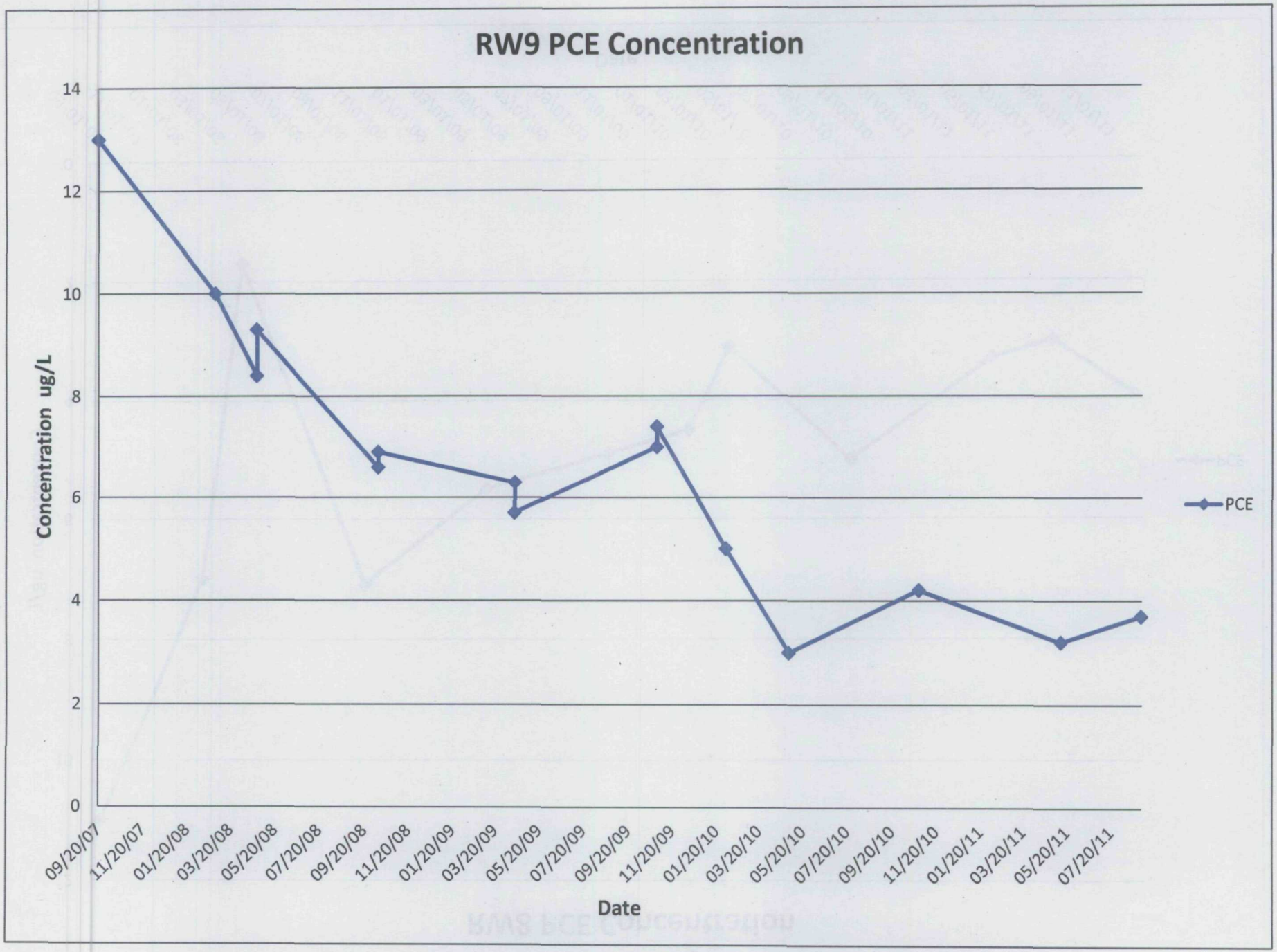
RW9 PCE Concentration
Concentration ug/L
14
12
10
8
6
4
2
0
09/20/07
11/20/07
01/20/08
03/20/08
05/20/08
07/20/08
09/20/08
11/20/08
01/20/09
03/20/09
05/20/09
07/20/09
09/20/09
11/20/09
01/20/10
03/20/10
05/20/10
07/20/10
09/20/10
11/20/10
01/20/11
03/20/11
05/20/11
07/20/11
Date
PCE

TABLE 3 - SOIL GAS, INDOOR AIR AND OUTDOOR AIR ANALYTICAL DATA (COCs)

Long Prairie Ground Water Contamination Site

Long Prairie, Minnesota

TERRACON PROJECT NO. 41037012

Sample Location	Sample Depth (ft)	Sample Date	Lab	PCE µg/m³	TCE µg/m³	cis-DCE µg/m³	trans-DCE µg/m³	Vinyl Chloride µg/m³
SVE MONITORING								
SVE Wells								
SVE-1	8-16	08/12/10	Fixed	223	4.3	<1.2	<1.2	<0.74
SVE-1	8-16	09/08/10	Fixed	666	3.9	6.9	<1.2	<0.80
SVE-1	8-16	10/29/10	Fixed	162	6.0	1.5	<1.1	<0.70
SVE-1	8-16	12/02/10	Fixed	109	<2.4	1.7	<1.7	<1.1
SVE-1	8-16	02/04/11	Fixed	25.6	4.6	2.1	<1.5	<0.96
SVE-1	8-16	04/22/11	Fixed	46.0	3.3	<1.5	<1.5	<0.47
SVE-1	8-16	06/10/11	Fixed	114	<0.96	<1.4	<1.4	<0.45
SVE-1	8-16	09/22/11	Fixed	206	<1.3	<1.9	<1.9	<0.60
SVE-1	8-16	11/09/11	Fixed	116	<0.91	<1.3	<1.3	<0.43
SVE-1	8-16	01/23/12	Fixed	75.2	1.4	<2.0	<2.0	<0.66
SVE-1*	8-16	03/29/12	Fixed	63.5	1.2	<1.4	<1.4	<0.44
SVE-2	8-16	08/12/10	Fixed	1,030	19.9	12.4	<1.5	<0.98
SVE-2	8-16	09/08/10	Fixed	341	<16.9	<12.5	<12.5	<8.0
SVE-2	8-16	10/29/10	Fixed	138	4.7	20.2	<1.1	<0.70
SVE-2	8-16	12/02/10	Fixed	68.2	<2.1	12.4	<1.6	<1.0
SVE-2	8-16	02/04/11	Fixed	55.6	<1.8	15.6	<1.3	<0.85
SVE-2	8-16	04/22/11	Fixed	34.0	1.3	<1.5	<1.5	<0.48
SVE-2	8-16	06/10/11	Fixed	175	<0.96	<1.4	<1.4	<0.45
SVE-2	8-16	09/22/11	Fixed	110	<1.0	<1.5	<1.5	<0.49
SVE-2	8-16	11/09/11	Fixed	33.3	<1.1	<1.7	<1.7	<0.54
SVE-2	8-16	01/23/12	Fixed	15.4	<2.2	<3.3	<3.3	<1.1
SVE-2*	8-16	03/29/12	Fixed	27.9	<0.92	2.7	<1.4	<0.44
SVE-3	8-16	08/12/10	Fixed	9,450	103	2.1	<1.2	<0.77
SVE-3	8-16	09/08/10	Fixed	1,530	<32.6	<24.0	<24.0	<15.4
SVE-3	8-16	10/29/10	Fixed	203	1.7	<1.0	<1.0	<0.65
SVE-3	8-16	12/02/10	Fixed	115	<2.4	<1.7	<1.7	<1.1
SVE-3	8-16	02/04/11	Fixed	47.1	<1.5	<1.1	<1.1	<0.72
SVE-3	8-16	04/22/11	Fixed	84.8	1.2	<1.5	<1.5	<0.47
SVE-3	8-16	06/10/11	Fixed	446	<1.6	<2.4	<2.4	<0.76
SVE-3	8-16	09/22/11	Fixed	125	2.2	<1.8	<1.8	<0.56
SVE-3	8-16	11/09/11	Fixed	55.4	<1.3	<1.9	<1.9	<0.60
SVE-3	8-16	01/23/12	Fixed	<0.92	<0.74	<1.1	<1.1	<0.35
SVE-3*	8-16	03/29/12	Fixed	51.7	<0.82	<1.2	<1.2	<0.39
SVE-4	8-16	08/12/10	Fixed	90,400	1,930	1,690	315	<0.83
SVE-4	8-16	09/08/10	Fixed	10,600	<271	<200	<200	<128
SVE-4	8-16	10/29/10	Fixed	2,750	26.3	22.2	2.0	<0.70
SVE-4	8-16	12/02/10	Fixed	1,040	6.1	5.5	<1.8	<1.2
SVE-4	8-16	02/04/11	Fixed	546	<1.8	2.8	<1.3	<0.85
SVE-4	8-16	04/22/11	Fixed	222	10.2	11.5	<2.8	<0.90
SVE-4	8-16	06/10/11	Fixed	2,990	98.2	61.6	<1.5	<0.47
SVE-4	8-16	09/22/11	Fixed	665	12.1	10.0	<1.5	<0.47
SVE-4	8-16	11/09/11	Fixed	301	10.2	10.5	<1.6	<0.51
SVE-4	8-16	01/23/12	Fixed	233	2.3	3.8	<2.2	<0.70
SVE-4*	8-16	03/29/12	Fixed	488	13.5	9.8	2.1	<0.37
SVE-5	8-16	08/12/10	Fixed	73,500	1,950	4,180	44.7	<1.1
SVE-5	8-16	09/08/10	Fixed	39,500	367	384	<24.9	<16.0
SVE-5	8-16	10/29/10	Fixed	3,550	31.3	35.3	<1.1	<0.70
SVE-5	8-16	12/02/10	Fixed	1,580	9.0	11.4	<1.6	<1.0

TABLE 3 - SOIL GAS, INDOOR AIR AND OUTDOOR AIR ANALYTICAL DATA (COCs)
Long Prairie Ground Water Contamination Site
Long Prairie, Minnesota
TERRACON PROJECT NO. 41037012

Sample Location	Sample Depth (ft)	Sample Date	Lab	PCE µg/m³	TCE µg/m³	cis-DCE µg/m³	trans-DCE µg/m³	Vinyl Chloride µg/m³
SVE-5	8-16	02/04/11	Fixed	356	2.7	23.4	<1.5	<0.96
SVE-5	8-16	04/22/11	Fixed	387	18.8	18.2	<4.7	<1.5
SVE-5	8-16	06/10/11	Fixed	4,360	106	93.5	<1.4	<0.45
SVE-5	8-16	09/22/11	Fixed	689	20.0	24.1	<1.4	<0.45
SVE-5	8-16	11/09/11	Fixed	247	10.1	36.9	<1.5	<0.47
SVE-5	8-16	01/23/12	Fixed	363	6.6	73.7	<2.2	<0.70
SVE-5*	8-16	03/29/12	Fixed	664	10.8	54.2	<1.4	<0.44
SVE-6	8-16	08/12/10	Fixed	99,200	6,640	4,770	126	<0.94
SVE-6	8-16	09/08/10	Fixed	4,360	211	176	<48.0	<30.8
SVE-6	8-16	10/29/10	Fixed	959	<52.9	51.2	<39.0	<25.0
SVE-6	8-16	12/02/10	Fixed	554	15.8	18.6	<1.4	<0.87
SVE-6	8-16	02/04/11	Fixed	260	8.7	14.0	<1.1	<0.72
SVE-6	8-16	04/22/11	Fixed	296	23.3	31.6	<4.7	<1.5
SVE-6	8-16	06/10/11	Fixed	1,980	122	138	6.1	<0.45
SVE-6	8-16	09/22/11	Fixed	861	32.6	60.6	<1.5	<0.47
SVE-6	8-16	11/09/11	Fixed	186	12.1	21.3	<1.7	<0.54
SVE-6	8-16	01/23/12	Fixed	138	4.4	10.8	<1.7	<0.55
SVE-6*	8-16	03/29/12	Fixed	310	13.0	25.0	1.2	<0.37
SVE-7	8-16	08/12/10	Fixed	4,680	156	168	14.5	<0.98
SVE-7	8-16	09/08/10	Fixed	277	26.3	12.7	<1.1	<0.72
SVE-7	8-16	10/29/10	Fixed	238	8.3	3.9	<1.1	<0.70
SVE-7	8-16	12/02/10	Fixed	41.4	<1.8	<1.4	<1.4	<0.87
SVE-7	8-16	02/04/11	Fixed	54.6	<2.0	<1.5	<1.5	<0.96
SVE-7	8-16	04/22/11	Fixed	127	5.1	7.6	<1.7	<0.56
SVE-7	8-16	06/10/11	Fixed	322	14.4	4.0	<1.4	<0.44
SVE-7	8-16	09/22/11	Fixed	206	3.9	2.9	<1.4	<0.45
SVE-7	8-16	11/09/11	Fixed	125	21.8	1.9	<1.5	<0.47
SVE-7	8-16	01/23/12	Fixed	15.3	<1.5	<2.2	<2.2	<0.70
SVE-7*	8-16	03/29/12	Fixed	39.6	2.0	2.4	<1.1	<0.36
SVE-8	8-16	08/12/10	Fixed	1,050	<152	<112	<112	<72.0
SVE-8	8-16	09/08/10	Fixed	93.6	<1.6	<1.2	<1.2	<0.77
SVE-8	8-16	10/29/10	Fixed	13.3	<1.6	<1.2	<1.2	<0.77
SVE-8	8-16	12/02/10	Fixed	4.6	<2.0	<1.5	<1.5	<0.94
SVE-8	8-16	02/04/11	Fixed	8.8	15.9	<1.1	<1.1	<0.72
SVE-8	8-16	04/22/11	Fixed	19.7	1.0	<1.4	<1.4	<0.44
SVE-8	8-16	06/10/11	Fixed	8.1	<2.7	<4.0	<4.0	<1.3
SVE-8	8-16	09/22/11	Fixed	12.6	<0.87	<1.3	<1.3	<0.41
SVE-8	8-16	11/09/11	Fixed	5.7	<0.74	<1.1	<1.1	<0.35
SVE-8	8-16	01/23/12	Fixed	3.0	<0.89	<1.3	<1.3	<0.42
SVE-8*	8-16	03/29/12	Fixed	7.4	<0.85	<1.3	<1.3	<0.40
SVE-9	8-16	11/17/11	Fixed	880	<283	<417	<417	<134
SVE-9	8-16	01/23/12	Fixed	84.9	<22.2	33.7	<32.7	<10.5
SVE-9*	8-16	03/29/12	Fixed	57.3	3.0	15.4	<1.3	<0.40
SVE-10	10-18	11/17/11	Fixed	<0.99	3.3	<1.2	<1.2	<0.37
SVE-10	10-18	01/23/12	Fixed	328	<1.4	<2.0	<2.0	<0.66
SVE-10*	10-18	03/29/12	Fixed	334	<2.8	<4.1	<4.1	<1.3
Pre-GAC	8-16	08/12/10	Fixed	41,500	1,300	1,270	51.0	<0.74

TABLE 3 - SOIL GAS, INDOOR AIR AND OUTDOOR AIR ANALYTICAL DATA (COCs)
Long Prairie Ground Water Contamination Site
Long Prairie, Minnesota
TERRACON PROJECT NO. 41037012

Sample Location	Sample Depth (ft)	Sample Date	Lab	PCE µg/m³	TCE µg/m³	cis-DCE µg/m³	trans-DCE µg/m³	Vinyl Chloride µg/m³
SVE System Off-Gas								
Post-GAC	-	08/12/10	Fixed	<2.7	<2.1	<1.6	<1.6	<1.0
Post-GAC	-	09/08/10	Fixed	**2,350**	**288**	**448**	**26.6**	<14.4
Post-GAC	-	10/29/10	Fixed	<3.8	<3.0	**13.1**	<2.2	<1.4
Post-GAC	-	12/02/10	Fixed	<2.7	<2.1	**1.8**	<1.6	<1.0
GAC-1	-	04/22/11	Fixed	<1.2	**2.0**	**2.1**	<1.4	<0.45
GAC-2	-	04/22/11	Fixed	<1.2	**2.3**	**1.8**	<1.4	<0.44
24-HOUR AIR SAMPLES								
Hartmall Air Sampling								
Hartmall Main Floor East	+3	06/17/09	Fixed	**11.9**	<1.6	<1.2	<1.2	<0.74
Hartmall Main Floor East	+3	08/12/09	Fixed	**5.0**	**15.7**	<1.2	<1.2	<0.80
Hartmall Main Floor Middle	+3	06/17/09	Fixed	**9.0**	<1.6	<1.2	<1.2	<0.74
Hartmall Main Floor West	+3	06/17/09	Fixed	**3.8**	<1.5	<1.1	<1.1	<0.70
Hartmall Main Floor West	+3	08/12/09	Fixed	**7.5**	**1.9**	<1.1	<1.1	<0.70
Hartmall Basement East	+3	06/17/09	Fixed	**80.9**	<1.5	<1.1	<1.1	<0.70
Hartmall Basement East	+3	01/05/12	Fixed	<0.92	<0.74	<1.1	<1.1	<0.35
Hartmall Basement West	+3	06/17/09	Fixed	**23.4**	**3.7**	<1.1	<1.1	<0.70
Hartmall Basement West	+3	01/05/12	Fixed	**1.3**	<0.74	<1.1	<1.1	<0.35
229 Central Air Sampling								
229 Basement	+3	06/17/09	Fixed	**9.0**	<1.5	**2.8**	<1.1	<0.70
229 Basement*	+3	03/15/12	Fixed	<0.92	<0.74	<1.1	<1.1	<0.35
239 Central Air Sampling								
239 Main Floor North	+3	06/17/09	Fixed	**10.7**	<1.5	<1.1	<1.1	<0.70
239 Main Floor South	+3	06/17/09	Fixed	**10.1**	<1.5	<1.1	<1.1	<0.70
239 Basement North	+3	06/17/09	Fixed	**75.4**	**2.5**	**5.6**	<1.1	<0.72
239 Basement North*	+3	03/15/12	Fixed	**2.2**	**1.2**	<1.2	<1.2	<0.37
239 Basement South	+3	06/17/09	Fixed	**80.6**	**2.9**	**4.4**	<1.2	<0.74
239 Basement South*	+3	03/15/12	Fixed	**1.3**	<0.79	<1.2	<1.2	<0.37
243 Central Air Sampling								
243 Main Floor North	+3	06/17/09	Fixed	**19.0**	<1.5	<1.1	<1.1	<0.70
243 Main Floor North	+3	08/12/09	Fixed	**24.4**	**5.2**	<1.1	<1.1	<0.70
243 Basement North	+3	06/17/09	Fixed	**102**	**3.5**	**1.6**	<1.2	<0.80
243 Basement North*	+3	03/15/12	Fixed	<0.92	<0.74	<1.1	<1.1	<0.35
243 Basement South	+3	06/17/09	Fixed	**98.9**	**3.5**	**1.5**	<1.1	<0.70
243 Basement South*	+3	03/15/12	Fixed	<0.99	**1,070**	<1.2	<1.2	<0.37
243 Basement South*	+3	04/12/12	Fixed	**3.2**	<0.79	<1.2	<1.2	<0.37
249 Central Air Sampling								
249 Main Floor North	+3	06/17/09	Fixed	**32.5**	**2.4**	<1.1	<1.1	<0.70
249 Main Floor South	+3	06/17/09	Fixed	**31.5**	**73.3**	**23.8**	<1.1	<0.70

TABLE 3 - SOIL GAS, INDOOR AIR AND OUTDOOR AIR ANALYTICAL DATA (COCs)
Long Prairie Ground Water Contamination Site
Long Prairie, Minnesota
TERRACON PROJECT NO. 41037012

Sample Location	Sample Depth (ft)	Sample Date	Lab	PCE µg/m³	TCE µg/m³	cis-DCE µg/m³	trans-DCE µg/m³	Vinyl Chloride µg/m³
249 Basement North*	+3	03/15/12	Fixed	1.9	<0.76	<1.1	<1.1	<0.36
253 Central Air Sampling								
253 Main Floor North	+3	08/12/09	Fixed	<1.9	<1.5	<1.1	<1.1	<0.70
253 Main Floor North	+3	08/12/09	Fixed	<1.9	<1.5	<1.1	<1.1	<0.70
262 Central Air Sampling								
262 Basement South	+3	01/24/12	Fixed	2.0	<0.79	<1.2	<1.2	<0.37
262 Basement North	+3	01/24/12	Fixed	2.0	8.4	<1.2	<1.2	<0.39
262 Basement North*	+3	03/15/12	Fixed	1.3	<0.74	<1.1	<1.1	<0.35
Ambient Air Sampling								
Ambient	+3	06/17/09	Fixed	<1.9	<1.7	<1.2	<1.2	<0.80
Ambient	+3	08/12/09	Fixed	6.6	<1.7	<1.2	<1.2	<0.80
Ambient	+3	01/05/12	Fixed	<0.96	<0.76	<1.1	<1.1	<0.36
Ambient	+3	01/24/12	Fixed	<0.92	<0.74	<1.1	<1.1	<0.35
Ambient*	+3	03/15/12	Fixed	<0.96	<0.76	<1.1	<1.1	<0.36
SUB-SLAB SAMPLES								
Hartmall Sub-Slab Points								
SS-Hma	0.5	05/06/09	Fixed	33,200	650	3,790	<399	<256
SS-HMa	0.5	08/12/09	Fixed	4,460	83.6	66.1	<1.1	<0.70
SS-HMa	0.5	02/03/11	Fixed	2,630	224	2,480	<16.7	<10.7
SS-HMa	0.5	06/10/11	Fixed	10,500	1,220	6,130	11.0	<0.44
SS-HMa	0.5	01/06/12	Fixed	414	21.1	204	<2.8	<0.91
SS-HMb	0.5	05/06/09	Fixed	687	68.1	399	<12.5	<8.0
SS-HMb	0.5	02/03/11	Fixed	225	21.4	152	<1.4	<0.90
SS-HMb	0.5	01/06/12	Fixed	349	37.0	129	<1.6	<0.50
SS-HMc	0.5	05/06/09	Fixed	395	<15.7	<11.6	<11.6	<7.4
SS-HMc	0.5	02/03/11	Fixed	<2.2	4.7	9.2	<1.3	<0.83
SS-HMc	0.5	01/06/12	Fixed	<1.2	1.3	<1.4	<1.4	<0.44
SS-HMd	0.5	08/12/09	Fixed	61600 A3	4.2	<1.1	<1.1	<0.72
SS-HMd	0.5	02/03/11	Fixed	123	3.2	19.1	<1.9	<1.2
SS-HMd	0.5	01/06/12	Fixed	104	5.7	<1.4	<1.4	<0.46
SS-HMe	0.5	05/06/09	Fixed	674	<16.3	<12.0	<12.0	<7.7
SS-HMe	0.5	02/03/11	Fixed	436	13.0	43.5	<2.5	<1.6
SS-HMe	0.5	01/06/12	Fixed	303	3.6	<1.5	<1.5	<0.48
229 Central Sub-Slab Points								
SS-229a	0.5	06/17/09	Fixed	128	15.3	68	<1.1	<0.70
SS-229a	0.5	02/03/11	Fixed	252	24.8	41.2	<1.8	<1.1
SS-229a	0.5	01/05/12	Fixed	224	32.0	146	<1.4	<0.46
239 Central Sub-Slab Points								
SS-239a	0.5	05/05/09	Fixed	62,200 A3,IS	2,410 A3,IS	4,990 A3,IS	<1.2	<0.80
SS-239a	0.5	02/03/11	Fixed	280	4.2	<1.2	<1.2	<0.74
SS-239a	0.5	01/05/12	Fixed	4.0	101	27.2	<1.7	<0.55

TABLE 3 - SOIL GAS, INDOOR AIR AND OUTDOOR AIR ANALYTICAL DATA (COCs)
Long Prairie Ground Water Contamination Site
Long Prairie, Minnesota
TERRACON PROJECT NO. 41037012

Sample Location	Sample Depth (ft)	Sample Date	Lab	PCE µg/m³	TCE µg/m³	cis-DCE µg/m³	trans-DCE µg/m³	Vinyl Chloride µg/m³
SS-239b	0.5	05/05/09	Fixed	1,900 IS	117	281 IS	<1.1	<0.72
SS-239b	0.5	02/03/11	Fixed	15.4	<1.5	<1.1	<1.1	<0.70
SS-239b	0.5	01/05/12	Fixed	1,430	27.2	25.7	<1.6	<0.52
243 Central Sub-Slab Points								
SS-243a	0.5	05/05/09	Fixed	248	7.0	1.3	<1.2	<0.80
SS-243a	0.5	02/03/11	Fixed	70.6	<1.7	<1.2	<1.2	<0.80
SS-243a	0.5	01/05/12	Fixed	89.0	43.2	9.4	<1.4	<0.46
SS-243b	0.5	05/05/09	Fixed	50,500 A3,IS	1,600 A3,IS	147	4.6	<0.74
SS-243b	0.5	02/03/11	Fixed	27.9	<1.6	<1.2	<1.2	<0.74
SS-243b	0.5	04/12/12	Fixed	11.4	1.9	<1.2	<1.2	<0.37
249 Central Sub-Slab Points								
SS-249a	0.5	05/05/09	Fixed	3,070 IS	6.0	<1.2	<1.2	<0.74
SS-249a	0.5	02/03/11	Fixed	1,310	<15.2	<11.2	<11.2	<7.2
SS-249a	0.5	06/09/11	Fixed	7.6	<0.96	<1.4	<1.4	<0.45
SS-249a	0.5	01/04/12	Fixed	921	<6.5	<9.5	<9.5	<3.0
SS-249b	0.5	05/05/09	Fixed	2,610 IS	73.1	4.6	<1.1	<0.70
SS-249b	0.5	02/03/11	Fixed	57.6	2.4	<1.3	<1.3	<0.86
SS-249b	0.5	01/04/12	Fixed	17.1	1.0	<1.4	<1.4	<0.46
Former Armory Sub-Slab Points								
AR-A	0.5	06/01/11	Fixed	63.8	<0.79	<1.2	<1.2	<0.37
AR-B	0.5	06/01/11	Fixed	22,400 A3	3.9	<1.2	<1.2	<0.37
AR-C	0.5	06/01/11	Fixed	58.4	5.4	2.6	<1.5	<0.48
SOIL-GAS PROBE SAMPLES								
Soil Probes								
PSG-1	8	12/17/08	Fixed	1,540 E,R1	12	<1.1	<1.1	<0.72
PSG-2	8	12/17/08	Fixed	6,090 E,R1	24.4	<1.1	<1.1	<0.70
PSG-3	8	02/19/09	Fixed	28,900 1M,A3	851	339	<1.1	<0.70
PSG-4	8	02/19/09	Fixed	870	27.7	25.5	<1.0	<0.65
PSG-5	8	02/19/09	Fixed	40,900 A3	25.5	38.1	<1.1	<0.70
PSG-6	8	02/19/09	Fixed	65.8	4.4	1.2	<1.0	<0.65
PSG-7	8	02/19/09	Fixed	39.2	3.6	<1.0	<1.0	<0.65
PSG-8	8	02/19/09	Fixed	<2.5	<2.0	<1.5	<1.5	<0.94
PSG-9	8	02/20/09	Fixed	46.7	<1.5	<1.1	<1.1	<0.70
PSG-10	8	05/04/09	Fixed	3,970	15.5	<1.2	<1.2	<0.8
PSG-11	8	05/04/09	Fixed	780	<1.7	<1.2	<1.2	<0.80
PSG-12	8	05/04/09	Fixed	233	<1.7	<1.2	<1.2	<0.80
PSG-13	8	05/04/09	Fixed	3,430	71.5	127	<1.2	<0.77
PSG-14	8	02/02/11	Fixed	28.2	<2.0	<1.5	<1.5	<0.94
PSG-15	8	02/02/11	Fixed	105	<1.8	<1.4	<1.4	<0.87
PSG-16	8	02/02/11	Fixed	320	<2.0	<1.5	<1.5	<0.94
PSG-16 (#2)	8	06/09/11	Fixed	2,180	19.3	2.0	<1.1	<0.36
PSG-17	8	02/02/11	Fixed	1,060	32.7	<20.2	<20.2	<13.0
PSG-18	8	02/02/11	Fixed	9,450	11.6	<1.5	<1.5	<0.94
PSG-18 (#2)	8	06/09/11	Fixed	22,500	109	<1.1	<1.1	<0.35
PSG-19	8	02/02/11	Fixed	295	3.1	<1.5	<1.5	<0.94
PSG-20	8	05/31/11	Fixed	322	<7.6	<5.6	<5.6	<3.6
PSG-21	8	05/31/11	Fixed	1,900	<40.7	<30.0	<30.0	<19.2

TABLE 3 - SOIL GAS, INDOOR AIR AND OUTDOOR AIR ANALYTICAL DATA (COCs)
Long Prairie Ground Water Contamination Site
Long Prairie, Minnesota
TERRACON PROJECT NO. 41037012

Sample Location	Sample Depth (ft)	Sample Date	Lab	PCE µg/m³	TCE µg/m³	cis-DCE µg/m³	trans-DCE µg/m³	Vinyl Chloride µg/m³
PSG-22	8	05/31/11	Fixed	**5,820**	<243	<179	<179	<115
PSG-22 (#2)	8	01/20/12	Fixed	**134**	<0.76	<1.1	<1.1	<0.36
PSG-23	8	05/31/11	Fixed	**148**	<2.0	<1.5	<1.5	<0.96
PSG-24	8	05/31/11	Fixed	**329**	**7.0**	<1.6	<1.6	<0.51
PSG-25	8	05/31/11	Fixed	**68.5**	<2.1	<1.6	<1.6	<1.0
SOIL-GAS MONITORING POINTS								
Fixed Monitor Points								
SGMP-1	6-10	02/17/11	Fixed	<0.95	<0.76	<1.1	<1.1	<0.36
SGMP-2	6-10	02/17/11	Fixed	<1.4	<1.1	<1.6	<1.6	<0.51
SGMP-3	6-10	02/17/11	Fixed	<1.1	**24.4**	<1.3	<1.3	<0.41
SGMP-4	6-10	02/17/11	Fixed	**6.7**	<0.79	<1.2	<1.2	<0.37
SGMP-5	6-10	02/17/11	Fixed	**625**	<7.4	<10.9	<10.9	<3.5
SGMP-6	6-10	02/18/11	Fixed	**101**	<6.9	<10.1	<10.1	<3.2
SGMP-7	6-10	02/17/11	Fixed	<1.1	<0.85	<1.2	<1.2	<0.40
VAPOR EXTRACTION TEST SAMPLES								
Soil Gas Extraction Test								
RW-1C (1)	8	08/11/09	Fixed	**92,800** [A3]	**2,010** [A3]	**74.7**	**4.7**	<0.90
RW-1C (2)	8	08/11/09	Fixed	**6,090**	**161**	**15.3**	<1.2	<0.80
RW-1C (3)	8	08/12/09	Fixed	**44,200**	**1,390**	**199**	<185	<119
MPCA Industrial Screening Value:		-	-	**60**	**8**	**NE**	**200**	**3**

Notes:
* Other analytes detected - See laboratory report
< = not detected above laboratory reporting limits
Bold = Analytical Results Above Laboratory Reporting Limits
µg/m³ = micrograms per cubic meter
PCE = Tetrachloroethene
TCE = Trichloroethene
cis-DCE = Cis-1,2-Dichloroethene
trans-DCE = Trans-1,2-Dichloroethene
[E] = Analyte concentration exceeded the calibration range. The reported result is estimated.
[1M] = Internal standard recovery exceeds the upper control limit.
[A3] = Sample analyzed by serial dilution.
[R1] = Relative percent difference value was outside control limits.
[IS] = The internal standard recovery associated with this result exceeds the lower control limit.

Appendix B

Site Inspection Checklist

Long Prairie Five Year Review
SVE Inspection
Site Inspection Checklist

System Enclosure –	Good condition Secure
System Well Vaults -	Good Condition Secure Surrounding asphalt in good condition
System Operation -	Functioning Inspected and maintained regularly Sampling conducted regularly
Monitoring Data -	Submitted on time Up to date

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Long Prairie GW Contamination	**Date of inspection:** 11-7-11
Location and Region: Long Prairie, MN - Region 5	**EPA ID:**
Agency, office, or company leading the five-year review:	**Weather/temperature:** Clear 35°

Remedy Includes: (Check all that apply)

G Landfill cover/containment
G Access controls
G Institutional controls
G Groundwater pump and treatment
G Surface water collection and treatment
G Other _____

G Monitored natural attenuation
G Groundwater containment
G Vertical barrier walls

Attachments: G Inspection team roster attached G Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Brett Steenberg (Name) Proj. Env. Engineer (Title) 11-7-11 (Date)
   Interviewed G at site G at office G by phone Phone no. _____
   Problems, suggestions; G Report attached _____

2. **O&M staff** Terrance M (Name) _____ (Title) _____ (Date)
   Interviewed G at site G at office G by phone Phone no. _____
   Problems, suggestions; G Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; G Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; G Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; G Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; G Report attached _____
_____

4. **Other interviews** (optional) G Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - G O&M manual — X Readily available — X Up to date — G N/A
   - G As-built drawings — G Readily available — G Up to date — G N/A
   - G Maintenance logs — G Readily available — G Up to date — G N/A

   Remarks

2. **Site-Specific Health and Safety Plan** — X Readily available — X Up to date — G N/A
   - G Contingency plan/emergency response plan — G Readily available — G Up to date — G N/A

   Remarks

3. **O&M and OSHA Training Records** — X Readily available — G Up to date — G N/A

   Remarks

4. **Permits and Service Agreements**
   - G Air discharge permit — G Readily available — G Up to date — X N/A
   - X Effluent discharge — G Readily available — G Up to date — G N/A
   - G Waste disposal, POTW — G Readily available — G Up to date — G N/A
   - G Other permits — G Readily available — G Up to date — G N/A

   Remarks D.N.R. permit Air water applications

5. **Gas Generation Records** — G Readily available — G Up to date — X N/A

   Remarks

6. **Settlement Monument Records** — G Readily available — G Up to date — X N/A

   Remarks

7. **Groundwater Monitoring Records** — X Readily available — X Up to date — G N/A

   Remarks

8. **Leachate Extraction Records** — G Readily available — G Up to date — G N/A

   Remarks

9. **Discharge Compliance Records**
   - G Air — G Readily available — G Up to date — G N/A
   - X Water (effluent) — X Readily available — X Up to date — G N/A

   Remarks

10. **Daily Access/Security Logs** — G Readily available — G Up to date — X N/A

    Remarks

IV. O&M COSTS

1. **O&M Organization**

G State in-house ☒ Contractor for State
G PRP in-house G Contractor for PRP
G Federal Facility in-house G Contractor for Federal Facility
G Other _____

2. **O&M Cost Records**

G Readily available G Up to date
G Funding mechanism/agreement in place
Original O&M cost estimate _____ G Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ G Breakdown attached
Date Date Total cost
From _____ To _____ _____ G Breakdown attached
Date Date Total cost
From _____ To _____ _____ G Breakdown attached
Date Date Total cost
From _____ To _____ _____ G Breakdown attached
Date Date Total cost
From _____ To _____ _____ G Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable G N/A

A. Fencing

1. **Fencing damaged** G Location shown on site map G Gates secured ☒ N/A

Remarks _____

B. Other Access Restrictions

1. **Signs and other security measures** G Location shown on site map ☒ N/A

Remarks _____

C. Institutional Controls (ICs) SWCA for area

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented G Yes G No G N/A
Site conditions imply ICs not being fully enforced G Yes G No G N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.

Reporting is up-to-date G Yes G No G N/A
Reports are verified by the lead agency G Yes G No G N/A

Specific requirements in deed or decision documents have been met G Yes G No G N/A
Violations have been reported G Yes G No G N/A
Other problems or suggestions: G Report attached

_____
_____
_____
_____

2. **Adequacy** G ICs are adequate G ICs are inadequate G N/A
Remarks _____
_____
_____

D. General

1. **Vandalism/trespassing** G Location shown on site map ☒ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** G N/A
Remarks _____
_____

3. **Land use changes off site** G N/A
Remarks _____
_____

VI. GENERAL SITE CONDITIONS

A. Roads G Applicable G N/A

1. **Roads damaged** G Location shown on site map G Roads adequate G N/A
Remarks _____
_____

B. Other Site Conditions

Remarks _____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS G Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) G Location shown on site map G Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** G Location shown on site map G Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** G Location shown on site map G Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** G Location shown on site map G Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** G Grass G Cover properly established G No signs of stress
   G Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** G N/A
   Remarks_____
   _____

7. **Bulges** G Location shown on site map G Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** G Wet areas/water damage not evident
G Wet areas G Location shown on site map Areal extent_____
G Ponding G Location shown on site map Areal extent_____
G Seeps G Location shown on site map Areal extent_____
G Soft subgrade G Location shown on site map Areal extent_____
Remarks_____

9. **Slope Instability** G Slides G Location shown on site map G No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches G Applicable G N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** G Location shown on site map G N/A or okay
Remarks_____

2. **Bench Breached** G Location shown on site map G N/A or okay
Remarks_____

3. **Bench Overtopped** G Location shown on site map G N/A or okay
Remarks_____

C. Letdown Channels G Applicable G N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** G Location shown on site map G No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** G Location shown on site map G No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** G Location shown on site map G No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

4. **Undercutting** G Location shown on site map G No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ G No obstructions
G Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
G No evidence of excessive growth
G Vegetation in channels does not obstruct flow
G Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations G Applicable G N/A

1. **Gas Vents** G Active G Passive
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance
G N/A
Remarks_____

2. **Gas Monitoring Probes**
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks_____

4. **Leachate Extraction Wells**
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks_____

5. **Settlement Monuments** G Located G Routinely surveyed G N/A
Remarks_____

E. Gas Collection and Treatment G Applicable G N/A

1. **Gas Treatment Facilities**
   G Flaring G Thermal destruction G Collection for reuse
   G Good condition G Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   G Good condition G Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   G Good condition G Needs Maintenance G N/A
   Remarks_____

F. Cover Drainage Layer G Applicable G N/A

1. **Outlet Pipes Inspected** G Functioning G N/A
   Remarks_____

2. **Outlet Rock Inspected** G Functioning G N/A
   Remarks_____

G. Detention/Sedimentation Ponds G Applicable G N/A

1. **Siltation** Areal extent_____ Depth_____ G N/A
   G Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   G Erosion not evident
   Remarks_____

3. **Outlet Works** G Functioning G N/A
   Remarks_____

4. **Dam** G Functioning G N/A
   Remarks_____

H. Retaining Walls G Applicable G N/A

1. **Deformations** G Location shown on site map G Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** G Location shown on site map G Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge G Applicable G N/A

1. **Siltation** G Location shown on site map G Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** G Location shown on site map G N/A
   G Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** G Location shown on site map G Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** G Functioning G N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS G Applicable G N/A

1. **Settlement** G Location shown on site map G Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   G Performance not monitored
   Frequency_____ G Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES G Applicable G N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines X Applicable G N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   X Good condition X All required wells properly operating G Needs Maintenance G N/A
   Remarks

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   X Good condition G Needs Maintenance
   Remarks

3. **Spare Parts and Equipment**
   G Readily available G Good condition G Requires upgrade G Needs to be provided
   Remarks Provided as needed (purchased)

B. Surface Water Collection Structures, Pumps, and Pipelines G Applicable G N/A

1. **Collection Structures, Pumps, and Electrical**
   G Good condition G Needs Maintenance
   Remarks

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   G Good condition G Needs Maintenance
   Remarks

3. **Spare Parts and Equipment**
   G Readily available G Good condition G Requires upgrade G Needs to be provided
   Remarks

C. Treatment System G Applicable G N/A

1. **Treatment Train** (Check components that apply)
   G Metals removal G Oil/water separation G Bioremediation
   G Air stripping X Carbon adsorbers
   G Filters ____
   G Additive (*e.g.*, chelation agent, flocculent) ____
   G Others ____
   X Good condition G Needs Maintenance
   X Sampling ports properly marked and functional
   G Sampling/maintenance log displayed and up to date
   X Equipment properly identified
   G Quantity of groundwater treated annually ≥ 85 million gal
   G Quantity of surface water treated annually ____
   Remarks ____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   G N/A X Good condition G Needs Maintenance
   Remarks ____

3. **Tanks, Vaults, Storage Vessels**
   G N/A X Good condition G Proper secondary containment G Needs Maintenance
   Remarks ____

4. **Discharge Structure and Appurtenances**
   G N/A G Good condition G Needs Maintenance
   Remarks Discharge to River via buried outlet - could not view - Discharge is underwater

5. **Treatment Building(s)**
   G N/A X Good condition (esp. roof and doorways) G Needs repair
   G Chemicals and equipment properly stored
   Remarks ____

6. **Monitoring Wells** (pump and treatment remedy)
   G Properly secured/locked G Functioning G Routinely sampled G Good condition
   G All required wells located G Needs Maintenance G N/A
   Remarks ____

D. Monitoring Data

1. Monitoring Data
   X Is routinely submitted on time G Is of acceptable quality

2. Monitoring data suggests:
   X Groundwater plume is effectively contained X Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

G Properly secured/locked G Functioning G Routinely sampled G Good condition
G All required wells located G Needs Maintenance G N/A
Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

[illegible] Page 1/4 mos

1.5-2 yrs life of carbon (extraction) - decreasing frequency
- evaluation of what wells are being used & monitoring wel
- FS for Central to 1st & 2nd N area - SVE study occurring
tomorrow (drilling + soil gas sampling)
- Back flush ≈ 1-2 mos
- Pigging, backflushing, well + pump maintenance used to
control Iron fouling
- SVE since 8-2010 sub slab points (VEA) in vicinity

Long Prairie City Hall Meeting 11/07/11

Nile Fellows - MPCA
Barb Grabasik - MPCA
Brett Staeden - Terracon
Karen Mason-Smith - U.S. EPA Region
Jake Knapp - Antea Group
Dan Spieker - Public Works Director

explain public notice + discuss placement in newspaper early Dec
still state + federal site state has O&M responsibility

since last 5 year review
- injection of EOS to enhance Biologic activity (2008)
- high soil gas in source area
- noted improvement in GW concentrations in injection areas except in source area
- SVE system install in source area - through carbon @ startup
- sub slab + indoor air sampling
- improvement in soil gas

planned
- expanding SVE system in place (2 points)
- installing additional remedial alternative
  - conduct a FS for vapors in area on N side of Central

motel - is closed - last private well - commercial
workers on South side of Central have been notified of vapor issues, have been explained of risk w/ spending extended periods in basement

Public meeting in Jan 2010 regarding site progress & SVE system installation

6 GW Ext wells ≈ 230 gpm

modeling has indicated city wells should not be affected

combined flow (influent) is below MCL

MDH well advisory in place

Weiderine 225 6th - not connected
~~Motel~~ 15 - 3rd street - not connected (vacant Bldg.)

- [redacted] Document IC Plan
  - what tools (IC) can fit the site
  - How can documentation of and notification be accomplished & documented.

-

Appendix C

Site Photos

Photo ID	Description: Back Lot and SVE system enclosure
1	Date: 11-7-11

Photo ID	Description: SVE Well (at grade)
2	Date: 11-7-11

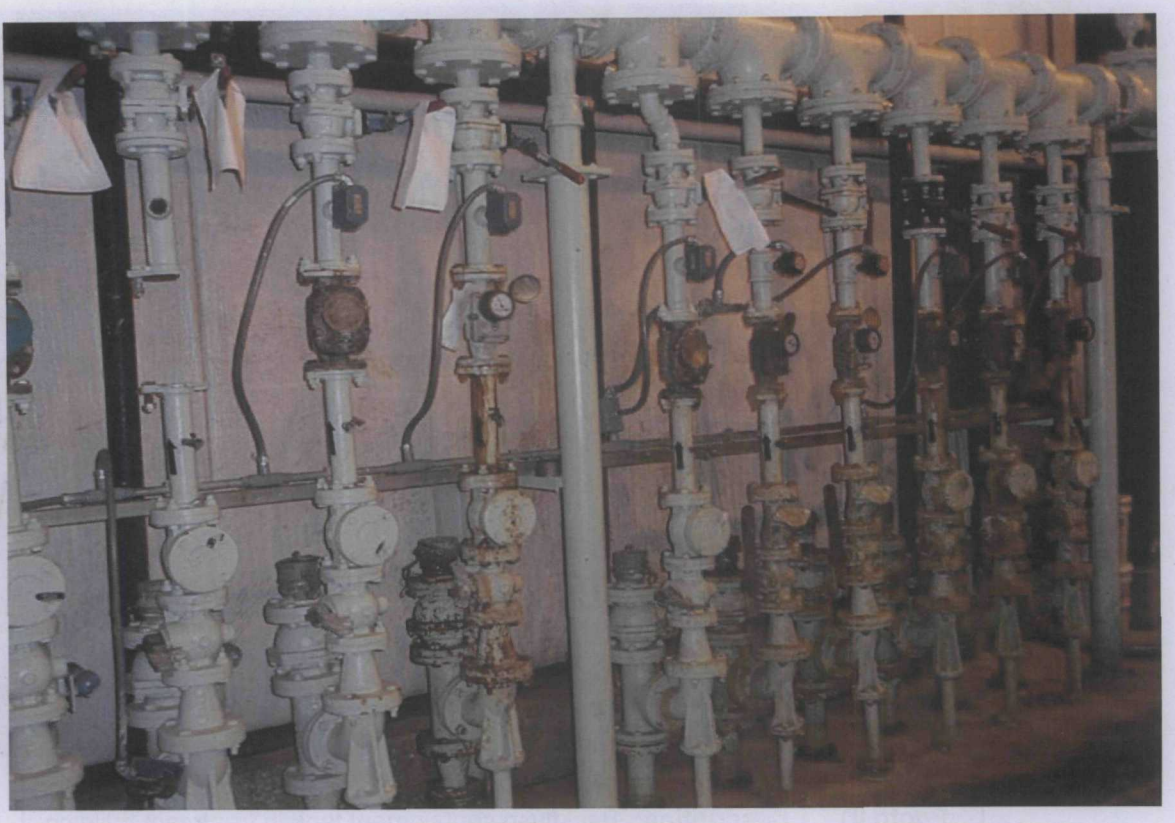

Photo ID	Description: Groundwater flow meters inside treatment building
3	**Date:** 11-7-11

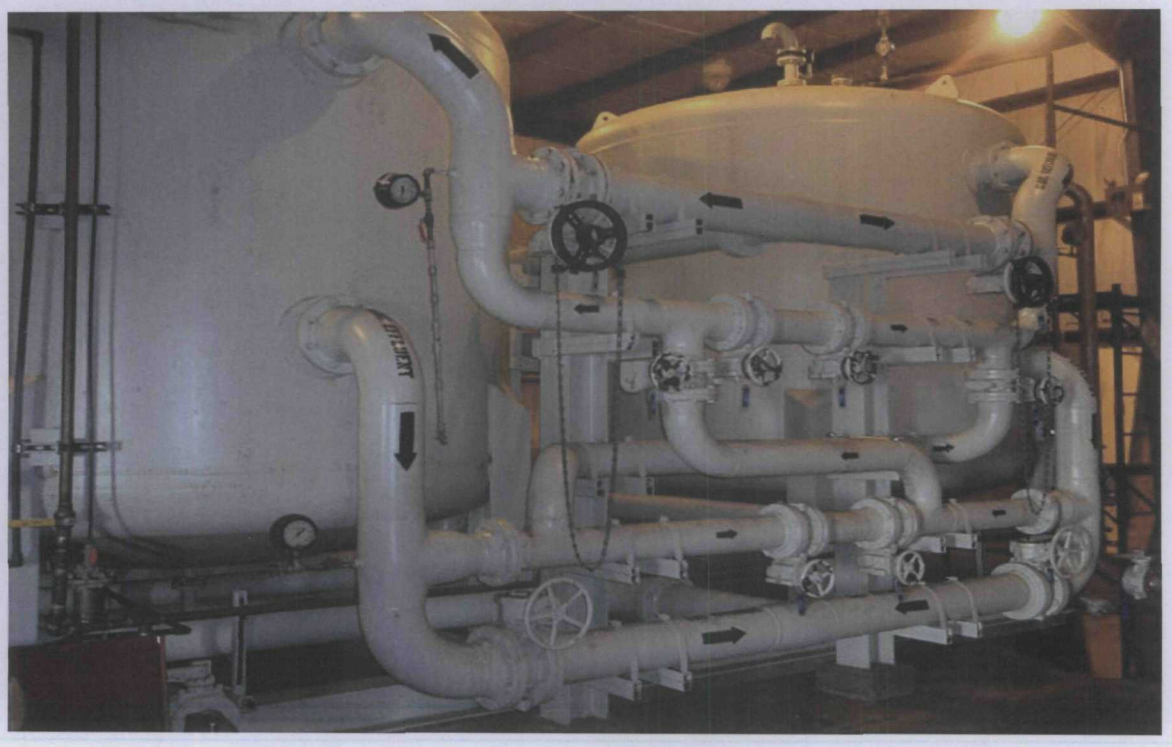

Photo ID	Description: Lead and Lag Carbon Vessels and Piping
4	**Date:** 11-7-11

Photo ID	**Description:** Backflush containment tank in treatment building
5	**Date:** 11-7-11

Photo ID	**Description:** Groundwater Treatment Building
6	**Date:** 11-7-11

Photo ID	Description: SVE System enclosure
7	Date: 11-7-11

Photo ID	Description: MW3A and MW3B
8	Date: 11-7-11

Photo ID	Description: MW3B
9	Date: 11-7-11

Photo ID	Description: RW-3, MW2A, MW2B and MW2C
10	Date: 11-7-11

Photo ID	Description: RW-6
11	Date: 11-7-11

Photo ID	Description: MW6A, MW6B and MW6C
12	Date: 11-7-11

Photo ID	Description: MW4A, MW4B and MW4C. Injection area one.
13	Date: 11-7-11

Photo ID	Description: MW2B and MW21C
14	Date: 11-7-11

Photo ID	Description: MW22 well cluster.
15	Date: 11-7-11

Photo ID	Description: MW14B, MW14B2, MW14C. Injection area three
16	Date: 11-7-11

Photo ID	Description: MW13C
17	Date: 11-7-11

Photo ID	Description: MW17B
18	Date: 11-7-11

Photo ID	Description: RW-8
19	Date: 11-7-11

Photo ID	Description: MW18A and MW18B
20	Date: 11-7-11

Appendix D

Public Notice

ANNOUNCEMENT OF A FIVE-YEAR REVIEW FOR THE *LONG PRAIRIE* GROUNDWATER CONTAMINATION *SUPERFUND SITE*

The Minnesota Pollution Control Agency (MPCA) is beginning a Third Five-Year Review of the Long Prairie Groundwater Contamination Superfund site (Site). Superfund law requires a review of sites where the cleanup is in progress or cleanup is completed with hazardous waste being managed on site. Five-Year Reviews ensure that cleanup efforts protect human health and the environment.

The Long Prairie Groundwater Contamination Superfund Site is located in the north central portion of the City of Long Prairie, Minnesota. The Site consists of a source area located in the vicinity of 243 Central Avenue and a groundwater plume extending to the northeast toward the Long Prairie River. The source area is in the vicinity of a former dry cleaning facility where past disposal practices led to the release of tetrachloroethene (PCE). Previous investigation indicated that PCE had impacted private and municipal wells within the groundwater plume. Between 1983 and 1985, private and municipal wells found to be impacted were closed. The City of Long Prairie installed a new municipal well and extended public water connections to affected properties.

Remedial action conducted for the site includes groundwater pumping and treatment, source area reduction by soil vapor extraction and municipal water supply connection to affected properties. The purpose of the Five-Year Review is to ensure cleanup efforts continue to protect human health and the environment. This five year review will also evaluate whether cleanup goals outlined in the Site decision documents are protective of human health and the environment. Site documents are available for review at the St. Paul MPCA office, 520 Lafayette Road North, St. Paul, MN 55155. These documents will provide more detail on Site cleanup history and remedies in place. The Site's EPA fact sheet is located at www.epa.gov/region5/superfund/npl/minnesota/index.html.

In the most recent Five-Year Review conducted in 2007, the MPCA found that remedial actions at the Site provided protection to human health and the environment in the short-term. The 2007 Five-Year Review also concluded that long-term protectiveness would be ensured by evaluation and compliance with effective institutional controls to ensure long-term stewardship for the Site.

The Five Year Review is expected to be completed by August 2012. A formal meeting or public comment period is not required for this review; however, the MPCA invites public opinion and comments. Comments should be submitted no later than January 31, 2012, and be directed to the Site Project Leader listed below. Local citizens are encouraged to participate by bringing information or any concerns related to this Site or requests for more information to the attention of:

Mr. Nile Fellows
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155
Or
Karen Mason-Smith
Remedial Project Manager
Superfund Division (Mailcode: SR-6J)
U.S. EPA Region 5
Chicago, IL
(312) 886-6150
mason-smith.karen@epa.gov

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AFFIDAVIT OF PUBLICATION

State of Minnesota } MN.
County of Todd }

Jason C. Brown, being duly sworn, on oath says that he is the publisher or authorized agent and employee of the publisher of the newspaper known as The Long Prairie Leader, and has full knowledge of the facts which are stated below:

(A) The newspaper has complied with all the requirements constituting qualifications as a qualified newspaper, as provided by Minnesota Statute 331A.02, 331A.07, and other applicable laws, as amended.

(B) The printed Announcement of a Five-Year Review for the Long Prairie Groundwater Contamination Superfund Site which is attached was cut from the columns of said newspaper, and was printed and published once each week, for one successive week; it was first and only published on Wednesday, the 14th day of December, 2011, and printed below is a copy of the lower case alphabet from A to Z, both inclusive, which is hereby acknowledged as being the size and kind of type used in the composition and publication of the notice:

*abcdefghijklmnopqrstuvwxyz

By: Jason C. Brown

TITLE: Publisher

Subscribed and sworn to before me on

this 14th day of December, 2011.

Beatrice Julia Clasemann
Notary Public

BEATRICE JULIA CLASEMANN
NOTARY PUBLIC - MINNESOTA
MY COMMISSION EXPIRES 1-31-2014

RATE INFORMATION

(1)	Lowest classified rate paid by commercial users for comparable space	$11.50 (Line, word, or inch rate per week)
(2)	Maximum rate allowed by law for the above matter	$7.30 (Line, word, or inch rate per week)
(3)	Rate actually charged for the above matter	$7.30 (Line, word, or inch rate per week)

Announcement of a Five-Year Review
For the
Long Prairie Groundwater Contamination Superfund Site

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