Third Five-Year Review Report

for

Pine Bend Sanitary Landfill SW-45

Inver Grove Heights, Minnesota

February 2010

PREPARED BY:

United States Environmental Protection Agency
Region 5
Chicago, Illinois

Approved by:

Richard C Karl

Richard C. Karl, Director
Superfund Division

2-11-10

Date

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Tables

Attachments

List of Acronyms

ARAR	Applicable or relevant and appropriate requirement
CADL	Crosby American Demolition Landfill
CERCLA	Comprehensive Environmental Response Compensation Liability Act
DCE	Dichloroethane
EMS	Environmental Monitoring System
EPA	Environmental Protection Agency
GCCS	Gas Collection and Control System
HDPE	High Density Polyethylene
IL	Intervention Limit
LCS	Leachate Collection System
LFG	Landfill Gas
ug/m^3	Micrograms Per Cubic Meter
MERLA	Minnesota Environmental Response and Liability Act
mg/kg	Milligram Per Kilogram
MNA	Monitored Natural Attenuation
MPCA	Minnesota Pollution Control Agency
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PCE	Perchloroethylene
PBLI	Pine Bend Landfill Inc.
PBSL	Pine Bend Sanitary Landfill
ppb	Parts Per Billion
ppm	Parts Per Million
PRP	Potentially Responsible Party
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
scfm	Standard Cubic Feet Per Minute
SVOC	Semi-Volatile Organic Compound
TCE	Trichloroethylene
TDS	Total Dissolved Solids
TNMOC	Total Non-Methane Organic Carbon
VC	Vinyl Chloride
VOC	Volatile Organic Chemical

Executive Summary

The remedy for the Pine Bend Sanitary Landfill (PBSL) Site, located in Inver Grove Heights, Minnesota, is currently protective of human health and the environment in the short-term due to the connection of residences to the extended municipal water supply system in the affected groundwater area. The long-term protectiveness at the site requires: 1) compliance with the PBSL solid waste permit, including requirements for monitoring, closure, post-closure, groundwater corrective action, and land use restrictions; and 2) compliance with restrictions on well installation and potable use of groundwater in the plume area until groundwater standards are achieved.

In an April 1985 Response Order by Consent signed by the State and Pine Bend Sanitary Landfill Inc., the potentially responsible parties (PRPs) were required to investigate the nature and extent of contamination at the site. In April 1985, Crosby American Properties Inc. entered into a Consent Order to address groundwater contamination. In September 1992, Amdura Corp. entered into an agreement with the state to temporarily provide bottled water to eight residences and complete an alternate water supply. In fall 1994, the extension of the present municipal water supply system was completed; the residences potentially affected by site contamination were connected to the system; and the contaminated private water supply wells were permanently sealed. In September 1995, the United States Environmental Protection Agency (EPA) concurred in a "No Further Action" Record of Decision (ROD) based on the following: 1) the permanent connection of residences in the vicinity of the landfill to a municipal water supply thereby reducing the risk posed by contaminated groundwater; 2) the accomplishment of certain closure requirements stated in the existing solid waste operating permit (installation of a landfill cover, clay liner; etc.); 3) a new permit would address groundwater contamination; and 4) the site is an active and permitted facility with closure requirements that the facility must meet. A Resource Conservation Recovery Act (RCRA) Subtitle D cap has been placed over all 90 unlined acres of the facility. On May 29, 2009, Solid Waste Permit SW-045 was reissued, which contained groundwater monitoring, groundwater corrective action requirements, and closure and post-closure requirements according to state law. The site was deleted from the National Priorities List on June 23, 1998. The second five-year review was completed on September 1, 2005, and found the remedy remains protective of human health and the environment. The trigger action for this third five-year review was the signing of the Second Five-Year Review Report on September 1, 2005.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*:Pine Bend Sanitary Landfill Site		
EPA ID *(from WasteLAN)*: MND000245795		
Region: 5	**State:** MN	**City/County:** Inver Grove Heights, Dakota County
SITE STATUS		
NPL status: □ Final X Deleted □ Other (specify)		
Remediation status (choose all that apply): □ Under Construction X Operating □ Complete		
Multiple OUs? X YES □ NO	**Construction completion date:** 09/25/1995	
Has site been put into reuse? X YES NO		
REVIEW STATUS		
Lead agency: □ EPA X State □ Tribe □ Other Federal Agency		
Author name: Denise Boone		
Author title: Remedial Project Manager	**Author affiliation:** EPA	
Review period: 8/17/2009 to 1/15/2010		
Date(s) of site inspection: 8/25/2009		
Type of review: X Post-SARA □ Pre-SARA □ NPL-Removal only □ Non-NPL Remedial Action Site □ NPL State/Tribe-lead □ Regional Discretion		
Review number: □ 1 (first) □ 2 (second) X 3 (third) □ Other (specify)		
Triggering action: □ Actual RA Onsite Construction at OU #____ □ Actual RA Start at OU#____ □ Construction Completion X Previous Five-Year Review Report □ Other (specify)		
Triggering action date *(from WasteLAN)*: 9/1/2005		
Due date *(five years after triggering action date)*: 09/1/2010		

Five-Year Review Summary Form, cont'd.

Issues:

Groundwater wells still exist within groundwater plume area.

Recommendations and Follow-up Actions:

Provide notification/verification letters to verify that the wells are not being used for drinking water purposes; to remind them of their potential to be impacted by the groundwater plume; and to remind them of their obligation to notify the prospective purchasers of the plume.

Protectiveness Statement(s):

The remedy at the Pine Bend Sanitary Landfill (PBSL) Site is currently protective of human health and the environment in the short-term due to the connection of residences to the extended municipal water supply system in the affected groundwater area. The long-term protectiveness at the site requires: 1) compliance with the PBSL solid waste permit, including monitoring, closure, post-closure, groundwater corrective action requirements and PBSL land use restrictions; and 2) compliance with restrictions prohibiting installation of wells and potable use of groundwater in the groundwater plume area until groundwater standards are achieved.

Other Comments:

None

Pine Bend Sanitary Landfill SW-45
Inver Grove Heights, Minnesota
Third Five-Year Review Report

I. Introduction

The purpose of five-year reviews is to determine whether the remedy at a 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.

The Agency 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.*

The agency interpreted this requirement 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.*

The United States Environmental Protection Agency (EPA) Region 5 has conducted a five-year review of the remedial actions implemented at the Pine Bend Sanitary Landfill Site, located in Inver Grove Heights, Dakota County, Minnesota. This review was conducted by the Remedial Project Manager (RPM) from August 17, 2009 to January 15, 2010. This report documents the results of the review.

This is the third five-year review for the site. The triggering action for this statutory review is the date of the signature of the second five-year review as shown in EPA's WasteLAN database: September 1, 2005. This review is required because certain response actions are ongoing and hazardous substances, pollutants, or contaminants are or will be left on site above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

Table 1: Chronology of Site Events	
Event	**Date**
Crosby American Demolition Landfill (CADL) permit issued	September 15, 1970
Pine Bend Sanitary Landfill (PBSL) issued first permit (SW-045)	September 7, 1971
PBSL proposed for NPL	October 15, 1984
Response Order by Consent Between MPCA and Pine Bend Landfill, Inc. (PBLI) for RI/FS and Response Action	April 1985
Crosby American Properties, Inc. (CAPI) enter Consent order to address groundwater contamination	April 1985
Remedial Investigation performed	1986
PBSL Site final on NPL	June 10, 1986
Additional Remedial Investigation Activities	1987
Groundwater Monitoring	1988-1999
Preliminary Alternatives Report	1989
Pump Test	1989-1990
Consent Order Amendment	October 23, 1990
Minnesota Pollution Control Agency (MPCA) Approves RI Report	August 1991
Operable Unit #1 ROD Signed - extension municipal water supply	September 30, 1991
MPCA enters Settlement Agreement for CADL Site	September 28, 1992
PBLI and Amdura enter Settlement Agreement on environmental claims	November 11, 1992
MPCA Approves Detailed Analysis Report	November 1994

Table 1: Chronology of Site Events	
Event	**Date**
Municipal water hookups completed	November 1994
Operable Unit #2 and #3 ROD Signed	September 28, 1995
Preliminary Close-Out Report	September 28, 1995
MPCA Terminates Amended Response Order by Consent	November 14, 1996
PBSL permit reissued	September 15, 1997
Site Deleted from NPL	June 23, 1998
First Five-Year Review completed by MPCA	September 20, 2000
Major permit modification issued	January 12, 2004
Second Five-Year Review completed by EPA	September 1, 2005
Solid Waste Management Facility Permit re-issued by MPCA	May 29, 2009

III. Background

Physical Characteristics

The Pine Bend Sanitary Landfill (PBSL) Site is located in northeast Dakota County, on the periphery of the Minneapolis/St. Paul metropolitan area, in Sections 27, 28, and 33, Township 27 North, Range 22 West, City of Inver Grove Heights, Minnesota (see Attachment 1). PBSL encompasses approximately 255 acres and is an open operating mixed municipal solid waste facility. Crosby American Demolition Landfill (CADL) is located immediately north of the PBSL (see Attachment 2). The PBSL and CADL were operated as separate landfills under separate ownership. CADL encompasses approximately 32 acres and ceased accepting waste in 1989 and is inactive. CADL and PBSL are connected hydrogeologically in the surficial aquifer, with CADL being immediately down and side-gradient of PBSL, and PBSL being side-gradient of CADL. MPCA has considered the two landfills as one site because hydrogeologic data demonstrates that the groundwater contamination plumes emanating from each landfill commingle east of their common border.

Land and Resource Use

The PBSL is bordered on the south by industrial areas, to the east by residential and industrial areas, to the north by residential areas, and to the west by pasture and residential areas. The terrain is generally flat to gently rolling and possesses an immature natural surface drainage

system resulting in numerous ponds and wetlands. The Mississippi River is located approximately one mile to the east of the site. Currently PBSL is an active landfill.

History of Contamination

The PBSL was first issued a permit (SW-045) to operate by the Minnesota Pollution Control Agency (MPCA) on September 7, 1971. Since then, it has operated as a sanitary landfill accepting mixed municipal solid waste (mmsw) and non-hazardous industrial waste. Pine Bend Landfill, Inc., (PBLI), a wholly-owned subsidiary of Allied Waste, was the owner and permitee of the PBSL.

The PBSL Site occupies 255 acres of which roughly half is areas of mixed municipal solid waste landfill. The filling operations began in 1971 with both non-hazardous industrial waste and mixed municipal solid waste. The rate of disposal changed over the years. For example, the average rate of disposal in 1987 was 60,000 tons per month, whereas in 1994 the rate of disposal was 16,000 tons per month.

In the vicinity of PBSL, the bedrock is overlain by a thick sequence of glacial drift. At the surface the drift consists of sand and gravel outwash deposits. Shallow groundwater in the PBSL area is present in the surficial drift at depths of 90 to 210 feet below ground surface. The groundwater flow beneath the site is to the east/northeast and the average linear velocity of the groundwater in the glacial drift aquifer is estimated to range from 240 to 1,900 feet/year.

Volatile organic compounds (VOCs) were detected in the surficial drift aquifer beneath PBSL in 1982 and in newly installed monitoring wells in 1983. VOCs detected included benzene, methylene chloride, chlorinated ethylene, and fluorocarbons. Local residential wells were also screened in this aquifer. Volatile organic compounds were detected in private residential wells east of the site in 1984. Sampling after 1984 showed that a number of residential and production wells to the east of the site were contaminated with one or more VOCs.

An extensive groundwater monitoring system is present around the PBSL. A wide range of compounds, both organic and inorganic, have been detected in the groundwater samples from the PBSL area. The highest concentrations of VOCs are found in samples from monitoring wells located in close proximity to the PBSL. Freon compounds are the most prevalent of the VOCs, but chlorinated solvents are also present in substantial concentrations in samples from many of the wells.

Initial Action

EPA became involved at the site in 1984 when it conducted a site investigation and developed a score under the Hazard Ranking System. The score qualified the site for listing on the National Priorities List (NPL). The site was placed on the NPL on June 10, 1986. Prior to being listed, in April 1985, under the Minnesota Environmental Response and Liability Act (MERLA), Pine Bend Landfill, Inc., entered into a Response Order by Consent with the MPCA

to carry out a Remedial Investigation (RI), Feasibility Study (FS), and Response Actions (RA). The Consent Order was amended on October 23, 1990. Pursuant to the Consent Order, PBLI has, among other things, conducted an RI (1986); conducted additional RI activities (1987); conducted a pump test (1989-90); submitted a Preliminary Alternatives Report (1989); undertaken an interim groundwater monitoring program (1988-1994); submitted an MPCA approved final RI report (August 1991); and an MPCA approved Detailed Analysis Report (November 1994). PBSL has completed the operable unit (OU1) for a permanent alternative water supply and is now addressing source control (OU2). The following work is required to be completed under the MPCA operating permit:

> "Placement of final cover on portions of the landfill that are filled to the final elevations, installation of a combustible gas collection system, installation of a clay liner and leachate collection system in an expansion area, and the installation of a surface drainage control system. The existing groundwater contamination is to be addressed through a compliance permit with Pine Bend Landfill. Browning Ferris Industries, Inc., by signing the Amended Order dated October 23, 1990, guarantees PBLI's performance of the obligations established in said Amended Order."

CADL was permitted on September 15, 1970. In April 1985, under MERLA, Crosby American Properties, Inc. (CAPI) entered into a Consent Order to address groundwater contamination including VOCs. Due to bankruptcy proceedings, CAPI claimed it could not carry out the terms of its Consent Order and suspended all activities at the CADL Site. MPCA entered into a settlement agreement for the CADL Site on September 28, 1992. In the agreement, Amdura Corporation agreed to implement the preferred remedy for the CADL Site, with the exception that MPCA will provide a portion of the materials for the engineered cover. PBLI and Amdura entered into a Settlement Agreement regarding environmental claims (No. 9226) on November 11, 1992. MPCA is working with the trustee to transfer ownership to the MPCA. The landfill is monitored under MPCA's Closed Landfill Program. The CADL is currently known as the Crosby American Properties Landfill.

Basis for Taking Action

Summary of Site Characteristics

The problem of primary concern is the VOCs contamination in groundwater due to leachate migrating from the site. The site is the only known source of contamination of groundwater in the impacted area east of the site. Groundwater was the only medium found to be contaminated off-site that could be attributable to the site. With the exception of benzene and chlorinated fluoromethanes, all of these substances identified may be related to the transformation of certain chemicals to vinyl chloride through both chemical and biological processes.

The major contaminants of concern include:
Benzene
1,1-Dichloroethane

1,1-Dichloroethylene
1,2-Dichloroethene
1,2-Dichloropropane
Methylene Chloride
Tetrachloroethylene
Trichloroethylene
Vinyl Chloride

Human Health Risk

The baseline risk assessment indicated that current exposure to residents and workers was acceptable. Future exposure to residents results in an excess lifetime cancer risk of 5×10^{-3}. For non-carcinogens, a hazard index was 1.3 was calculated.

Ecological Risk

The concentrations of the contaminants did not exceed the selected criteria or toxicity value. Thus, no ecological risks were identified in association with the release of contaminants from the site.

IV. Remedial Actions

Remedy Selection

The EPA and MPCA initially agreed to divide the project into three operable units in order to facilitate progress toward remedial action at the site. The three operable units were OU1, OU2, and groundwater contamination OU3. EPA staff recommended that OU2 and OU3 be combined for administrative and technical reasons. MPCA concurred with this recommendation. Subsequently, source control and groundwater contamination operable units were combined into one operable unit, OU2. The OU1 ROD for PBSL was signed on September 30, 1991.

Remedy Implementation

OU1 - Permanent Alternative Water Supply

The work required under the September 30, 1991 OU1 ROD was completed in November 1994. The components of this selected remedy are:

- The extension of the existing City of Inver Grove Heights municipal water supply;

- The connection of impacted or potentially impacted premises to the municipal water supply; and

- The permanent sealing of the private water wells which presently serve the premises that were connected to the municipal water supply.

OU2 - Source Control and Groundwater Contamination

The ROD for OU2 was signed on September 28, 1995 and called for no further action at the facility. The ROD specified that any potential problems associated with the site would be addressed through the Minnesota Solid Waste Landfill Compliance Program, the Resource Conservation and Recovery Act, and a Response Order by Consent between the MPCA and PBLI. This is an open facility. Under these programs and order, the site will continue to be monitored to verify that no unacceptable risks posed by the site occur in the future. The landfill is an operating facility and all remedial work was considered to be covered under the operating permit (installation of a landfill cover, clay liner, leachate collection system, etc.). The site was subsequently deleted from the NPL on June 23, 1998.

Corrective Action of VOCs in groundwater is being addressed under Permit SW-045. The source control provided for the facility is a low permeability cover, combustible gas collection system and surface drainage control system which reduces both the production of leachate and the toxicity of the compounds released from the closed, unlined fill area. PBSL has conducted numerous response activities under Permit SW-045, including the following:

1) Installation of an active landfill gas/methane gas recovery system consisting of the following components:
    a) Final cover on Phase I and II including:
        i) high permeability sand layer to promote venting of landfill gas/methane gas;
        ii) low permeability landfill cap to prevent infiltration of precipitation;
        iii) rooting zone soils; and
        iv) top soils.
    b) Active gas wells connected by lateral lines;
    c) Landfill gas to energy plant;
2) Installation of a liner and leachate collection system under all horizontal areas of phased development;
3) Implementation of a long-term groundwater monitoring program in accordance with the Minnesota Solid Waste Landfill Compliance Program to assess trends in groundwater quality down-gradient of the landfill;
4) Installation of a surface drainage control system;
5) Performance of an in-situ bioremediation pilot study to determine site suitability for enhancing biodegradation of VOCs in groundwater;
6) Relocation of 1.4 million cubic yards of refuse from an unlined area of the landfill to reduce the footprint of the unlined landfill; and
7) Installation of a pilot leachate dewatering system to remove perched leachate within the unlined portion of the landfill.

Leachate

PBSL has continued its operation of the waste disposal facility in accordance with its permit requirements. Construction of a new ten acre landfill cell (Phase IV.B) with a leachate collection system was completed in August of 2001. The pilot leachate dewatering system is now part of the long-term operation and maintenance (O&M) of the closed landfill portions and maintenance of the system is a requirement of the Pine Bend solid waste permit. The methane extraction system was expanded in the summer of 2001 with the addition of nine new methane gas extraction wells. The expansion was installed in the 39 acre lined area of Phase III. In 2002, three new methane gas extraction wells were installed in the 115 acre closed, unlined area of the landfill. In 2002, PBSL installed and began operating a new leachate recovery system in Phases 1 and 2 of the landfill. Forty-six of the existing gas extraction wells were reconfigured to allow for simultaneous landfill gas and leachate recovery. In 2003, a second leachate holding tank was installed at the south end of the landfill. The methane extraction system was also expanded in Phase 4 of the landfill with the installation of eight extraction wells. In January 12, 2004, a major modification of Permit SW-045 was approved by MPCA. This modification revised the number of monitoring locations, parameters, and frequency of sampling.

The existing telemetry controlled leachate extraction system was installed in Phases 1 and 2 in August 2002 through October 2002. Because this portion of the landfill is unlined, successful leachate extraction is vital in source control for the groundwater and in reducing leachate from the landfill mound. Forty-six of the existing gas extraction wells were reconfigured to allow for simultaneous landfill gas and leachate recovery. Site data show a continued reduction in leachate levels throughout the second half of 2002 and throughout 2003 and 2004. Eighteen wells have less than 10 feet of leachate, fourteen extraction wells have 10 to 20 feet of leachate, and only two wells have 20 to 30 feet of leachate present. Leachate levels in the extraction wells have decreased an average of 25 feet per well from the 2002 measurements. In 2004, approximately 782,892 gallons of leachate were removed via the vertical extraction wells in Phases 1 and 2.

Landfill Gas

PBSL has installed and currently operates a gas collection and control system (GCCS) for the areas filled to final grade. The existing GCCS consists of 159 vertical extraction wells in the final grade and active fill areas. These extraction wells convey the landfill gas (LFG) from the refuse, through a series of lateral and header pipes to a gas to energy facility.

The vertical extraction wells are generally positioned on the landfill plateau. Lateral and header pipes are generally installed below grade and are constructed of high-density polyethylene (HDPE) pipe. The LFG is conveyed through this pipe network to the gas to energy facility located on the northwest side of the facility. The average spacing between the wells is approximately 150 to 200 feet. Operations of the gas to energy facility are monitored continuously.

Surface emissions monitoring is conducted quarterly using flame ionization detectors. Testing is conducted around the perimeter of the collection area and in a serpentine pattern across the collection area. In addition, any areas where visual observations indicate potentially elevated concentrations of methane are also screened. No exceedances of the methane standard of 500 ppm have been reported.

An annual performance test of the GCCS control device is required per the Air Emission Permit No. 03700138-002. The performance test establishes operation criteria based on the type of control device to maintain a 98% destruction efficiency of non-methane organic compounds (NMOCs).

The control device for the gas to energy facility at the PBSL consists of two stationary turbines with a total rated capacity of 2,500 standard cubic feet per minute (scfm), two blowers with a total rated capacity of 3,200 to 10,500 scfm, two compressors with a total rated capacity of approximately 6,500 scfm, and one enclosed flare. Test results demonstrated the flare and the stack are operating in compliance with the New Source Performance Standards (NSPS) and Minnesota Rule 7011.3510 emission limitations.

System Operation and Maintenance (O&M)

O&M at the site is performed in accordance with the requirements of the facility's operating permit (Permit SW-045). Those documents include:

- Landfill Operation Plan;
- Leachate Management Plan;
- Groundwater Corrective Action Plan;
- Contingency Action Plan;
- Closure Plan;
- Post-Closure Care Plan; and
- Construction Inspection and QA/QC Programs.

Institutional Controls (ICs)

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 is required to assure long-term protectiveness for any areas which do not allow for unlimited use or unrestricted exposure (UU/UE).

The table below identifies those areas that do not support unlimited use and unrestricted exposure and the institutional controls for these restricted areas at the site.

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 – the current area that exceeds groundwater cleanup standards is identified in Attachments 3 and 4	Permanent sealing of private groundwater wells in plume area	Minn. Stat. 103I.301 Minn. Rules Chapter 4725 Dakota County Ordinance No. 114
Groundwater – the current area that exceeds groundwater cleanup standards is identified in Attachment 3 and 4.	Prohibit installation of groundwater wells in plume area	Inver Grove Heights Special Well Construction Area pursuant to Minnesota Rule: Chapter 4725.3650 Inver Grove Heights City Code 715.0.5.

Status of ICs and Follow-up Actions Required

Groundwater Institutional Controls

The OU1 ROD required permanent sealing of private groundwater wells in the area of the groundwater plume. Dakota County has the authority to require sealing of these wells. Under Section 110 of Ordinance No. 114, Dakota County has the authority to inventory and require sealing of wells within the County. Also under Minn. Statute 103I.301, a property owner is required to have a well or boring sealed if "the well or boring is contaminated or may contribute to the spread of contamination."

The OU1 ROD also referred to the Special Well Construction Area established pursuant to Minnesota Rule 4725.3650. In 1973, the Minnesota Department of Health designated the area east and west of the PBSL as a special well construction area. Currently, the Inver Grove Heights (Pine Bend Area) special well construction area includes Sections 33, 34, 35, Township 27 North, Range 22 West in Dakota County. However, the special well construction area does not cover the Crosby American Properties Landfill plume area. See Attachment 11, map identifying special well construction areas. Under Minn. Chapter 4725.3650, a well may not be constructed, repaired, or sealed in a Special Well Construction Area unless the commissioner has reviewed and approved a proposed plan. In addition, the MPCA commissioner requires the owner of a newly constructed contaminated well in a special well and boring construction area to install, use, and monitor an effective water treatment device if the commissioner determined that the device is reasonably necessary to ensure a safe drinking water supply or monitor the degree of contamination. In addition, Inver Grove Heights Code 715.0.5 states that no person, firm, or corporation shall install, alter or extend any water well in the City of Inver Grove Heights

without first obtaining a permit from the city. The PBSL and Crosby American Properties Landfill are covered under the Inver Grove Heights Code 715.0.5. EPA recommends that the Minnesota Department of Health extend the special well construction area to include the Crosby American Properties Landfill plume area as well but it is not critical as the concentrations of vinyl chloride are approaching non-detect in all wells. The Crosby American Properties Landfill plume is discussed further in Section VI.

The ROD for OU2 required all homes in the area at the time of the ROD to be hooked up to municipal water and all private wells to be properly abandoned. Dakota County conducted a groundwater well inventory in August 2009 and determined that three industrial wells (Union Carbide, Pabst Meat Supply Company, and Northern States Power Company) are located within the plume area. The three properties have been connected to municipal water and the wells are not used for potable purposes. The Pabst Meat Supply Company's well is being used for fire suppression purposes. EPA will work with the MPCA and Dakota County to develop a notification/verification strategy for the three businesses. MPCA or Dakota County will provide notification/verification letters to verify that the wells are not being used for drinking water purposes; to remind them of their potential to be impacted by the groundwater plume; and to remind them of their obligation to notify the prospective purchasers of the plume.

Landfill Institutional Controls

Although EPA's five-year review pertains to the groundwater protection at the site, there are institutional controls for the landfill. EPA's concurrence in the ROD for OU2 was based on the fact that closure and post-closure requirements would be implemented and maintained at the site pursuant to the state permit. The operating permit for the landfill has significant language regarding land use restrictions at the site. Specifically, the reissuance of Permit SW-045 (May 29, 2009) requires the permitee to comply with post-closure use of property requirements in accordance with Minn. R. 7035.2655 subp. 2 which states:

> *Subp. 2. Post-closure use of property. The landowner must not allow post-closure use of the facility property to disturb the integrity of final covers, liners, or any other components of any containment system, or the function of the facility's monitoring system, unless the commissioner determines that the disturbance: A. is necessary to the proposed use of the property and will not cause a violation of the standards outlined in parts 7035.2565 and 7035.2815, subpart 4; and B. is necessary to remedy a violation of the standards in parts 7035.2565 and 7035.2815, subpart 4.*

Current Compliance

The groundwater institutional controls have been implemented. Based on the well inventory conducted by Dakota County, there are three industrial wells within the plume area. EPA will work with the MPCA and Dakota County to develop a notification/verification strategy for the three businesses that have wells located in the plume area to ensure that wells are not used for potable purposes. The landfill institutional controls, closure and post-closure requirements will be implemented and maintained at the site pursuant to the state permit. The long-term

protectiveness at the site requires: 1) compliance with the PBSL solid waste permit, which includes requirements for monitoring, closure, post-closure, groundwater corrective action and land use restrictions on the PBSL; and 2) compliance with restrictions on potable groundwater use in the groundwater plume area.

Long-Term Stewardship

Inspections of the facility by MPCA personnel are conducted on a random basis for regulatory compliance. The facility has developed a self-inspection program whereby the MPCA certified operator inspects the waste disposal area on a frequent basis. Annual groundwater, gas monitoring, and dual extraction system reports are submitted to MPCA, Dakota County, and the City of Inver Grove Height as required as part of the permit.

V. Progress Since the Last Review

The second five-year review, found that the remedy was protective of human health and the environment. Since the second five-year review, which was completed on September 1, 2005, PBSL has continued its operation of the waste disposal facility. MPCA reissued the permit to the facility on May 29, 2009, which allows the continued development of the facility and the placement of up to a total airspace capacity of 29,800,000 cubic yards of solid waste and cover material. The reissuance allows for the continued construction and operation of the facility with the addition of the leachate recirculation in Phases 4 and 5.

The ROD for OU2 required all homes in the area at the time of the ROD to be hooked up to municipal water and all private wells to be properly abandoned. In the second five-year review, the Dakota County well inventory for the area down-gradient of the landfill showed that seven wells still existed in the area possibly impacted by the groundwater plume from the site. Six of the wells were located at industrial facilities and one at a residence. A new inventory conducted by Dakota County in August 2009 determined that three wells have been sealed, one industrial well is south of the plume, and only three industrial wells (Union Carbide, Pabst Meat Supply Company, and Northern States Power Company) are located within the plume. The three properties have been connected to municipal water and the wells are not used for potable purposes. The Pabst Meat well is being used for fire suppression purposes.

VI. Five-Year Review Process

Administrative Components

The landfill owner was notified of the initiation of the five-year review on July 8, 2009. The Pine Bend Sanitary Landfill Site third five-fear review was led by Denise Boone of the EPA, Remedial Project Manager for the site. Lisa Mojsiej, Alex Hokenson, Kathy Holland-Hanson, and Joe Julik assisted in the review as the representatives for the MPCA.

The review, which began on August 17, 2009, consisted of the following components:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection; and
- Five-Year Review Report Development and Review.

Community Involvement

Activities to involve the community in the five-year review were initiated on August 17, 2009 by the RPM. A notice was sent to a local newspaper that a five-year review was to be conducted. The notice was published in the Lillie Suburban Newspaper, South-West Review on August 23, 2009. The notice invited the public to submit any comments to EPA (see Attachment 5). The results of the review and the report will be made available at the site information repository located at the Inver Glen Library in Inver Grove Heights, Minnesota. No comments were received during this review.

Document Review

This five-year review consisted of a review of relevant documents including the annual monitoring reports (see Attachment 6).

Data Review

Groundwater

PBSL initiated operations under MPCA site Permit SW-045 in 1971. PBSL has been collecting groundwater quality information at and adjacent to the landfill as part of PBSL's Environmental Monitoring System (EMS) since 1971. The EMS requires that PBSL submit annual water quality reports to MPCA, as specified by Minnesota Solid Waste Rule 7035.2815, subpart 14, item P as contained in the Required Actions and Submittals Table of the permit. In 2006, the City of Inver Grove Heights Ordinance 1084 began requiring that five-year statistical analyses be performed on EMS wells and springs for any parameter that exceeded its respective intervention.

An extensive monitoring well network, shown in Attachment 3, is used for water level measurements and water quality sampling at the site. Attachment 3 also shows the plume orientation based on the 2008 Annual Water Quality Monitoring Report.

PBSL's current EMS monitoring well locations, sampling frequency, and analytical parameters were established in 2004 following a major modification to Permit SW-045 by the MPCA on January 12, 2004. The network consists of 18 monitoring wells, 2 lysimeters, and 2 springs located near the Mississippi River. In addition, a three times per year sampling frequency

(spring, summer, and fall) was applied to all EMS wells and springs. Groundwater levels are measured in association with the three sampling events. Groundwater samples collected during the three monitoring events are analyzed for indicator parameters (pH, temperature, specific conductance, and redox potential) and volatile organic compounds (VOCs). In addition, groundwater samples collected during the summer monitoring event are analyzed for inorganics and dissolved metals. In accordance with the reissuance of Permit SW-045, Intervention Limits (ILs) are the water quality standards for PBSL. Attachment 7 presents the permit required applicable ILs for various organic and inorganic parameters. Trends in groundwater quality are characterized by changes observed in indicator parameter measurements, inorganic, metal, and VOC concentrations.

Attachment 8 presents IL exceeding values recorded at PBSL in 2008. Groundwater samples analyzed from the monitoring network included a total of five metals that exceeded groundwater ILs in July 2008. These metals consisted of arsenic (well M-5B), barium (well M-5B), boron (well M-6, M-26, M-30, and M-46), manganese (wells M-6, M-7, M-28, M-46, M-47, and M-48), and nickel (wells M-30 and M-46). Nitrate also exceeded the IL value at two wells (M-11A and M-46) in 2008. Manganese is a naturally occurring element that is associated with iron-oxide coating on the aquifer sand grains. In the degradation of carbon-containing material and under anaerobic conditions, bacteria will reduce manganese oxides found on sand-grain coating and increase its solubility. Barium is also a natural occurring element that is known to substitute for magnesium and calcium cations in carbonate minerals. Nitrates are typically derived from fertilizers and are anticipated to be consumed by microbes in locations where dissolved organic carbon is present.

A total of 7 VOCs exceeded IL values during the 2008 monitoring events.

1,4-Dichlorobenzene	(M-5B)
1,2-Dichloroethane	(M-26, M-38, M-42, and M-47)
Tetrachloroethene (PCE)	(M-26, M-29, M-38, M-42, M-47, and M-49)
Cis-1,2-Dichloroethene (cis-DCE)	(M-26, M-38, and M-42)
Vinyl Chloride (VC)	(M-5B, M-26, M-28, M-38, M-42, M-47, M-48, and Pipeline Spring)
1,2-Dichloropropane	(M-26, M-38, M-42, M-46, M-47, and M-48)
Trichloroethene (TCE)	(M-26 and M-38)

Attachment 9 depicted the destruction of PCE and TCE down-gradient from the landfill and the appearance of biodegradation products cis-DCE and VC in the direction of groundwater transport as indicated by the VOC refrigerant dichloroflouromethane (R21). In general, chloroethane (PCE, TCE, cis-DCE, and VC), and refrigerant concentrations continue to decrease along the flow path relative to previous years. Vertically in the aquifer, contaminant concentrations also appear to be decreasing.

Leachate

The following are the leachate volumes reported in the Application for Permit Renewal

prepared by Wenck Associates, Inc., dated July 2008:

2005 6,798,041 gallons
2006 6,435,901 gallons
2007 5,363,687 gallons

Landfill Gas

In 2007, PBSL undertook several projects to improve gas collection efficiency. These included the following:

- Installed seven new gas extraction wells in Phase 4.
- Repaired 10 wells in the northern corner of the site that were showing high oxygen levels. Since the bentonite seals were excavated and replaced, oxygen levels have subsequently started to improve.

Crosby American Demolition Landfill

The results of the laboratory analyses of the groundwater samples collected during 2006 indicate low level impacts to the groundwater from the Crosby American Properties Landfill. Attachment 10 shows long-term downward trends in total volatile organic compounds (VOCs). This is indicative of continued improvements to groundwater quality beneath the Crosby American Properties Landfill. A map showing contours of the Total VOC concentrations is presented in Attachment 4. Only VC had exceedances of the health risk limit during this reporting period (Attachment 12). VC has a decreasing trend since the late 1990s and is approaching non-detect levels in all wells. Historical exceedances of PCE at this site indicate that natural degradation is likely occurring at this site. VC is often the final degradation product of PCE. Other possible contributions to the contamination at this site may be from the PBSL located up-gradient of the Crosby American Properties Landfill.

No groundwater remediation system is operating at the Crosby American Properties Landfill. The remedial actions at the PBSL are believed to contribute to the long-term clean up of the groundwater contamination plume. The groundwater down-gradient of the Crosby American Properties Landfill will continue to be monitored to evaluate the remedial measures at both these sites.

Site Inspection

A site inspection was conducted on August 25, 2009, by Denise Boone, EPA RPM. The EPA RPM was accompanied by the PBSL's site environmental manager, Aaron Janusz and Brian Deering of Groundwater and Environmental Services, Inc. The purpose of the inspection was to assess the protectiveness of the remedy, including the maintenance and operation of the landfill cap, gas extraction system, fencing, on-site access road, and groundwater monitoring wells. No significant problems were identified regarding the cap, the gas extraction system, the monitoring

network, the on-site access roads, and the perimeter fencing. No areas of cracking or erosion of the cap were noted.

A visual reconnaissance of the Crosby American Properties Landfill revealed no areas of cracking or erosion of the cap and the vegetation was dense and vibrant.

VII. Technical Assessment

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

Yes, the review of documents, risk assumptions, and the results of the site inspection indicates that the on-site equipment is functioning as intended. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. There have been no changes in the toxicity factors for the contaminants of concern that were used in the health assessment, and there have been no changes to the standardized health assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

Operation and maintenance of the landfill cover and drainage structures has been effective. The landfill gas collection and control system and leachate collection system both have been effective in the management of potential risks associated with exposure to, or releases of, landfill gas and leachate.

Groundwater data has shown that contaminant concentrations have been decreasing and natural attenuation may be effectively controlling contaminant concentrations within the aquifer beneath the site and off-site.

EPA's concurrence in the ROD for OU2 was based on the fact that closure and post-closure requirements would be implemented and maintained at the site pursuant to the state permit. The operating permit for the landfill has significant language regarding land use restrictions at the site. Specifically, the reissuance of Permit SW-045 (May 29, 2009) requires the permitee to comply with post-closure use of property requirements in accordance with Minn. R. 7035.2655 subp. 2 which states:

> *Subp. 2. Post-closure use of property. The landowner must not allow post-closure use of the facility property to disturb the integrity of final covers, liners, or any other components of any containment system, or the function of the facility's monitoring system, unless the commissioner determines that the disturbance: A. is necessary to the proposed use of the property and will not cause a violation of the standards outlined in parts 7035.2565 and 7035.2815, subpart 4; and B. is necessary to remedy a violation of the standards in parts 7035.2565 and 7035.2815, subpart 4.*

The ROD for OU2 required all homes in the area at the time of the ROD to be hooked up

to municipal water and all private wells to be properly abandoned. Dakota County conducted a groundwater well inventory in August 2009 and determined that three industrial wells (Union Carbide, Pabst Meat Supply Company, and Northern States Power Company) are located within the plume area. The three properties have been connected to municipal water and the wells are not used for potable purposes. The Pabst Meat Supply Company's well is being used for fire suppression purposes.

The ROD for OU1 referred to Minnesota Plumbing Code, Section 4715.0310 as providing the city with authority to require connection to the extended system by residents. The Inver Grove Heights Code does not mandate connection to the water system (Section 705.31), however new wells require a state license and city permit prior to construction of a water well under Section 715 of the Inver Grove Heights Code. In addition the Minnesota Department of Health has instituted a Special Well Construction Area encompassing the PBSL site. Minnesota Rule 4725 states that all wells to be constructed in a well advisory area must have prior review and approval by the state before being constructed. The city and the state have the authority to prevent potable water use for any new wells under the licensing and permitting authorities described above.

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, the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection are still valid.

Changes in Standards

Because the Record of Decision for this site required no additional remedial action, no Applicable or Relevant and Appropriate Requirements (ARARs) were identified for the site. The ROD requires that the site be addressed under the Minnesota Solid Waste Landfill Compliance Program, the Resource Conservation and Recovery Act, and the Response Order by Consent. MPCA continues to address the risks posed by the site under their programs. There have been no changes in remedial action objectives affecting the protectiveness of the remedy.

Changes in Exposure Pathways, Toxicity, and other Contaminant Characteristics

The exposure assumptions used to develop the Human Health Risk Assessment included both current exposures and potential future exposures for workers and off-site residential groundwater users. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. These assumptions are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No change to these assumptions or the cleanup levels developed from them is warranted. There has been no change in the standardized risk assessment methodology that could affect the protectiveness of the remedy.

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

No, there is no other information that calls into question the protectiveness of the remedy. No weather-related events have affected the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed and the site inspection, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. Because the remedy selected for this site was No Action, no ARARs were cited in the ROD. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

VIII. Issues

Table 2: Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Groundwater wells still exist within groundwater plume area.	N	Y

IX. Recommendations and Follow-up Actions

Table 3: Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Institutional Controls (ICs).	Provide notification/ verification letters to verify that the wells are not being used for drinking water purposes; to remind them of their potential to be impacted by the groundwater plume; and to remind them of their obligation to notify the prospective purchasers of the plume.	MPCA	MPCA	May 2011	N	Y

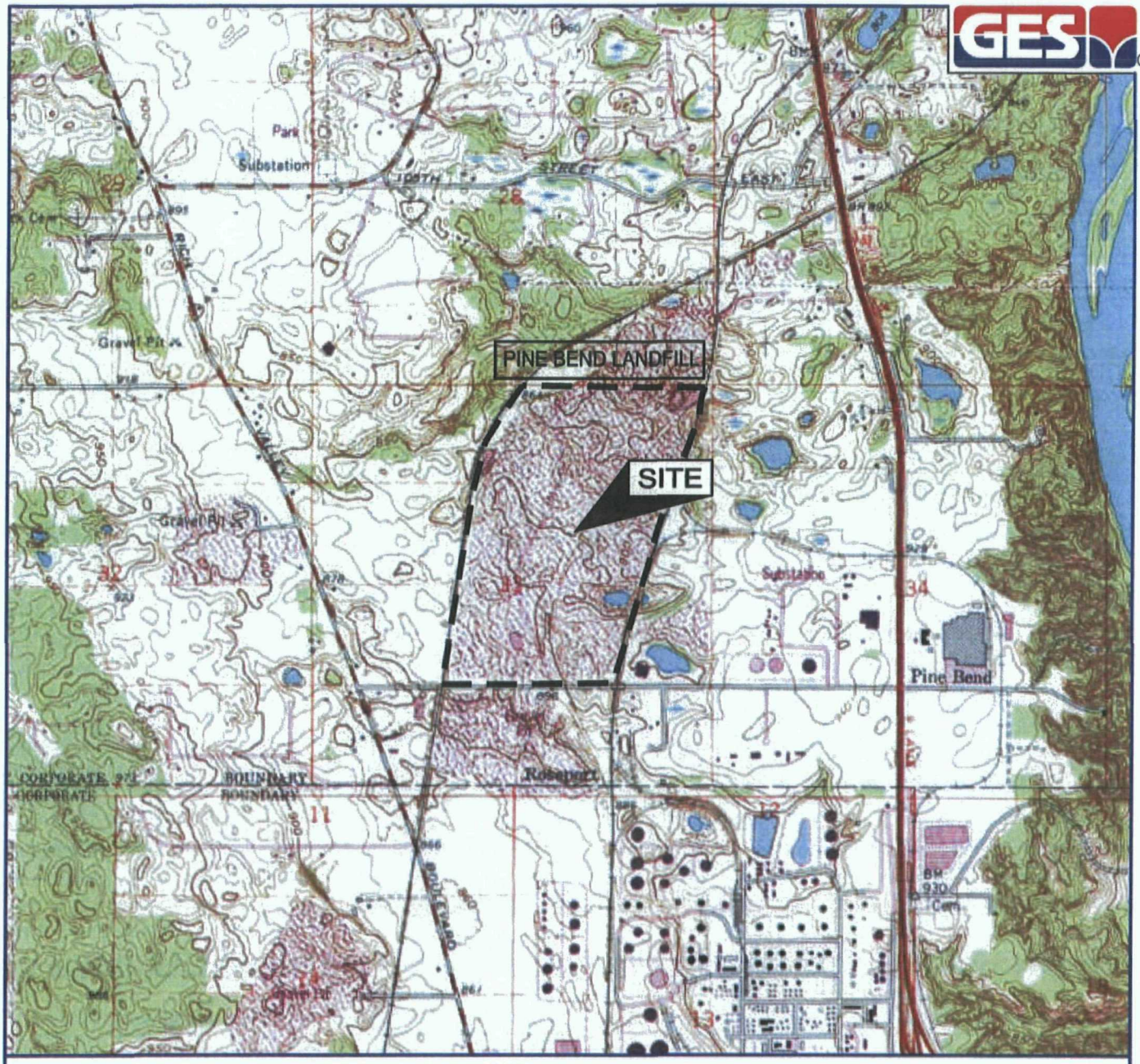
X. Protectiveness Statement

The remedy at the Pine Bend Sanitary Landfill Site is currently protective of human health and the environment in the short-term due to the connection of residences to the extended municipal water supply system in the affected groundwater area and due to effective actions taken under permits issued through the Minnesota Solid Waste Landfill Compliance Program and under a Response Order issued by MPCA. The long-term protectiveness at the site requires: 1) compliance with the PBSL solid waste permit, which includes requirements for monitoring, closure, post-closure, groundwater corrective action and land use restrictions on the PBSL; and 2) compliance with restrictions on potable groundwater use in the groundwater plume area.

XI. Next Review

The next five-year review for the Pine Bend Sanitary Landfill Site is required by February 2015, five years from the signature date of this review.

Attachment 1
Site Location Map



SOURCE: USGS 7.5 MINUTE SERIES
TOPOGRAPHIC QUADRANGLE 1993
INVER GROVE HEIGHTS, MINNESOTA
CONTOUR INTERVAL = 10'

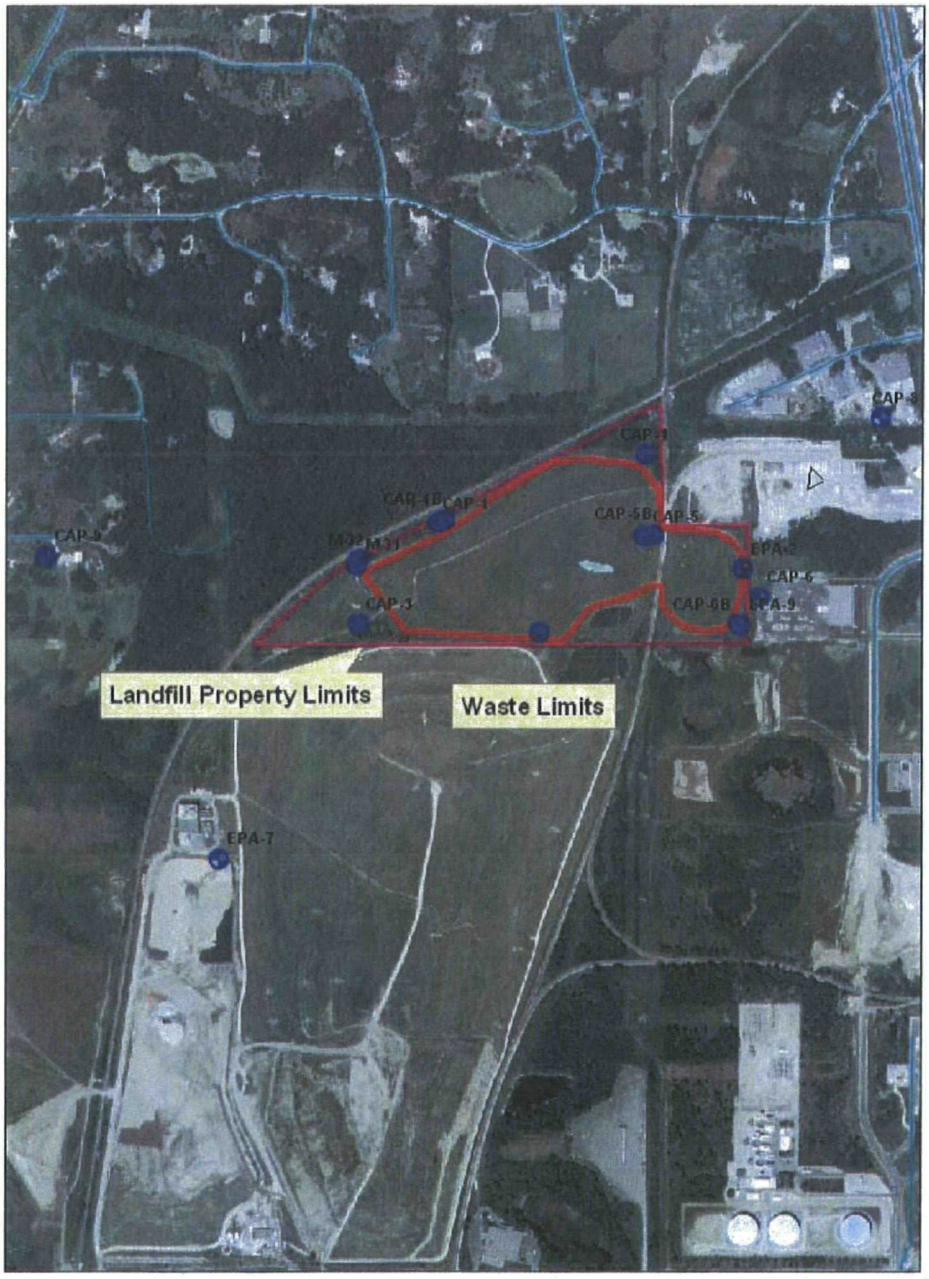
QUADRANGLE LOCATION

DRAFTED BY: W.G.S. (N.J.)	**SITE LOCATION MAP**
CHECKED BY:	**BFI** **PINE BEND LANDFILL** **INVER GROVE HEIGHTS, MINNESOTA**
REVIEWED BY:	
NORTH	**Groundwater & Environmental Services, Inc.** 1285 CORPORATE CENTER DRIVE, SUITE 120, EAGAN, MN 55121
SCALE IN FEET: 0 — 2000	DATE: 6-25-07 / FIGURE: 1

Attachment 2
Crosby American Properties Landfill & Groundwater Monitoring Wells

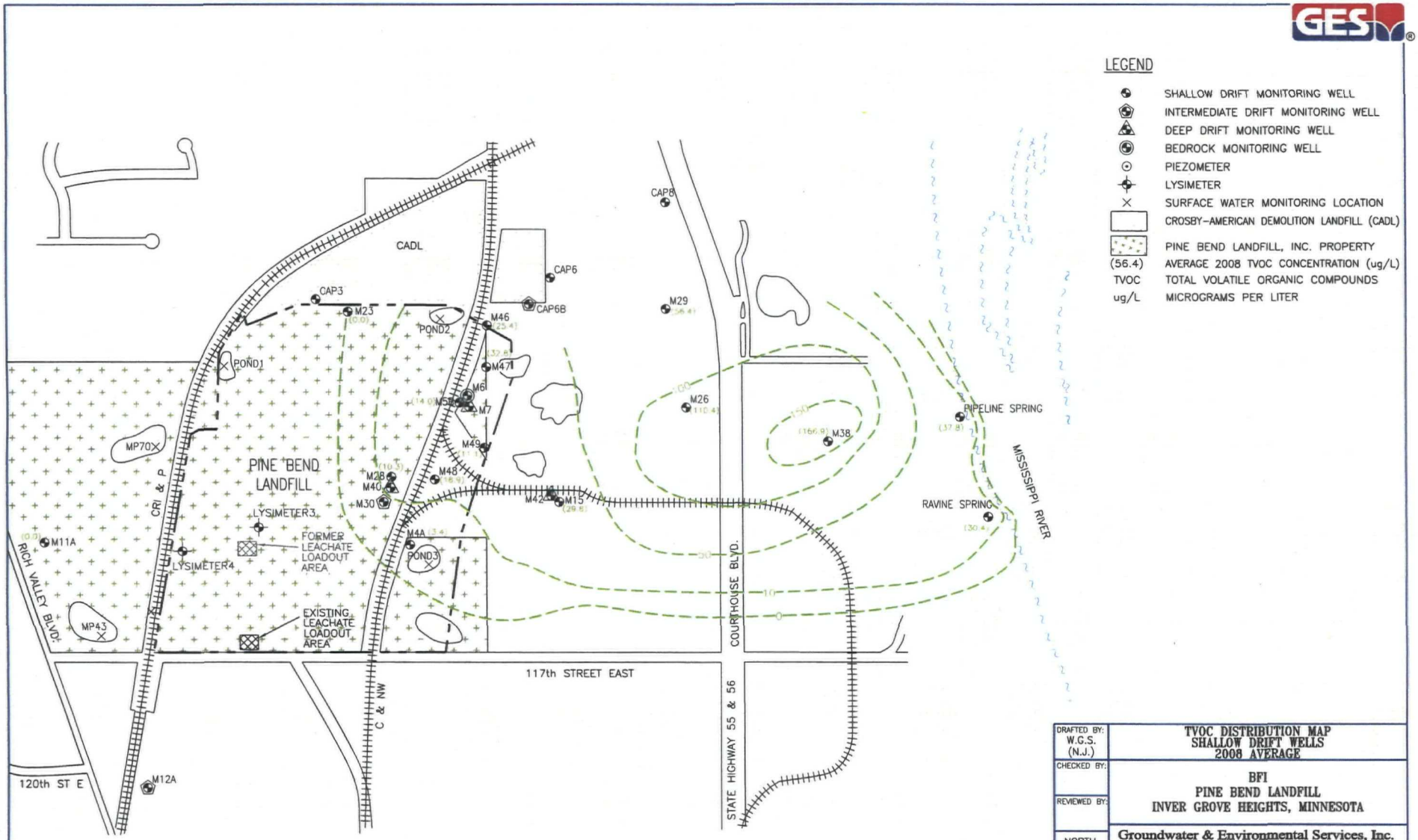
Figure 2

Crosby American Properties Landfill & GW Monitoring Wells



Attachment 3

Pine Bend Sanitary Landfill Monitoring Locations & Plume Map



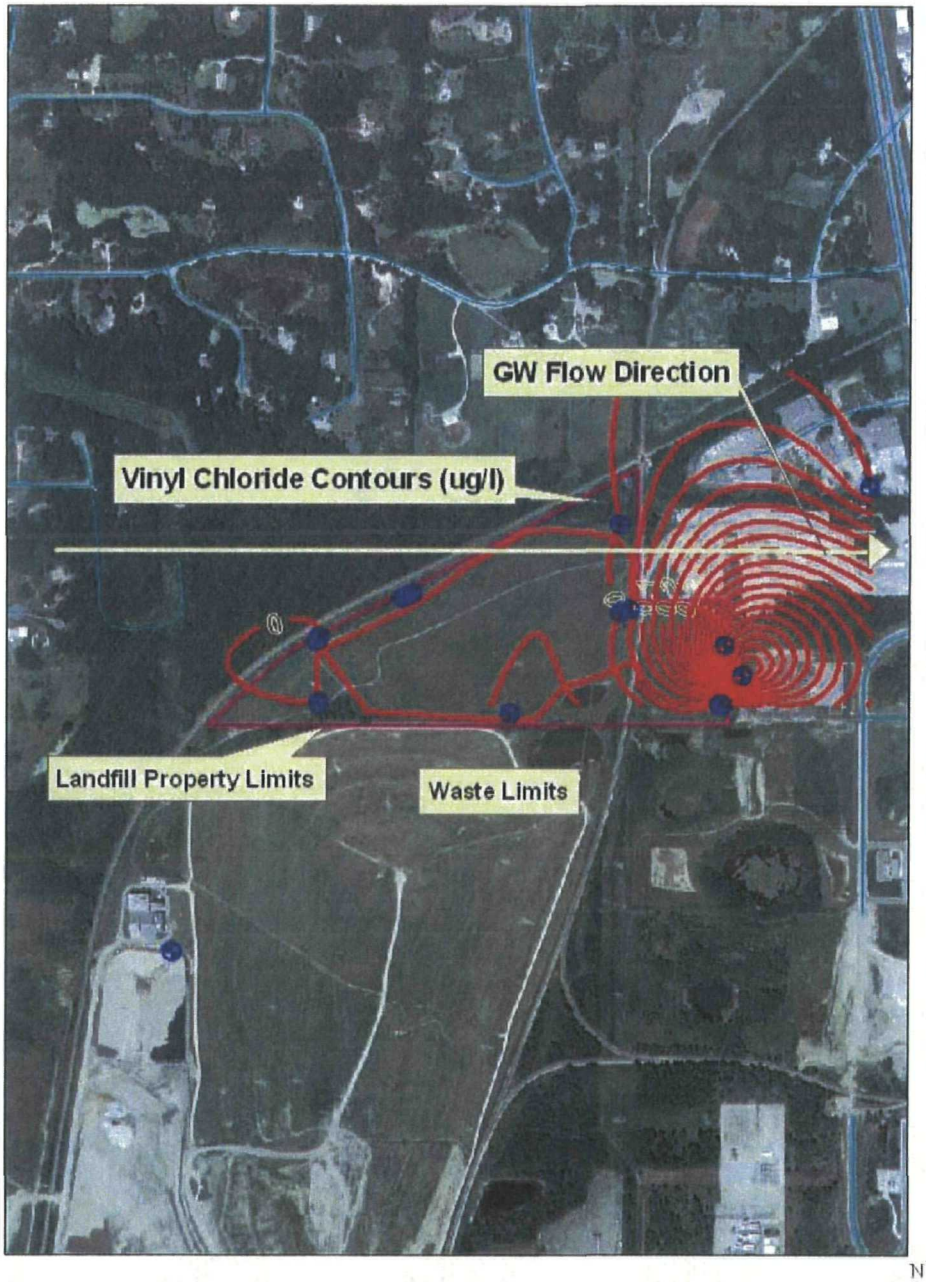
NOTE: BASE MAP ADAPTED FROM 1996 ANNUAL GROUNDWATER MONITORING REPORT – PINE BEND SANITARY LANDFILL, DATED JANUARY 1997.

M:\Graphics\3500-Minnesota\BFI Pine Bend\Inver Grove Heights (Pine bend landfill)\SM.dwg, B-1000, 8/18/2009 3:43:57 PM, WShea

Attachment 4

Crosby American Properties Landfill Plume Map

Crosby American Properties Landfill
Vinyl Chloride Contours (ug/l)



Attachment 5
Public Outreach by EPA for Five-Year Review

8/23/2009

EPA Begins Review of Pine Bend Landfill Superfund Site

Inver Grove Heights, Minnesota

U.S. Environmental Protection Agency is conducting a five-year review of the Pine Bend Sanitary Landfill Superfund site, 2495 East 117th Street, Inver Grove Heights. The Superfund law requires regular checkups of sites that have been cleaned up – with waste managed on-site – to make sure the cleanup continues to protect people and the environment. This is the third five-year review of this site.

Volatile organic compounds contamination in ground water was caused by leachate migrating from the Pine Bend Sanitary Landfill (PBSL) and the Crosby American Properties (CAP) Landfill. The Superfund Program required permanent connection of residences in the vicinity of the landfill to a municipal water supply. All affected residents were connected to the Inver Grove Heights system.

The CAP has been closed since 1989 and is now managed by Minnesota Pollution Control Agency (MPCA) under the Closed Landfill Program. The PBSL is an operating solid waste facility under Permit SW-045 issued by MPCA. The groundwater contamination is being addressed under the Minnesota Solid Waste Landfill Compliance Program, Resource Conservation and Recovery Act and a Response Order by Consent between the MPCA and PBLI. Some of the groundwater cleanup activities conducted under MPCA Permit SW-045 include installation of a liner and leachate collection system and relocation of 1.4 million cubic yards of refuse from an unlined area of the landfill to reduce the footprint of the unlined landfill.

More information is available at Inver Glen Library, 8098 Blaine Ave., Inver Grove Heights, at www.epa.gov/region5superfund/npl/minnesota/MND000245795.htm and EPA Region 5 Records Center, 77 W. Jackson Blvd., Chicago. For an appointment to view the documents at the Region 5 office, call Janet Pfundheller, records manager, 800-621-8431 Ext 5821. The review should be completed by the end of September 2010.

The five-year review is an opportunity for you to tell EPA about site conditions and any concerns you have. Contact:

Denise Boone
Remedial Project Manager
312-886-6217
boone.denise@epa.gov

Don de Blasio
EPA Community Involvement Coordinator
312-886-4360
deblasio.don@epa.gov

You may also call Region 5 toll-free at 800-621-8431, 8:30 a.m. to 4:30 p.m., weekdays.

Attachment 6
Documents Reviewed

Pine Bend Landfill Superfund Site
Inver Grove Heights, Minnesota
Documents Reviewed

6/19/2007	Crosby American Properties Landfill Annual Report 2006
6/19/2007	2007 Spring Water Quality and Natural Attenuation Monitoring Report
1/28/2008	2007 Annual Water Quality and Natural Attenuation Monitoring Report
1/29/2009	2008 Annual Water Quality and Natural Attenuation Monitoring Report
7/2008	Application for Permit Renewal
5/29/2009	MPCA – Solid Waste Management Facility Permit

Attachment 7

Pine Bend Sanitary Landfill Intervention Limit Table

INTERVENTION LIMITS

BFI Waste Systems of North America, LLC
2495 East 117th Street
Inver Grove Heights, Minnesota

Parameter	CAS	IL	Unit
1,1,1,2-Tetrachloroethane	630-20-6	17.5	ug/l
1,1,1-Trichloroethane	71-55-6	150	ug/l
1,1,2,2-Tetrachloroethane	79-34-5	0.5	ug/l
1,1,2-Trichloroethane	79-00-5	0.75	ug/l
1,1,2-Trichlorotrifluoroethane	76-13-1	50,000	ug/l
1,1-Dichloroethane	75-34-3	17.5	ug/l
1,1-Dichloroethylene (Vinylidene chloride)	75-35-4	1.5	ug/l
1,1-Dichloropropene	563-58-6	-	-
1,2-(trans-) Dichloroethylene	156-60-5	25	ug/l
1,2,3-Trichloropropane	96-18-4	10	ug/l
1,2-Dibromoethane (Ethylene dibromide) EDB	106-93-4	0.001	ug/l
1,2-Dichlorobenzene (orth-)	95-50-1	150	ug/l
1,2-Dichloroethane	107-06-2	1	ug/l
1,2-Dichloroethylene (cis-)	156-59-2	17.5	ug/l
1,2-Dichloropropane	78-87-5	1.25	ug/l
1,3-Dichlorobenzene (meta-)	541-73-1	150	ug/l
1,3-Dichloropropane	142-28-9	-	-
1,3-Dichloropropene (cis + trans)	100-61-015	0.5	ug/l
1,4-Dichlorobenzene (para-)	106-46-7	2.5	ug/l
2,2-Dichloropropane	594-20-7	-	-
2-Chlorotoluene (ortho-)	95-49-8	-	-
4-Chlorotoluene (para-)	106-43-4	-	-
Acetone	67-64-1	175	ug/l
Allyl chloride (3 chloropropene)	107-05-1	7.5	ug/l
Ammonia Nitrogen	7664-41-7	-	-
Arsenic	7440-38-2	12.5	ug/l
Barium	7440-39-3	500	ug/l
Benzene	71-43-2	2.5	ug/l
Boron	7440-42-8	150	ug/l
Bromobenzene	108-86-1	-	-
Bromochloromethane (Chlorobromomethane)	74-97-5	-	-
Bromodichloromethane (Dichlorobromomethane)	75-27-4	1.5	ug/l
Bromoform	75-25-2	10	ug/l
Bromomethane (Methyl bromide)	74-83-9	2.5	ug/l
Cadmium	7440-43-9	1	ug/l
Carbon tetrachloride	56-23-5	0.75	ug/l
Chloride	16887-00-6	-	-
Chlorobenzene (monochlorobenzene)	108-90-7	25	ug/l
Chlorodibromomethane (Dibromochloromethane)	124-48-1	2.5	ug/l
Chloroethane	75-00-3	-	-
Chloroform	67-66-3	15	ug/l
Chloromethane (Methyl chloride)	74-87-3	-	-

INTERVENTION LIMITS

BFI Waste Systems of North America, LLC
2495 East 117th Street
Inver Grove Heights, Minnesota

Parameter	CAS	IL	Unit
Chromium (total) (Chromium VI)	18540-29-9	25	ug/l
Chromium III	10025-73-7	5,000	ug/l
Copper	7440-50-8	250	ug/l
Cumene (Isopropylbenzene)	98-82-8	75	ug/l
Dibromochloropropane (DBCP)	96-12-8	0.05	ug/l
Dibromomethane (Methylene bromide)	74-95-3	-	-
Dichlorodifluoromethane	75-71-8	250	ug/l
Dichlorofluoromethane	75-43-4	-	-
Dichloromethane (Methylene chloride)	75-09-2	12.5	ug/l
Dissolved Oxygen,Field	T-1-05	-	-
Eh (Oxidation potential)	4	-	-
Ethyl benzene	100-41-4	175	ug/l
Ethyl ether	60-29-7	250	ug/l
Hexachlorobutadiene	87-68-3	0.25	ug/l
Iron	7439-89-6	-	-
Lead	7439-92-1	-	-
Magnesium	7439-95-4	-	-
Manganese	7439-96-5	250	ug/l
Mercury	7439-97-6	0.5	ug/l
Methyl ethyl ketone (MEK)	78-93-3	1,000	ug/l
Methyl isobutyl ketone (4-Methyl-2-pentanone)	108-10-1	75	ug/l
Methyl tertiary-Butyl Ether (MTBE)	1634-04-4	-	-
Naphthalene	91-20-3	75	ug/l
n-Butyl Benzene	104-51-8	-	-
Nickel	7440-02-0	25	ug/l
Nitrate (as Nitrogen)	14797-55-8	2,500	ug/l
Nitrite (as Nitrogen)	14797-65-0	250	ug/l
n-Propyl benzene	103-65-1	-	-
pH	C-0-06	-	-
p-Isopropyltoluene	99-87-6	-	-
Potassium	7440-00-97	-	-
sec-Butyl Benzene	135-98-8	-	-
Selenium	7782-49-2	12.5	ug/l
Silver	7440-22-4	7.5	ug/l
Sodium	7440-23-5	-	-
Specific Conductance	C-0-11	-	-
Static Water Level	PCA-00-1	-	-
Styrene	100-42-5	25	ug/l
Sulfate	14808-79-8	-	-
Temperature	T-1-21	-	-
tert-Butyl Benzene	98-06-6	-	-
Tetrachloroethylene (Perchloroethylene)	127-18-4	1.75	ug/l

INTERVENTION LIMITS

BFI Waste Systems of North America, LLC
2495 East 117th Street
Inver Grove Heights, Minnesota

Parameter	CAS	IL	Unit
Tetrahydrofuran	109-99-9	25	ug/l
Toluene	108-88-3	250	ug/l
Trichloroethylene (TCE)	79-01-6	7.5	ug/l
Trichlorofluoromethane	75-69-4	500	ug/l
Turbidity Field	G-0-19	-	-
Vinyl chloride (chloroethene)	75-01-4	0.05	ug/l
Xylenes (mixture of o,m,p)	1330-20-7	2,500	ug/l
Zinc	7440-66-6	500	ug/l

Attachment 8

Pine Bend Sanitary Landfill 2008 Groundwater Intervention Limit Data

2008 GROUNDWATER INTERVENTION LIMIT DATA

BFI Waste Systems of North America, LLC
2495 East 117th Street
Inver Grove Heights, Minnesota

Well Name	Date Sampled	Parameter	Result	Intervention Limit	Units	CAS No
M-11A	7/16/08	Nitrogen, Nitrate	3550	2500	ug/l	14797-55-8
M-23	7/16/08	Manganese	377	250	ug/l	7439-96-5
M-26	4/17/08	1,2-Dichloropropane	1.4	1.3	ug/l	78-87-5
M-26	7/17/08	1,2-Dichloropropane	4.5	1.3	ug/l	78-87-5
M-26	10/29/08	1,2-Dichloropropane	3.9	1.25	ug/l	78-87-5
M-26	7/17/08	Boron	176	150	ug/l	7440-42-8
M-26	7/17/08	cis-1,2-Dichloroethene	28	17.5	ug/l	156-59-2
M-26	10/29/08	cis-1,2-Dichloroethene	26	17.5	ug/l	156-59-2
M-26	4/17/08	Tetrachloroethene	4.5	1.75	ug/l	127-18-4
M-26	7/17/08	Tetrachloroethene	11	1.75	ug/l	127-18-4
M-26	10/29/08	Tetrachloroethene	11	1.8	ug/l	127-18-4
M-26	7/17/08	Trichloroethene	9.2	7.5	ug/l	79-01-6
M-26	10/29/08	Trichloroethene	8.4	7.5	ug/l	79-01-6
M-26	7/17/08	Vinyl Chloride	3.2	0.05	ug/l	75-01-4
M-26	10/29/08	Vinyl Chloride	2.6	0.05	ug/l	75-01-4
M-28	4/10/08	1,2-Dichloropropane	1.3	1.25	ug/l	78-87-5
M-28	7/16/08	Manganese	2220	250	ug/l	7439-96-5
M-28	4/10/08	Vinyl Chloride	0.66	0.05	ug/l	75-01-4
M-29	4/9/08	Tetrachloroethene	2.2	1.8	ug/l	127-18-4
M-29	7/17/08	Tetrachloroethene	2.2	1.75	ug/l	127-18-4
M-29	10/29/08	Tetrachloroethene	2.2	1.75	ug/l	127-18-4
M-30	7/16/08	Boron	297	150.0	ug/l	7440-42-8
M-30	7/16/08	Nickel	36.9	25	ug/l	7440-02-0
M-38	4/11/08	1,2-Dichloropropane	4.6	1.3	ug/l	78-87-5
M-38	7/17/08	1,2-Dichloropropane	5.4	1.25	ug/l	78-87-5
M-38	10/29/08	1,2-Dichloropropane	5.2	1.25	ug/l	78-87-5
M-38	4/11/08	cis-1,2-Dichloroethene	23	17.5	ug/l	156-59-2
M-38	7/17/08	cis-1,2-Dichloroethene	26	17.5	ug/l	156-59-2
M-38	10/29/08	cis-1,2-Dichloroethene	25	17.5	ug/l	156-59-2
M-38	4/11/08	Tetrachloroethene	9.5	1.75	ug/l	127-18-4
M-38	7/17/08	Tetrachloroethene	10	1.75	ug/l	127-18-4
M-38	10/29/08	Tetrachloroethene	10	1.8	ug/l	127-18-4
M-38	4/11/08	Trichloroethene	7.9	7.5	ug/l	79-01-6
M-38	7/17/08	Trichloroethene	9.3	7.5	ug/l	79-01-6
M-38	10/29/08	Trichloroethene	8.8	7.5	ug/l	79-01-6
M-38	4/11/08	Vinyl Chloride	2	0.1	ug/l	75-01-4
M-38	7/17/08	Vinyl Chloride	2.4	0.05	ug/l	75-01-4
M-38	10/29/08	Vinyl Chloride	2.1	0.05	ug/l	75-01-4
M-42	4/9/08	1,2-Dichloropropane	1.6	1.25	ug/l	78-87-5
M-42	7/15/08	1,2-Dichloropropane	1.7	1.25	ug/l	78-87-5
M-42	10/29/08	1,2-Dichloropropane	1.4	1.25	ug/l	78-87-5

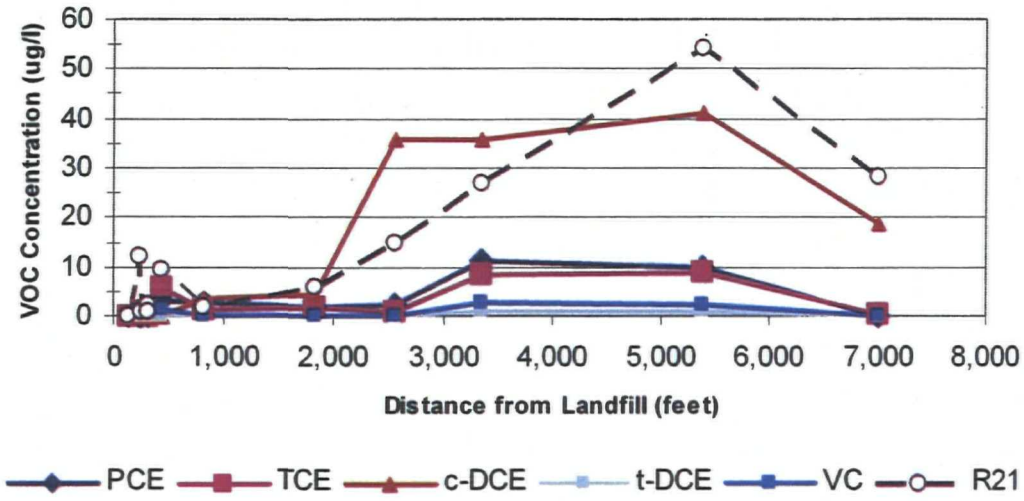
2008 GROUNDWATER INTERVENTION LIMIT DATA

BFI Waste Systems of North America, LLC
2495 East 117th Street
Inver Grove Heights, Minnesota

Well Name	Date Sampled	Parameter	Result	Intervention Limit	Units	CAS No
M-42	4/9/08	cis-1,2-Dichloroethene	22	17.5	ug/l	156-59-2
M-42	7/15/08	cis-1,2-Dichloroethene	23	17.5	ug/l	156-59-2
M-42	10/29/08	cis-1,2-Dichloroethene	18	17.5	ug/l	156-59-2
M-42	4/9/08	Tetrachloroethene	4.2	1.8	ug/l	127-18-4
M-42	7/15/08	Tetrachloroethene	4	1.75	ug/l	127-18-4
M-42	10/29/08	Tetrachloroethene	4.1	1.75	ug/l	127-18-4
M-42	4/9/08	Vinyl Chloride	0.97	0.05	ug/l	75-01-4
M-42	7/15/08	Vinyl Chloride	1	0.05	ug/l	75-01-4
M-42	10/29/08	Vinyl Chloride	0.74	0.05	ug/l	75-01-4
M-46	4/8/08	1,2-Dichloropropane	1.9	1.25	ug/l	78-87-5
M-46	7/14/08	1,2-Dichloropropane	2.2	1.25	ug/l	78-87-5
M-46	10/27/08	1,2-Dichloropropane	2.5	1.25	ug/l	78-87-5
M-46	7/14/08	Boron	347	150	ug/l	7440-42-8
M-46	7/14/08	Manganese	4140	250.0	ug/l	7439-96-5
M-46	7/14/08	Nickel	54.8	25.0	ug/l	7440-02-0
M-46	7/14/08	Vinyl Chloride	0.7	0.1	ug/l	75-01-4
M-46	10/27/08	Vinyl Chloride	0.94	0.05	ug/l	75-01-4
M-47	4/9/08	1,2-Dichloropropane	2.6	1.25	ug/l	78-87-5
M-47	7/14/08	1,2-Dichloropropane	2.6	1.3	ug/l	78-87-5
M-47	10/27/08	1,2-Dichloropropane	3.1	1.25	ug/l	78-87-5
M-47	7/14/08	Manganese	2910	250	ug/l	7439-96-5
M-47	4/9/08	Tetrachloroethene	3	1.75	ug/l	127-18-4
M-47	7/14/08	Tetrachloroethene	1.8	1.75	ug/l	127-18-4
M-47	10/27/08	Tetrachloroethene	3	1.75	ug/l	127-18-4
M-47	4/9/08	Vinyl Chloride	0.85	0.05	ug/l	75-01-4
M-47	7/14/08	Vinyl Chloride	1.4	0.05	ug/l	75-01-4
M-47	10/27/08	Vinyl Chloride	1.2	0.1	ug/l	75-01-4
M-48	4/9/08	1,2-Dichloropropane	1.3	1.25	ug/l	78-87-5
M-48	7/16/08	Manganese	2820	250	ug/l	7439-96-5
M-48	4/9/08	Tetrachloroethene	1.8	1.8	ug/l	127-18-4
M-48	4/9/08	Vinyl Chloride	0.96	0.05	ug/l	75-01-4
M-48	7/16/08	Vinyl Chloride	1.5	0.05	ug/l	75-01-4
M-48	10/28/08	Vinyl Chloride	0.75	0.05	ug/l	75-01-4
M-49	7/14/08	Nitrogen, Nitrate	3,440.0	2500	ug/l	14797-55-8
M-49	7/14/08	Tetrachloroethene	2	1.75	ug/l	127-18-4
M-49	10/27/08	Tetrachloroethene	2.8	1.75	ug/l	127-18-4
M-4A	10/28/08	Vinyl Chloride	0.88	0.05	ug/l	75-01-4
M-5B	4/17/08	1,4-Dichlorobenzene	4.2	2.5	ug/l	106-46-7
M-5B	7/15/08	1,4-Dichlorobenzene	6.3	2.5	ug/l	106-46-7
M-5B	10/27/08	1,4-Dichlorobenzene	6	2.5	ug/l	106-46-7
M-5B	7/15/08	Arsenic	18.9	12.5	ug/l	7440-38-2

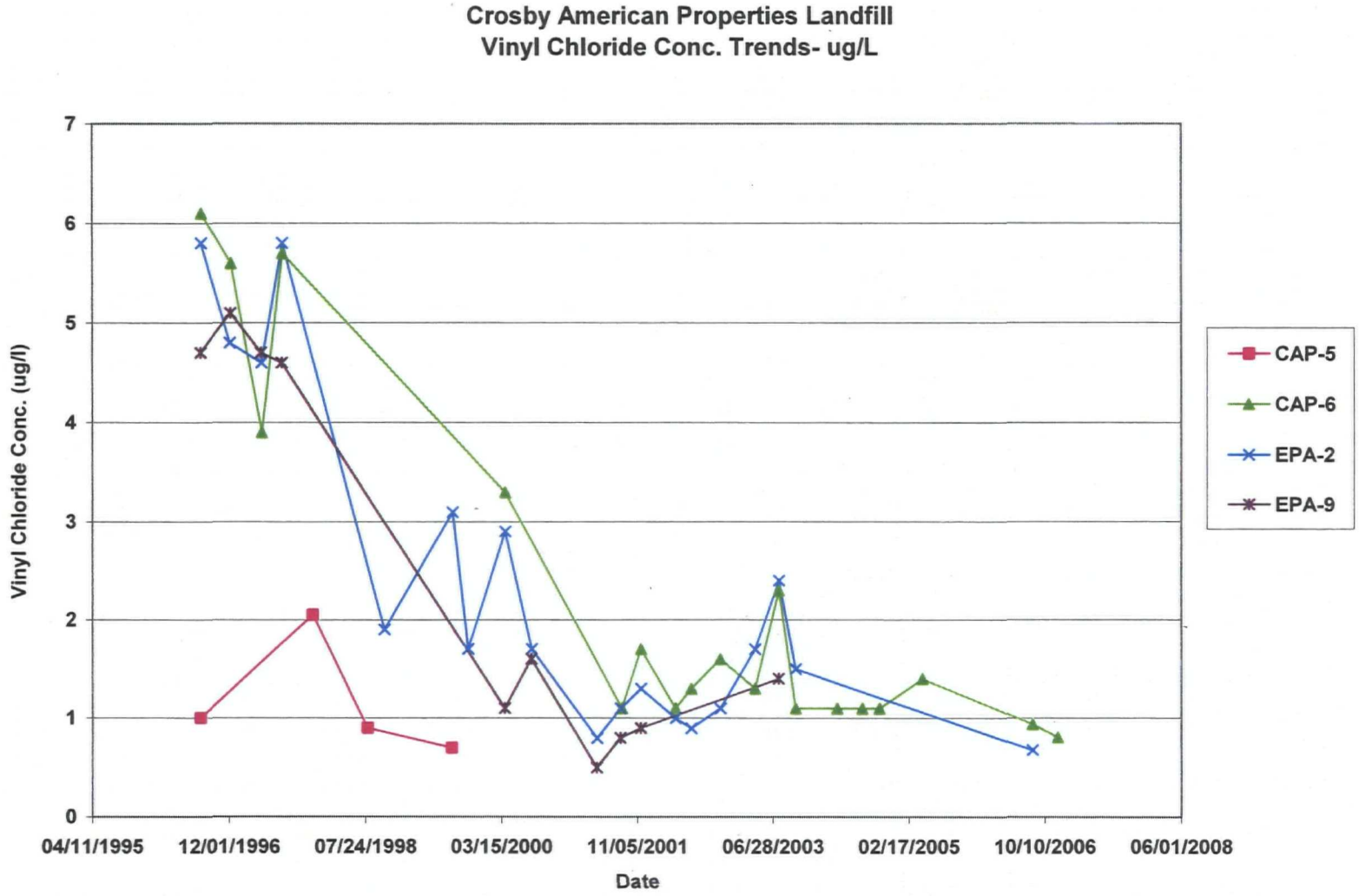
Attachment 9
Pine Bend Sanitary Landfill PCE and TCE Degradation Products

PCE and TCE Degradation Products and R21 Tracer in Shallow Wells and Pipeline Sping
Distance Versus Concentration - Fall 2008



Attachment 10

Crosby American Properties Landfill Vinyl Chloride Trends


Crosby American Properties Landfill
Vinyl Chloride Conc. Trends- ug/L
Vinyl Chloride Conc. (ug/l)
0
1
2
3
4
5
6
7
04/11/1995
12/01/1996
07/24/1998
03/15/2000
11/05/2001
06/28/2003
02/17/2005
10/10/2006
06/01/2008
Date
CAP-5
CAP-6
EPA-2
EPA-9

Attachment 11
Minnesota Special Well Construction Area Map

Institutional Controls
Minnesota Special Well Construction Areas

Superfund
U.S. Environmental Protection Agency

Pine Bend Sanitary Landfill
Dakota County, MN

EPA ID# MND000245795

Legend

- Wells with Exceedances: Pine Bend Landfill**
- Wells with Exceedances: Crosby American Landfill*
- Other Wells* **
- Pine Bend Landfill site boundary**
- Crosby American Landfill site boundary*
- Crosby American: Limit of Waste*
- Sections with Institutional Controls^

N

Produced by Angela Rozinski
U.S. EPA Region 5 on 01/21/2010
Image Date: 2009

Sources:
* Annual Report 2006, Crosby American Properties Landfill (MPCA)
** Water Quality and Natural Attenuation Monitoring Reports (GES, 2007/2008)
^ Minnesota Dept. of Health and US Public Land Survey (ESRI)

GEOS
Groundwater Evaluation and Optimization System

EPA Disclaimer: Please be advised that areas depicted in the map have been estimated. The map does not create any rights enforceable by any party. EPA may refine or change this data and map at any time.

Attachment 12

Crosby American Properties Summary of Groundwater Exceedances

Crosby American Properties Landfill
Summary of Groundwater Exceedances

Well	DATECOLLECTED	PARAMETER	RESULT	HRL	MCL	LIMIT
CAP-6	17-Aug-06	Vinyl chloride	0.94 ug/L	0.2	2	0.2
CAP-6	07-Dec-06	Vinyl chloride	0.81 ug/L	0.2	2	0.2
EPA-2	17-Aug-06	Arsenic	20 ug/L		10	10
EPA-2	17-Aug-06	Vinyl chloride	0.68 ug/L	0.2	2	0.2
CAP-6B	17-Aug-06	Vinyl chloride	0.95 ug/L	0.2	2	0.2
CAP-6B	07-Dec-06	Vinyl chloride	0.95 ug/L	0.2	2	0.2

HRL – Health Risk Limit
MCL = Maximum Contaminate Limit