

# EXPLOSIVE GAS MONITORING PLAN ST. BERNARD LANDFILL

Presented To:

**Village of St. Bernard**



110 Washington Avenue  
St. Bernard, Ohio 45217  
(513) 242-7770

Presented By:

**SCS Engineers**  
2060 Reading Road, Suite 200  
Cincinnati, OH 45202  
(513) 421-5353

December 5, 2014  
File No. 23212007.02

Revised June 2015

**EXPLOSIVE GAS MIGRATION MONITORING PLAN APPLICATION FORM  
FACILITY DATA SHEET**

Name of Applicant Village of St. Bernard, Ohio Owner  X  
Operator  X  
Name of Sanitary Landfill Facility Former City of St. Bernard Landfill (known as Ludlow Grove Park)  
Address of Facility 0 Ludlow Avenue, St. Bernard, Ohio 45177  
(number, street or route, city, zip code)

County Hamilton Township N/A

Exact Location South of Bank Avenue Subdivision and East of I-75

Status of Facility:     Proposed                      No. of Occupied Structures: 9 within 200 ft.  
                               Operating    232 within 1000 ft.  
                               Closed

**Facility Operator or Licensee:** (Person legally responsible for the operation)

Name Village of St. Bernard Street, R.D. # or Box# 110 Washington Avenue  
City St. Bernard State Ohio Zip 45217  
Telephone (513) 242-7770  
Any prior landfill experience?     Yes     No    If yes, explain. \_\_\_\_\_

**Landowner/Lessee/or Person who has control of the land:**

Name: Village of St. Bernard Street, R.D. # or Box# 110 Washington Avenue  
City: St. Bernard State: Ohio Zip 45217  
Telephone (513) 242-7770

**Designer:**

Name SCS Engineers  
Street, R.D. # or Box # 2060 Reading Road, Suite 200  
City Cincinnati State Ohio Zip 45202  
Reg. Engineer James Walsh Reg. Surveyor N/A  
Reg. No. E-44053 Reg. No. N/A

Any prior explosive gas monitoring system design experience?  
 Yes     No  
If yes, explain. Many landfill PTI applications and explosive gas plans in Ohio.

TABLE OF CONTENTS

	<u>Page</u>
1.0 EXPLOSIVE GAS MONITORING SYSTEM DESIGN.....	1
1.1 COMPLETED APPLICATION FORM AND NAME CLARIFICATION.....	1
1.2 PREVIOUSLY PREPARED EXPLOSIVE GAS PLANS.....	1
1.3 SUMMARY OF SITE ENVIRONS.....	2
1.3.1 Detailed Topographical Information.....	7
1.3.2 Property Boundary and Facility Boundary, Horizontal Limits of Waste Placement..	8
1.3.3 Two Hundred and One-Thousand Foot Offsets.....	9
1.3.4 Property Boundaries, Property Ownership, Political Subdivisions and Zoning.....	9
1.3.5 On-Site and Off-Site Structures Within 1,000 Feet.....	9
1.3.6 Potential Manmade Explosive Gas Migration Pathways.....	10
1.4. GEOLOGICAL INFORMATION.....	10
1.4.1 Groundwater Table and Depth.....	10
1.4.2 Site and Surrounding Area Topography, Geology .....	11
1.4.3 Natural Barrier to Gas Migration.....	12
1.4.4 Potential Explosive Gas Migration Pathways.....	13
1.4.4.1 Primary Pathways of Concern - North.....	13
1.4.4.2 Primary Pathways of Concern - Southeast.....	15
1.4.4.3 Primary Pathways of Concern -West.....	15
1.4.5 Geologic Cross Sections .....	16
1.5 OTHER SOURCES OF EXPLOSIVE GAS .....	17
1.6 LANDFILL CHARACTERISTICS .....	18
1.6.1 Depth of Waste and Excavation.....	18
1.6.2 Historical Operations .....	18
1.6.3 Types of Waste .....	21
1.6.4 Landfill Construction.....	21
1.6.5 Gas Extraction System.....	22
1.6.6 Existing Explosive Gas Monitoring System.....	23
1.7 EXPLOSIVE GAS GENERATION POTENTIAL.....	25
1.8 EXPLOSIVE GAS MONITORING PLAN .....	26
1.8.1 Proposed Permanent Monitoring Network .....	26
1.8.2 Methods of Construction.....	27
1.8.3 Proposed Installation and Implementation Schedule.....	29
1.8.4 Procedure for Abandonment of Permanent Monitors.....	29
1.9 PURPOSE AND RATIONALE BEHIND THE EXPLOSIVE GAS MONITORING SYSTEM.....	30
2.0 EXPLOSIVE GAS MONITORING, SAMPLING AND REPORTING .....	31
2.1 MONITORING, SAMPLING, AND REPORTING PROCEDURES .....	31
2.1.1 Monitoring Frequency .....	31
2.1.2 Monitoring Parameters.....	31
2.1.3 Monitoring Equipment.....	32
2.1.3.1 Equipment Type .....	32

2.1.3.2 Equipment Maintenance and Calibration .....	33
2.1.4 Monitoring Procedures.....	33
2.1.5 Validation of Data.....	35
2.1.6 Data Reporting.....	36
2.2 EVALUATION OF MONITORING RESULTS .....	36
2.3 CONTINGENCY PLAN .....	37
2.4 DISCONTINUATION OF CONTINGENCY PLAN .....	40
2.6 CERTIFICATION REPORT.....	41
2.7 MODIFICATION OF THE MONITORING SYSTEM.....	41
2.8 ABANDONMENT OF EXPLOSIVE GAS MONITORING SYSTEM.....	42

## FIGURES

### Figure No.

- 1 Site Vicinity Plan
- 2 Site and Vicinity Aerial Map
- 3 Site Map
- 4 Existing Monitoring Network
- 5 Proposed Monitoring Network
- 6 200 and 1,000 Foot Off-sets from the Landfill
- 7 Man Made Migration Pathways (Other Sources of Combustible Gas)
- 8 CEC 2011 Northern Geologic Cross Section

## LIST OF APPENDICES

### Appendix

- A Reporting Forms
- B Letters of Notification
- C Geologic Boring Logs
- D (reserved for) Certification Reports
- E Monitoring Results
- F Property Description

## **1.0 EXPLOSIVE GAS MONITORING SYSTEM DESIGN**

### **1.1 COMPLETED APPLICATION FORM AND NAME CLARIFICATION.**

OAC 3745-27-12 (D)(1)

The completed application form is provided at the front of this document. It is noted throughout this document that the Village of St. Bernard was formally classified as a City prior to April 2011. Therefore, past references in this document remain attributed to the City of St. Bernard, while present day references will refer to the Village of St. Bernard.

### **1.2 PREVIOUSLY PREPARED EXPLOSIVE GAS PLANS**

Previously prepared and approved explosive gas monitoring plans and system design reports are extensively referenced throughout this revised Plan. These plans and reports are identified as follows:

- Explosive Gas Monitoring, Sampling, and Reporting Procedures, St. Bernard Landfill, October 4, 1991.
- Explosive Gas Monitoring System Design, St. Bernard Landfill, October 4, 1991.
- Explosive Gas Monitoring Plan, Former City of St. Bernard Landfill, CEC, November 18, 2011.

It is noted that various items of information presented in these documents with respect to landfill history, disposal practices, waste composition, and waste streams accepted cannot be presently verified, nor do they appear to be supported by documentation or historical data. However, these documents as a whole are nonetheless useful for the purposes of overall evaluation of explosive gas migration at the site. Various report figures, site maps, drawings, and illustrations from these previously prepared plans are also utilized throughout this updated Plan where applicable and appropriate.

### 1.3 SUMMARY OF SITE ENVIRONS

OAC 3745-27-12 (D)(2)

This updated Explosive Gas Monitoring Plan (Plan) was prepared for the former City of St. Bernard (City) Landfill, now known as Ludlow Grove Park. The landfill is located at the end of Phillips Avenue in the Village of St. Bernard. The former landfill lies immediately east of Interstate I-75, and is adjacent to the Bank Avenue residential subdivision. The portion of the subdivision closest to the landfill is commonly referred to as “Phase II”. The primary use of the facility currently is as a Village park including soccer fields and associated green space. An area map depicting the site location is provided as Figure 1.

The landfill is located within an area of the Village with a significant history of industrial use. Accounts of development reflect industrial use as early as the late 1800s and continuing through the late 1970s. Industrial facilities within the immediate vicinity included those used for the production of animal hides, starch, glues, fertilizers, electrical equipment, and greenhouse products. These are documented within historical accounts of the area maintained and published by the Village.<sup>1</sup>

In the late 1970s and early 1980s, the City (now Village) began the process of acquiring various industrial properties with the intent of converting the area outside of the solid waste landfill to a residential area. Prior to residential development, the area adjacent to the landfill was used as a soccer and baseball field. Anecdotal information suggests that the industrial structures were demolished with demolition materials used to fill what is now land occupied by residential structures. Observations within the area, both surficial and subsurface, support this account. An aerial photo of the landfill in relation to the former industrial complex is provided as Figure 2.

The precise use and history of the landfill is not well known. However, anecdotal information suggests that it was used as an ash and “by-pass” disposal facility for the former City of St. Bernard municipal solid waste incinerator, as well as disposal of construction and demolition

---

1. Referenced from the document titled: *St. Bernard, Ohio, 1878-1978*. This document is a historical account of the area formerly known as Ludlow Grove.

debris generated within the City. Aerial photographic records indicate that the landfill was generally maintained as an open disposal area with limited waste volumes disposed throughout its operating history. Although the volume of waste material in-place and predominant waste composition is not known, positive detection of methane gas along the northern perimeter of the facility does suggest that at least some portion was organic and capable of generating explosive levels of methane gas.

By letter dated May 5, 1977, Ohio EPA confirmed that the landfill was closed. Capping of the landfill was conducted during the period of 1981 through 1985. Photographic records indicate the cap was placed as early as 1981. Information obtained from the Village of St. Bernard indicates that approximately five to six feet of cover material was applied over the fill area, which was then seeded and landscaped for use as a public park. This information was supported by observations recorded in November 2010 during installation of two power poles within the footprint of the landfill cover. At least six feet of clean cohesive cover material was observed and photographed in boreholes, thereby supporting reported cover operations.

Currently, the cap is maintained in excellent condition. No settlement, leachate seeps, gas seeps, or other common problems associated with closed landfills have been observed on-site since routine gas monitoring was resumed in July 2000.

At the request of the Ohio EPA, efforts to monitor landfill gas were initiated in the early 1990s by the Village, including installation of six gas-monitoring probes along the northern margin of the landfill. These probes were originally designated MP-1 through MP-6. The monitoring probes were proposed to be installed between the assumed limit of waste and adjacent residential structures. MP-1 appears to be located outside of previous fill limits. Former probes MP-2 (now designated SP-2) through MP-6 (now designated SP-6R) were of limited use in assessing off-site migration as they appear to be in direct contact with (or very near) waste fill.

Initial sampling of these six monitoring probes was conducted by Foppe Thelen Group, Inc. during selected periods from 1991 through 1994. Sampling indicated elevated concentrations of combustible gas, and in some instances, concentrations at or in excess of the lower explosive

limit (LEL) for methane. Although total combustible gas percentages were not recorded, concentrations of at least 5% by volume were measured in several probes and the potential for off-site migration of landfill gas was identified at that time.

In July 2000, the City retained Civil & Environmental Consultants, Inc. (CEC) for engineering services associated with assessment of potential risk associated with off-site gas migration. The scope of these services was initially limited to sampling of the original six monitoring probes (MP-1 through MP-6) to validate previous sampling results. Sampling results indicated combustible gas concentrations in excess of 5% in several probes. Additional work resulting from the initial sampling effort included installation of numerous additional gas probes, analytical sampling of landfill gas within the monitoring network (including analysis of toxic organic vapors), and installation of a gas extraction system.

Installation of additional probes (MP-7 through MP-13) was completed in April 2001. In addition, installation of a vacuum line that was attached to original gas probes MP-2 through MP-6 was completed in April 2001, effectively converting these probes to vacuum extraction wells. At that time, these probes were changed from compliance monitoring probes and subsequently identified as extraction wells (with an applicable "EW" designation) within subsequent monitoring reports.

Following activation of this original extraction system, gas levels continued to decline in the compliance monitoring network with the exception of probe MP-7 which continued to indicate elevated levels of combustible gas. In all other compliance probes, compliance was routinely reported after December 2001 with the exception of sporadic exceedances in probes MP-11, MP-12, and MP-13 which were corrected following extraction system adjustments (it is noted that these sporadic exceedances were ultimately traced to accumulation of groundwater in former extraction well EW-3 (now designated SP-3R)). In July 2002, two supplemental probes were installed adjacent to MP-7 (MP-7A and MP-7B) in an effort to better define gas concentrations within this area. Gas levels fluctuated in compliance probes MP-7, MP-7A and MP-7B for a period of several months. In November 2002, two additional probes, MP-7C and MP-7D were installed to further refine gas concentration data. Data from the probes was then studied for a



period of several months. After the initial period of study, monitoring continued, with the data through April 2004 submitted to Ohio EPA.

In April 2004, a temporary gas probe network (T-1 through T-16) was installed on the landfill side of the MP-7 series of probes in an effort to better define gas concentrations as well as possible migration patterns in this area. The network was monitored bi-weekly for two months following installation. Analysis of data compiled during this monitoring period indicated a rather well defined area of elevated gas concentrations within approximately 10 feet of the MP-7 series of probes (note probes MP-7C and MP-7A were used in this evaluation and have subsequently been removed along with T-1 through T-16). Therefore, the former landfill remains as a potential source of gas generation, and data collected suggested that isolated sources of gas generation may have been present outside of what is identified as the landfill footprint.

As a variety of mechanical and operational adjustments to the existing gas extraction system did not satisfactorily reduce gas concentrations in this area, installation of a gas cutoff trench was selected as the next step in the mitigation effort. The intent of this installation was threefold:

- To excavate and remove organic materials that may be contributing to gas generation immediately adjacent to the affected monitoring probes;
- To excavate and remove large inert demolition debris which may promote migration of explosive gas; and
- To install a low-permeability barrier such that migration pathways from the landfill to the affected probes would be disrupted to the extent practical.

The trench was excavated to a depth of 10 to 12 feet and 3 to 5 feet wide. The total length of the trench was approximately 48 feet (see Figure 4). Trench alignment was configured such that the series of temporary monitoring probes on the landfill side of the trench (T-7 through T-15) was preserved to the extent practical. Compliance probes MP-7C and MP-7D located on the residential side of the trench were replaced with probes MP-7E and MP-7F, which were installed on September 14, 2004, and have been supplemented with a third probe designated MP-7G installed in 2010.

Following installation of the trench, several important observations were noted. First, explosive gas concentrations on the residential side of the trench increased rapidly (in excess of 40% combustible gas by volume), with those on the landfill side remaining at or near 0%. This suggested that a potential source of combustible gas (i.e., putrescible material) existed outside of both the current property limits and footprint of the landfill. The presence of these materials was confirmed in December 2010 following excavation of four exploratory trenches within the rear yard of 429 Bank Avenue. Although limited in volume, these putrescible materials, which consisted principally of wood debris unrelated to waste fill, were present in sufficient volume to release limited volumes of methane. This methane was then released to, and detected within, the property line monitoring probes.

In December 2004, a temporary vacuum line was extended to MP-7E, which immediately reduced gas concentration in MP-7E and MP-7F to below the 5% compliance threshold with the exception of one isolated excursion (August 17, 2009 at 11% methane by volume). It is noted that vacuum was removed prior to any compliance sampling activity (24 hours prior) per the request of Ohio EPA.

In June 2007, elevated levels of combustible gas were observed in MP-8. These levels fluctuated through the remainder of 2007 and a supplemental probe (MP-8A) was installed in October 2007. Observed gas levels in each probe fluctuated considerably through December 2008 when a second supplemental probe (MP-8B) was installed. Over various time periods, vacuum was applied to MP-8A and MP-8B in an effort to reduce observed concentrations. These efforts proved ineffective and this series of probes continued to exhibit gas concentrations above 5% on a routine basis. The impact of the cut-off wall installation adjacent to the MP-7 series probes on the MP-8 series of probes was thoroughly considered and may have contributed to the observed gas levels. Furthermore, boring data obtained immediately adjacent to MP-8A and MP-8B indicated the presence of minor quantities of organic (wood) debris which may have represented a localized and limited source of gas generation directly impacting these probes. The Delineation Investigation performed in 2013 showed that the two layers of soil fill placed to raise the ground level to the current elevation in the Bank Avenue development adjacent to the landfill contain small amounts of non-soil debris, including wood.

In November 2010, installation of a new perimeter gas extraction system was initiated. This system was completed and activated in April 2011. This system, as well as the current network of compliance probes and monitoring locations may be referenced on Figure 4. For the past three years (2012-2014), this extraction system has resulted in maintenance of compliant gas levels within the majority of the monitoring network with the exception of probes MP-7E, MP-8D, MP-8F, MP-9, MP-10, and MP-16 which have exhibited seasonal elevated gas levels.

In June 2012, in order to address a number of threshold limit exceedances in the 8-series probes an approximately 5-foot wide and 50-foot long trench (as shown on Figure 4) was excavated. This excavation resulted in the removal of probes MP-8, MP-8A, MP-8B, and MP-8C. The excavation was backfilled with clean granular soil fill and replacement probes MP-8D, MP-8E, MP-8F, and MP-8G were installed in the backfilled trench. The excavation removed the organic materials contained in the original soil fill that were immediately adjacent to the initial MP-8 series probes.

On August 23, 2013, the two half-horsepower blowers that supplied vacuum to the extraction system were replaced by a single one-horsepower blower. The objective of the installation of the higher capacity blower was to apply additional vacuum on the horizontal collector system.

### 1.3.1 Detailed Topographical Information

#### OAC 3745-27-12 (D)(2)(a)

Site topography is provided on Figure 3. The information required by OAC 3745-27-12 (D)(2)(a)(i) through (vi) is presented in the following sections and/or shown on the figures described in the following sections.

### 1.3.2 Property Boundary and Facility Boundary, Horizontal Limits of Waste Placement OAC 3745-27-12 (D)(2)(a)(i)

The landfill property is situated on several property parcels acquired by the City of St. Bernard since the early 1940s. Major revision to property boundaries occurred in the early 1940s with construction of the Mill Creek Expressway (Interstate-75), and again in the late 1970s and early 1980s with development of the Bank Avenue Subdivision. A legal description of the current landfill property parcels is presented in Appendix F. Landfill parcel boundaries and the property boundaries, property owners, and parcel identification numbers of properties within 1,000 feet of the limits of waste are provided on Figure 6.

The basis for assignment of the horizontal extent of the landfill is based upon review of historical site photos, topographic maps, and similar available documentation and the test pits performed for the Delineation Investigation. An Aerial Photographic Analysis Report dated November 1, 2012 was prepared by Environmental Research, Inc. (ERI) and detailed the development of the Landfill and surrounding areas from 1946 to 2009. There is general agreement on the extent of the landfill along its eastern, southern, and western boundaries. The eastern boundary is approximately the intersection of the flat surface of the closed landfill and the hillside slope parallel with the access road along the former canal right of way. The southern boundary is roughly parallel to the tree line on the hillside south of the landfill. The western boundary is approximately the base of the slope between the flat surface of the closed landfill and the I-75 shoulder. The Village of St. Bernard has determined that the northern boundary of the landfill is located within the limits of the Village owned property parcel(s) which contain the landfill, with the exception of a localized extension into the backyard of the property located at 441 Bank Avenue. With the completion of the remediation of the backyard of 441 Bank Avenue, the landfill limits of waste have been moved to the south and revert to within the landfill property.

The landfill property parcel boundaries, facility boundary, and limits of waste placement are shown on Figures 3 and 6.

### 1.3.3 Two Hundred and One-Thousand Foot Offsets

OAC 3745-27-12 (D)(2)(a)(ii)

A vicinity plan depicting the 200 and 1,000 foot offsets from the landfill limits of waste is provided on Figure 6. The property parcels boundaries, the facility boundary, and limits of waste placement are shown on Figure 6.

### 1.3.4 Property Boundaries, Property Ownership, Political Subdivisions and Zoning

OAC 3745-27-12 (D)(2)(a)(iii) & (iv)

Property boundaries within 1,000 feet of the landfill are illustrated on Figure 6. Properties within 1,000 feet of the landfill are generally bounded by Ross Avenue to the North, Andalus Avenue to the East, and Vine Street to the South. Detailed information of property owners immediately adjacent to the landfill along Bank Avenue is provided on Figure 4.

The properties located within 1,000 feet of the landfill property are primarily within the Village of St. Bernard, with some properties to the west located in the City of Cincinnati. Political boundaries, zoning and related boundary information may be referenced on Figure 6. Zoning for the landfill parcel and adjacent areas is primarily residential (R-1 and R-2). The zoning of the parcels listed in the table on Figure 6 are shown by the color of the text within the table.

### 1.3.5 On-Site and Off-Site Structures Within 1,000 Feet

OAC 3745-27-12 (D)(2)(a)(iv)

On-site and off-site structures within 1,000 feet of the landfill are depicted on Figure 6. The single on-site structure is a passively ventilated restroom facility which services the soccer fields.

Verification of on-site and off-site structures was conducted through review of Hamilton County CAGIS and property tax data following a graphical offset of limits of waste placement.

Other sources of explosive gas are described in Section 1.6 below.

### 1.3.6 Potential Manmade Explosive Gas Migration Pathways

OAC 3745-27-12 (D)(2)(a)(v)

Potential manmade pathways include various storm sewers, sanitary sewers, and drainage tiles. The approximate position and alignment of the storm sewers is based on a visual investigation of manholes and inlets, and is therefore an estimation of actual alignment. Other pathways include underground service utilities (water, electric, natural gas, etc.) servicing the park restroom, as well as adjoining properties. The known locations of potential manmade explosive gas migration pathways are illustrated on Figure 7. Mapping for all the pathways listed above is not available from the utilities directly or Hamilton County GIS records.

The 6-inch corrugated drain tile identified on Figure 7 was not located by survey, but was encountered during installation of vacuum piping in the vicinity of one of the 7-series wells. No record for installation of this tile was recorded by the City. The alignment of the exposed portion of the tile suggested that it roughly parallels the toe of the landfill slope. This tile discharges into the storm sewer inlet (formerly SS-7) behind 441 Bank Avenue; however, no inlet structure was found. Further discussion of the tile as a migration pathway is presented in Section 1.4.4.1.

A 12-inch corrugated metal culvert was located adjacent to monitoring probe MP-7H during installation of the perimeter extraction system. The purpose or extent of this culvert is not known and initial sampling during construction activities did not indicate the presence of combustible gas.

## 1.4. GEOLOGICAL INFORMATION

OAC 3745-27-12 (D)(2)(c)

### 1.4.1 Groundwater Table and Depth

Considerable variation in groundwater levels along the northern boundary of the landfill has been recorded through measurement of static water levels in gas monitoring probes and

extraction wells. Although approximate water table elevations identified in the 1991 Design Report suggested groundwater elevations are approximately 10 to 15 feet below ground surface, measurement in the monitoring probes indicate that the groundwater table is responsive to precipitation, and varies based on location and climatic (barometric pressure, etc.) conditions. Water levels are shown for the probes depicted on the geologic cross section along the northern perimeter of the landfill presented as Figure 8.

Generally, this area of the site collects stormwater runoff from the park soccer fields, as well as hillside runoff upslope from Phillips Avenue. Anecdotal information from local residents and City (now Village) officials indicates that the area in which monitoring probes MP-7H through MP-11 are currently located was formerly a very wet “swampy” area prior to the construction of the Bank Avenue subdivision. The addition of stormwater drainage utilities has apparently eased this condition; however, probe data suggest that groundwater elevations along this margin of the landfill are quite responsive to wet weather.

In general, wet weather and subsequent groundwater table response is anticipated to affect landfill gas movement as well as gas extraction efficiency.

#### 1.4.2 Site and Surrounding Area Topography, Geology

OAC 3745-27-12 (D)(2)(c)(ii)

The topography of the landfill and surrounding area generally consists of a series of hillside terraces transitioning to a lower flatland now developed for residential housing (Bank Avenue Subdivision). The landfill itself has been converted to a large flat terrace which is used as an athletic field. Area topography is depicted on Figure 4.

With respect to regional geology, the site is situated on the southeast edge of the Mill Creek Valley. The regional geology reflects multiple glacial advances and is consistent with a glacial outwash valley. Generally, regional geologic sequences consist of glacial valleys incised within Ordovician bedrock formations. These valley fills consist of highly variable interbedded sands, gravels, clays, silts, boulders, and cobbles.

With respect to site specific geology, the most significant feature includes a glacial till/outwash sequence which appears to form the base of the site. This unit is predominated by low permeability clays and or silts interbedded with silty sands within the areas investigated. Both oxidized and non-oxidized native materials have been found at depth, suggesting deposition in multiple sequences.

Although interbedded sands represent a potential zone of migration, those materials examined via borings were saturated and included a high percentage of silt (estimated at 40 percent or higher). As such, although classified as granular material, the potential for large scale gas transmission is seen as limited.

#### 1.4.3 Natural Barrier to Gas Migration

OAC 3745-27-12 (D)(2)(c)(iii)

The native soil underlying the fill acts as a natural barrier to gas migration. No consistent geologic trend or formation has been identified along the perimeter of the site other than this soft, saturated silty sand/sandy clay formation into which the majority of monitoring probes were advanced and terminated. The elevation of this formation varies, and may be referenced on the geologic section provided on Figure 8. Fill material and a variety of clayey soils predominate in the interval above this unit.

Generally, considering the silt content and degree of saturation observed within this unit, it represents a likely barrier to downward gas migration. The overlying fill material is likely the predominant transmissive zone, and is believed to be the primary unit of interest with respect to gas migration and control. In addition, the presence of the wood and similar organic debris recorded in monitoring probe installation logs and the Delineation Investigation test pit logs indicates that said organic content may support limited generation of methane gas.



#### 1.4.4 Potential Explosive Gas Migration Pathways

OAC 3745-27-12 (D)(2)(c)(iv)

Several potential explosive gas pathways have been identified at the former landfill. However, it is noted that the analysis of pathway risk includes consideration of the nature of the landfill, its relatively small size, and limited gas production observed to date. The gas generation potential of the landfill is further discussed in Section 1.8. Several pathways, while present, represent low or minimal risk to structures due to these factors. The analysis also considers the unique topography associated with the immediate area, and physical barriers or likely points of atmospheric discharge for accumulated gas that this topography provides. The focus of monitoring and data evaluation should be focused on the northern perimeter of the site where the former landfill property limits are contiguous with several Bank Avenue residential properties. There are some pathways that exist within the landfill and potentially connect to pathways at the perimeter of the landfill (Figures 4 and 7). These pathways include the storm sewer along the western edge of the landfill that drains the landfill surface, and the water and sanitary sewer lines that serve the restroom building. The line connecting the high water alarm in the condensate tank to the control unit mounted on the restroom building could also be considered a potential pathway. A brief discussion of pathways identified along the perimeter of the landfill is presented in the following narrative.

##### 1.4.4.1 Primary Pathways of Concern - North

The primary pathways of concern lie along the northern perimeter of the site, where the former landfill property lines are contiguous with several residential properties along Bank Avenue. Essentially, this area consists of a flat terrace, projecting out from the toe of the landfill slope and transitioning into the back yards of the Bank Avenue residences. This terrace was raised to its current elevation by the placement of two generations of fill. The fill soils, in particular the lower fill, contain hard fill and miscellaneous debris. As a result, the near surface geologic profile of this terrace is quite varied. This fill is assumed to be the primary route for any potential gas migration along this boundary of the site. While the exact extent of fill placement beyond site property boundaries is not known, reports, City Council meeting minutes, etc.

suggest that fill material was placed through the Bank Avenue development adjacent to the landfill to raise the grade for the soccer and baseball field, prior to the second fill layer to raise the grade for the later Bank Avenue development.

The fill is underlain by undisturbed geologic formations consisting of saturated silty sand and/or sandy clays. This underlying formation appears to serve as a lower bound for any gas migration. Borehole logs indicate that this underlying formation is typically very moist to wet. Blow counts suggest a normally consolidated formation, possibly indicating backwater or floodplain deposits that may have been associated with the Mill Creek Valley.

In addition to the fill, stormwater utilities are also located along this northern property boundary, and represent potential gas migration pathways. The location and description of these utilities may be referenced on Figures 4 and 7. In addition to these mapped utilities, a previously unidentified corrugated polyethylene drain tile was also located during installation of vacuum lines in the vicinity of extraction well EW-7. This 6-inch tile roughly parallels the toe of the landfill slope and also represents a potential gas migration pathway. No record of installation for the tile is known to exist. The outlet of the drain tile is located at the stormwater inlet (labeled as INV. 496.68-8"E) located between probes MP-10 and MP-11 (SS-R). No defined surface inlet structure related to this drain tile has been observed or is known to exist. The tile appears to have been installed as an infiltration device to assist in removal of ponding water which accumulates along the toe of the landfill slope. Since discovery of this drain tile, explosive gas readings have been monitored at the outlet during periodic gas monitoring. To date, no explosive gas has been measured above detection limits.

In addition to stormwater utilities located on-site along this site perimeter, off-site storm drains along Bank Avenue have previously been monitored for evidence of gas accumulations. To date, no methane has been detected in storm drains located on Bank Avenue from June 2000 through 2014. Other underground utilities are present along Bank Avenue, including sanitary sewer, electric, phone, cable, water, and natural gas, that could represent potential pathways. The locations of the sanitary and storm sewers are shown on Figure 7. Mapping for the other utilities along Bank Avenue are not readily available.

To address the identified potential for migration through subsurface utilities, the addition and/or maintenance of existing combustible gas indicators (CGIs) within structures located within 200 feet of the landfill property boundary is recommended as a component of this Plan, contingent on approval for the installation by the building owners and/or occupants.

#### 1.4.4.2 Primary Pathways of Concern - Southeast

Along the southern margin of the site, a hillside spring is present, indicating a zone of increased transmissivity within the hillside geologic formation. However, the outlet of the spring is located several tens of feet above the surface of the landfill cap, thus it is not considered as a potential gas migration pathway. The presence of the spring suggests that a natural geological barrier is present, which acts as a lower barrier to movement of groundwater. This barrier would also serve as a barrier to upward migration of landfill gas. Thus the potential for movement of landfill gas upward from the landfill through this barrier is considered limited.

Based on the nature of pathways identified in this direction and topographic conditions, no additional monitoring is recommended along this perimeter of the site.

#### 1.4.4.3 Primary Pathways of Concern -West

The elevation of the landfill and Interstate-75 do not preclude the potential for gas migration assuming appropriate geology and adequate gas pressure is present. While geologic conditions under Interstate-75 were not evaluated for the purposes of this Plan, it is assumed that the geology immediately under Interstate-75 has undergone significant modification during roadway construction. Thus any presumption of continuity for geologic formations that exist adjacent to the landfill may not accurately reflect the nature and extent of potential pathways under Interstate-75. While examination of geologic conditions under Interstate-75 was not undertaken as a component of this Plan, it is conservatively assumed that potential gas pathways may exist.

Assuming the presence of migration pathways, topography must then be considered in the evaluation of migration potential. Examining topography west of the landfill, it is seen that the Mill Creek channel forms a potential barrier to gas migration. Assuming prevailing groundwater table is at or near streambed elevation within the Creek and Creek banks provide sufficient area for discharge of gas to the atmosphere, the Creek represents a limit for gas migration west toward the Vine Street industrial corridor. Also, considering the low level of gas generation and pressure observed within the landfill, the potential for migration under Interstate-75 and across the Mill Creek channel is considered limited.

For structures located east of the Mill Creek but west of Interstate-75, potential migration pathways were also evaluated. A series of commercial structures are located southwest of the landfill. Assuming appropriate geologic conditions exist, potential subsurface migration cannot be discounted. However, structures in this area are constructed slab-on-grade, and the ground surface profile approaches the estimated base elevation of the landfill, thus offering significant opportunities for atmospheric discharge of migrating gas. Combined with the low level of gas pressure observed at the landfill and distance to the structures, migration potential and risk to these structures is also considered low.

Based on these observations and current conditions at the landfill, no need for additional subsurface monitoring west of the landfill is currently recommended. Should additional pathways be installed (e.g. subsurface pipelines or utilities) or significant changes in gas generation be observed, re-evaluation of subsurface monitoring requirements should be performed.

#### 1.4.5 Geologic Cross Sections

OAC 3745-27-12 (D)(2)(c)(vi)

A geologic cross section of the northern perimeter of the site is provided on Figure 8. This cross section depicts borehole information gathered during installation of various gas monitoring probes and other subsurface investigations. It is noted that information provided on this cross-section was developed through extrapolation of borehole information obtained at approximate

50-foot spacing. Based on the heterogeneity of the subsurface within potential transmissive zones, appropriate caution is recommended regarding strict interpretation of geology between borehole locations.

### **1.5 OTHER SOURCES OF EXPLOSIVE GAS**

OAC 3745-27-12 (D)(2)(c)(v)

As previously indicated, organic materials within debris fill, mainly buried wood, may be of sufficient volume to produce measurable quantities of methane gas. As part of the Delineation Investigation, an estimate of the methane potentially generated by the organic material in the soil fill was calculated using a USEPA LandGEM Model. The results of this modeling indicated that the quantity of gas generated did not represent a threat to the residential properties adjacent to the northern boundary of the landfill property. Accumulations of organic material, previously described as peat, are present in the native glacial deposits and decomposition of these materials may generate methane. Test borings have indicated that this material is not horizontally continuous in the site vicinity and, where present, its thickness is less than six inches. In addition, anecdotal reports indicate a significant portion of the site was seasonally inundated or “swampy” prior to development. Swamp deposits that were accumulated then buried during development of the residential subdivision may also represent a potential source of gas generation.

Other non-landfill related sources of explosive gas include yard waste deposits placed by the City along the northeast portion of the site (approximate area of reported disposal area is indicated on Figure 3). While it is reported by City (now Village) personnel that yard waste was accumulated along the surface of this slope and not buried (thus promoting surface discharge of accumulated gases), limited potential exists for contribution to subsurface gas migration. Prior investigation of this area including installation of a monitoring probe at the base of this hillside indicated no significant combustible gas concentrations are present. Based on the location of this area and prior investigation results, no further monitoring of this area is deemed necessary.

With respect to public utilities, natural gas supply and sanitary sewer lines serving residences are identified as a potential off-site source of explosive gas. These utilities are located in the Bank

Avenue right-of-way and are not considered significant with respect to assessment of gas migration from the landfill. No other potential off-site sources of explosive gas have been identified at this time.

## **1.6 LANDFILL CHARACTERISTICS**

OAC 3745-27-12 (D)(3)

### **1.6.1 Depth of Waste and Excavation**

OAC 3745-27-12 (D)(3)(a) & (b)

No recorded information is known to exist with respect to the depth of waste or excavations associated with the former landfill. Anecdotal information from various parties contained in the 1991 Design Report suggests that the landfill was developed principally as an area fill with limited excavation, if any. Previous research regarding landfill depth and methods of disposal was described in Section 3.0 of the 1991 Foppe Thelen Design Report and is summarized below. The present top surface of the landfill varies from 516 to 520 feet in elevation. Topographic maps of the area prior to commencement of landfill activities were obtained (Hamilton County, 1914, 1959). Both the 1914 and 1959 maps indicate that the surface of the landfill area, prior to filling, was at an elevation of less than 495 feet but greater than 490 feet. This is consistent with the boreholes and test pits mentioned previously which indicate an elevation of 491 to 493 feet ( $\pm$ ). Therefore; the depth of the landfill is estimated to vary between 23 and 29 feet.

### **1.6.2 Historical Operations**

OAC 3745-27-12 (D)(3)(c)

As previously indicated, historical operating information is related primarily to anecdotal information from City (now Village) officials or residents of the area. This information was described in Section 3.3 of the 1991 Foppe Thelen Design Report and is summarized below. The land occupied by the landfill has been owned by the City of St. Bernard since 1945. The City acquired the land from E. I. DuPont Company. The City began controlled waste disposal sometime prior to 1958 as indicated by 1958 aerial photographs acquired from Hamilton County.

No permits or other authorization were obtained prior to 1958. A summary of regulatory authorizations is presented below.

<b>Date</b>	<b>Document</b>
May 5, 1977	Acknowledgement of Closure
April 14, 2003	Director's Final Finding and Orders
May 18, 2004	OAC 3745-27-13 Authorization
September 16, 2009	Director's Final Finding and Orders
September 9, 2010	Remedial Action Plan & Response to Comments
June 8, 2011	OAC 3745-27-13 Authorization for ODOT
December 12, 2011	Alteration to Approved EGMP
November 6, 2012	Alteration to Approved EGMP
November 6, 2012	Revised Compliance Probe Monitoring Form
November 6, 2012	Alteration to 1 <sup>st</sup> Remediation Plan
December 17, 2012	Delineation Plan
May 16, 2012	Clarification of MP-8 Series Replacement Probes
May 16, 2012	Approval of 2 <sup>nd</sup> Revision to Explosive Gas Remediation
January 17, 2013	Alteration to Approved EGMP

For several years, the disposed material was not graded or covered but during the later years of operation the material was graded and covered weekly with several feet of soil. Final grade was achieved by covering the landfill area with 3 to 5 feet of clay in 1981, with additional soil added later for the development of the soccer field.

The area occupied by the landfill was for years a vegetable farm and orchard. The landfill began by disposal over the outslope of the Miami and Erie Canal bench. A 1958 aerial photograph and the 1959 topographic map compiled from the photo show a small area of disposal near the southern corner of the area. The canal bench was the disposal point and the disposed material fanned out onto the flat area below. Total area covered was approximately 150 feet wide by 200 feet long. The remainder of the area was orchard and gardens. I-75 had already been

constructed. The subdivision area northeast of the landfill was at this time also gardens except for the eastern 1/3 which was occupied by small warehouses and factories.

A 1973 aerial photograph shows that the landfill was actively receiving disposed material. An access road had been constructed from the canal bench down to the flat along the southwest side. Disposal was apparently still taking place over an approximately 250 foot length extending from the access road northeast along the canal bench. The remainder of this slope between the bench and the flat area is tree covered. Disposed material is seen in a band approximately 200 feet wide parallel to I-75 and running along the western side of the landfill property. This band is approximately 500 feet long, with the end near the present northern boundary of the landfill at the approximate center of the curve in the face. The warehouses and factories are still present.

By letter dated May 5, 1977, the Ohio EPA confirmed that the landfill had been closed.

A pre-1978 aerial photograph shows that the landfill had nearly assumed its present shape. The surface was apparently still receiving material for disposal, but the northern face had already been graded. The disposal area between the canal bench and the flat has already been graded over a length of approximately 350 feet and is grass covered. The undeveloped portion of the subdivision area had been graded and is occupied by a baseball/soccer field. Several of the southernmost factories/warehouses have been demolished.

By 1981, the final grading of the landfill had been completed. The slope area between the canal bench and landfill had been graded and was grass covered. The landfill surface had also been graded to its present configuration. The baseball/soccer field is still present but several more of the factories/warehouses have been demolished.

By 1986, the pine trees along the north face of the landfill were in place, as were the restrooms, storm sewers, and sanitary sewer. The subdivision had already been developed to its present configuration.



### 1.6.3 Types of Waste

OAC 3745-27-12 (D)(3)(d)

No detailed records or similar documentation regarding types of waste received at the facility are known to exist. Information pertaining to waste type was primarily obtained from interviews held with individuals familiar with landfill operations. Information gathered from these interviews is useful in terms of providing a general characterization of materials that may have been disposed. This information is summarized in Section 3.4 of the 1991 Design Report. No physical records of the material placed in the landfill were kept. However, several people familiar with the operation of the landfill were interviewed to determine waste characteristics. The following summarizes what is known about waste disposal at the landfill, based on these interviews.

The City began disposal from the canal bench soon after acquiring the property. Materials disposed included cans, glass, burned refuse from the City's incinerator, construction debris, stoves, refrigerators, tires, empty oil drums, soap manufacturing by-products, grass clippings, tree limbs and kitchen wastes. The oil drums were picked up by the City at local gasoline stations. They were empty and reportedly never contained anything but new oil. The empty drums were crushed with a bulldozer when they were placed in the landfill. The soap manufacturing by-products were materials from Procter & Gamble. These reportedly included soap powder, soap "sludge", and bottles of shampoo and liquid soap. The kitchen wastes also came from Procter & Gamble. These were wastes from Procter & Gamble's in-house cafeterias. There is no evidence that hazardous materials were placed in the landfill.

### 1.6.4 Landfill Construction

OAC 3745-27-12 (D)(3)(e)

Section 1.6.2 above relates what is known about the landfill's construction. No specific details of landfill construction means or methods are available other than historical information gathered from aerial photos and anecdotal information. An Aerial Photographic Analysis Report dated

November 1, 2012 was prepared by Environmental Research, Inc. (ERI) and detailed the development of the Landfill and surrounding areas from 1946 to 2009.

### 1.6.5 Gas Extraction System

OAC 3745-27-12 (D)(3)(f)

As previously indicated, various gas migration control systems have been installed and operated since October 2000. The current system utilizes a series of six extraction “pods” which effectively offer six independently controlled zones where subsurface vacuum may be applied. The combined system provides for continuous vacuum extraction along the perimeter of the landfill that lies adjacent to occupied residential properties.

From October 2000 until April 24, 2013, a pair of explosion proof half-horsepower blowers provided vacuum to the system and were operated individually. After April 24, 2013 and until August 23, 2013, the two blowers were operated simultaneously to apply more vacuum to the horizontal collector system. On August 23, 2013, the two half-horsepower blowers were replaced by a single one-horsepower blower. Vacuum is applied on a continuous basis. The blower assembly is equipped with a flow meter and vacuum gauge to assist in adjustment of operating flow rate and vacuum. The migration control system layout is illustrated on Figure 4. Each pod is equipped with sampling ports facilitating measurement of applied vacuum and gas composition.

Condensate within extraction piping is fed via gravity to a 1,500-gallon receiving tank. Condensate collected within the tank is disposed off-site. A high level alarm, which notifies the Village police department of a high water condition in the tank, was installed on January 28 and 29, 2013.

Ambient air intrusion is anticipated during system operation. Overall, the current system is anticipated to be effective in reducing subsurface gas concentrations in the vicinity of the northern property boundary. However, it is expected to have little influence beyond current landfill property limits.

## 1.6.6 Existing Explosive Gas Monitoring System

OAC 3745-27-12 (D)(3)(g)

The existing gas monitoring system is depicted on Figure 4 and summarized in Table 1. The screened interval depths for the probes are presented in Table 2.

**Table 1  
Landfill Gas Monitoring Network Summary  
St. Bernard Landfill**

Probe ID	Use Category			Former ID
	Compliance	Special Purpose	Extraction	
MP-1	•			
SP-1		•		
SS-1		•		
SP-2		•		EW-2
SP-2R		•		EW-2R
EW-2S			•	
SS-2		•		
SP-3R		•		EW-3R
EW-3S			•	
SS-3		•		
EW-4S			•	
SS-4		•		
EW-5S			•	
SS-5		•		
SP-6R		•		EW-6R
EW-6S			•	
SS-6		•		
MP-7E	•			
MP-7F	•			
MP-7G	•			
MP-7H	•			
MP-7T		•		
SS-7		•		
MP-8R		•		
MP-8AR		•		
MP-8BR		•		
MP-8CR		•		
MP-8D	•			
MP-8E	•			
MP-8F	•			
MP-8G	•			
SS-8		•		
MP-9	•			
SS-9		•		
MP-10	•			
SS-10		•		

Probe ID	Use Category			Former ID
	Compliance	Special Purpose	Extraction	
SS-11		•		
SP-12		•		MP-12
SS-12		•		
SP-14		•		MP-14
EW-14S			•	EW-14S
MP-15	•			MP-15
MP-16	•			MP-16
MP-17	•			
(un-named probe at base of hillside)		•		

Table 2.  
 Probe Screened Interval Depths  
 St. Bernard Landfill

Probe	Top of Screen	Bottom of Screen
	Depth (feet below ground surface)	Depth (feet below ground surface)
MP-1	Not known	Not known
SP-2	Not known	Not known
SP-2R	Not known	≤24
MP-7E	3	14
MP-7F	3	14
MP-7G	2	15
MP-7H	2	15
MP-7T	Not known	Not known
MP-8R	2.5	14
MP-8AR	2.5	13
MP-8BR	2.5	14
MP-8CR	2.5	15
MP-8D	4	14
MP-8E	4	14
MP-8F	4	14
MP-8G	4	14
MP-9	2	12
MP-10	2	12
SP-12	2	17
SP-14	2	15
MP-15	0.8	4
MP-16	2	12
MP-17	3	13

As shown, 14 compliance probes are in use in addition to various special purpose and supplemental observation points which include current extraction wells. Tables summarizing the monitoring of the existing compliance probes for 2011, 2012, 2013, and 2014 (partial) are presented in Appendix E. These tables show that both the number of threshold limit exceedances and the actual methane concentrations of those exceedances have been declining over time. These tables also serve as the basis for the selection of the compliance probes that will remain in the revised monitoring network.

## **1.7 EXPLOSIVE GAS GENERATION POTENTIAL**

OAC 3745-27-12 (D)(4)

The gas generation potential for a municipal solid waste landfill typically peaks at closure and declines over time. The St. Bernard landfill was used primarily to dispose of ash from the City's municipal solid waste incinerator and as a result likely generated less gas during any period of its history compared to a typical solid waste landfill. Further, because the landfill has not accepted waste for over 30 years, the gas generation has decreased considerably from its peak rate.

Based on current monitoring probe sampling data, the potential for explosive gas generation is confirmed. While data compiled through operation of the gas monitoring and extraction system does suggest that gas production is minimal, concentrations sufficient to exceed applicable regulatory thresholds have been present on occasion.

No incidents of odor or snow melt have been reported. No damage to the final cover has been observed. Some distressed/dying trees have been noted, including pine trees planted on the northern side slope of the landfill and trees within the back yards of some of the residences immediately north of the landfill. The impact to the pine trees on the side slopes is likely due to the shallow soil cover being unable to support large mature trees and is not due to landfill gas. Impacted pine trees are located in areas where methane has been detected in the monitoring probes and in areas where methane has not been detected in the monitoring probes. The impact on the trees in the back yards are likely due to the impact of the drought conditions that occurred two or three years ago and is not due to landfill gas.

## 1.8 EXPLOSIVE GAS MONITORING PLAN

OAC 3745-27-12 (D)(5)

### 1.8.1 Proposed Permanent Monitoring Network

OAC 3745-27-12 (D)(5)(a)

A summary of the proposed monitoring locations is provided in Table 3 and the monitoring probes are shown on Figure 5. The probes were selected so that there is a minimum of one probe per each residence. Preference was given to both including probes which had experienced exceedances and creating a uniformly spaced network of probes. For example, both MP-7E and MP-7G have both experienced exceedances, but since two closely spaced probes would have been unnecessary, MP-7E was selected to provide a more evenly spaced network. In addition, each residence within 200 feet of the limits of waste placement (421 through 448 Bank Avenue, excluding 444 Bank Avenue where the owner declined the installation of a CGI) has been equipped with an in-building combustible gas indicator (CGI). An additional CGI is also installed at 426 Bank Avenue. These monitoring locations have been established to provide a redundant level of detection. The location of monitoring probes and in-building CGIs is illustrated on Figure 3. All of the CGIs, with the exception of 441 Bank Avenue, are set to alarm at 10,000 ppm methane (1 percent methane by volume). This is below the regulatory threshold concentration of 1.25 percent methane by volume in occupied structures. The two CGIs installed in 441 Bank Avenue are set to alarm at 2,000 ppm methane (0.2 percent methane by volume).

**Table 3.**  
**Proposed Monitoring Network**  
**St. Bernard Landfill**

Probe	Adjacent Structure
MP-1	448 Bank
MP-7E	429 Bank
MP-7H	425 Bank (and 421 Bank)
MP-8F	433 Bank
MP-9	437 Bank

<b>Probe</b>	<b>Adjacent Structure</b>
MP-10	441 and 437 Bank
MP-16	441 Bank
MP-17	441 Bank

Each monitoring probe is constructed with a bolt-down cover (flush mount) or locking well casing. Existing probes are fitted with quick-connect couplings to facilitate monitoring. Future monitoring probes (if necessary) will be equipped in a similar fashion.

Installation details for the probes may be referenced on borehole logs provided in Appendix C.

The additional monitoring points included as a component of this Plan include the two storm sewer manholes located within the landfill, SS-6 and SS-8.

The former compliance probes not included in the revised network and the special purpose probes included in the existing network will be properly abandoned, as described in Section 1.9.4 below.

The proposed monitoring network described above will become the network of record when this Explosive Gas Monitoring Plan (EGMP) is approved.

### 1.8.2 Methods of Construction

OAC 3745-27-12 (D)(5)(b)

Typical installation details for monitoring probe MP-1 through MP-6 may be referenced on Figure 11, which is presented in Appendix C. No individual installation logs were provided for this original series of probes.

More recent probes were installed using hollow stem rotary augers or direct push methods, with boreholes continuously sampled. Installation details for existing compliance monitoring probes

may be referenced in Appendix C. The screened intervals of the existing probes are presented in Table 2 above.

Future probes will typically be constructed using hollow stem augers with continuous (2-ft interval) split spoon sampling. The auger will be clean and free of foreign materials, solvents, and other substances, which may contaminate groundwater or cause an incorrect explosive gas measurement.

Permanent monitors will typically be screened from two to three feet below grade to the target depth of the permanent monitor, typically the top of the native soil beneath the soil fill. The target depths will be adjusted in the field depending on the conditions encountered. For example, if the water table is encountered within the target depth, the bottom of the screened zone will be raised so that the permanent monitor will not extend into the seasonal low water table.

A person knowledgeable in drilling, installation of permanent monitors, and geology will observe the installation and keep accurate, detailed records on materials encountered and permanent monitor construction. These logs will contain the information listed on an appropriate form. Solvent welded joints will not be used.

The pipe will be capped when backfilling the annular space. The quantities of the various backfill materials will be recorded on the form. The probes will be designated, as MP-xx and the designation will be placed on the interior and exterior of the protective casing for each probe.

A locking protective casing or bolt down flush mount protective casing will be installed for each permanent monitor as soon as possible after the pipe is installed and backfilled. The protective casing is required to minimize the possibility of accidental damage and vandalism. In order to minimize air infiltration during monitoring and also to obtain accurate pressure readings, the top end of the probe riser will be fitted with a PVC end cap with a sample port. The sample port will provide positive closure when not being sampled. The fitting will facilitate a simple connection to the combustible gas indicator's sampling hose.



### 1.8.3 Proposed Installation and Implementation Schedule

OAC 3745-27-12 (D)(5)(c)

The monitoring locations referenced in this Plan are currently installed. No schedule for the abandonment of the former compliance probes not included in the proposed network or the special purpose probes is presented. The Village will have the abandonment performed as soon as practical within regular budgetary considerations.

### 1.8.4 Procedure for Abandonment of Permanent Monitors

OAC 3745-27-12 (D)(5)(d)

In the event that permanent monitoring probes require removal, replacement, or abandonment, the following general procedures will be utilized:

- Open the protective casing and confirm the probe number.
- Carefully fill the casing with bentonite chips, adding water to the casing to hydrate the bentonite as the casing is filled. The bentonite chips will be added so as to avoid introducing fines that could potentially cause bridging at the water surface.
- Using a small excavator, remove the concrete pad (if present) and the protective casing, severing the probe casing below the ground surface in the process.
- If the removal of the concrete pad and protective casing inadvertently removes the probe casing and screen, fill the remaining hole with bentonite, adding water to the hole to hydrate the bentonite as the hole is filled.
- If the top of the probe casing is less than 3 feet below the ground surface, excavate and cut off the probe casing a minimum of 3 feet below the ground surface.
- Place a slip cap on the top of the filled casing. The cap will be glued in place or secured with a screw.
- If the excavation of the protective casing has removed the annular seal, place a minimum of 1 foot of hydrated bentonite chips as a seal above the capped probe casing. If the excavation of the protective casing does not remove the annular seal, a replacement seal does not need to be added.
- Backfill the remaining hole made when the protective casing was removed with any soil excavated with the concrete pad/protective casing, adding clean fill soil as required to return the surface to grade. The areas of disturbed soil would be seeded and mulched with straw to reestablish grass in those areas.

- Dispose of the concrete slabs and protective casings as regular solid waste.

The process of abandonment will be documented by an experienced observer. Photographs will be taken as part of the documentation. A certification report will be prepared and will be inserted to Appendix D in the EGMP. Abandonment will be undertaken only with prior approval of the Ohio EPA. Replacement permanent monitoring probes, if required, will be positioned to provide similar detection capacity to those removed. Any replacement probes will be installed and constructed in accordance with the approved EGMP.

### **1.9 PURPOSE AND RATIONALE BEHIND THE EXPLOSIVE GAS MONITORING SYSTEM**

The purpose of the explosive gas monitoring is the detection of methane gas emanating from the former City landfill. Occupied residences north of the landfill are the primary focus of the monitoring system. Continued implementation of this plan will facilitate detection of potentially explosive gases migrating toward these residences.



## 2.0 EXPLOSIVE GAS MONITORING, SAMPLING AND REPORTING

### 2.1 MONITORING, SAMPLING, AND REPORTING PROCEDURES

OAC 3745-27-12 (E)

#### 2.1.1 Monitoring Frequency

OAC 3745-27-12 (E)(1)

Monitoring of some of the eight compliance probes is currently conducted weekly, while others are monitored monthly. Upon implementation of this EGMP, the monitoring frequency of the eight compliance probes will be changed to monthly. After a period of one (1) year with no exceedances of the Explosive Gas Threshold Limit (EGTL) in the compliance probes, the monitoring frequency will be reduced to quarterly as specified in OAC 3745-27-12(E)(1). Storm Sewers (“SS”) series monitoring points will be tested annually. Based on development of a record of compliance, further reduction of gas monitoring frequency will be in accordance with OAC 3745-27-12(E)(1).

Maintenance and calibration checks of in-building combustible gas indicators (CGIs) will be performed as needed. Re-calibration of in-building CGIs will be performed at least once per year. The maximum alarm set point is 10,000 ppm (1.00 percent by volume) which is less than the Explosive Gas Threshold Limit (EGTL) of 1.25 percent required by regulation. The CGIs in most of the residential properties are set at 10,000 ppm (1.0 percent by volume). The CGIs in one residential property (441 Bank Avenue) are set at 2,000 ppm (0.2 percent by volume).

#### 2.1.2 Monitoring Parameters

OAC 3745-27-12 (E)(2)

Each compliance probe will be monitored for the following parameters, in the order indicated:

- Pressure/vacuum.
- Initial percent combustible gas by volume.

- Sustained percent combustible gas by volume.
- Water level.

Atmospheric data will also be recorded for each monitoring event. These data may be obtained from a local or nearby National Oceanic and Atmospheric Administration (NOAA) registered climate data station if on-site climate data is not available. Parameters to be recorded include:

- Ambient barometric pressure.
- Ambient air temperature.
- Observed weather conditions.
- Relative humidity.

Pursuant to OAC Rule 3745-27-12(F)(1-4), installation of new or replacement permanent monitors will require that a certification report will be submitted with the initial reporting of the monitoring results in accordance with the approved explosive gas monitoring plan. The certification report will include the following:

1. Record drawing showing the locations of the new punch bar stations and/or the new permanent monitors with their associated identification designations.
2. Geologic logs from the installation of each permanent monitor.
3. Depth and length of screened intervals for each permanent monitor.
4. A new geologic cross section of the perimeter of the side of the landfill property will be prepared if a new occupied structure is built within 1,000 feet of solid waste placement and there is no existing cross section for that side of the landfill in the approved Explosive Gas Monitoring Plan.

### 2.1.3 Monitoring Equipment

#### *2.1.3.1 Equipment Type*

The following equipment, or equivalent alternates, will be utilized at the individual compliance probes and extraction wells.

1. Landfill Gas Analyzer capable of measuring methane, carbon dioxide, and pressure/vacuum. The calibration standard used will be 15% methane by volume (15% carbon dioxide and 4% oxygen by volume if the instrument measures these gases in addition to methane).
2. Water Level – an electric Water Level Indicator graduated to 1/100<sup>th</sup> of a foot.

#### *2.1.3.2 Equipment Maintenance and Calibration*

Equipment maintenance and calibration will be performed per the manufacturer's recommendations. Prior to proceeding to the landfill, each instrument to be used will be calibrated or calibration checked to manufacturer's specifications. The results of these calibrations will be recorded on the monitoring log sheets. Calibration procedures are included in respective equipment manuals.

#### 2.1.4 Monitoring Procedures

OAC 3745-27-12 (E)(2)

The following information is required by regulation and will be recorded on monitoring logs for each monitoring event:

- Site name or identification number
- Date and time of sampling for each station
- Weather conditions (general)
- Ambient air temperature
- Barometric pressure
- Relative humidity
- Gas pressure (inches H<sub>2</sub>O)
- Combustible gas as percent by volume methane (each station)
- Depth to water below the reference point

Monitoring probes are equipped with quick connect fittings or valves to facilitate monitoring. The instrument will be connected to the fittings only as long as required to obtain sampling data.

Sample extraction will be conducted in a manner that limits contact or inhalation of gases. Smoking will be strictly prohibited. Sources of spark or combustion will be removed from the area prior to sampling.

The step-wise instructions for sampling of the monitoring network are listed as follows. Sampling must occur in the order listed below:

1. Health and safety precautions. During sampling, there shall be no smoking, open flames, sparking, or use of non-explosion proof motors within 10 feet of compliance probes. If possible, sample from a position upwind of the probe being measured. Avoid inhalation of vapors or gasses emitted from the probes. Thoroughly wash hands following completion of sampling.
2. Unbolt cover to flush mount casing, or unlock protective casing for each probe to be sampled. Each compliance probe is fitted with a quick connect coupling. Do not remove or damage this coupling.
3. For flush mount casings, remove water that may have accumulated within the probe protective casing. Do not connect sampling devices under water.
4. Connect the landfill gas analyzer to the probe.
5. Record probe pressure reading. Record reading in inches of water column. Maintain reading for at least 10 seconds to determine if a variation in pressure is present. Make sure the sample line is observed for signs of water or accumulation of condensation.
6. Record time at the start of sampling.
7. Start sampling pump. Allow pump to run for 60 seconds.
8. Record explosive gas concentration. Record methane concentration in percent by volume. Do not allow probe to vent. (Note: the methane meter used will have a maximum accuracy and sensitivity in the range of +/- 1% methane by volume. The calibration standard used will be methane. For methane meters with variable calibration ranges, calibration will be set to no more than 15% methane by volume. A detection limit of at least 1.25% methane is required). Record initial and sustained gas concentrations over one minute.
9. Record water level measurements. Remove sampling port or cap as required to access the probe casing. Measure depth to water in the probe from the reference point (the top of the cap if the quick connect is removed or the top of the casing if the cap is removed) to the top of the water surface.
10. Record ambient barometric pressure, ambient temperature, weather conditions and relative humidity. If portable or site-specific weather stations are not available, utilize time stamped data from the nearest NOAA registered climate data recording station.
11. Storm sewer sampling. Storm sewer sampling locations are noted on the sampling log. To sample a storm sewer inlet, lower the landfill gas analyzer sampling tube into the inlet

to its full length. DO NOT ALLOW THE SAMPLING TUBE TO COME IN CONTACT WITH WATER. Record gas concentrations for a minimum of one minute.

With respect to monitoring equipment calibration and maintenance, the following schedule will be employed:

1. Gas Detection Equipment: Maintenance no less than annually or more frequently if recommended by the manufacturer. For detection equipment utilized to determine compliance, calibration checks will be performed prior to sampling either via “bumping” of the meter with calibration gas or completing a standard instrument calibration. Calibration gas for compliance sampling will be 15% methane by volume. If the unit is bumped, an allowable deviation of not more than 0.2% methane (by volume) relative to the calibration standard will be considered acceptable.
2. Pressure Detection Equipment: No less than annually or more frequently if recommended by the manufacturer. Pressure detection equipment will be capable of calibration to existing atmospheric pressure (zeroing) and will be calibrated to atmospheric pressure prior to each use.
3. Water Level Measurement: The unit will be tested to confirm detection of liquids either through use of test buttons or immersion into a clean water source.

#### 2.1.5 Validation of Data

OAC 3745-27-12 (E)(3)

Data obtained from monitoring probes will be compared to the applicable compliance threshold levels established by regulation. Currently, an explosive gas concentration equal to or greater than 5% in a compliance probe is the regulatory threshold.

Step by step instructions for validation of sampling data for gas monitoring probes are listed as follows:

1. For gas compliance probes, compare peak explosive gas concentrations to the threshold limit concentration of 5% by volume.
2. For a probe that equals or exceeds 5%, immediately resample to confirm initial readings.
3. If repeat sampling of an affected probe results in gas concentration in excess of 5% by volume, immediately implement the contingency plan. The contingency plan is presented in Section 2.3 below.

### 2.1.6 Data Reporting

OAC 3745-27-12 (E)(4)

Data collected during system monitoring will be compiled and reported to the Ohio EPA no later than 15 days following the date of sampling (note that non-compliant data must be reported immediately as outlined in the contingency plan). Data will be reported on forms provided in Appendix A. Completed data forms will be mailed to:

Ohio EPA  
Southwest District Office  
401 East Fifth Street  
Dayton, Ohio 45402  
Attn: Designated OEPA Contact

Hamilton County Public Health  
250 William Howard Taft, 2nd Floor  
Cincinnati, Ohio 45219  
Attn: Designated Health Dept. Contact

Village of St. Bernard  
Office of the Mayor  
110 Washington Street  
St. Bernard, Ohio 45217  
Attn: Mayor

Data collected for the site will be retained by the Village, or their designee, for a minimum of five years.

## 2.2 EVALUATION OF MONITORING RESULTS

OAC 3745-27-12 (E)(3)

The monitoring results from each compliance probe will be compared to applicable compliance thresholds. Resampling procedures are described in detail in Section 2.1.5 above. If compliance threshold levels are exceeded during re-sampling, then the contingency plan will be enacted and listed authorities will be notified immediately (within 24 hours).



## 2.3 CONTINGENCY PLAN

OAC 3745-27-12 (E)(5)

In accordance with the requirements of OAC 3745-27-12(E)(5), contingency measures will be implemented following confirmed exceedance of applicable gas threshold limits. These limits are currently 5% combustible gas (by volume) in a compliance probe or 1.25% combustible gas (by volume) in an on-site structure or occupied structure within 200 ft of the landfill. Contingency measures to be implemented for probe exceedances include, but are not limited to:

1. Verify explosive gas concentrations in a compliance probe by immediate re-sampling. If gas levels are less than 5% during re-sampling, no further action is necessary. If re-sampling indicates gas concentration above the threshold limit, immediately implement the contingency plan.
2. Upon verification of readings above the explosive gas threshold limits, provide immediate notification (within 24 hours) to the following public safety authorities and regulatory agencies. Notification will be via telephone or email to be followed by a hard copy sent by mail:

- St. Bernard Fire Dept.  
5116 Vine Street  
St. Bernard, OH 45217  
513-242-8474  
513-242-0305 (fax)  
Attn: Fire Chief
- St. Bernard Police Dept.  
4700 Vine Street  
St Bernard, OH 45216  
(513) 242-7770  
(513) 482-7234 (fax)  
Attn: Police Chief
- Hamilton County Public Health  
250 William Howard Taft  
2nd Floor  
Cincinnati, OH 45219  
Attn: Designated Health Dept. Contact
- Ohio EPA  
Southwest District Office

401 East Fifth Street  
Dayton, Ohio 45402  
(937) 285-6357  
Attn: Designated OEPA contact

- Village of St. Bernard  
Office of the Mayor  
110 Washington Street  
St. Bernard, Ohio 45217  
(513) 242-7770  
Attn: Mayor

3. Increase the monitoring frequency at the impacted probe to weekly, until the criteria for the discontinuation of contingency monitoring are met.
4. Because the homes adjacent to the northern boundary of the landfill property already have CGIs installed and because of the limited distance between the compliance probes, no additional monitoring points are needed for an exceedance at one of the compliance probes.
5. Continue weekly monitoring until sustained concentrations of less than 5% methane by volume in the impacted compliance probe(s) are recorded for a minimum of four sequential monitoring events, over a minimum period of two weeks. Upon completion of the contingency monitoring of compliance probes, where an exceedance has been recorded, monitoring will return to the monthly schedule.
6. In the event of an exceedance of the threshold concentration in a compliance probe, the following steps will be taken to protect human health and the environment:
  - a. The gas extraction system will be checked to ensure it is operating properly.
  - b. The migration control system will be adjusted to attempt to provide additional vacuum to the horizontal collector segment nearest the probe that has experienced the exceedance.

The contingency plan for CGI alarm activation includes, but is not necessarily limited to the following:

1. When a resident experiences a continuous sounding CGI alarm, he or she will contact the St. Bernard Fire Department. The Fire Department will respond to determine if an explosive gas concentration is present in the home. If an explosive concentration of methane is present, the Fire Department will evacuate the home and ventilate to reduce the methane concentration below the LEL. The Fire Department will notify the Village's monitoring subcontractor.
2. Upon verification of readings above the explosive gas threshold limits, immediate notification (within 24 hours) will be provided to the following public safety authorities

and regulatory agencies not already notified. Notification will be via telephone or email to be followed by a hard copy sent by mail:

- St. Bernard Police Dept.  
4700 Vine Street  
St Bernard, OH 45216  
(513) 242-7770  
(513) 482-7234 (fax)  
Attn: Police Chief
  
  - Hamilton County Public Health  
250 William Howard Taft  
2nd Floor  
Cincinnati, OH 45219  
Attn: Designated Health Dept. Contact
  
  - Ohio EPA  
Southwest District Office  
401 East Fifth Street  
Dayton, Ohio 45402  
(937) 285-6357  
Attn: Designated OEPA Contact
3. Attempt to reconfirm the presence of methane and to locate the entry point into the structure.
  4. If methane is accumulating in the home, steps to protect human health and the environment may include:
    - a. Installation of a sub-slab ventilation system.
    - b. Installation of an extension of the migration control system adjacent to the side of the residence facing the landfill.

The contingency plan includes the following reporting:

1. Within seven days of the initial detection above threshold limits, submit to the Ohio EPA and Hamilton County Public Health the monitoring results and the description of the steps taken or to be taken to ensure protection of human health and the environment.
2. Every 30 days from the date of initial detection above threshold limits, until contingency plan discontinuation criteria are met, submit a report to the Ohio EPA and Hamilton County Public Health containing:
  - a. Analysis and summary of the results from the contingency monitoring including the lateral extent of explosive gas concentrations above the threshold limit and a

characterization of explosive gas pathways. Characterization, based on visual inspection, of the pathways will include the degree of saturation and porosity (textural classification or fracturing) within the pathways and the possible causes of the increase in gas concentrations such as landfill operational procedures, gas control system failure or upset, climatic conditions, or other activities being conducted on or near the site.

- b. A summary of the steps taken to ensure protection of human health and the environment and an analysis of their effectiveness.

During implementation of the contingency plan, monitoring of non-affected probes as well as other components of the gas extraction system will continue per the requirements of this Plan. In addition, contingency monitoring of previously affected probes will also be continued in accordance with the respective contingency monitoring requirements.

## **2.4 DISCONTINUATION OF CONTINGENCY PLAN**

OAC 3745-27-12 (E)(5)(e)

The following criteria are provided as general guidelines that may be used to determine if actions implemented under the contingency plan may be discontinued. The provisions of OAC 3745-27-12(E)(5) will govern with respect to discontinuation of contingency monitoring.

The following criteria, in addition to those set forth in OAC 3745-27-12(E)(5) are to be considered in evaluating discontinuation:

1. Weekly monitoring will continue until sustained concentrations of less than 5% methane by volume in the impacted compliance probe(s) are recorded for a minimum of four sequential monitoring events, over a minimum period of two weeks.

A report summarizing this information will be compiled and submitted to the Ohio EPA and Hamilton County Public Health, and will also include the following information:

1. Analysis and summary of the results from contingency monitoring, including the lateral extent of explosive gas concentrations above the threshold limit and a characterization of

the explosive gas pathways. Characterization of the pathway will include degree of saturation and porosity (textural classification or fracturing).

2. Consideration of the possible causes of the increased concentrations, such as landfill operational procedures, gas control system failure or upset, climatic conditions, or other activities being conducted on or near the site.

## **2.6 CERTIFICATION REPORT**

OAC 3745-27-12 (F)

Should modification of the gas extraction system or installation of additional gas monitoring probes be required, a certification report will be prepared and submitted to the Ohio EPA. The certification report will include a full description of modification or installations, survey and sampling data (as applicable), updated site plans and information relevant to continued operation or maintenance of the system and/or monitoring probes. A copy of the certification will be placed in Appendix D.

## **2.7 MODIFICATION OF THE MONITORING SYSTEM**

OAC 3745-27-12 (H)

Modification of the explosive gas monitoring system may be required under circumstances including, but not limited to:

- Construction of new occupied structures adjacent to or on the landfill property within 1,000 feet of the landfill.
- Installation of subsurface utilities within 1,000 feet of the limit of the landfill.
- Capping or other modification of the landfill surface that may promote lateral migration of gas.
- Identification of trends suggesting increased gas production or migration potential.

A report detailing system modifications will be submitted prior to implementation to the Ohio EPA and the Hamilton County Public Health. Requirements per OAC 3745-27-12(H) will be reflected in this report, including details regarding modifications (added, abandoned, or replaced probes, etc.), why it was necessary (new structure, demolished structure, etc.), and amendment of

monitoring and/or sampling procedures, if required. The results of initial monitoring of new probes will also be included.

## **2.8 ABANDONMENT OF EXPLOSIVE GAS MONITORING SYSTEM**

OAC 3745-27-12 (G)

A request may be submitted to the Ohio EPA requesting termination of explosive gas monitoring. The request will include:

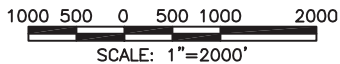
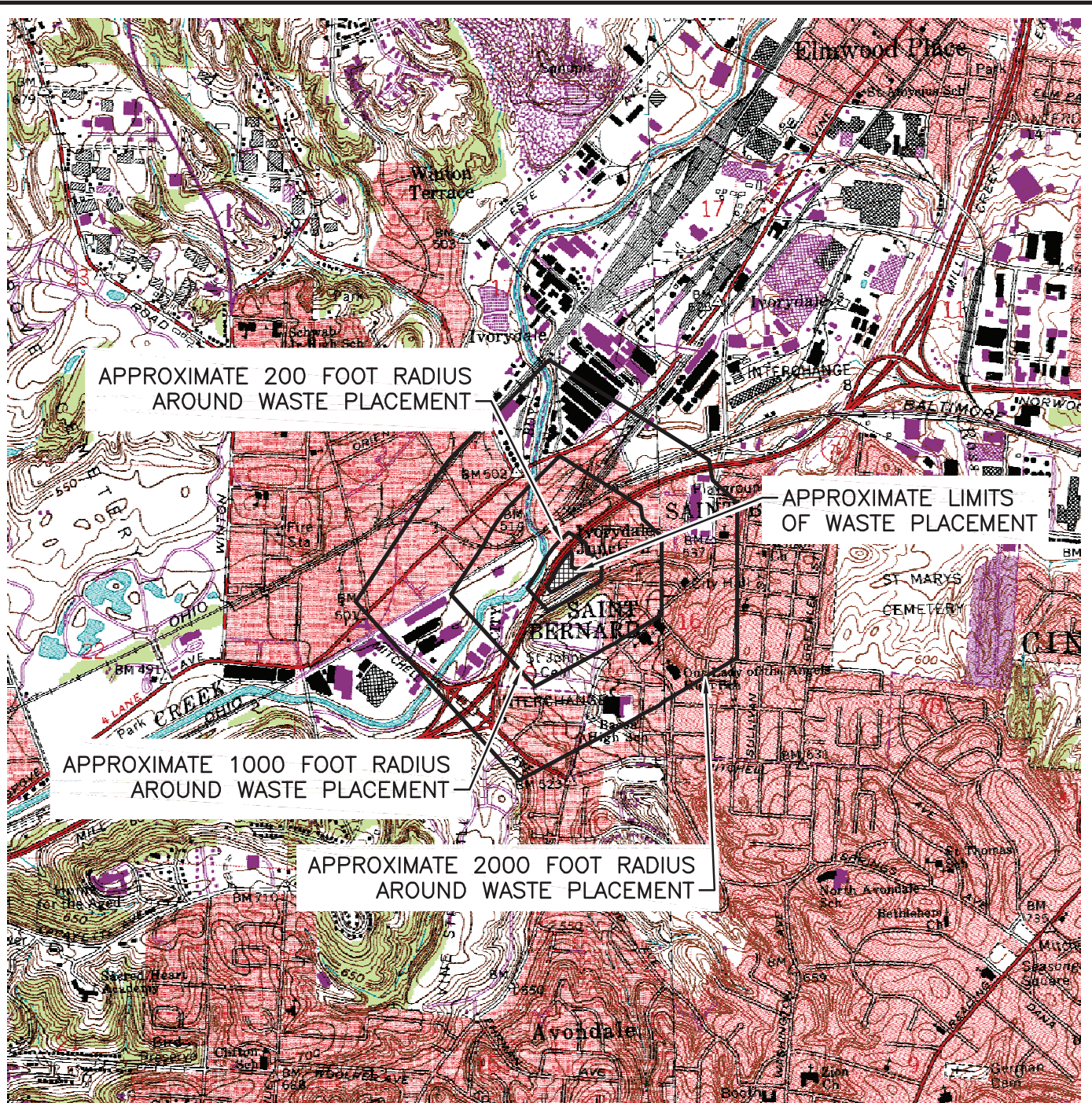
- Identification of the Landfill Site.
- Documentation showing that there is no significant likelihood of future explosive gas formation and migration sufficient to require contingency procedures.
- A proposed schedule for the implementation of the abandonment activities.

---

## **FIGURES**

---

G:\PROJECTS\2001\210158\DWG\210158 SITE LOC.dwg DSNOKK - JANUARY 29, 2004 - 07:51:41 XREFS:



SOURCE: USGS 7.5 MINUTE QUADRANGLES CINCINNATI EAST, OHIO, 1961 PHOTOREVISED 1981 AND CINCINNATI WEST, OHIO, 1961, PHOTOREVISED 1981, PHOTOINSPECTED 1986.



**Civil & Environmental Consultants, Inc.**

Cincinnati, OH

(513) 985-0226 (800) 759-5614

Pittsburgh, PA Columbus, OH Indianapolis, IN  
Nashville, TN Chicago, IL St. Louis, MO

**SITE VICINITY MAP  
FORMER BANK AVENUE LANDFILL  
ST. BERNARD, OHIO  
HAMILTON COUNTY**

**DWN BY: MTM**

**SCALE:**

**DATE:**

**PROJECT NO.:**

**FIGURE NO.:**

**CHKD. BY: RH**

AS NOTED

MAY 2003

210158

1





SOURCE: PORTION OF AN OHIO DEPARTMENT OF TRANSPORTATION (ODOT) AERIAL PHOTOGRAPH - APRIL 1974.

- CAGIS - Parcel Boundary
- CAGIS - Edge of Pavement
- CAGIS - 2001 Topographic Contours
- CAGIS - Building Footprints

June 18, 2014. SCS incorporates this figure in full and unedited from the original source: CEC EGMP, November 2011.



**Civil & Environmental Consultants, Inc.**

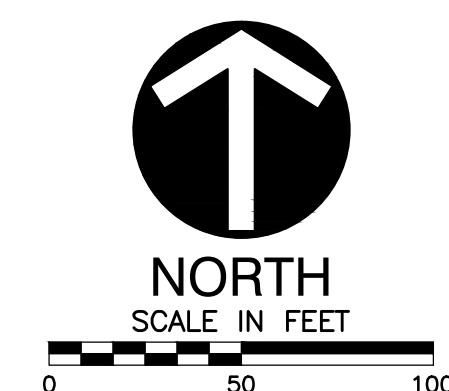
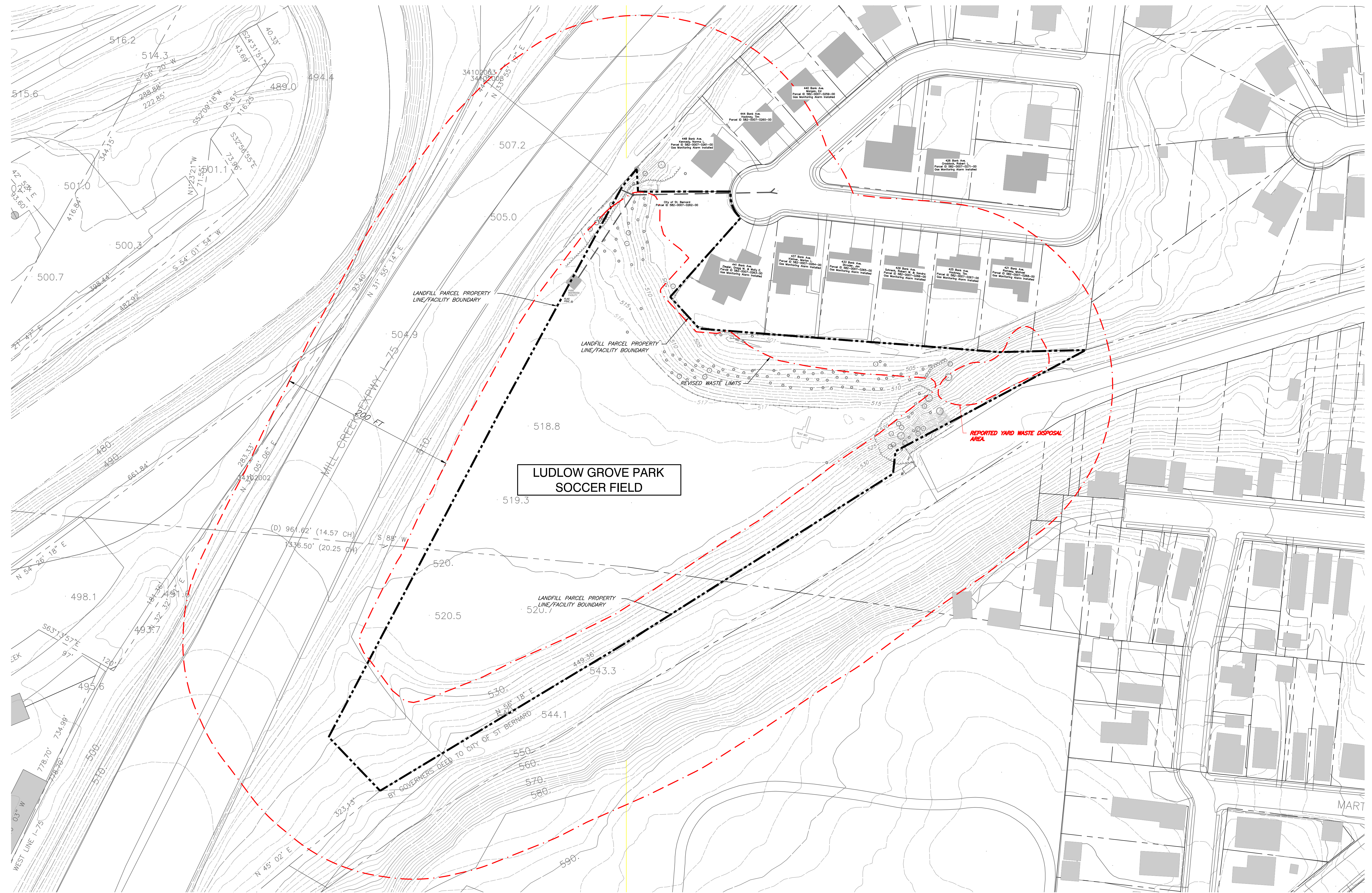
4274 Glendale-Milford Road - Cincinnati, OH 45242  
 513-985-0226 - 800-759-5614  
 www.cecinc.com

BANK AVENUE LANDFILL - ST. BERNARD, OHIO  
 BASE - APRIL 1974 ODOT AERIAL PHOTOGRAPH  
 OVERLAY - CURRENT CAGIS PROPERTY  
 AND TOPOGRAPHIC DATA

**SITE AND VICINITY AERIAL MAP**

DRAWN BY:	MJB	CHECKED BY:	RH	APPROVED BY:	RH	FIGURE NO:	<b>2</b>
DATE:	MARCH 31, 2011	DWG SCALE:	1" = 150'	PROJECT NO:	100-194		

I:\PROJECT\2012 Projects\23212007.00 St. Bernard LF\Deliverables\EGMP\Draft Revised EGMP\Sept 2014 Revision\Fig 3.dwg Sep 12, 2014 - 10:58am Layout Name: Fig 3 By: 0649fdb



REV.	DATE	DESCRIPTION	CK. BY
1			
2			
3			
4			

SHEET TITLE  
**SITE MAP**

PROJECT TITLE  
**ST. BERNARD LANDFILL  
VILLAGE OF ST. BERNARD, OHIO**

CLIENT  
**VILLAGE OF ST. BERNARD  
110 WASHINGTON AVENUE  
ST. BERNARD, OHIO 45217**

**SCS ENGINEERS**  
STEARNS, CONRAD AND SCHMIDT  
CONSULTING ENGINEERS, INC.  
2060 READING ROAD, CINCINNATI, OH 45202  
PH. (613) 421-5353 FAX. (613) 421-2847

DATE: 09/12/14  
SCALE: AS SHOWN  
DRAWING NO. **FIG 3**

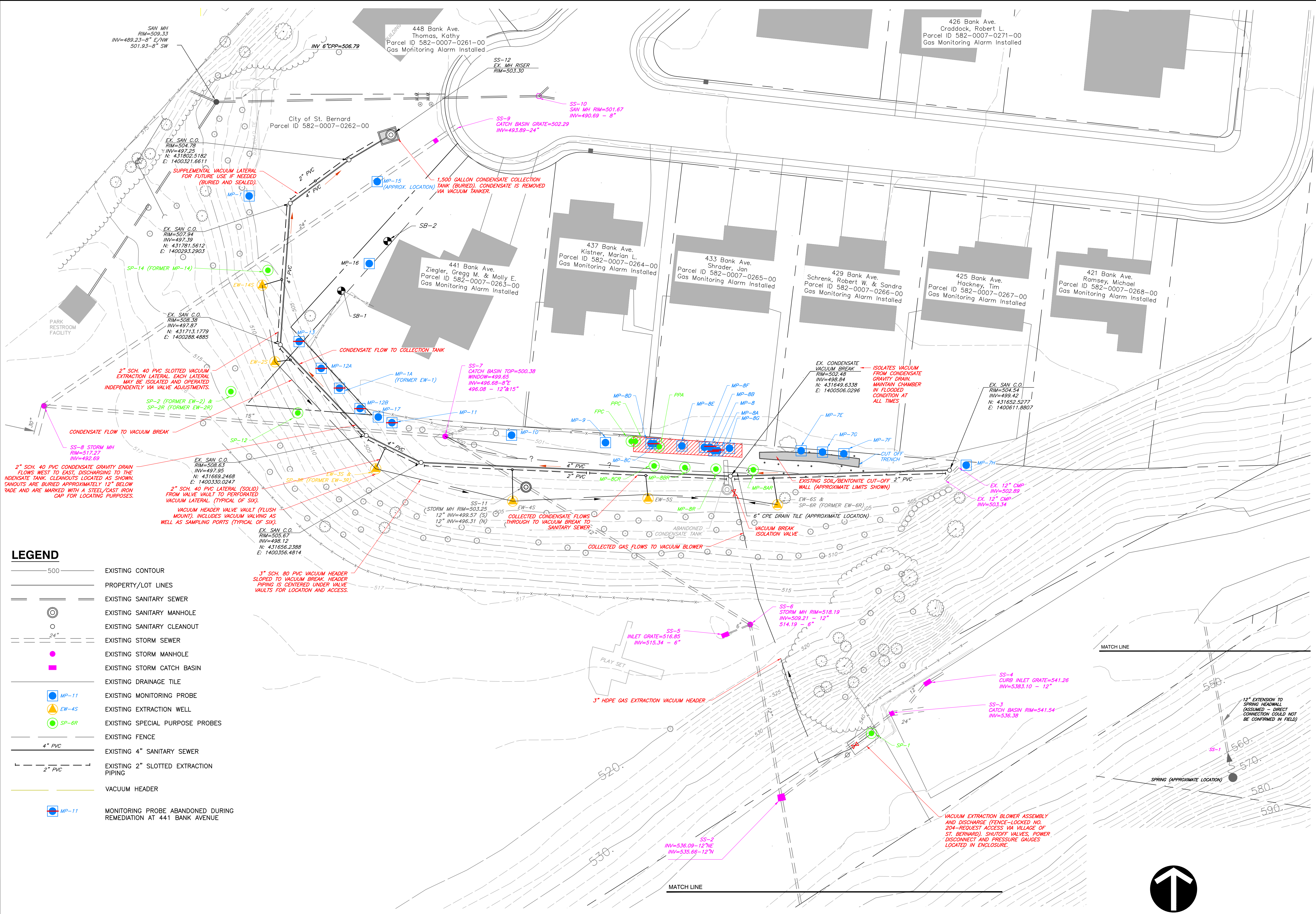
CADD FILE:  
Figure 3

DATE:  
SEPTEMBER 2014

SCALE:  
AS SHOWN

DRAWING NO.  
**FIG 3**

I:\PROJECT\2012 Projects\23212007.00 St. Bernard LF\Deliverables\EGMP\Sept 2014 Revised EGMP\Draft Revised EGMP\Fig 4.dwg Sep 12, 2014 - 10:59am Layout Name: FIG 4 By: 0649fdb



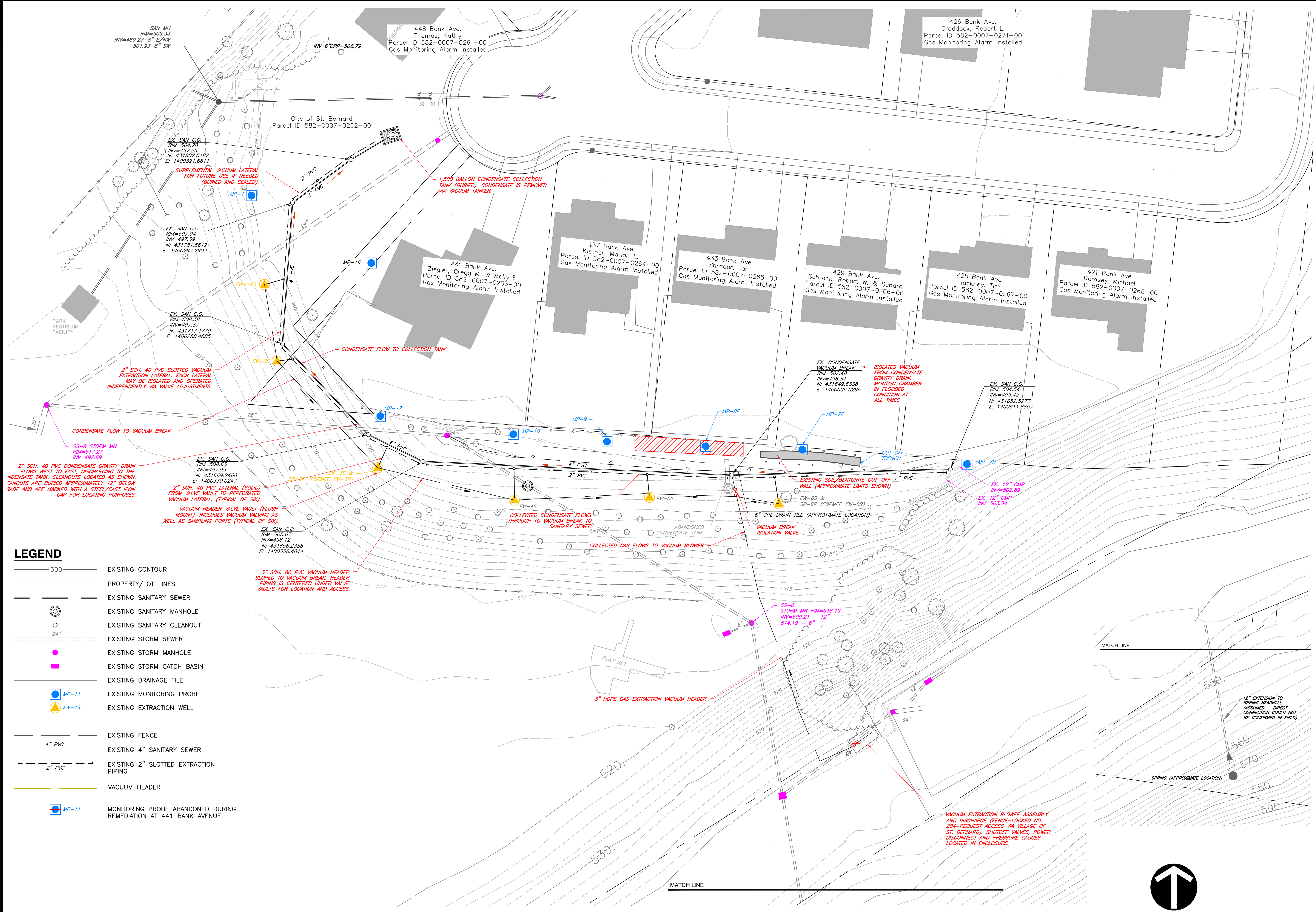
- LEGEND**
- 500 ——— EXISTING CONTOUR
  - PROPERTY/LOT LINES
  - EXISTING SANITARY SEWER
  - EXISTING SANITARY MANHOLE
  - EXISTING SANITARY CLEANOUT
  - EXISTING STORM SEWER
  - EXISTING STORM MANHOLE
  - EXISTING STORM CATCH BASIN
  - EXISTING DRAINAGE TILE
  - MP-11 EXISTING MONITORING PROBE
  - EW-4S EXISTING EXTRACTION WELL
  - SP-6R EXISTING SPECIAL PURPOSE PROBES
  - EXISTING FENCE
  - 4" PVC EXISTING 4" SANITARY SEWER
  - 2" PVC EXISTING 2" SLOTTED EXTRACTION PIPING
  - VACUUM HEADER
  - MP-11 MONITORING PROBE ABANDONED DURING REMEDIATION AT 441 BANK AVENUE

**NOTES:**  
 1. BASE MAP SOURCE CEC DRAWING 2B, DATED MARCH 31, 2011

CK. BY:	DESCRIPTION	REV. DATE	EXISTING NETWORK	ST. BERNARD LANDFILL VILLAGE OF ST. BERNARD, OHIO												
RCM	ADD MP-17; SHOW MP-1A, MP-11, MP-12, MP-12B, MP-13 AS REMOVED	9/25/14	MONITORING NETWORK													
PROJECT TITLE		SHEET TITLE		CLIENT												
VILLAGE OF ST. BERNARD 110 WASHINGTON AVENUE ST. BERNARD, OHIO 45217		VILLAGE OF ST. BERNARD MONITORING NETWORK		SCS ENGINEERS STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC. 2060 READING ROAD, CINCINNATI, OH 45202 PH. (619) 421-5353 FAX. (613) 421-2847												
DATE:	SCALE:	DRAWING NO.:	<table border="1"> <tr> <td>DATE:</td> <td>SCALE:</td> <td>DRAWING NO.:</td> </tr> <tr> <td>SEPTEMBER 2014</td> <td>AS SHOWN</td> <td></td> </tr> </table>		DATE:	SCALE:	DRAWING NO.:	SEPTEMBER 2014	AS SHOWN							
DATE:	SCALE:	DRAWING NO.:														
SEPTEMBER 2014	AS SHOWN															
<table border="1"> <tr> <td>DATE:</td> <td>SCALE:</td> <td>DRAWING NO.:</td> </tr> <tr> <td>SEPTEMBER 2014</td> <td>AS SHOWN</td> <td></td> </tr> </table>		DATE:	SCALE:	DRAWING NO.:	SEPTEMBER 2014	AS SHOWN		<table border="1"> <tr> <td>DATE:</td> <td>SCALE:</td> <td>DRAWING NO.:</td> </tr> <tr> <td>SEPTEMBER 2014</td> <td>AS SHOWN</td> <td></td> </tr> </table>			DATE:	SCALE:	DRAWING NO.:	SEPTEMBER 2014	AS SHOWN	
DATE:	SCALE:	DRAWING NO.:														
SEPTEMBER 2014	AS SHOWN															
DATE:	SCALE:	DRAWING NO.:														
SEPTEMBER 2014	AS SHOWN															

**FIG 4**

I:\PROJECT\2012 Projects\23212007.00 St. Bernard LF\Deliverables\EGMP\Sept 2014 Revised EGMP\Draft Revised EGMP\Fig 5.dwg Sep 26, 2014 - 9:01am Layout Name: FIG 5 By: 0649fab

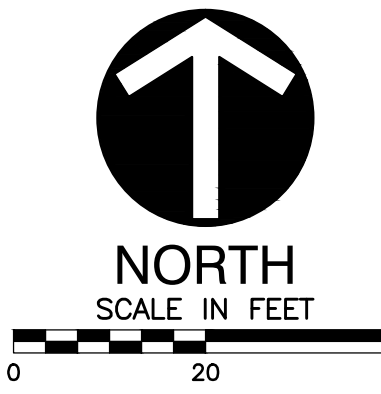


**LEGEND**

- 500 ——— EXISTING CONTOUR
- PROPERTY/LOT LINES
- EXISTING SANITARY SEWER
- EXISTING SANITARY MANHOLE
- EXISTING SANITARY CLEANOUT
- 24" EXISTING STORM SEWER
- EXISTING STORM MANHOLE
- EXISTING STORM CATCH BASIN
- EXISTING DRAINAGE TILE
- MP-11 EXISTING MONITORING PROBE
- EW-45 EXISTING EXTRACTION WELL
- 4" PVC EXISTING FENCE
- 4" PVC EXISTING 4" SANITARY SEWER
- 2" PVC EXISTING 2" SLOTTED EXTRACTION PIPING
- VACUUM HEADER
- MP-11 MONITORING PROBE ABANDONED DURING REMEDIATION AT 441 BANK AVENUE

**NOTES:**  
 1. BASE MAP SOURCE CEC DRAWING 2B, DATED MARCH 31, 2011

CK. BY:	
DESCRIPTION:	
REV. DATE:	
SHEET TITLE:	PROPOSED MONITORING NETWORK
PROJECT TITLE:	ST. BERNARD LANDFILL VILLAGE OF ST. BERNARD, OHIO
CLIENT:	VILLAGE OF ST. BERNARD 110 WASHINGTON AVENUE ST. BERNARD, OHIO 45217
DESIGNER:	SCS ENGINEERS STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC. 2060 READING ROAD, CINCINNATI, OH 45202 PH. (613) 421-5353 FAX. (613) 421-2847
DRAWN BY:	FDB
CHECKED BY:	RCM
DATE:	SEPTEMBER 2014
SCALE:	AS SHOWN
DRAWING NO.:	FIG 5



\\PROJECT\2012 Projects\3212007.00 St. Bernard LF\Deliverables\EGMP\Draft Revised EAMP\Sept 12, 2014 - 2:59pm Layout Name: Fig 6 By: 0649frc

Table with columns: PARCEL, BOOK, PAGE, PARCEL, OWNERSHIP, OWNERSHIP, OWNERSHIP. Lists various parcels and their owners.

Table with columns: PARCEL, BOOK, PAGE, PARCEL, OWNERSHIP, OWNERSHIP, OWNERSHIP. Lists various parcels and their owners.

Table with columns: PARCEL, BOOK, PAGE, PARCEL, OWNERSHIP, OWNERSHIP, OWNERSHIP. Lists various parcels and their owners.

Table with columns: PARCEL, BOOK, PAGE, PARCEL, OWNERSHIP, OWNERSHIP, OWNERSHIP. Lists various parcels and their owners.

Table with columns: PARCEL, BOOK, PAGE, PARCEL, OWNERSHIP, OWNERSHIP, OWNERSHIP. Lists various parcels and their owners.

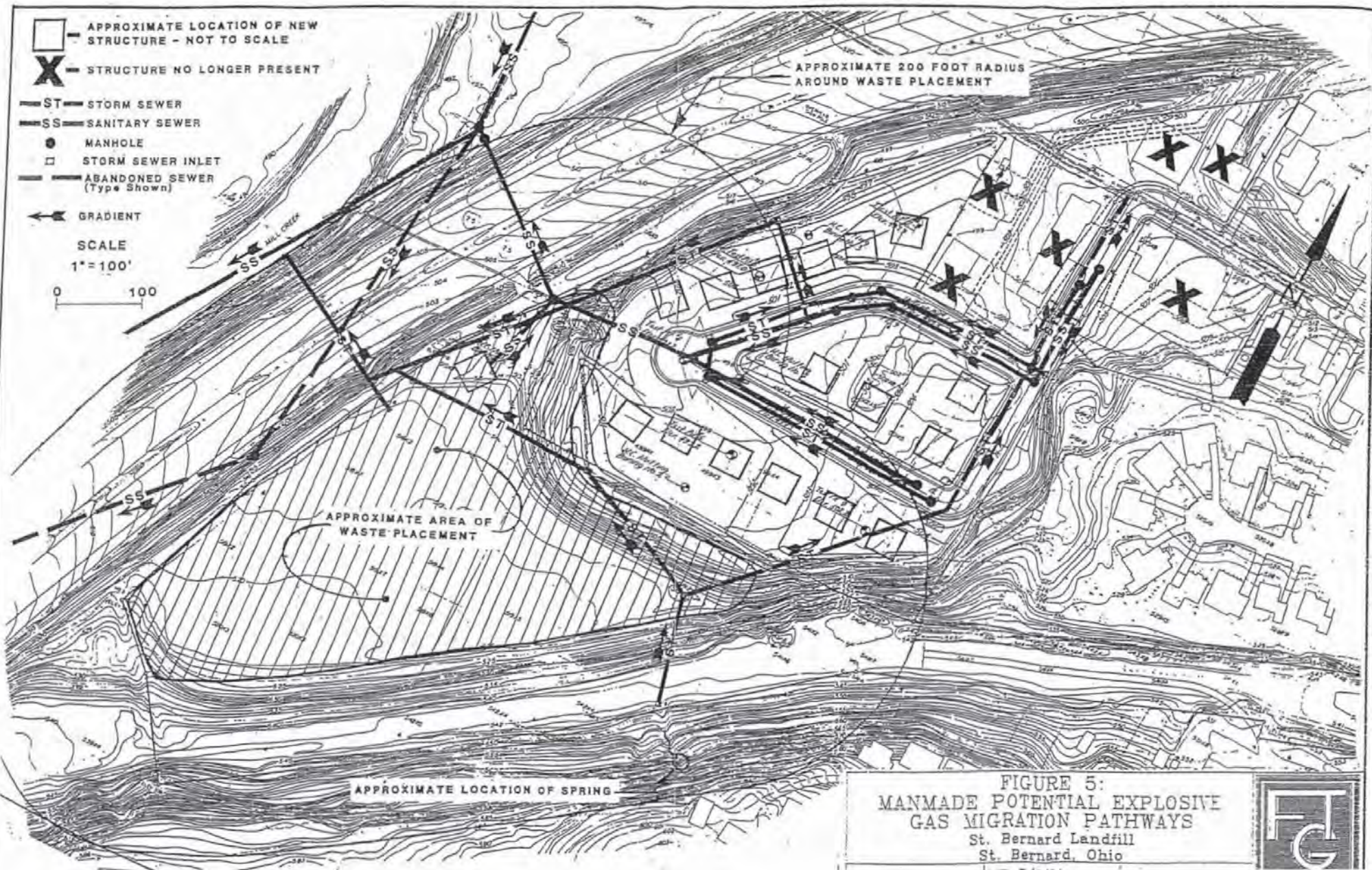


Legend, SCS NOTES, and project information including SCS ENGINEERS, ST. BERNARD LANDFILL, and VILLAGE OF ST. BERNARD, OHIO 45217.

SOURCE: CEC EGMP, APPENDIX H, DATED NOVEMBER 2011 INCORPORATED IN FULL

North arrow and scale bar in feet (0, 200, 400).

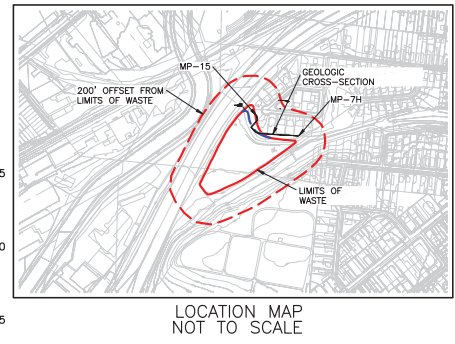
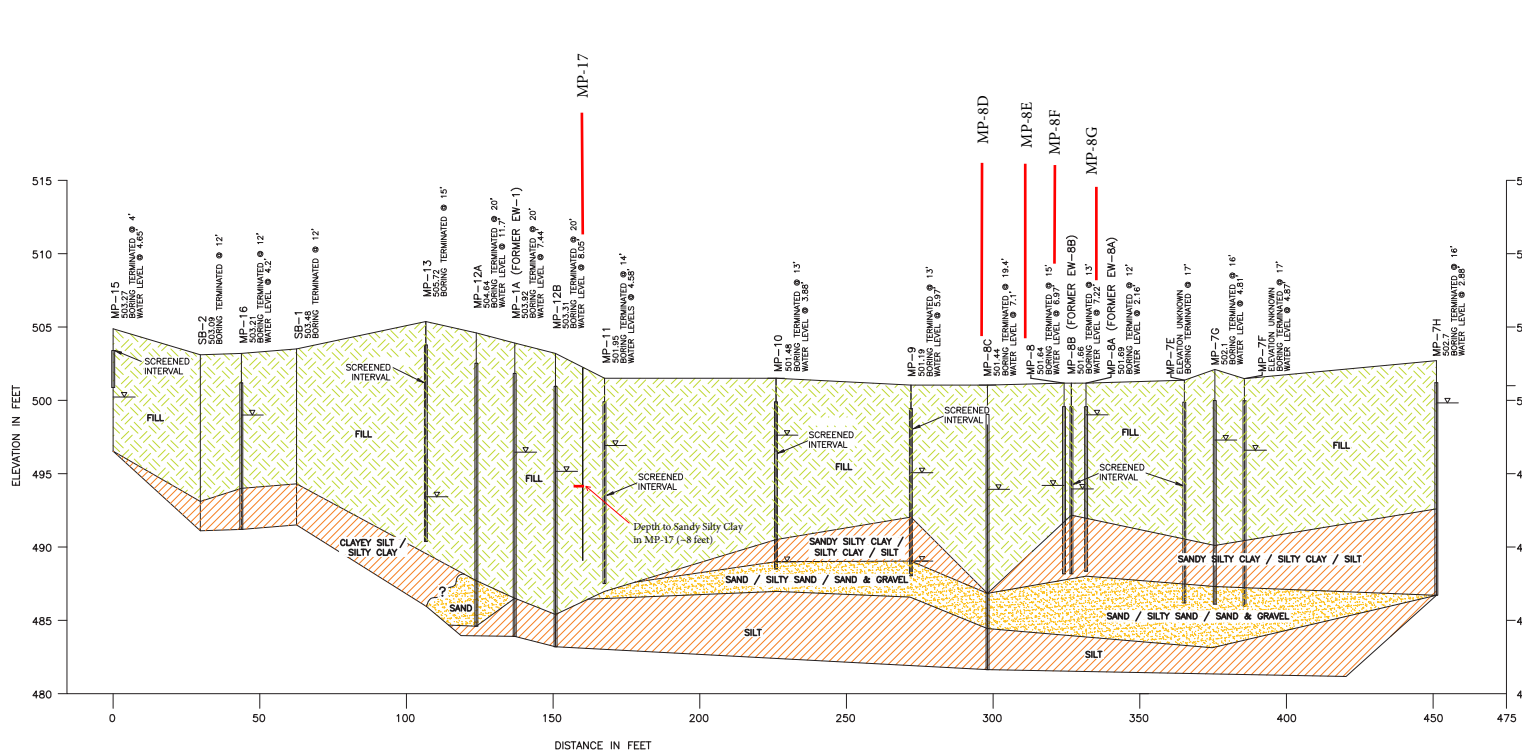
FIG 6



June 18, 2014. SCS incorporates this figure in full and unedited from the original source: Foppe Thelen, Explosive Gas Monitoring System Design, October 1991.

FIGURE 7. MAN MADE MIGRATION PATHWAS

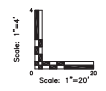
REVISION RECORD		
NO.	DATE	DESCRIPTION




THE WATER LEVELS PRESENTED HEREIN ARE APPLICABLE TO THE LOCATION AND TIME OF MEASUREMENT. WATER LEVELS MAY FLUCTUATE THROUGH TIME

LEGEND	
	FILL (GAS MIGRATION ZONE)
	CLAY / SILTY CLAY / SANDY SILTY CLAY / SILT
	SAND / SILTY SAND / SAND & GRAVEL
	INITIAL WATER LEVEL RECORDED DURING PROBE INSTALLATION

- NOTES:
1. WATER LEVELS MEASURED ON 03/04/2011.
  2. SEE DRAWING NO. 2 FOR PROBE LOCATIONS. CROSS-SECTION TRACE INTERCEPTS PROBE LOCATIONS SHOWN.
  3. FILL OR DEBRIS INDICATED IS OUTSIDE OF LIMITS OF WASTE PLACEMENT. FILL SHOWN WAS OBSERVED TO CONSIST PRIMARILY OF INERT FILL WITH INCIDENTAL QUANTITIES OF ORGANIC DEBRIS.





**Civil & Environmental Consultants, Inc.**  
 4274 Glendale-Milford Road - Cincinnati, OH 45242  
 Ph: 513.985.0226 - 800.759.5614 - Fax: 513.985.0228  
 www.cecinc.com

---

**BANK AVENUE LANDFILL  
 ST. BERNARD, OHIO  
 HAMILTON COUNTY**

---

DRAWN BY: MLB	CHECKED BY: RJS	APPROVED BY: RHT
DATE: 03/31/2011	DWG. SCALE: AS SHOWN	PROJECT NO: 100-191
GEOLOGIC CROSS-SECTION		<b>4B</b>

FIGURE 8. CEC 2011 Northern Geologic Cross Section

---

**APPENDIX A**

**REPORTING FORMS**

---



### Compliance Probe Monitoring Form for St. Bernard Landfill

Date: _____	Sampler: _____
Instrument: _____	Weather: _____
Calibration Prior to Sampling: _____	Ambient Air Temperature (°F): _____
Calibration Gas: _____	Barometric Pressure (in Hg): _____
Recalibration: _____	Relative Humidity (%): _____

Probe ID	Start Time	Stop Time	Gas Pressure (inches water)	Initial CH <sub>4</sub> (% by Volume)	Sustained CH <sub>4</sub> (% by Volume)	Depth to Water Level (feet below ground surface)	Depth to Top of Screen (feet below ground surface)	Open Screen# (feet)
MP-1							not known	
MP-7E							3	
MP-7H							2	
MP-8F							4	
MP-9							2	
MP-10							2	
MP-16							2	
MP-17							2	

Notes:

---



---



---



---



---



---



---



---



---



---

Signature: \_\_\_\_\_

# A zero or negative value indicates that the probe is watered in.

---

**APPENDIX B**

**LETTERS OF NOTIFICATION**

---

## SCS ENGINEERS

June 18, 2014  
File No. 23212007.02

Chief Don Moeller  
St. Bernard Fire Department  
5116 Vine Street  
St. Bernard, OH 45217

Subject: Explosive Gas Monitoring Plan  
Notification St. Bernard Landfill

Dear Chief Moeller:

Pursuant to the Municipal Solid Waste Landfill Regulations and on behalf of the Village of St. Bernard, SCS Engineers is hereby notifying you that the Village of St. Bernard is submitting a revised Explosive Gas Monitoring Plan for the above referenced landfill. This letter is being sent to you per OAC 3745-27-12(E)(6)(b), which states that the appropriate authorities be informed that they will be notified if there is an exceedance of the threshold concentration of explosive gas at a monitoring probe. The threshold is 100 percent of the lower explosive limit (5 % methane by volume) in a probe at or within the facility boundary.

The landfill is located at the Ludlow Grove Park and is bounded by I-75 to the west, Bank Avenue to the north, and the extension of Phillips Avenue to the east.

If you have any questions pertaining to the request or the information presented herein, please contact the Village of St. Bernard at (513) 242-7770.

Sincerely,



Randall C. Mills, P.G.  
Senior Project Professional  
**SCS ENGINEERS**



James J. Walsh, P.E.  
Project Director  
**SCS ENGINEERS**

RCM/JJW

cc Chuck DeJonckheere, Hamilton County Health Dept.  
Nick Schapman, CRA  
Bill Burkhardt, Mayor, Village of St. Bernard



## SCS ENGINEERS

June 13, 2014  
File No. 23212007.02

Mr. Chuck DeJonckheere  
Hamilton County Public Health  
250 William Howard Taft, 2nd Floor  
Cincinnati, OH 45219

Subject: Explosive Gas Monitoring Plan Notification  
St. Bernard Landfill

Dear Mr. DeJonckheere:

Pursuant to the Municipal Solid Waste Landfill Regulations and on behalf of the Village of St. Bernard, SCS Engineers is hereby notifying you that the Village of St. Bernard is submitting a revised Explosive Gas Monitoring Plan for the above referenced landfill. This letter is being sent to you per OAC 3745-27-12(E)(6)(b), which states that the appropriate authorities be informed that they will be notified if there is an exceedance of the threshold concentration of explosive gas at a monitoring probe. The threshold is 100 percent of the lower explosive limit (5 % methane by volume) in a probe at or within the facility boundary.

The landfill is located at the Ludlow Grove Park and is bounded by I-75 to the west, Bank Avenue to the north, and the extension of Phillips Avenue to the east.

If you have any questions pertaining to the request or the information presented herein, please contact the Village of St. Bernard at (513) 242-7770.

Sincerely,



Randall C. Mills  
Senior Project Scientist  
**SCS ENGINEERS**



James J. Walsh, P.E.  
Project Director  
**SCS ENGINEERS**

rcm/JJW

cc Nick Schapman, Conestoga Rovers



## SCS ENGINEERS

June 13, 2014  
File No. 23212007.02

Chief Steven Moeller  
St. Bernard Police Dept.  
4700 Vine Street  
St Bernard, OH 45216

Subject: Explosive Gas Monitoring Plan Notification  
St. Bernard Landfill

Dear Chief Moeller:

Pursuant to the Municipal Solid Waste Landfill Regulations and on behalf of the Village of St. Bernard, SCS Engineers is hereby notifying you that the Village of St. Bernard is submitting a revised Explosive Gas Monitoring Plan for the above referenced landfill. This letter is being sent to you per OAC 3745-27-12(E)(6)(b), which states that the appropriate authorities be informed that they will be notified if there is an exceedance of the threshold concentration of explosive gas at a monitoring probe. The threshold is 100 percent of the lower explosive limit (5 % methane by volume) in a probe at or within the facility boundary.

The landfill is located at the Ludlow Grove Park and is bounded by I-75 to the west, Bank Avenue to the north, and the extension of Phillips Avenue to the east.

If you have any questions pertaining to the request or the information presented herein, please contact the Village of St. Bernard at (513) 242-7770.

Sincerely,



Randall C. Mills  
Senior Project Scientist  
**SCS ENGINEERS**



James J. Walsh, P.E.  
Project Director  
**SCS ENGINEERS**

rcm/JJW

cc Nick Schapman, Conestoga Rovers



---

**APPENDIX C**

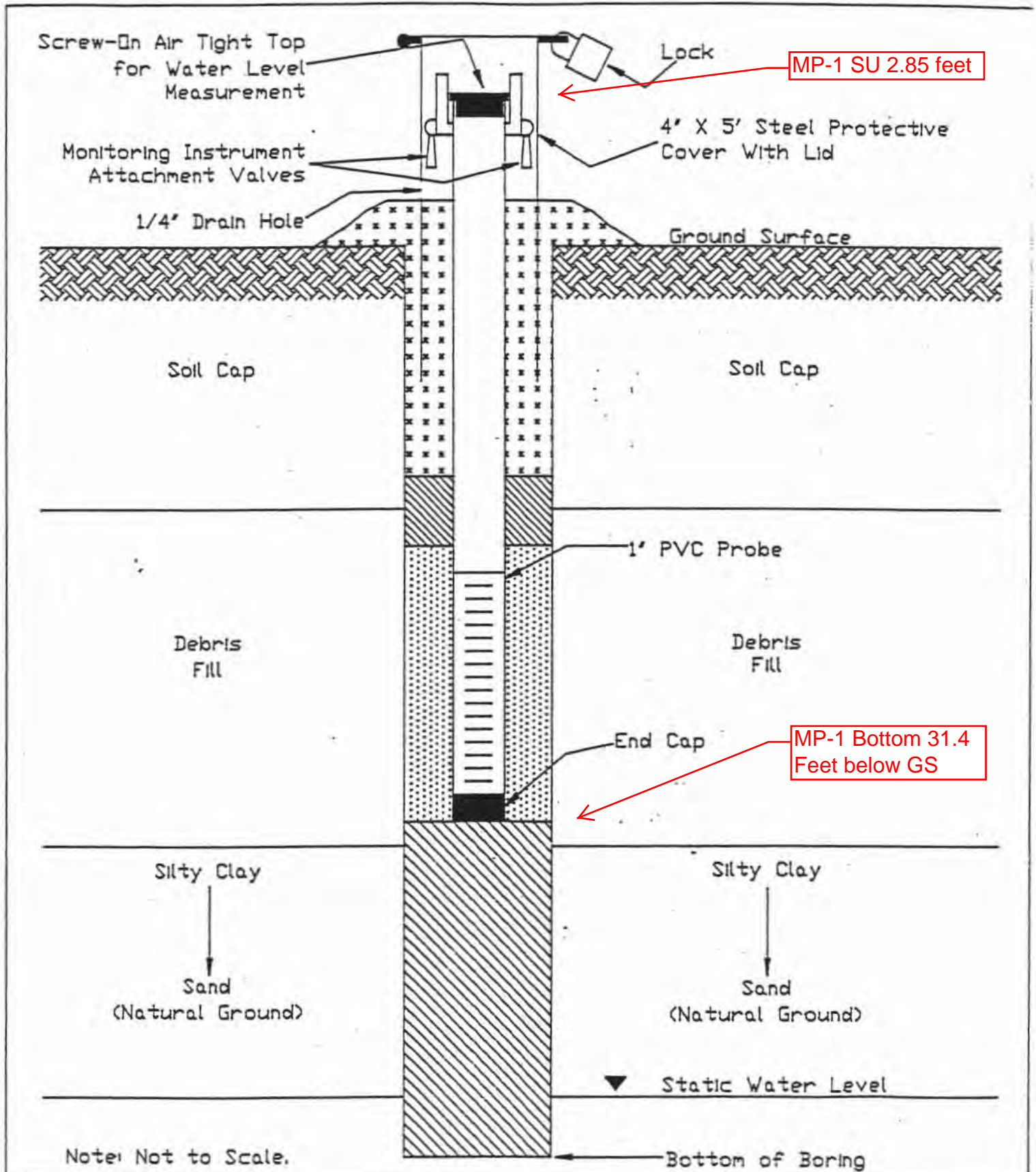
**GEOLOGIC BORING LOGS**

---

Note: Boring logs do not exist for the following probes:

- MP-1 & SP-2: Installed by Foppe Thelen. Boring logs were not provided in the Foppe Thelen produced reports.
- MP-7E, MP-7F, MP-8A and MP-8B: These probes were installed by direct push methods in close vicinity to existing probes and as such, soil was not removed in order to log the geologic profile.

# MP-1 (Typical)



Legend	
	Cement
	Sand Pack
	Bentonite Seal

FIGURE 11:  
GENERALIZED MONITORING PROBE

St. Bernard Landfill  
St. Bernard, Ohio



PROJECT NO. 910261

DATE: 5/13/91

ENGINEER: LEF



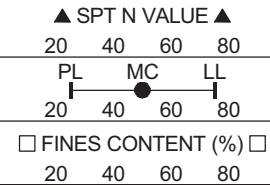


Civil & Environmental Consultants, Inc.  
4274 Glendale Milford Road  
Cincinnati, Ohio 45242

<b>CLIENT</b> <u>St. Bernard</u>	<b>PROJECT NAME</b> <u>MP Install</u>
<b>CEC PROJECT NUMBER</b> <u>100-194</u>	<b>PROJECT LOCATION</b> <u>Former St. Bernard Landfill</u>
<b>DATE STARTED</b> <u>5/27/10</u> <b>COMPLETED</b> <u>5/27/10</u>	<b>GROUND ELEVATION</b> <u>NA</u> <b>HOLE SIZE</b> <u>4 inch</u>
<b>DRILLING CONTRACTOR</b> <u>Jersey West</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Direct Push</u>	<b>AT TIME OF DRILLING</b> <u>None</u>
<b>LOGGED BY</b> <u>MJM</u> <b>CHECKED BY</b> <u>RH</u>	<b>AT END OF DRILLING</b> <u>---</u>
<b>LOCATION</b> <u>See Map</u>	<b>AFTER DRILLING</b> <u>DTW 8.75 feet bgs</u>

CEC CUSTOM LOG 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/8/10

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) T=Torvane	▲ SPT N VALUE ▲						
								20	40	60	80			
0		Topsoil	0.0											
0		Brownish-orange silty SAND, trace gravel, slightly moist, loose												
0		Grayish-green clayey SILT, moist, stiff		DP 1	85									
0		Dark brown and black clayey SILT, trace gravel, trace brick, glass, and wood pieces, very moist becoming wet, medium stiff												
0		Dark brown and black clayey SILT, trace gravel, trace wood pieces, noted two concrete pieces separated by soft clayey silt, noted odor, moist	5.0											
0		Dark brown to dark green clayey SILT, trace coarse sand, piece of wood noted at approximately 8.0', noted black coating from overlying soil particularly from 12' to 12.8', moist, medium stiff	10.0	DP 3	60									
0		Dark gray and black SAND and GRAVEL, wet, loose	15.0	DP 4	53									
0		Gray SILT, wet, stiff		DP 5	60									
0		Bottom of hole at 20.0 feet.	20.0											





Civil & Environmental Consultants, Inc.  
4274 Glendale Milford Road  
Cincinnati, Ohio 45242

**BORING NUMBER EW-2**

<b>CLIENT</b> <u>St. Bernard</u>	<b>PROJECT NAME</b> <u>MP Install</u>
<b>CEC PROJECT NUMBER</b> <u>100-194</u>	<b>PROJECT LOCATION</b> <u>Former St. Bernard Landfill</u>
<b>DATE STARTED</b> <u>6/2/10</u> <b>COMPLETED</b> <u>6/2/10</u>	<b>GROUND ELEVATION</b> <u>NA</u> <b>HOLE SIZE</b> <u>4 inch</u>
<b>DRILLING CONTRACTOR</b> <u>Jersey West</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Direct Push</u>	<b>AT TIME OF DRILLING</b> <u>None</u>
<b>LOGGED BY</b> <u>MJM</u> <b>CHECKED BY</b> <u>RH</u>	<b>AT END OF DRILLING</b> <u>---</u>
<b>LOCATION</b> <u>See Map</u>	<b>AFTER DRILLING</b> <u>---</u>

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) T=Torvane	▲ SPT N VALUE ▲						
								20	40	60	80			
0		Bentonite	0.0											
0		Brown silty CLAY, trace coarse sand below 2.6' and increased silt and gray mottling, noted iron staining, moist, medium stiff		DP 1	88									
0		Brown becoming gray silty CLAY, few brick fragments at 4.5', noted iron staining, moist, stiff												
0		Black clayey SILT, trace gravel, few concrete fragments, moist, medium stiff	5.0	DP 2	65									
0		Black clayey SILT, trace gravel, few cinders and wood fragments, moist, medium stiff												
0		Brown and gray silty CLAY, moist, stiff												
0		Black clayey SILT, some coarse sand, trace gravel, few brick and wood fragments, moist to very moist, soft to medium stiff	10.0	DP 3	63									
0		Black clayey SILT, some coarse sand, trace gravel, noted sheet plastic, moist to very moist and wet at bottom, soft to medium stiff												
0		Black clayey SILT, some coarse sand, trace gravel, noted large wood fragment at about 18.0', very moist to wet, soft to medium stiff	15.0	DP 4	50									
0		Black clayey SILT, some coarse sand, trace gravel, noted large wood fragment at about 18.0', very moist to wet, soft to medium stiff												
0		Silty clay, noted large piece of wood and rubber, noted sand present in the shoe	20.0	DP 6	23									
0		Silty clay, noted large piece of wood and rubber, noted sand present in the shoe												
0		Silty clay, noted large piece of wood and rubber, noted sand present in the shoe		DP 7	20									
0		Bottom of hole at 24.0 feet.												

CEC CUSTOM LOG 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/8/10



Civil & Environmental Consultants, Inc.  
4274 Glendale Milford Road  
Cincinnati, Ohio 45242

# BORING NUMBER EW-3

CLIENT <u>St. Bernard</u>	PROJECT NAME <u>MP Install</u>
CEC PROJECT NUMBER <u>100-194</u>	PROJECT LOCATION <u>Former St. Bernard Landfill</u>
DATE STARTED <u>6/2/10</u> COMPLETED <u>6/2/10</u>	GROUND ELEVATION <u>NA</u> HOLE SIZE <u>4 inch</u>
DRILLING CONTRACTOR <u>Jersey West</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Direct Push</u>	AT TIME OF DRILLING <u>None</u>
LOGGED BY <u>MJM</u> CHECKED BY <u>RH</u>	AT END OF DRILLING <u>---</u>
LOCATION <u>See Map</u>	AFTER DRILLING <u>---</u>

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) T=Torvane	▲ SPT N VALUE ▲						
								20	40	60	80			
0		Bentonite	0.0											
0		Gray and green silty CLAY, trace coarse sand, trace gravel, noted silt and sand partings at 2.0', 2.2', and 2.4', moist, medium stiff		DP 1	85									
0		Black clayey SILT, few wood and glass fragments, moist, soft												
0		Black clayey SILT, few wood and concrete fragments, noted odor, noted wet silt interval from 4.8' to 5.3', moist, soft	5.0	DP 2	50									
0		Black clayey SILT, few wood and concrete fragments, wet, soft												
0		Gray silty CLAY, noted black staining at top, moist, medium stiff	10.0	DP 3	60									
0		Bottom of hole at 12.0 feet.												

CEC CUSTOM LOG 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/8/10



Civil & Environmental Consultants, Inc.  
4274 Glendale Milford Road  
Cincinnati, Ohio 45242

# BORING NUMBER EW-6

<b>CLIENT</b> <u>St. Bernard</u>	<b>PROJECT NAME</b> <u>MP Install</u>
<b>CEC PROJECT NUMBER</b> <u>100-194</u>	<b>PROJECT LOCATION</b> <u>Former St. Bernard Landfill</u>
<b>DATE STARTED</b> <u>6/2/10</u> <b>COMPLETED</b> <u>6/2/10</u>	<b>GROUND ELEVATION</b> <u>NA</u> <b>HOLE SIZE</b> <u>4 inch</u>
<b>DRILLING CONTRACTOR</b> <u>Jersey West</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Direct Push</u>	<b>AT TIME OF DRILLING</b> <u>None</u>
<b>LOGGED BY</b> <u>MJM</u> <b>CHECKED BY</b> <u>RH</u>	<b>AT END OF DRILLING</b> <u>---</u>
<b>LOCATION</b> <u>See Map</u>	<b>AFTER DRILLING</b> <u>---</u>

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) T=Torvane	▲ SPT N VALUE ▲						
								20	40	60	80			
0		Bentonite	0.0											
0		Brown silty CLAY, trace coarse sand, trace gravel, few cinders and wood fragments, noted iron staining, noted clayey sand in shoe, moist, medium stiff		DP 1	90									
0		Brown silty CLAY, trace coarse sand, trace gravel, noted charred wood, noted iron staining, noted clayey sand in shoe, moist, medium stiff	5.0											
0		Gray clayey SAND, trace coarse sand, moist, medium dense		DP 2	90									
0		Brown fine and medium SAND, moist, loose												
0		Gray clayey SAND, trace wood, moist, medium dense												
0		Gray CLAY, trace silt, noted black mottling, moist, soft												
0		Gray fine and medium SAND, loose, wet												
0		Gray clayey SILT, trace wood pieces, noted medium sand parting at 10.5', moist, soft	10.0	DP 3	85									
0		Gray clayey SILT, transitioning to silty clay, moist, soft												
0		Gray silty CLAY, noted plastic and black mottling, moist, soft												
0		Bottom of hole at 12.0 feet.												

CEC CUSTOM LOG 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/8/10



**Civil & Environmental Consultants, Inc.**  
 Cincinnati, OH Pittsburgh, PA  
 (513) 885-0226 • (800) 759-5614 (412) 921-3402 • (800) 385-2324

**CITY OF ST. BERNARD**

JOB NO.: 200610

LOG OF MP-7

St. Bernard, Ohio

Sheet 1 of 1

LOGGED BY: PCS

GROUND SURFACE ELEVATION:

DRILLER: Jersey West Drilling

TOP OF CASING ELEVATION:

DATE DRILLED: 08/14/00

INITIAL WATER LEVEL: 14.5 ft. BGS

DATE: 08/14/00

DRILL METHOD: 4 1/4 IN. HSA

STATIC WATER LEVEL:

DATE:

HNu (ppm)	Recovery (in.)	Blow Counts	Elevation, MSL	Depth (ft.)	Graphic Log	Materials Description	Well Completion
						No sample	
				5			
	24	3-4 2-1				Brown to gray silty fine SAND, wet, loose (FILL)	
	24	2-1 2-3		10		Dark brown to gray fine sandy silty CLAY w/ wood, moist, medium stiff (FILL)	
						Same as above, soft	
	24	1-2 2-2					
	24	2-3 6-10		15		Same as above, stiff	
	10	10-17 8-5				Gray silty fine SAND w/ trace clay, wet, loose	
						Fine gravel, wet, medium dense	
						Boring terminated at 17 feet	
				20			
				25			



**Civil & Environmental Consultants, Inc.**  
 Cincinnati, OH      Pittsburgh, PA  
 (513) 985-0226 • (800) 759-5614      (412) 921-3402 • (800) 365-2324

**City of St. Bernard**  
 St. Bernard Landfill

JOB NO.: 210158

LOG OF MW-7A

Sheet 1 of 1

St. Bernard, Ohio

LOGGED BY: BHI	GROUND SURFACE ELEVATION:	
DRILLER: Jersey West Drilling	TOP OF CASING ELEVATION:	
DATE DRILLED: 07/09/02	INITIAL WATER LEVEL: 10	DATE: 07/09/02
DRILL METHOD: 4 1/4" HSA	STATIC WATER LEVEL:	DATE:

HNU (ppm)	Recovery	Blow Counts	Elevation	Depth (ft.)	Graphic Log	Materials Description	Well Completion
						Brown silty CLAY with sand, moist	
				5		Gray silty medium well graded SAND (SM) with some gravel, moist	
				10		Olive brown silty fine well graded SAND (SM), wet	
	24					Gray SILT and CLAY (CL) with organic material, soft, moist	
	18			15		Gray clayey SILT (ML) with fine sand, moist	
						Brown poorly sorted SAND (SP) with angular and loose gravel, wet	
						Boring terminated at 17 feet.	
				20			
				25			



**Civil & Environmental Consultants, Inc.**  
 Cincinnati, OH      Pittsburgh, PA  
 (513) 985-0226 • (800) 759-5614      (412) 921-3402 • (800) 365-2324

**City of St. Bernard**  
 St. Bernard Landfill

JOB NO.: 210158

LOG OF MW-7B

Sheet 1 of 1

St. Bernard, Ohio

LOGGED BY: BHI

GROUND SURFACE ELEVATION:

DRILLER: Jersey West Drilling

TOP OF CASING ELEVATION:

DATE DRILLED: 07/09/02

INITIAL WATER LEVEL: 7

DATE: 07/09/02

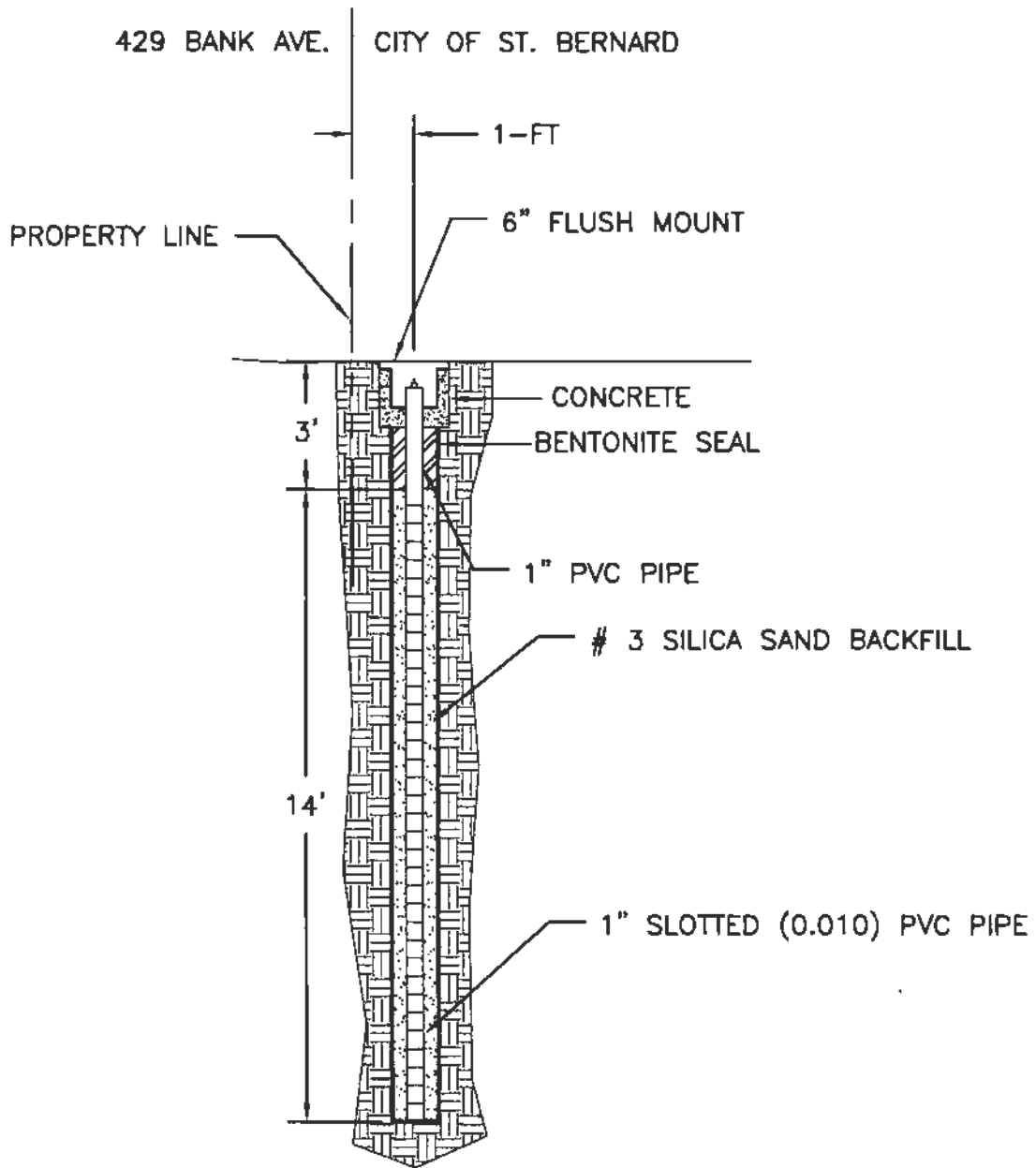
DRILL METHOD: 4 1/4" HSA

STATIC WATER LEVEL:

DATE:

HNU (ppm)	Recovery	Blow Counts	Elevation	Depth (ft.)	Graphic Log	Materials Description	Well Completion
				5		Brown silty CLAY, moist  Dark gray silty CLAY with sand and gravel, moist, brick fragments, fill  wood fragment	
				10		Brown silty fine SAND (SC) with clay, moist to wet  Gray silty well graded fine SAND (SC) with clay, moist	
	24	1-1-1-4		15		Dark grayish brown poorly graded SAND (SM) with silt, loose, wet	
	12	2-4-5-5		17		Boring terminated at 17 feet.	
				20			
				25			

G:\Projects\2001\210158\dwg\7E-7F detail Sept 2004.dwg, Layout2, 10/27/2004 4:17:47 PM, dsnook



MP-7E

NTS



**Civil & Environmental Consultants, Inc.**

Cincinnati, OH

(513) 985-0226 (800) 759-5614

Pittsburgh, PA  
Nashville, TN

Columbus, OH  
Chicago, IL

Indianapolis, IN  
St. Louis, MO

FORMER ST. BERNARD LANDFILL  
MONITORING PROBE INSTALLATION  
MP-7E & MP-7F  
HAMILTON COUNTY, OHIO

DWN BY: DGS

SCALE:

DATE:

PROJECT NO.:

FIGURE NO.:

CHKD. BY: RH

AS NOTED

SEPT. 2004

210158

3





Civil & Environmental Consultants, Inc.  
 4274 Glendale Milford Road  
 Cincinnati, Ohio 45242

# BORING NUMBER MP-7G

**CLIENT** St. Bernard      **PROJECT NAME** MP Install  
**CEC PROJECT NUMBER** 100-194      **PROJECT LOCATION** Former St. Bernard Landfill  
**DATE STARTED** 5/27/10      **COMPLETED** 5/27/10      **GROUND ELEVATION** NA      **HOLE SIZE** 4 inch  
**DRILLING CONTRACTOR** Jersey West      **GROUND WATER LEVELS:**  
**DRILLING METHOD** Direct Push      **AT TIME OF DRILLING** None  
**LOGGED BY** MJM      **CHECKED BY** RH      **AT END OF DRILLING** ---  
**LOCATION** See Map      **AFTER DRILLING** DTW 6.17 feet bgs

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) T=Torvane	▲ SPT N VALUE ▲						
								PL	MC	LL	FINES CONTENT (%)			
0		Topsoil	0.0											
0		Mottled brown and gray clayey SILT, few medium to coarse sand, trace brick and charred wood pieces, very moist, soft		DP 1	38									
0		Brown to gray clayey SILT, trace coarse sand, trace gravel, trace brick and wood pieces, moist, medium stiff	5.0											
0		Brown medium SAND, moist, loose		DP 2	70									
0		Gray medium SAND, wet, loose												
0		Gray SILT, trace becoming some clay, trace roots and wood pieces; moist, soft	10.0	DP 3	95									
0		Gray clayey SILT, moist, medium stiff		DP 4	95									
0		Gray fine and medium SAND, trace gravel, moist becoming wet below 15.3', loose	15.0											
0		Bottom of hole at 16.0 feet.												

CEC CUSTOM LOG 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/8/10



Civil & Environmental Consultants, Inc.  
 4274 Glendale Milford Road  
 Cincinnati, Ohio 45242

# BORING NUMBER MP-7H

**CLIENT** St. Bernard **PROJECT NAME** MP Install  
**CEC PROJECT NUMBER** 100-194 **PROJECT LOCATION** Former St. Bernard Landfill  
**DATE STARTED** 5/27/10 **COMPLETED** 5/27/10 **GROUND ELEVATION** NA **HOLE SIZE** 4 inch  
**DRILLING CONTRACTOR** Jersey West **GROUND WATER LEVELS:**  
**DRILLING METHOD** Direct Push **AT TIME OF DRILLING** None  
**LOGGED BY** MJM **CHECKED BY** RH **AT END OF DRILLING** ---  
**LOCATION** See Map **AFTER DRILLING** DTW 4.00 feet bgs

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) T=Torvane	▲ SPT N VALUE ▲						
								PL	MC	LL	FINES CONTENT (%)			
0		Topsoil	0.0											
0		Mottled brown and gray clayey SILT, medium stiff, noted iron staining, moist, medium stiff		DP 1	83									
0		Brown SILT, moist, loose												
0		Brown clayey SAND, medium, trace gravel, moist, medium stiff												
0		Fine and medium SAND, moist, loose												
0		Mottled brown and gray clayey SILT, noted wet silt partings approximately 0.4' apart, medium stiff	5.0	DP 2	88									
0		Brown clayey SAND, moist, soft												
0		Dark gray clayey SILT, moist, medium stiff												
0		Dark gray clayey SILT, transitioning to silt, trace medium sand at top, moist, medium stiff												
0		Gray SILT, very moist, medium stiff	10.0	DP 3	80									
0														
0		Gray SILT, wet, loose to medium dense												
0			15.0	DP 4	100									
0		Bottom of hole at 16.0 feet.												

CEC CUSTOM LOG 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/8/10



**Civil & Environmental Consultants, Inc.**  
 Cincinnati, OH Pittsburgh, PA  
 (513) 885-0226 • (800) 759-5814 (412) 821-3402 • (800) 365-2324

**CITY OF ST. BERNARD**

**JOB NO.: 200610**

**LOG OF MP-8**

**Sheet 1 of 1**

**St. Bernard, Ohio**

**LOGGED BY: PCS**

**GROUND SURFACE ELEVATION:**

**DRILLER: Jersey West Drilling**

**TOP OF CASING ELEVATION:**

**DATE DRILLED: 08/14/00**

**INITIAL WATER LEVEL: 9 ft. BGS**

**DATE: 08/14/00**

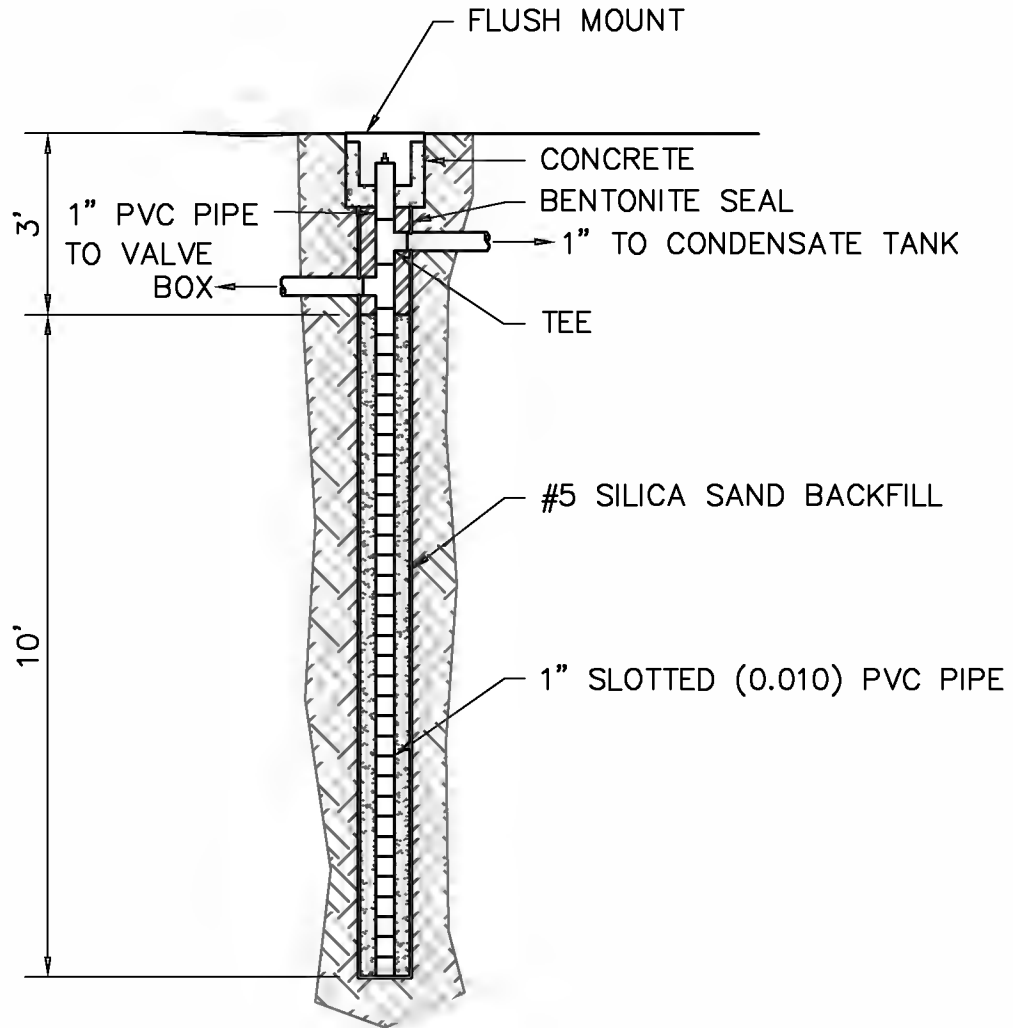
**DRILL METHOD: 4 1/4 IN. HSA**

**STATIC WATER LEVEL:**

**DATE:**

HNu (ppm)	Recovery (in.)	Blow Counts	Elevation, MSL	Depth (ft.)	Graphic Log	Materials Description	Well Completion
						No sample	
	21	5-8 12-15		5		Dark brown to gray silty CLAY w/ fine to medium sand, moist, very stiff (FILL)	
	N/A	4-3 4-3				Light brown fine SAND, moist, medium dense (FILL)	
						Dark brown to gray silty CLAY w/ fine to medium sand, concrete, wood, brick, plastic, and rubber, moist, very stiff (FILL)	
						No recovery	
						Dark brown to gray sandy silty CLAY, wet, very soft	
	18	1-1 1-1		10		Brown oxidized seam at 12.5 feet	
	18	0-1 1-1				Boring terminated at 13 feet	
				15			
				20			
				25			

Revised designation: MP8A



NOTE:  
1. INSTALLED ON 10/15/07  
2. ASSUMED LOCATION OF TEES.



**Civil & Environmental Consultants, Inc.**  
4274 Glendale-Milford Road - Cincinnati, OH 45242  
513-985-0226 · 800-759-5614  
www.cecinc.com

CITY OF ST. BERNARD  
ST. BERNARD LANDFILL  
LANDFILL GAS ABATEMENT  
HAMILTON COUNTY, OHIO  
EXTRACTION WELL INSTALLATION  
EW-8A

DRAWN BY: DAR	CHECKED BY: RH	APPROVED BY:	FIGURE NO.:
DATE: MARCH 2009	DWG SCALE: NTS	PROJECT NO: 210-158-AW00	<b>B-1</b>

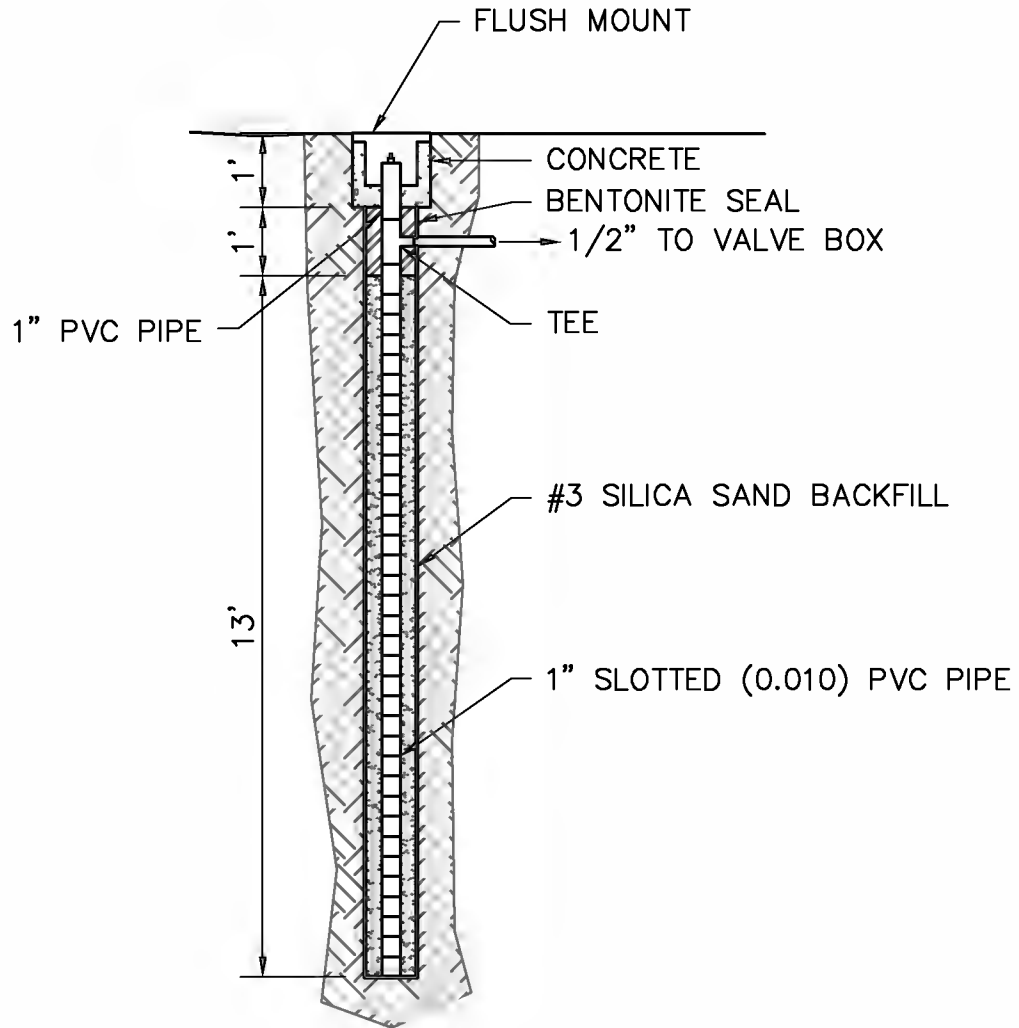
10:51:0

10:58

10:1

0

Revised designation: MP-8B



NOTE: INSTALLED BY JERSEY WEST DRILLING ON 12/30/08



**Civil & Environmental Consultants, Inc.**  
4274 Glendale-Milford Road - Cincinnati, OH 45242  
513-985-0226 · 800-759-5614  
www.cecinc.com

CITY OF ST. BERNARD  
ST. BERNARD LANDFILL  
LANDFILL GAS ABATEMENT  
HAMILTON COUNTY, OHIO

**MONITORING PROBE INSTALLATION  
EW-8B**

DRAWN BY: DAR	CHECKED BY: RH	APPROVED BY:	FIGURE NO.:
DATE: MARCH 2009	DWG SCALE: NTS	PROJECT NO: 210-158-AW00	<b>B-2</b>

2009 10:51:39

10158

101



Civil & Environmental Consultants, Inc.  
 4274 Glendale Milford Road  
 Cincinnati, Ohio 45242

# BORING NUMBER MP-8C

<b>CLIENT</b> <u>St. Bernard</u>	<b>PROJECT NAME</b> <u>MP Install</u>
<b>CEC PROJECT NUMBER</b> <u>100-194</u>	<b>PROJECT LOCATION</b> <u>Former St. Bernard Landfill</u>
<b>DATE STARTED</b> <u>5/27/10</u> <b>COMPLETED</b> <u>5/27/10</u>	<b>GROUND ELEVATION</b> <u>NA</u> <b>HOLE SIZE</b> <u>4 inch</u>
<b>DRILLING CONTRACTOR</b> <u>Jersey West</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Direct Push</u>	<b>AT TIME OF DRILLING</b> <u>None</u>
<b>LOGGED BY</b> <u>MJM</u> <b>CHECKED BY</b> <u>RH</u>	<b>AT END OF DRILLING</b> <u>---</u>
<b>LOCATION</b> <u>See Map</u>	<b>AFTER DRILLING</b> <u>---</u>

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) T=Torvane	▲ SPT N VALUE ▲						
								20	40	60	80			
0		Topsoil	0.0											
0		Brown clayey SILT, trace gravel, trace coarse sand, few brick, charred wood, and concrete fragments, moist, medium stiff		DP 1	100									
0		Gray clayey SILT, trace gravel, trace coarse sand, many brick, wood, and concrete fragments, noted wet granular pocket at 7.9' with brick fragments, moist, medium stiff	5.0	DP 2	98									
0		Gray fine and medium SAND, moist, loose												
0		Gray and green clayey SILT, trace plant material, moist, medium stiff	10.0	DP 3	100									
0		Gray SAND and GRAVEL, wet, loose	15.0	DP 4	78									
0		Gray SILT, wet, stiff		DP 5	100									
0		Bottom of hole at 19.4 feet.												

CEC CUSTOM LOG 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/8/10



Civil & Environmental Consultants, Inc.  
 4274 Glendale Milford Road  
 Cincinnati, Ohio 45242

# BORING NUMBER MP-8AR

CLIENT <u>St. Bernard</u>	PROJECT NAME <u>MP Install</u>
CEC PROJECT NUMBER <u>100-194</u>	PROJECT LOCATION <u>Former St. Bernard Landfill</u>
DATE STARTED <u>11/17/11</u> COMPLETED <u>11/17/11</u>	GROUND ELEVATION <u>NA</u> HOLE SIZE <u>3 inch</u>
DRILLING CONTRACTOR <u>Jersey West</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Direct Push</u>	AT TIME OF DRILLING <u>None</u>
LOGGED BY <u>RJS</u> CHECKED BY <u>RH</u>	AT END OF DRILLING <u>Dry</u>
LOCATION <u>16' East of MP-8R and 14' South of fence</u>	∇ .5 hours AFTER DRILLING <u>12.3 ft / Elev 0.0 ft</u>

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					
	DP 1	75		Brown silty CLAY, few brick fragments	<p>Concrete</p> <p>Bentonite Seal</p> <p>Sand Pack</p>
	DP 2	75		3.0 3.8 GRAVEL Olive with reddish mottling silty CLAY, stiff	
5	DP 3	90		7.0 Noted piece of pottery at 7'. Grayish-green clayey SILT, very soft	
	DP 4	90		9.0 Grayish-green silty CLAY	
10	DP 5	100		13.0 ∇ Noted 2" peat layer at 12.5'.	
Bottom of hole at 13.0 feet					
Initial methane reading = 0%, 3:40-3:42 PM 11/17/2011.					

GENERAL BH / TP / WELL 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 12/5/11



Civil & Environmental Consultants, Inc.  
 4274 Glendale Milford Road  
 Cincinnati, Ohio 45242

# BORING NUMBER MP-8BR

PAGE 1 OF 1

CLIENT <u>St. Bernard</u>	PROJECT NAME <u>MP Install</u>
CEC PROJECT NUMBER <u>100-194</u>	PROJECT LOCATION <u>Former St. Bernard Landfill</u>
DATE STARTED <u>11/17/11</u> COMPLETED <u>11/17/11</u>	GROUND ELEVATION <u>NA</u> HOLE SIZE <u>3 inch</u>
DRILLING CONTRACTOR <u>Jersey West</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Direct Push</u>	▽ AT TIME OF DRILLING <u>14.8 ft / Elev 0.0 ft</u>
LOGGED BY <u>RJS</u> CHECKED BY <u>RH</u>	AT END OF DRILLING <u>---</u>
LOCATION <u>16' East of MP-8CR, 15.5' South of fence</u>	▽ 2.5 hours AFTER DRILLING <u>2.9 ft / Elev 0.0 ft</u>

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0				Brown silty CLAY, noted layers of pea gravel	<p>Concrete</p> <p>Bentonite Seal</p> <p>Sand Pack</p>
3.0	DP 1	75		Noted corrugated pipe at 3'.	
3.5				Concrete	
5				Olive silty CLAY, noted glass and pottery	
8.0	DP 2	80		Noted brick from 5' to 8'. Noted wood pieces at 5.5' and 6'.	
10				Grayish-green clayey SILT with fine sand	
14.3	DP 3	75		Wet, very soft from 9' to 10'.	
14.8				PEAT	
15.0				SAND and GRAVEL, wet	
<p>Bottom of hole at 15.0 feet</p> <p>Initial methane reading = 0%, 12:42-12:45 PM 11/17/2011. Initial vacuum = -0.37" water.</p>					

GENERAL BH / TP / WELL / 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 12/5/11





Civil & Environmental Consultants, Inc.  
 4274 Glendale Milford Road  
 Cincinnati, Ohio 45242

# BORING NUMBER MP-8CR

CLIENT <u>St. Bernard</u>	PROJECT NAME <u>MP Install</u>
CEC PROJECT NUMBER <u>100-194</u>	PROJECT LOCATION <u>Former St. Bernard Landfill</u>
DATE STARTED <u>11/17/11</u> COMPLETED <u>11/17/11</u>	GROUND ELEVATION <u>NA</u> HOLE SIZE <u>3 inch</u>
DRILLING CONTRACTOR <u>Jersey West</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Direct Push</u>	AT TIME OF DRILLING <u>None</u>
LOGGED BY <u>MJM</u> CHECKED BY <u>RH</u>	▼ AT END OF DRILLING <u>7.0 ft / Elev 0.0 ft</u>
LOCATION <u>15.5' South of fence, 5' West of MP-8C</u>	▼ 4 hours AFTER DRILLING <u>3.7 ft / Elev 0.0 ft</u>

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					<p>Concrete Bentonite Seal Sand Pack</p>
	DP 1	60	[Cross-hatch pattern]	Brown silty CLAY, some pea gravel	
	DP 2	60	[Cross-hatch pattern]	▼ Concrete from 4.5' to 5', wet on top of concrete.	
5			[Cross-hatch pattern]	Pushed concrete in tip, wood noted	
	DP 3	10	[Vertical lines]	▼	
10				10.0	
	DP 4	80	[Diagonal lines]	Gray silty CLAY, soft	
				12.5	
	DP 5	80	[Vertical lines]	Grayish-green clayey SILT, wet, soft	
				14.5	
				Becoming silty fine sand at 14'. Noted 0.5" of wood at 14'.	
15				15.0	
				Grayish-green silty SAND, noted coarse sand and gravel at 15'	
				Bottom of hole at 15.0 feet	
				Initial methane reading = 0%, 11:30 AM 11/17/2011 and 0%, 12:24-12:26 AM. Vacuum = 0.1" water	

GENERAL BH / TP / WELL 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 12/5/11

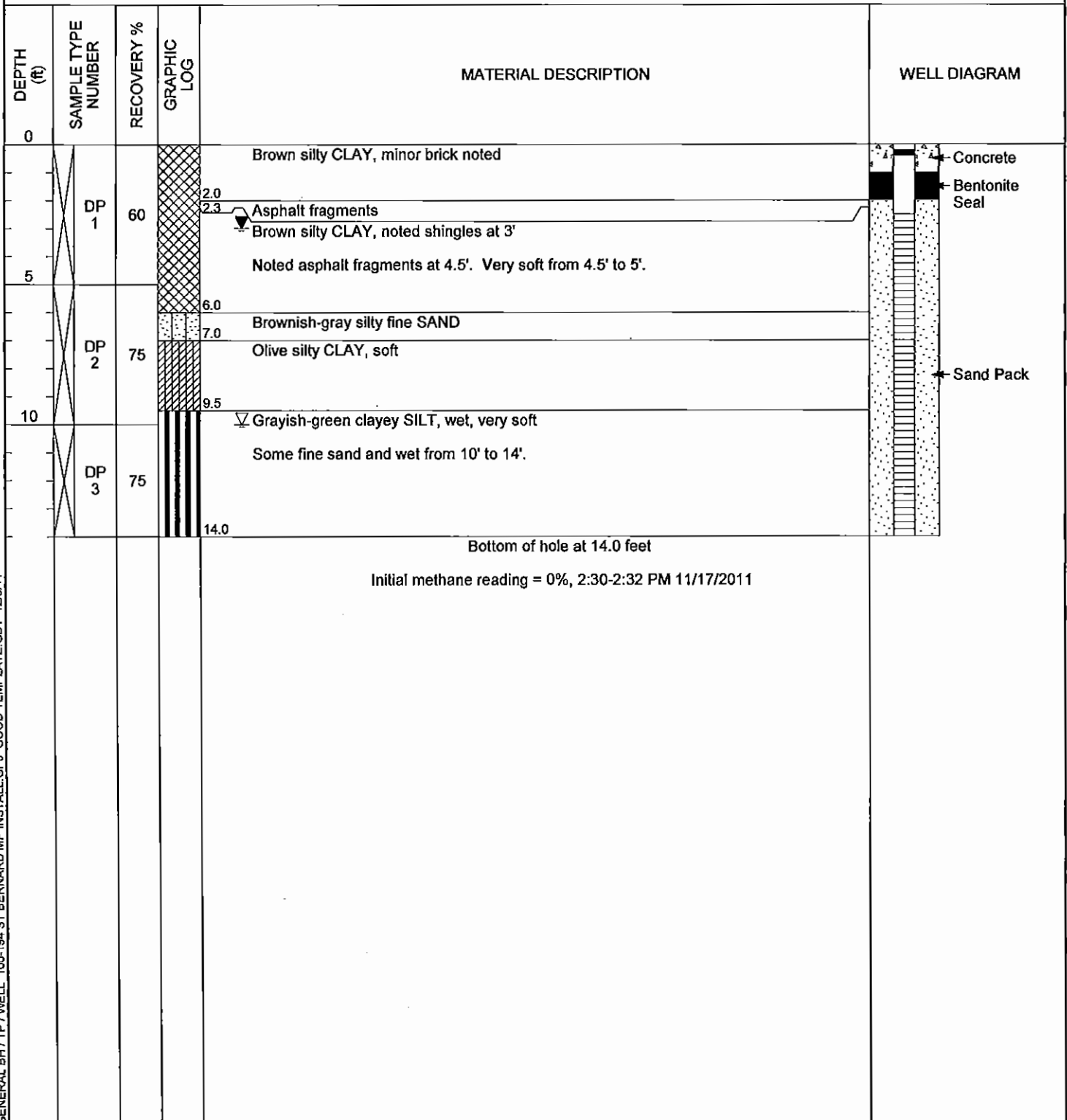


Civil & Environmental Consultants, Inc.  
4274 Glendale Milford Road  
Cincinnati, Ohio 45242

# BORING NUMBER MP-8R

PAGE 1 OF 1

CLIENT <u>St. Bernard</u>	PROJECT NAME <u>MP Install</u>
CEC PROJECT NUMBER <u>100-194</u>	PROJECT LOCATION <u>Former St. Bernard Landfill</u>
DATE STARTED <u>11/17/11</u> COMPLETED <u>11/17/11</u>	GROUND ELEVATION <u>NA</u> HOLE SIZE <u>3 inch</u>
DRILLING CONTRACTOR <u>Jersey West</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Direct Push</u>	∇ AT TIME OF DRILLING <u>10.0 ft / Elev 0.0 ft</u>
LOGGED BY <u>RJS</u> CHECKED BY <u>RH</u>	∇ AT END OF DRILLING <u>3.0 ft / Elev 0.0 ft</u>
LOCATION <u>16' East of MP-8BR, 14.5' South of fence, 5' West of VB</u>	AFTER DRILLING <u>---</u>



GENERAL BH / TP / WELL\_100-194-ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 12/5/11



Civil & Environmental Consultants, Inc.  
 4274 Glendale Milford Road  
 Cincinnati, Ohio 45242

# BORING NUMBER MP-8D

PAGE 1 OF 1

<b>CLIENT</b> <u>St. Bernard</u>	<b>PROJECT NAME</b> <u>MP Install</u>
<b>CEC PROJECT NUMBER</b> <u>100-194</u>	<b>PROJECT LOCATION</b> <u>Former St. Bernard Landfill</u>
<b>DATE STARTED</b> <u>6/29/12</u> <b>COMPLETED</b> <u>6/29/12</u>	<b>GROUND ELEVATION</b> _____ <b>HOLE SIZE</b> _____
<b>DRILLING CONTRACTOR</b> <u>Jersey West</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Direct Push</u>	<b>AT TIME OF DRILLING</b> <u>---</u>
<b>LOGGED BY</b> <u>CHW</u> <b>CHECKED BY</b> <u>RH</u>	<b>AT END OF DRILLING</b> <u>---</u>
<b>LOCATION</b> <u>7' West of MP-8C, 3' South of fence</u>	<b>AFTER DRILLING</b> <u>---</u>

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					
0.7				Brown CLAY, little fine to coarse sand, little gravel, dry, hard (FILL) Fine to coarse SAND, dry to saturated (FILL)	Concrete Bentonite Seal
5					
9.0				Dark gray to green clayey SILT and silty CLAY, trace fine to coars sand, saturated, soft (NATURAL)	Sand Pack
10	DP 1	83		Light gray clayey SILT, some fine to coarse sand, some gravel, saturated, soft (NATURAL)	1" Sch. 40 slotted PVC pipe
14.0	DP 2	96		Fine to coarse SAND and GRAVEL, saturated, dense (NATURAL)	
15.3				Trace peat layer (less than 1' thick) at 15.3'	Bentonite
16.0				Bottom of hole at 16.0 feet	

GENERAL BH / TP / WELL 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/9/12



Civil & Environmental Consultants, Inc.  
4274 Glendale Milford Road  
Cincinnati, Ohio 45242

# BORING NUMBER MP-8E

PAGE 1 OF 1

<b>CLIENT</b> <u>St. Bernard</u>	<b>PROJECT NAME</b> <u>MP Install</u>
<b>CEC PROJECT NUMBER</b> <u>100-194</u>	<b>PROJECT LOCATION</b> <u>Former St. Bernard Landfill</u>
<b>DATE STARTED</b> <u>6/29/12</u> <b>COMPLETED</b> <u>6/29/12</u>	<b>GROUND ELEVATION</b> _____ <b>HOLE SIZE</b> _____
<b>DRILLING CONTRACTOR</b> <u>Jersey West</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Direct Push</u>	<b>AT TIME OF DRILLING</b> <u>---</u>
<b>LOGGED BY</b> <u>CHW</u> <b>CHECKED BY</b> <u>RH</u>	<b>AT END OF DRILLING</b> <u>---</u>
<b>LOCATION</b> <u>8' East of MP-8C, 3' South of fence</u>	<b>AFTER DRILLING</b> <u>---</u>

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					
0.7				Brown CLAY, little fine to coarse sand, little gravel, dry, hard (FILL) Fine to coarse SAND, dry to saturated (FILL)	Concrete Bentonite Seal
5					
9.3				Gray clayey SILT, trace fine to coarse sand, saturated, soft (NATURAL)	Sand Pack
10	DP 1	94			
12.0				Gray clayey SILT, some fine to coarse sand, some gravel, saturated, soft (NATURAL)	1" Sch. 40 slotted PVC pipe
15	DP 2	81			
15.5				Very dark brown to black fine to coarse SAND and GRAVEL, saturated, dense (NATURAL)	Bentonite
16.0				Bottom of hole at 16.0 feet	

GENERAL BH / TP / WELL 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/9/12



Civil & Environmental Consultants, Inc.  
4274 Glendale Milford Road  
Cincinnati, Ohio 45242

# BORING NUMBER MP-8F

<b>CLIENT</b> <u>St. Bernard</u>	<b>PROJECT NAME</b> <u>MP Install</u>
<b>CEC PROJECT NUMBER</b> <u>100-194</u>	<b>PROJECT LOCATION</b> <u>Former St. Bernard Landfill</u>
<b>DATE STARTED</b> <u>6/29/12</u> <b>COMPLETED</b> <u>6/29/12</u>	<b>GROUND ELEVATION</b> _____ <b>HOLE SIZE</b> _____
<b>DRILLING CONTRACTOR</b> <u>Jersey West</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Direct Push</u>	<b>AT TIME OF DRILLING</b> <u>---</u>
<b>LOGGED BY</b> <u>CHW</u> <b>CHECKED BY</b> <u>RH</u>	<b>AT END OF DRILLING</b> <u>---</u>
<b>LOCATION</b> <u>3' West of MP-8B, 3' South of fence</u>	<b>AFTER DRILLING</b> <u>---</u>

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					
0.7				Brown CLAY, little fine to coarse sand, little gravel, hard, dry (FILL) Fine to coarse SAND, dry to saturated (FILL)	
5					
9.5	DP 1	88		Gray clayey SILT, fine to coarse sand, very moist to saturated, soft (NATURAL)	
13.0				Gray to brown fine to coarse SAND and GRAVEL, saturated, dense (NATURAL)	
15	DP 2	88			
17.0				Bottom of hole at 17.0 feet	

GENERAL BH / TP / WELL 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/9/12



Civil & Environmental Consultants, Inc.  
4274 Glendale Milford Road  
Cincinnati, Ohio 45242

# BORING NUMBER MP-8G

PAGE 1 OF 1

<b>CLIENT</b> <u>St. Bernard</u>	<b>PROJECT NAME</b> <u>MP Install</u>
<b>CEC PROJECT NUMBER</b> <u>100-194</u>	<b>PROJECT LOCATION</b> <u>Former St. Bernard Landfill</u>
<b>DATE STARTED</b> <u>6/29/12</u> <b>COMPLETED</b> <u>6/29/12</u>	<b>GROUND ELEVATION</b> _____ <b>HOLE SIZE</b> _____
<b>DRILLING CONTRACTOR</b> <u>Jersey West</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Direct Push</u>	<b>AT TIME OF DRILLING</b> <u>---</u>
<b>LOGGED BY</b> <u>CHW</u> <b>CHECKED BY</b> <u>RH</u>	<b>AT END OF DRILLING</b> <u>---</u>
<b>LOCATION</b> <u>4' East of MP-8A, 3' South of fence</u>	<b>AFTER DRILLING</b> <u>---</u>

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					
0.7				Brown CLAY, little fine to coarse sand, little gravel, dry, hard (FILL) Fine to coarse SAND, dry to saturated (FILL)	Concrete Bentonite Seal
5					
9.5				Gray to grayish-green clayey SILT, little fine to coarse sand, saturated, soft (NATURAL)	Sand Pack
10	DP 1	68			1" Sch. 40 slotted PVC pipe
14.0				Gray clayey SILT, little to some fine to coarse sand, trace fine gravel, peat fragment at 15.5', saturated, soft (NATURAL)	
15	DP 2	96			
16.0				Fine to coarse SAND and GRAVEL, saturated, dense (NATURAL)	Bentonite and Sand
18.0				Bottom of hole at 18.0 feet	

GENERAL BH / TP / WELL 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/9/12



**Civil & Environmental Consultants, Inc.**  
 Cincinnati, OH Pittsburgh, PA  
 (513) 985-0226 • (800) 759-5614 (412) 921-3402 • (800) 365-2324

**CITY OF ST. BERNARD**

JOB NO.: 200610

LOG OF MP-9

St. Bernard, Ohio

Sheet 1 of 1

LOGGED BY: PCS

GROUND SURFACE ELEVATION:

DRILLER: Jersey West Drilling

TOP OF CASING ELEVATION:

DATE DRILLED: 08/14/00

INITIAL WATER LEVEL: 12 ft. BGS

DATE: 08/14/00

DRILL METHOD: 4 1/4 IN. HSA

STATIC WATER LEVEL:

DATE:

HNu (ppm)	Recovery (in.)	Blow Counts	Elevation, MSL	Depth (ft.)	Graphic Log	Materials Description	Well Completion
5.3						No sample, Vapor reading from open bore hole	
4.9	3	50/3		5	Concrete		
0.0	3	14-6 4-4			Gray silty CLAY w/ fine sand, moist, trace concrete and metal, moist, stiff (FILL)		
0.0	18	2-2 2-2		10	Olive gray silty CLAY w/ fine sand and brown oxidized areas through sample, moist, soft		
0.0	21	1-1 1-1			Very soft Gray silty fine SAND, wet, very loose		
						Boring terminated at 13 feet	
				15			
				20			
				25			



**Civil & Environmental Consultants, Inc.**  
 Cincinnati, OH Pittsburgh, PA  
 (513) 985-0226 • (800) 759-5814 (412) 921-3402 • (800) 365-2324

**CITY OF ST. BERNARD**

**JOB NO.:** 200610

**LOG OF MP-10**

**St. Bernard, Ohio**

**Sheet 1 of 1**

**LOGGED BY:** PCS

**GROUND SURFACE ELEVATION:**

**DRILLER:** Jersey West Drilling

**TOP OF CASING ELEVATION:**

**DATE DRILLED:** 08/14/00

**INITIAL WATER LEVEL:** 12.5 ft. BGS

**DATE:** 08/14/00

**DRILL METHOD:** 4 1/4 IN. HSA

**STATIC WATER LEVEL:**

**DATE:**

HNu (ppm)	Recovery (in.)	Blow Counts	Elevation, MSL	Depth (ft.)	Graphic Log	Materials Description	Well Completion
1.8						No sample, Vapor reading from soil cuttings	
1.2	17	5-18 5-5		5		Gray silty CLAY w/ fine to medium sand, glass, concrete, metal, rubber, and fine gravel, wet in concrete fragments at 6.7 to 7 feet, very stiff (FILL)	
0	18	1-3 4-4				Gray silty CLAY w/ roots and black organic stains, moist, medium stiff (FILL)	
						Soft	
1.0	22	1-1 2-1		10		Gray fine sandy silty CLAY w/ medium sand, moist, very soft	
1.9	16	1-1 1-2				Gray fine SAND, wet, very loose	
						Boring terminated at 13 feet	
				15			
				20			
				25			





**Civil & Environmental Consultants, Inc.**  
 Cincinnati, OH Pittsburgh, PA  
 (513) 985-0226 • (800) 759-5614 (412) 921-3402 • (800) 385-2324

**CITY OF ST. BERNARD**

**JOB NO.: 200610**

**LOG OF MP-II**

**Sheet 1 of 1**

**St. Bernard, Ohio**

**LOGGED BY: PCS**

**GROUND SURFACE ELEVATION:**

**DRILLER: Jersey West Drilling**

**TOP OF CASING ELEVATION:**

**DATE DRILLED: 08/15/00**

**INITIAL WATER LEVEL: 5 ft. BGS**

**DATE: 08/15/00**

**DRILL METHOD: 4 1/4 IN. HSA**

**STATIC WATER LEVEL:**

**DATE:**

HNu (ppm)	Recovery (in.)	Blow Counts	Elevation, MSL	Depth (ft.)	Graphic Log	Materials Description	Well Completion
1.8						No sample, Vapor reading from open bore hole	
0.1	5	1-1 1-1		5	+	Brown grading to black silty CLAY w/ fine gravel, concrete, metal, wood, and roots, wet, organic odor, very soft (FILL) No recovery, wet	
N/A	N/A	3-2 2-3				Soft	
N/A	N/A	N/A		10	+	No recovery, wet, wood and metal from cuttings	
N/A	N/A	4-3 3-4				Black silty fine SAND, wet grades to fine sand at 13.5 feet, medium stiff	
0	20	1-2 4-8				Boring terminated at 14 feet	
				15			
				20			
				25			



**Civil & Environmental Consultants, Inc.**  
 Cincinnati, OH Pittsburgh, PA  
 (513) 885-0226 • (800) 758-5614 (412) 821-3402 • (800) 365-2324

**CITY OF ST. BERNARD**

**JOB NO.: 200610**

**LOG OF MP-12**

**St. Bernard, Ohio**

**Sheet 1 of 1**

<b>LOGGED BY:</b> PCS	<b>GROUND SURFACE ELEVATION:</b>
<b>DRILLER:</b> Jersey West Drilling	<b>TOP OF CASING ELEVATION:</b>
<b>DATE DRILLED:</b> 08/15/00	<b>INITIAL WATER LEVEL:</b> <b>DATE:</b>
<b>DRILL METHOD:</b> 4 1/4 IN. HSA	<b>STATIC WATER LEVEL:</b> <b>DATE:</b>

HNu (ppm)	Recovery (in.)	Blow Counts	Elevation, MSL	Depth (ft.)	Graphic Log	Materials Description	Well Completion
9.3						No sample, Vapor reading from open bore hole	
1.3	12	3-4 4-8		5	+	0.3% Methane - Gray to dark brown silty CLAY w/ medium sand, glass, and wood, moist, medium stiff	
N/A	N/A	3-5 8-7				1.7% Methane - No recovery, wood in shoe	
0.0	12	3-8 9-6		10	+	3.0% Methane - Gray silty CLAY w/ paper, wood, and foundry sand, moist, very stiff	
N/A	N/A	2-3 13-18				9.0% Methane - No recovery	
0.0	2	2-3 3-7		15	///	1.2% Methane - Gray silty CLAY w/ black organic discoloration, moist, medium stiff	
0.0	18	4-4 3-3				Gray silty CLAY, moist, medium stiff	
						Boring terminated at 17 feet	
				20		NOTE: Methane readings from open bore hole at depth	
				25			



Civil & Environmental Consultants, Inc.  
 4274 Glendale Milford Road  
 Cincinnati, Ohio 45242

# BORING NUMBER MP-12B

PAGE 1 OF 1

<b>CLIENT</b> St. Bernard	<b>PROJECT NAME</b> MP Install
<b>CEC PROJECT NUMBER</b> 100-194	<b>PROJECT LOCATION</b> Former St. Bernard Landfill
<b>DATE STARTED</b> 6/8/10 <b>COMPLETED</b> 6/8/10	<b>GROUND ELEVATION</b> NA <b>HOLE SIZE</b> 4 inch
<b>DRILLING CONTRACTOR</b> Jersey West	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> Direct Push	<b>AT TIME OF DRILLING</b> None
<b>LOGGED BY</b> MJM <b>CHECKED BY</b> RH	<b>AT END OF DRILLING</b> ---
<b>LOCATION</b> See Map	<b>AFTER DRILLING</b> ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0				0.4 Topsoil	
	DP 1	93		2.1 Brown clayey SILT, trace coarse sand, trace gravel, noted iron staining, moist, stiff	Concrete Seal Bentonite
				4.0 Brown clayey SAND, trace gravel, noted glass, porcelain, wood pieces, sheet plastic, and cinders, orange mottling in areas, moist, soft	
5	DP 2	35		8.0 Black clayey SAND, trace gravel, few concrete and plastic pieces, moist becoming wet at bottom <i>sample retained from 4' to 5'</i>	
				8.3 Black clayey SAND, trace gravel, few concrete and plastic pieces, wet	
10	DP 3	8		12.0	Screen
				12.7 Dark gray and black clayey SILT, moist to wet, soft	Sand Backfill
	DP 4	53		14.4 Black SAND and gravel, some clay at top and bottom with gravel, sorted fine and medium sand from 13.2' to 13.7', wet, loose	
15				16.0 Black SAND and gravel, wet, loose	
	DP 5	73		17.9 Gray SILT, trace clay, few gravel at top, wet, stiff	
20				18.9	
				20.0 Bottom of hole at 20.0 feet	

GENERAL BH / TP / WELL 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 11/17/11



Civil & Environmental Consultants, Inc.  
4274 Glendale Milford Road  
Cincinnati, Ohio 45242

<b>CLIENT</b> <u>St. Bernard</u>	<b>PROJECT NAME</b> <u>MP Install</u>
<b>CEC PROJECT NUMBER</b> <u>100-194</u>	<b>PROJECT LOCATION</b> <u>Former St. Bernard Landfill</u>
<b>DATE STARTED</b> <u>6/8/10</u> <b>COMPLETED</b> <u>6/8/10</u>	<b>GROUND ELEVATION</b> <u>NA</u> <b>HOLE SIZE</b> <u>4 inch</u>
<b>DRILLING CONTRACTOR</b> <u>Jersey West</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Direct Push</u>	<b>AT TIME OF DRILLING</b> <u>None</u>
<b>LOGGED BY</b> <u>MJM</u> <b>CHECKED BY</b> <u>RH</u>	<b>AT END OF DRILLING</b> <u>---</u>
<b>LOCATION</b> <u>See Map</u>	<b>AFTER DRILLING</b> <u>---</u>

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) T=Torvane	▲ SPT N VALUE ▲						
								20	40	60	80			
0		Topsoil	0.0											
0		Brown clayey SILT, trace sand, trace gravel, few brick, concrete, and glass fragments, slightly moist, medium stiff		DP 1	83									
0		Black clayey SAND, few concrete and metal fragments, moist, loose												
0		Black clayey SAND, noted concrete and carpet, strong odor, moist, loose	5.0	DP 2	10									
0		Dark gray and black clayey SILT, few brick fragments, noted tar-like material, soft	10.0	DP 3	8									
0		Dark gray and black clayey SILT, few brick fragments, noted tar-like material and strong odor, very moist, soft <i>sample retained from 12' to 12.3'</i>	15.0	DP 4	28									
0		Gray clayey SAND, few gravel, noted copper tubing, wet, medium stiff												
0		Gray SAND, trace gravel, wet, loose		DP 5	43									
0		Bottom of hole at 20.0 feet.	20.0											

CEC CUSTOM LOG 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/8/10



**Civil & Environmental Consultants, Inc.**  
 Cincinnati, OH      Pittsburgh, PA  
 (513) 985-0226 • (800) 759-5614      (412) 921-3402 • (800) 365-2324

**CITY OF ST. BERNARD**

**JOB NO.: 200610**

**LOG OF MP-13**

**St. Bernard, Ohio**

**Sheet 1 of 1**

**LOGGED BY: PCS**

**GROUND SURFACE ELEVATION:**

**DRILLER: Jersey West Drilling**

**TOP OF CASING ELEVATION:**

**DATE DRILLED: 08/15/00**

**INITIAL WATER LEVEL:**

**DATE:**

**DRILL METHOD: 4 1/4 IN. HSA**

**STATIC WATER LEVEL:**

**DATE:**

HNu (ppm)	Recovery (in.)	Blow Counts	Elevation, MSL	Depth (ft.)	Graphic Log	Materials Description	Well Completion
0.0						No sample, Cuttings contain tar	
0.0	12	33-55/2		5	+	Black silty CLAY w/ wet tar (asphalt), moist, very hard (FILL)	
N/A	N/A	5-5 5-9				20.0% Methane - No recovery, metal and wood in shoe along w/ asphalt	
0.0	6	4-3 2-2		10	///	9.0% Methane - Gray to black silty CLAY w/ asphalt and wood, moist, medium stiff (FILL)	
0.0	22	5-4 3-4				0.3% Methane - Gray to black silty CLAY w/ black organic discoloration and roots, moist, medium stiff	
0.0	21	3-2 4-4		15	///	0.2% Methane - Gray silty CLAY w/ black organic discoloration, moist, medium stiff	
						Boring terminated at 15 feet	
				20			
				25			

NOTE: Methane readings from open bore hole at depth



**Civil & Environmental Consultants, Inc.**  
 Cincinnati, OH Pittsburgh, PA  
 (513) 985-0226 • (800) 759-5614 (412) 921-3402 • (800) 365-2324

**CITY OF ST. BERNARD**

**JOB NO.: 200610**

**LOG OF MP-14**

**Sheet 1 of 1**

**St. Bernard, Ohio**

**LOGGED BY:** PCS

**GROUND SURFACE ELEVATION:**

**DRILLER:** Jersey West Drilling

**TOP OF CASING ELEVATION:**

**DATE DRILLED:** 08/15/00-08/16/00

**INITIAL WATER LEVEL:**

**DATE:**

**DRILL METHOD:** 4 1/4 IN. HSA

**STATIC WATER LEVEL:**

**DATE:**

HNu (ppm)	Recovery (in.)	Blow Counts	Elevation, MSL	Depth (ft.)	Graphic Log	Materials Description	Well Completion
0.0						No sample, Metal in cuttings	
0.0	12	4-4 4-2		5	+	Brown silty CLAY w/ medium to coarse sand and fine gravel, glass, moist, medium stiff	
0.0	6	3-32 50/3			+	Black to gray silty CLAY w/ medium sand, wood, and fine gravel, moist, very hard	
0.0	10	2-2 4-6		10	+	Same as above w/ plastic, medium stiff	
0.7	8	3-4 5-6			+	Gray silty CLAY, moist, stiff	
0.0	20	1-3 5-8			+	Gray silty CLAY w/ fine sand, moist, medium stiff	
				15		Boring terminated at 15 feet	
				20			
				25			

Civil & Environmental Consultants, Inc.		<b>LOG OF BORING NO. MP-15</b>					
		Client <u>CITY OF ST. BERNARD</u>		Project No. <u>210158</u>			
		Location <u>ST. BERNARD LANDFILL</u>					
Field Geologist <u>PCS</u>		Checked By <u>DGS</u>		Date Started <u>12-22-2003</u>		Date Completed <u>12-22-2003</u>	
Driller <u>CEC</u>		GWL: <u>          </u>		Depth <u>NA</u>		Date/Time <u>NA</u>	
Drilling Method <u>HAND AUGER</u>							

HNU (ppm)	RECOVERY	BLOW COUNTS	DEPTH (ft.)	GRAPHIC LOG	MATERIALS DESCRIPTION	WELL/PIEZOMETER CONSTRUCTION DETAIL	ELEVATION (FEET, MSL)
			2	Backfill			
			4	Trace Clay			
			6	Boring terminated at 4 feet.			



Civil & Environmental Consultants, Inc.  
 4274 Glendale Milford Road  
 Cincinnati, Ohio 45242

# BORING NUMBER MP-16

PAGE 1 OF 1

<b>CLIENT</b> St. Bernard	<b>PROJECT NAME</b> MP Install
<b>CEC PROJECT NUMBER</b> 100-194	<b>PROJECT LOCATION</b> Former St. Bernard Landfill
<b>DATE STARTED</b> 5/27/10 <b>COMPLETED</b> 5/27/10	<b>GROUND ELEVATION</b> NA <b>HOLE SIZE</b> 4 inch
<b>DRILLING CONTRACTOR</b> Jersey West	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> Direct Push	<b>AT TIME OF DRILLING</b> None
<b>LOGGED BY</b> MJM <b>CHECKED BY</b> RH	<b>AT END OF DRILLING</b> ---
<b>LOCATION</b> See Map	<b>AFTER DRILLING</b> DTW 4.89 feet bgs

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0				0.3 Topsoil and cinders	
	DP 1	88		Brown clayey SILT, trace gravel, trace brick and charred wood throughout, noted iron staining, moist with few wet seams, medium stiff	Concrete Riser Bentonite
5	DP 2	65		3.8 Concrete and wood 4.2 Gray clayey SILT, trace gravel, trace coarse sand, trace brick fragments, very moist, soft	
				5.7 Gray becoming black silty CLAY, trace gravel, trace brick fragments, moist, stiff	
				6.2 Black wood and concrete, few wet seams	Screen
				6.6	Sand Backfill
				8.0 Gray silty CLAY, trace gravel, noted brick and glass, moist, stiff	
10	DP 3	85		9.2 Green and gray clayey SILT, moist, medium stiff	
				11.4	
				12.0 Bottom of hole at 12.0 feet	

GENERAL BH / TP / WELL 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 11/17/11



PROJECT INFORMATION		DRILLING INFORMATION	
Project:	St Bernard Landfill	Drilling Co.:	Terra Probe
Address:		Driller:	Joe Fojtik
City, State:	Village of St. Bernard, OH	Rig Type:	Geoprobe
Job No.	23212007.02	Tooling:	3-inch tube
Logged By:	R. Mills	Sampler Type:	1-inch
Date:	8/29/2014	Total Depth:	14 feet

DEPTH	SOIL DESCRIPTION	SAMPLE	RECOVERY	PID (ppm)	WELL DESCRIPTION
	<b>FILL SOIL</b> Reddish brown SILT & CLAY, some Sand, little Gravel,	S-1	23"		
5	Brown SILT & CLAY, some Sand, little Gravel, moist.	S-2	20"		
10	<b>NATIVE SOIL</b> 4" olive gray SILT & CLAY, trace Sand 8" brownish gray fine SAND, little Clayey Silt 6" gray SILT & CLAY 10" olive gray SILT & CLAY, trace Sand	S-3	32"		
15	Bottom of boring at 14 feet.				



Civil & Environmental Consultants, Inc.  
 4274 Glendale Milford Road  
 Cincinnati, Ohio 45242

# BORING NUMBER SB-1

PAGE 1 OF 1

CLIENT <u>St. Bernard</u>	PROJECT NAME <u>MP Install</u>
CEC PROJECT NUMBER <u>100-194</u>	PROJECT LOCATION <u>Former St. Bernard Landfill</u>
DATE STARTED <u>6/8/10</u> COMPLETED <u>6/8/10</u>	GROUND ELEVATION <u>NA</u> HOLE SIZE <u>4 inch</u>
DRILLING CONTRACTOR <u>Jersey West</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Direct Push</u>	AT TIME OF DRILLING <u>None</u>
LOGGED BY <u>MJM</u> CHECKED BY <u>RH</u>	AT END OF DRILLING <u>---</u>
LOCATION <u>See Map</u>	AFTER DRILLING <u>---</u>

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) T=Torvane	▲ SPT N VALUE ▲							
								20	40	60	80				
0		Topsoil	0.0												
0		Brown clayey SILT, trace gravel, few brick and charred wood fragments, moist, medium stiff		DP 1	73										
0		Brown silty CLAY, trace gravel, few brick and concrete pieces at depth, moist, medium stiff													
0		Brown becoming grayish-green to dark gray silty CLAY, trace gravel, few brick and concrete pieces at depth, moist, medium stiff	5.0	DP 2	80										
0		Black and dark gray clayey SAND, trace gravel, few wood pieces, trace concrete, glass, and foam, noted odor, moist, soft													
0		<i>sample retained from 5' to 7.2'</i>													
0		Black and dark gray clayey SAND, trace gravel, many wood pieces and trace glass, moist, soft													
0		Gray becoming light gray silty CLAY, moist, soft to medium stiff	10.0	DP 3	100										
0		Bottom of hole at 12.0 feet.													

CEC CUSTOM LOG 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/8/10



Civil & Environmental Consultants, Inc.  
 4274 Glendale Milford Road  
 Cincinnati, Ohio 45242

# BORING NUMBER SB-2

PAGE 1 OF 1

<b>CLIENT</b> <u>St. Bernard</u>	<b>PROJECT NAME</b> <u>MP Install</u>
<b>CEC PROJECT NUMBER</b> <u>100-194</u>	<b>PROJECT LOCATION</b> <u>Former St. Bernard Landfill</u>
<b>DATE STARTED</b> <u>6/8/10</u> <b>COMPLETED</b> <u>6/8/10</u>	<b>GROUND ELEVATION</b> <u>NA</u> <b>HOLE SIZE</b> <u>4 inch</u>
<b>DRILLING CONTRACTOR</b> <u>Jersey West</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Direct Push</u>	<b>AT TIME OF DRILLING</b> <u>None</u>
<b>LOGGED BY</b> <u>MJM</u> <b>CHECKED BY</b> <u>RH</u>	<b>AT END OF DRILLING</b> <u>---</u>
<b>LOCATION</b> <u>See Map</u>	<b>AFTER DRILLING</b> <u>---</u>

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) T=Torvane	▲ SPT N VALUE ▲										
								20	40	60	80							
0		Topsoil	0.0															
0		Brown silty CLAY, trace gravel and coarse sand throughout, noted concrete and trace coal at bottom, metal pin at top, moist, medium stiff		DP 1	85													
0		Concrete and wood	5.0															
0		Dark gray clayey SILT, some medium sand, trace gravel, noted black mottling, few coal and brick fragments, moist, medium stiff		DP 2	85													
0		Dark gray clayey SILT, some medium sand, trace gravel, noted black mottling, few concrete and wood pieces, very moist, medium stiff																
0		<i>sample retained from 5.7' to 7.4'</i>																
0		Dark gray clayey SILT, some medium sand, trace gravel, less fill than above, noted metal piece at 9.1' and non-plastic clayey silt lense at 10', moist, medium stiff	10.0	DP 3	98													
0		Dark gray clayey SILT, no fill noted, moist, medium stiff																
0		Bottom of hole at 12.0 feet.																

CEC CUSTOM LOG 100-194 ST BERNARD MP INSTALL.GPJ GOOD TEMPLATE.GDT 7/8/10

# SCS ENGINEERS

# LOG OF Peat Probe A

(Page 1 of 1)

SCS Project Number: 23212007.00  
 Probe Installation  
 Closed Landfill  
 St. Bernard, Ohio

Logged By: . R. Mills  
 Drilled By: . Jersey West  
 Boring Method: . direct push  
 Total Boring Depth: . 16 feet  
 Sampling Method: . direct push

Date Started: : 3/9/12  
 Date Completed: : 3/9/12  
 G. S. Elevation: :  
 Northing :  
 Easting :

Depth in feet	Surf. Elev.	Samples	Recovery (in.)	Headspace (ppm)	Blow Count	GRAPHIC	USCS	DESCRIPTION	Peat Probe A
0								FILL brown SILT & CLAY, brick fragments	<p>Bentonite backfill</p> <p>Riser</p> <p>Sand Pack</p> <p>Screen</p>
2		1	40					~3 in. of concrete fragments at 1.5 ft becoming grey to dark grey soil mixed with wood, cinders, moist	
4								greenish grey SILT & CLAY, moist	
6		2	40					at ~6 ft, dark grey soil with concrete, becoming saturated	
8								7.8 ft	
10		3	39					Native Soil grey SILT & CLAY, varved grading to Clayey SILT grading to fine SAND and Clayey Silt, saturated	
12								grey medium SAND, little Clayey Silt	
14		4	18					grading to SAND and Gravel, little Clayey Silt, saturated	
16		5	18					15 ft dark grey organic layer 15.3 ft SAND and Gravel, some Clayey Silt, saturated	
18									
20									

03-15-2012 I:\PROJECT\2012 Projects\23212007 00 St Bernard LF\Datat\Peat Probe A bor

# SCS ENGINEERS

# LOG OF Drift Probe C

(Page 1 of 1)

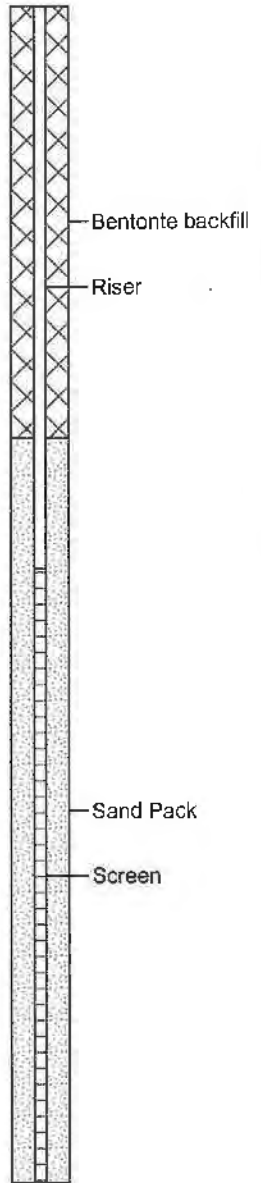
SCS Project Number: 23212007.00  
 Probe Installation  
 Closed Landfill  
 St. Bernard, Ohio

Logged By: R. Mills  
 Drilled By: Jersey West  
 Boring Method: direct push  
 Total Boring Depth: 16 feet  
 Sampling Method: direct push

Date Started: 3/9/12  
 Date Completed: 3/9/12  
 G. S. Elevation: :  
 Northing :  
 Easting :

Depth in feet	Surf. Elev.	Samples	Recovery (in.)	Headspace (ppm)	Blow Count	GRAPHIC	USCS	DESCRIPTION	Peat Probe C
0								<b>FILL</b> Brown SILT & CLAY, little to some Sand, trace Gravel, moist.	
2		1	40					A ~2 ft, olive grey SILT & CLAY, little Sand, little Gravel, brick fragments, pieces of concrete, shingle, moist.	
4									
6		2	40						
8								<b>Native Soil</b> Olive grey massive SILT & CLAY to CLAY & SILT, trace f Sand, old root channels, saturated.	
10		3	39					alternating in approximately 7 in. layers with Clayey SILT, little fine Sand, saturated	
12									
14		4	18						
16		5	18					fine SAND grading to coarse to fine SAND, little Gravel, many small shells, disperse pieces of wood, saturated	
18		6	24					Clayey SILT to SILT and fine Sand, saturated	
20									

6.6 ft



# SCS ENGINEERS

## LOG OF Fill Probe C

(Page 1 of 1)

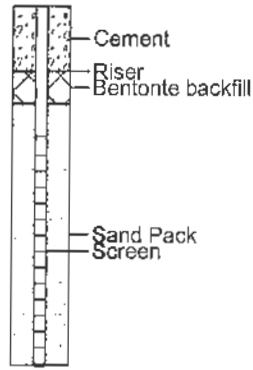
SCS Project Number: 23212007.00  
 Probe Installation  
 Closed Landfill  
 St. Bernard, Ohio

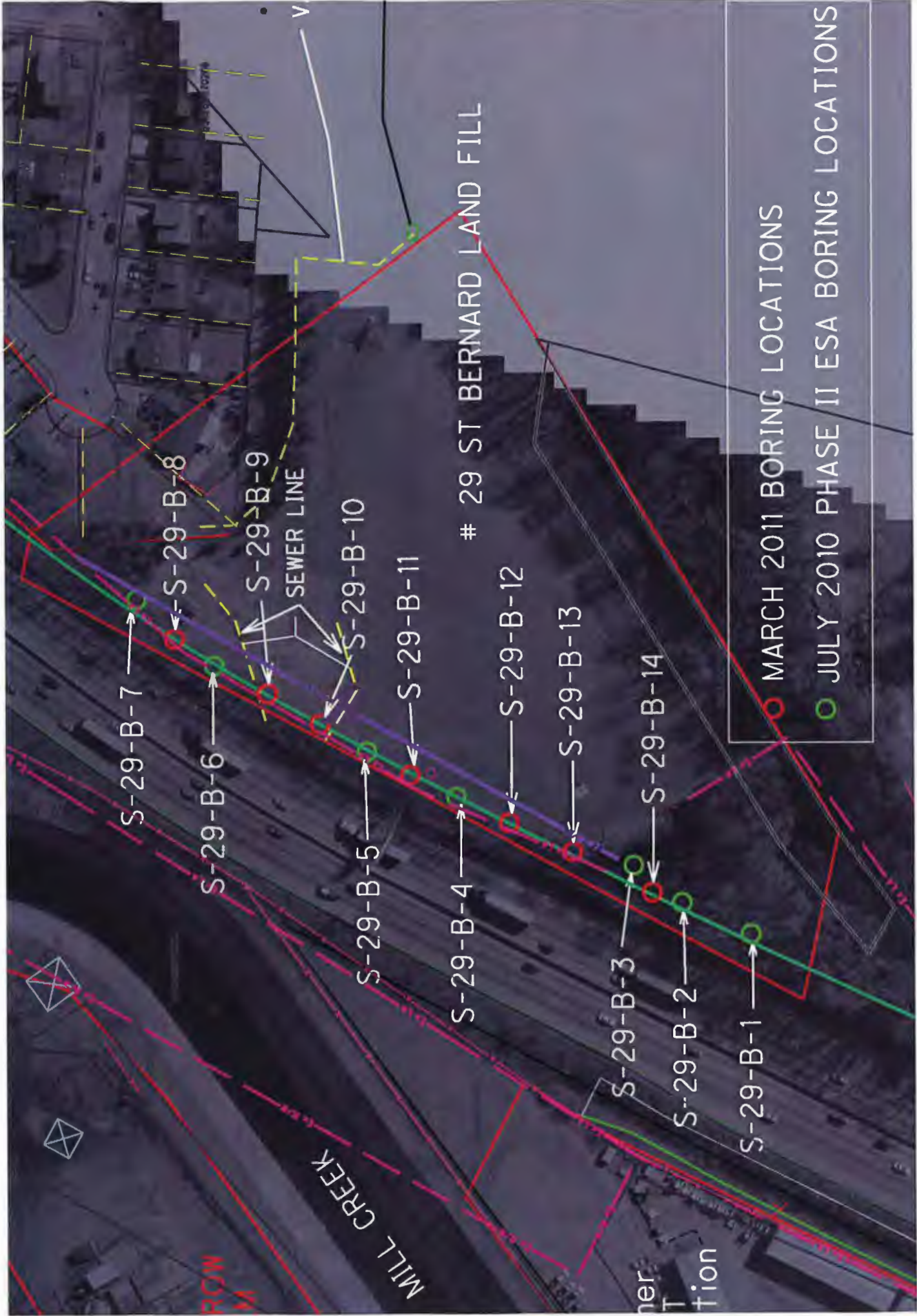
Logged By: R. Mills  
 Drilled By: Jersey West  
 Boring Method: solid augers  
 Total Boring Depth: 5.5 feet  
 Sampling Method: direct push

Date Started: 4/2/12  
 Date Completed: 4/2/12  
 G. S. Elevation:  
 Northing  
 Easting

Depth in feet	Surf Elev	Samples	Recovery (in.)	Headspace (ppm)	Blow Count	GRAPHIC	USCS	DESCRIPTION
0								See the log for Drift Probe C for a description of the soils in this depth range.
2								
4								
6								
8								
10								
12								
14								
16								
18								
20								

Fill Probe C











Date: March 8, 2011  
 Driller: TerraProbe  
 Geologist: Scott Stewart  
 Drilling Method: Direct Push  
 Weather: ~50F, sunny, light wind

Job: Site # 29 St. Bernard Landfill  
 HAM-75-2.30 Phase II ESA  
 Hamilton County, Ohio  
 P403040044

Page 9 of 14  
 Boring No. S-29-B-9  
 Located on the northern portion of the site, approximately 50-feet south of B-6 (on top of northern sewer line)

ELEV.	DEPTH	SAMP. NO.	Rec. (%)	PID (ppm)	FID (ppm)	LITHOLOGIC DESCRIPTION	Ds	W E L L	A N N	REMARKS
	1					0-8" Light brown silty sand 8"-13" Light brown sand				<p>a second boring was placed beside the first boring in an attempt to gain better recovery, 6"-8" per interval was gained</p> <p>No water bearing zones observed</p> <p>Boring readings:            LEL readings &lt;1%            PID/FID readings &lt;1 ppm</p>
	2					13'-3' Light brown sandy clay, some gravel				
	3			53	0					
	4		75			3'-4' No recovery				
	5					4'-8' Brown clayey silt, dense, 1" slag at 5'				
	6					5'-7' Brown sandy silt with gravel, 2" concrete at 6'				
	7			43	0	trace wood at 6'				
	8		75			7'-8' No recovery				
	9					8'-11' Brown clayey sand with gravel, trace orange brown sand at 11'				
	10									
	11			29	0					
	12		75			11'-12' No recovery				
	13					12'-15' Brown sandy clay with gravel, trace wood				
	14									
	15			49	0					
	16		75			15'-16' No recovery				
	17					16'-19' Brown sandy clay with gravel, trace wood				
	18									
	19			46	0					
	20		75			19'-20' No recovery				
	21					Boring terminated at 20' bgs				
	22									
	23									
	24									
	25									
	26									
	27									
	28									
	29									
	30									
	31									
	32									

S-29-B-9-4-7 and S-29-B-9-16  
 19 submitted for  
 laboratory analysis



Date: March 8, 2011  
 Driller: TerraProbe  
 Geologist: Scott Stewart  
 Drilling Method: Direct Push  
 Weather: ~55F, sunny, light wind

Job: Site # 29 St. Bernard Landfill  
 HAM-75-2.30 Phase II ESA  
 Hamilton County, Ohio  
 P403040044

Page 10 of 14  
 Boring No. S-29-B-10

Located beside the southern storm sewer

ELEV	DEPTH	SAMP. NO.	Rec. (%)	PID (ppm)	FID (ppm)	LITHOLOGIC DESCRIPTION	Ds	W E L L	A N N	REMARKS
	1					0-2' Brown clayey silt, trace gravel, trace slag				
	2			18.0	0					
	3					2'-3' Brown sandy silt, trace gravel				
	4		85	54	0	3'-3'6" Black sandy clay, trace gravel 3'6"-4' No recovery				
	5					4'-8' Brown clayey silt, dense, 1" slag at 5'				
	6					4'6"-6'10" Dark brown clayey sand, trace light brown slag, brick and black sand with a sewer odor				
	7			53	0					
	8		70			6'10"-8' No recovery				
	9					8'-10'2" Brown clayey sand, some gravel, trace metal, trace glass, black stain at 9' and 10' with metal odor, piece of green slag with odor				
	10			204	0					
	11					10'2"-12' No recovery				
	12		60							
	13					12'-12'6" Black silty sand, some brick, trace metal, trace glass fragments 12'6"-12'10" Olive clay 12'10"-14'2" Black silty sand, some brick, trace metal, trace glass fragments				
	14			84	8	14'2"-16' No recovery				
	15									
	16		60			16'-17'2" Black clayey sand, trace brick, trace gravel, slight creosote odor				
	17					17'2"-18'5" Brown silty sand, trace glass, wood, china, slag, and metal				
	18									
	19			116	0	18'5"-20' No recovery				
	20		85			Boring terminated at 20' bgs				
	21									
	22									
	23									
	24									
	25									
	26									
	27									
	28									
	29									
	30									
	31									
	32									

two attempts were made to obtain better recovery

No water bearing zones observed

Boring readings:  
 LEL readings <1%  
 PID/FID readings <1 ppm

S-29-B-10-4-7 and S-29-B-10-16-19 submitted for laboratory analysis



Date: March 8, 2011  
 Driller: TerraProbe  
 Geologist: Scott Stewart  
 Drilling Method: Direct Push  
 Weather: ~55F, partly sunny, light wind

Job: Site # 29 St. Bernard Landfill  
 HAM-75-2.30 Phase II ESA  
 Hamilton County, Ohio  
 P403040044

Page 11 of 14  
 Boring No. S-29-B-11

Located approximately 50-feet south of B-5, near utility pole

ELEV	DEPTH	SAMP NO.	Rec. (%)	PID (ppm)	FID (ppm)	LITHOLOGIC DESCRIPTION	Ds	WELL	ANN	REMARKS
	1					0-2" Brown clayey silt				
	2			147	0	8"-14" Brown clayey sand				
	3					14"-17" Brown medium sand				
	4		50			17"-22" Tan fine sand				
	5					22"-4' No recovery				
	6			275	0	4'-8' Brown clayey silt, dense, 1" slag at 5'				
	7			342	0	5'-7'2" Brown grading to dark brown silty clay				
	8		77			7'2"-8' No recovery				
	9					8'-11' Olive brown clayey silt				
	10			103	0	11'-11'6" Black silty sand, trace wood				
	11					11'6"-12' No recovery				
	12		87	30	0	12'-14' Dark brown silty coarse sand, trace brick, slag, and glass				
	13					14'-16' No recovery				
	14			15	0	16'-18'6" Dark brown silty sand, trace glass and black sand				
	15					18'6"-20' No recovery				
	16		50			Boring terminated at 20' bgs				
	17									
	18			343	67					
	19									
	20		87							
	21									
	22									
	23									
	24									
	25									
	26									
	27									
	28									
	29									
	30									
	31									
	32									

two attempts were made to obtain better recovery

No water bearing zones observed

Boring readings:

LEL readings <1%  
 PID/FID readings <1 ppm

S-29-B-11-6-7 and S-29-B-11-16-18 submitted for laboratory analysis

Date: March 8, 2011  
 Driller: TerraProbe  
 Geologist: Scott Stewart  
 Drilling Method: Direct Push  
 Weather: ~50F, cloudy, light wind

Job: Site # 29 St. Bernard Landfill  
 HAM-75-2.30 Phase II ESA  
 Hamilton County, Ohio  
 P403040044

Page 12 of 14  
 Boring No. S-29-B-12

Located approximately 50-feet  
 south of B-4

ELEV	DEPTH	SAMP. NO.	Rec. (%)	PID (ppm)	FID (ppm)	LITHOLOGIC DESCRIPTION	Ds	W E L L	A N N	REMARKS
	1									
	2					0-3'2" Brown clayey sand, some gravel				
	3			41	0					
	4		80			3'2"-4' No recovery				
	5					4'-8' Brown clayey silt, dense, 1" slag at 5'				
	6			31	0					
	7					6'-6'9" Olive clay, plastic 6'9"-7'7" Light brown silt				
	8		95	46	0	7'7"-8" No recovery				
	9									
	10			35	0					
	11					8'-12' Light brown silt, black stain at 11'8"				
	12		100	24	0					
	13					12'-13'1" Light brown silt				
	14			29	0	13'1"-14' Dark brown silty sand with gravel				two attempts were made to obtain better recovery
	15									
	16		50			14'-16' No recovery				
	17									
	18					16'-19'1" Dark brown silty sand, some slag, trace plastic, gravel, and sand				
	19			21	0					
	20		75			19'1"-20' No recovery				No water bearing zones observed
	21					Boring terminated at 20' bgs				
	22									
	23									Boring readings:
	24									
	25									
	26									LEL readings <1%
	27									PID/FID readings <1 ppm
	28									
	29									
	30									
	31									
	32									

S-29-B-12-4-6 and S-29-B-12-12-14 submitted for laboratory analysis



Date: March 8, 2011  
 Driller: TerraProbe  
 Geologist: Scott Stewart  
 Drilling Method: Direct Push  
 Weather: ~50F, cloudy, light wind

Job: Site # 29 St. Bernard Landfill  
 HAM-75-2.30 Phase II ESA  
 Hamilton County, Ohio  
 P403040044

Page 13 of 14  
 Boring No. S-29-B-13  
 Located approximately 50-feet  
 south of B-12, near corner of  
 ODOT ROW

ELEV	DEPTH	SAMP. NO.	Rec. (%)	PID (ppm)	FID (ppm)	LITHOLOGIC DESCRIPTION	Ds	WELL	ANN	REMARKS
	1					0-8" Dark brown silt 8"-2'6" Light brown silt, some gravel				two attempts were made to obtain better recovery  No water bearing zones observed  Boring readings:  LEL readings <1% PID/FID readings <1 ppm
	2									
	3			41	0	2'6"-2'8" Brown medium sand, trace brick				
	4		70			2'8"-4' No recovery				
	5					4'-8' Brown clayey silt, dense, 1" slag at 5'				
	6			155	0					
	7					6'-7' Light brown silt				
	8		100	61	0	7'-11' Light brown silty clay				
	9									
	10									
	11			65	0	11'-12' No recovery				
	12		75							
	13					12'-12'2" Light brown silty clay 12'2"-14'8" Dark brown grading to black medium sand, trace gravel and glass				
	14									
	15			523	0	14'8"-16' No recovery				
	16		70							
	17					16'-17'10" Black grading to dark brown clayey sand, trace wood 17'10"-18' Gravel				
	18			60	0					
	19					18'-20' No recovery				
	20		50							
	21					Boring terminated at 20' bgs				
	22									
	23									
	24									
	25									
	26									
	27									
	28									
	29									
	30									
	31									
	32									

S-29-B-13-4-6 and S-29-B-13-12-15 submitted for laboratory analysis



Date: March 8, 2011  
 Driller: TerraProbe  
 Geologist: Scott Stewart  
 Drilling Method: Direct Push  
 Weather: ~45F, cloudy, light wind

Job: Site # 29 St. Bernard Landfill  
 HAM-75-2.30 Phase II ESA  
 Hamilton County, Ohio  
 P403040044

Page 14 of 14  
 Boring No. S-29-B-14

Located approximately 38-feet southwest of B-3

ELEV	DEPTH	SAMP. NO.	Rec. (%)	PID (ppm)	FID (ppm)	LITHOLOGIC DESCRIPTION	Ds	W E L L	A N N	REMARKS
	1					0-1'6" Brown silty sand, trace gravel				four attempts were made to obtain better recovery  No water bearing zones observed  Boring readings:  LEL readings <1% PID/FID readings <1 ppm
	2					1'6"-3' Tan silt, trace sand, wet				
	3			35	0					
	4		75			3'-4' No recovery				
	5									
	6			295	0					
	7									
	8		100	140	0	4'-8' Brown clayey silt, dense, 1" slag at 5'				
	9									
	10			115	0					
	11									
	12		87	215	0	11'6"-12' No recovery				
	13					12'-12'2" Brown clayey silt				
	14									
	15			312	0	12'2"-14'6" Dark brown sand, trace glass and gravel				
	16		87			14'6"-16' No recovery				
	17									
	18			103	0	16'-18' Dark brown sand, trace glass and gravel				
	19									
	20		50			18'-20' No recovery				
	21					Boring terminated at 20' bgs				
	22									
	23									
	24									
	25									
	26									
	27									
	28									
	29									
	30									
	31									
	32									

S-29-B-14-0-3, S-29-B-14-4-6 and S-29-B-14-12-15 submitted for laboratory analysis

---

**APPENDIX D**

**(reserved for) CERTIFICATION REPORTS**

---

---

**APPENDIX E**

**MONITORING RESULTS**

---







**Table 6. Probe Readings - 2013  
St. Bernard Landfill**

2013 Month	Methane Concentration (Percent By Volume), When Equal To Or Greater Than 5% Explosive Gas Threshold Limit.																																																			
	January				February				March				April				May				June				July				August				September				October				November				December							
Compliance Probes	1/2/13	1/10/13	1/17/13	1/24/13	1/31/13	2/7/13	2/14/13	2/21/13	2/28/13	3/8/13	3/14/13	3/21/13	3/28/13	4/4/13	4/12/13	4/18/13	4/25/13	5/3/13	5/9/13	5/13/13	5/24/13	5/31/13	6/6/13	6/14/13	6/20/13	6/26/13	7/3/13	7/11/13	7/18/13	7/25/13	7/31/13	8/8/13	8/14/13	8/20/13	8/26/13	9/5/13	9/12/13	9/20/13	9/26/13	10/4/13	10/10/13	10/17/13	10/25/13	11/11/13	11/18/13	11/14/13	11/20/13	12/2/13	12/9/13	12/16/13	12/23/13	1/3/14
No. of Compliance Wells Monitored	18	18	18	17	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
No. of Compliance Wells with Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MP-1																																																				
MP-1A																																																				
MP-7E																									7.3	5.9			5.5	5.9																						
MP-7F																																																				
MP-7G																																																				
MP-7H																																																				
MP-8D																																																				
MP-8E																																																				
MP-8F																																																				
MP-8G																																																				
MP-9																																																				
MP-10																																																				
MP-11																																																				
MP-12A																																																				
MP-12B																																																				
MP-13																																																				
MP-15																																																				
MP-16																																																				

**Legend:**

- Reading collected. Result collected was anywhere from 0% to less than 5% methane.
- Reading not collected due to either probe not yet installed, probe was replaced, probe was redesignated, or probe was inaccessible due to weather conditions.



---

**APPENDIX F**

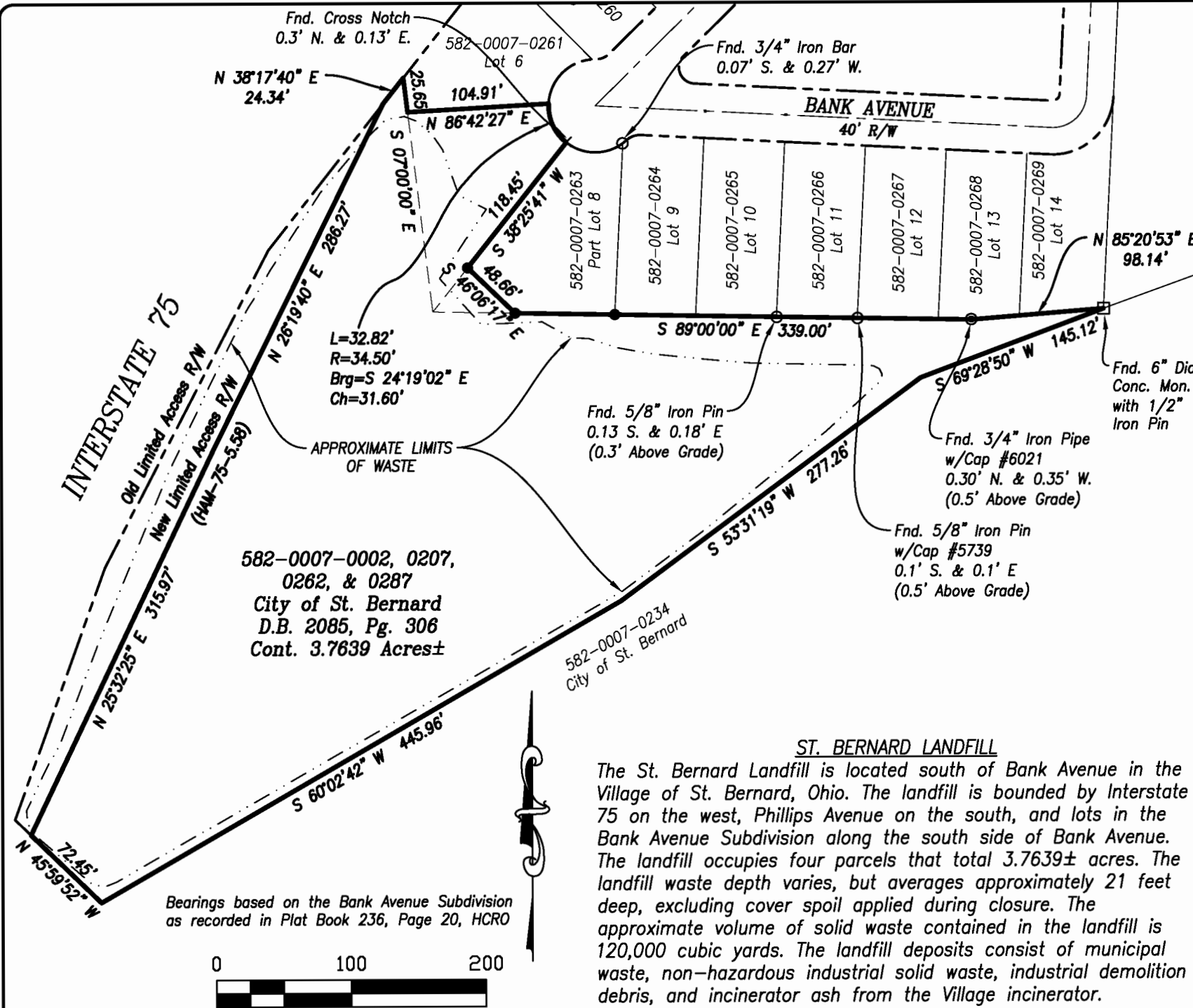
**PROPERTY DESCRIPTION**

---

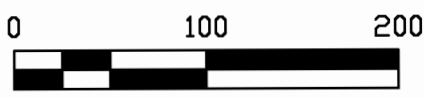
**LANDFILL MAP**  
 for  
 City of St. Bernard  
 located in  
 Section 16, Town 3, Fractional Range 2, M.P.  
 Millcreek Twp., City of St. Bernard, Hamilton Co., OH

Date:	August, 27, 2014
Scale:	1" = 100'
Job No.:	81405801
Sheet	1 of 1
Drawn by:	SAG/DTD
Checked by:	DTD

ACAD Name: R:\058\_SCS Engineers\2014\Drawing Files\Model\81405801V-P8.dwg



Bearings based on the Bank Avenue Subdivision as recorded in Plat Book 236, Page 20, HCRO



Graphic Scale 1"=100'

**ST. BERNARD LANDFILL**  
 The St. Bernard Landfill is located south of Bank Avenue in the Village of St. Bernard, Ohio. The landfill is bounded by Interstate 75 on the west, Phillips Avenue on the south, and lots in the Bank Avenue Subdivision along the south side of Bank Avenue. The landfill occupies four parcels that total 3.7639± acres. The landfill waste depth varies, but averages approximately 21 feet deep, excluding cover spoil applied during closure. The approximate volume of solid waste contained in the landfill is 120,000 cubic yards. The landfill deposits consist of municipal waste, non-hazardous industrial solid waste, industrial demolition debris, and incinerator ash from the Village incinerator.

KNOW ALL MEN BY THESE PRESENTS,

THAT E. I. du PONT de NEMOURS and COMPANY, a Delaware corporation, duly licensed to do business in the State of Ohio, the Grantor, for the consideration of Ten Dollars (\$10.00) and other good and valuable consideration, received to its full satisfaction of CITY OF ST. BERNARD, a municipal corporation of the State of Ohio, the Grantee, does give, grant, bargain, sell and convey unto the said Grantee, its successors and assigns, the following described premises, situated in the County of Hamilton, State of Ohio, and known as being all that certain tract of land in Township 3, Second Fractional Range in the Miami Purchase, being in Section 16:

Beginning at the intersection of the easterly line of Lot 3 of the Alfred Phillips Estate Subdivision, of which this tract is a part, with the center line of Bank Street 25 feet wide (being the Northwest corner of a tract of ten (10) acres formerly owned by E. M. Gregory and in 1896 known as the Starch Factory property); thence along the center line of said Street, North 88° 45' West 306.72 feet to a stake at the intersection of the center line of said Street with the right of way line of the Baltimore and Ohio Southwestern Railroad Company; thence South 56° 20' West 833.19 feet parallel to and distant 100 feet from the center line of the east bound main track of said Railroad to a stake; thence South 24° 04' West 416.84 feet to a point in the Corporation line between the City of Cincinnati and the City of St. Bernard; thence along said Corporation line South 0° 30' West 1320 feet to a stake; thence North 20° 59' East 789.32 feet to a stake; thence North 21° 42½' East 102.01 feet to a stake; thence North 44° 19½' East 116.75 feet to a stake; thence North 45° 02' East 323.13 feet to a stake; thence North 56° 18' East 449.36 feet to a stake; thence North 65° 30½' East 178.16 feet to a stake in the line of Lot 3 of the said Alfred Phillips Estate Subdivision, being also the west line of the ten (10) acre tract formerly owned by E. M. Gregory; thence along said east line North 1° 15' East 689.14 feet to the place of beginning.

The said land and premises are conveyed subject to legal highways, block and zoning ordinances, rights of tenants and to all easements and restrictions of record.

Without limiting the foregoing, there are expressly excepted and reserved from this conveyance the following:

X Right of way and easement thirty-four (34) feet in width granted by The Grasselli Chemical Company, a corporation of Ohio, to The Union Gas & Electric Company by deed dated June 11, 1925, for the purpose of constructing, erecting, operating and maintaining thereon the necessary wires, cables, fixtures and equipment for transmitting electrical energy upon, over, through and across said property, the center line of which in said deed is described as follows:

Beginning at a point in the west line of said property, which point is 47.8 feet southwest of the northeast corner of the property now or formerly of Bernard H. Wess, measured along \_\_\_\_\_

58  
446

BHP

the east boundary of the property now or formerly of Bernard H. Wess; thence North 38° 30' East 211.15 feet to a point in the north line of said property, which point is 73.3 feet east of the northwest corner of the said property, measured along the north boundary of the property, together with the right to cut, trim or remove any trees, overhanging branches or other obstructions which may endanger the safety of or interfere with the construction, operation or maintenance of said system; but the Grantor herein, E. I. du Pont de Nemours and Company, does hereby grant, sell, assign and convey unto the Grantee herein all of Grantor's right, title and interest in and to the said deed of June 11, 1925, and in and to all rights and reservations thereunder or therein retained.

Easement or right of way for sewer ten feet (10') in width five feet (5') on each side of the center line of the sewer as shown by plat thereof, Accession No. 10,657, as filed in the office of the Chief Engineer, Department of Public Service, Cincinnati, Ohio, granted by The Grasselli Chemical Company, a corporation of Ohio, to the City of Cincinnati by that certain agreement dated March 19, 1917.

The intention of this deed is to convey unto the Grantee, its successors and assigns, only the premises described and conveyed to the Grantor herein by that certain deed from The Grasselli Chemical Company, a Delaware corporation, dated October 31, 1936, and recorded in the Recorder's Office of Hamilton County, Ohio, in Deed Book 1730, page 509.

TO HAVE AND TO HOLD the above granted and bargained premises, with the appurtenances thereof, unto the said Grantee, its successors and assigns, forever, subject as aforesaid.

AND E. I. du Pont de Nemours and Company, the said Grantor, does for itself, and its successors and assigns, covenant with the said Grantee, its successors and assigns, that at and until the sealing of these presents it is well seized of the above described premises, as a good and indefeasible estate in fee simple, and has good right to bargain and sell the same in manner and form as above written, and that the same are free from all encumbrances whatsoever, except as aforesaid, and that it will WARRANT and DEFEND said premises, with the appurtenances thereunto belonging, to the said Grantee, its successors and assigns, against all lawful claims and demands whatsoever, except as aforesaid.

36



IN WITNESS WHEREOF, the said E. I. du PONT de NEMOURS and COMPANY has caused its corporate seal to be affixed to these presents by W. F. Harrington, its Vice-President, and E. A. Howard, its Assistant Secretary, this 13th day of February, A. D. 1945.

Signed, Sealed and Acknowledged in the Presence of:  
R. W. [Signature]

E. I. du PONT de NEMOURS and COMPANY  
 By [Signature]  
 Vice-President

Esther E. Griffith

By Ed Howard  
 Assistant Secretary

STATE OF DELAWARE )  
 ) SS.  
 COUNTY OF NEW CASTLE )

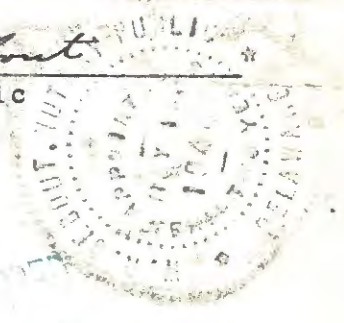
Before me, a Notary Public in and for said County, personally appeared W. F. Harrington and E. A. Howard, known to me to be the persons who, as a Vice-President and Assistant Secretary, respectively, of E. I. du PONT de NEMOURS and COMPANY, the corporation which executed the foregoing instrument, signed the same, and acknowledged to me that they did so sign said instrument in the name and upon behalf of said corporation as such officers, respectively; that the same is their free act and deed as such officers, respectively, and the free and corporate act and deed of said corporation; that they were duly authorized thereunto by its Board of Directors; and that the seal affixed to said instrument is the corporate seal of said corporation.

In Testimony Whereof, I have hereunto subscribed my name, and affixed my official seal, at Wilmington, Delaware, this 13th day of February, 1945.

W. R. Debrout  
 Notary Public

APPROVED FOR EXECUTION  
 [Signature]  
 GREAT SEAL DIVISION  
 2085 PAGE 308

M. J. [Signature]  
C. [Signature]



Deed 3-1-45 No. 36 AT 3:20 PM  
 REG. FOR RECORD  
 GEORGE E. KEARNS, RECORDER, HAMILTON COUNTY, OHIO

*236* DEED *Camp Property*

0 6937

E.I. DUPONT DE  
MEMORANDUM COMPANY

To  
CITY OF ST. BERNARD,  
Ohio

*58/1/10*

RECEIVED FOR RECORD  
HAMILTON CO., OHIO  
GEORGE E. KEARNS  
RECORDER

MAR 1 3 21 PM 1945

RECORDED *Deed* BOOK  
NO. *2085* PAGE *306*  
EASTERN STANDARD TIME

TRANSMITTED  
MAR 2 1945

*pd* *10*

*2357A*

FEB 20 11 01 AM '45



REGISTERED  
GOVERNOR'S DEED  
STATE OF OHIO

KNOW ALL MEN BY THESE PRESENTS: THAT,

WHEREAS: Under and by virtue of the provisions of an Act of the General Assembly, known as Amended Senate Bill No. 206, passed by the 101st General Assembly of the State of Ohio on June 17, 1955, approved June 23, 1955 and effective September 22, 1955 and in consideration of the passage, on March 18, 1954, by the city council of the city of St. Bernard of ordinance No. 10, 1954, giving consent of the city of St. Bernard required by Section 5521.01 of the Revised Code, for the construction of the Millcreek Expressway as a limited access highway or freeway through the city of St. Bernard, certified copy of which, attached to files in Office of Auditor of State, the Governor was authorized to transfer and convey all the right, title and interest of the State of Ohio in a certain parcel of land located in the city of St. Bernard in Hamilton County, Ohio, to the city of St. Bernard as such parcel of land was described in said Amended Senate Bill No. 206, and

WHEREAS: Further pursuant to the provisions of said Act, a deed of conveyance was executed by the Governor of the State of Ohio, dated October 24, 1955, recorded in Office of Auditor of State in Volume 4, Part 2, Page 364, New Deeds, Various State Lands, transferring and conveying to the city of St. Bernard, its successors and assigns forever, all right, title and interest of the State of Ohio in said parcel of land as said parcel thereof was in said Act, designated and described as follows:

Situated in the city of St. Bernard, Hamilton county, Ohio.

Beginning at or near Station 1247 + 47.4 in the transit line of the F. H. Nichols Survey of the Miami and Erie Canal property and extending thence southwesterly with the line of said canal property to Station 12513 + 16 of said survey and being all that portion of

Gen. Ind. 8th Ser. Bk. P.

JUN 11 3 42 PM 1957

REC-2912 PAGE 1

Page 1

Said canal property which is located between and at right angles to Stations 215 + 00 and 255 + 00 in the center line of the survey for the proposed Millcreek Expressway.

For further description of the above described property reference is hereby made to plat entitled schedule "D" of the Millcreek Expressway, prepared by Yeget, Irera, Samsen and Associates dated July 1954; also to plat No. 249 of the F. H. Nichols Survey of said canal property now on file in the office of the Department of Public Works at Columbus, Ohio, and

WHEREAS: Such deed was delivered to the city of St. Bernard, as later found to contain the same typographical error in the designation and description of said parcel, erroneously naming Station 1247 + 47.4 instead of Station 12471 + 47.4, and

WHEREAS: Under and by virtue of the provisions of an Act of the General Assembly to amend Section One of Amended Senate

BOOK 2912 PAGE 2

Bill No. 206 in order to correct a typographical error in said Act, known as Senate Bill No. 419, passed by the 101st General Assembly of the State of Ohio, Second Special Session, 1955-1956, on June 29, 1956, approved July 6, 1956 and effective July 6, 1956 and in consideration of the passage, on March 18, 1954, by the city council of the city of St. Bernard of ordinance No. 10, 1954, giving consent of the city of St. Bernard required by Section 5521.01 of the Revised Code, for the construction of the Millcreek Expressway as a limited access highway or freeway through the city of St. Bernard, certified copy of which, attached to files in office of Auditor of State, the Governor is authorized to transfer and convey all the right, title and interest of the State of Ohio in a certain parcel of land located in the city of St. Bernard in Hamilton County, Ohio, to the city of St. Bernard as such parcel of land is in said Senate Bill No. 419 and hereinafter in like manner more particularly described, and

WHEREAS: Further pursuant to the provisions of said Act, this deed is prepared for execution and delivery in accordance with

and subject to the provisions of said Act and the provisions of Section Nos. 115.20 and 5301.13 of the Revised Code of Ohio.

NOW, THEREFORE, The State of Ohio, by FRANK J. LAUSCHE, Governor, under and pursuant to the power and authority conferred by the provisions of said Act, and said Section and related Sections of the Revised Code of the State of Ohio, and for the consideration as therein provided, does hereby transfer and convey to the city of St. Bernard, <sup>whose address is, CITY HALL, ST. BERNARD, OHIO</sup> its successors and assigns forever, all right, title and interest of the State of Ohio in the parcel of land as said parcel thereof is in said Act, designated and described as follows:

Situated in the city of St. Bernard, Hamilton county, Ohio.

Beginning at or near Station 12471  $\pm$  47.4 in the transit line of the F. H. Nichols Survey of the Miami and Erie Canal property and extending thence southeasterly with the line of said canal property to Station 12513  $\pm$  16 of said survey and being all that portion of said canal property that is located between and at right angles to Stations 715  $\pm$  00 and 255  $\pm$  00 in the center line of the survey for the proposed Millers Creek Expressway.

For further description of the above described property reference is hereby made to plat entitled scheme "B" of the Millers Creek Expressway, prepared by Vogt, Irwin, Secum and Associates dated July 1954, also to plat No. 249 of the F. H. Nichols Survey of said canal property now on file in the office of the Department of Public Works at Columbus, Ohio.

\* \* \* \* \*

TO HAVE AND TO HOLD said premises with all the privileges  
and appurtenances thereto belonging unto the said city of St.  
Bernard, its successors and assigns forever, that neither the  
State of Ohio, nor any person claiming through or under it, shall  
or will hereafter claim or demand any right or title to said land.

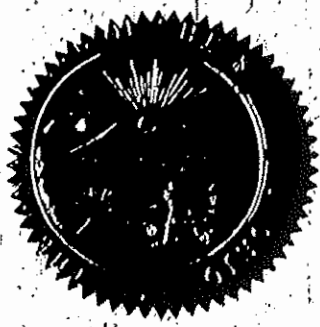
IN TESTIMONY WHEREOF, I, FRANK J. LAUSCHE, Governor,

BOOK 2912 PAGES 3

TO HAVE AND TO HOLD unto the said city of St. Bernard, its successors and assigns forever, that neither the State of Ohio, nor any person claiming through or under it, shall or will hereafter claim or demand any right or title to said land.

IN TESTIMONY WHEREOF, I, FRANK J. LAUSCHE, Governor,

for and in the name of the State of Ohio, have signed this deed at Columbus, Ohio, and have caused the same to be countersigned by the Secretary of State and the Great Seal of the State of Ohio to be hereunto affixed this 12 day of August in the Year of Our Lord, One Thousand, Nine Hundred Fifty-six (1956).



STATE OF OHIO  
BY Frank J. Lausche  
FRANK J. LAUSCHE  
Governor

Countersigned  
BY Ted W. Brown  
TED W. BROWN  
Secretary of State

Drafted  
BY James A. Rhodes  
JAMES A. RHODES  
Auditor of State

APPROVED:  
C. William O'Neill  
C. WILLIAM O'NEILL  
Attorney General

Recorded in  
Office of Auditor of State  
Now Deeds  
Various State Lands  
Volume 4, Part 2  
Page 390

REG FOR RECORD No. 12 AT 9:34 AM  
GILBERT I. SHAFER RECORDER HAMILTON COUNTY, OHIO  
JUL 12 1956



### AN ACT

To amend section 1 of S. B. No. 206, entitled "An act to facilitate the construction of that portion of the state highway system known as the Millcreek Expressway through the city of St. Bernard", passed June 17, 1955, approved June 23, 1955, and filed in the office of the Secretary of State, June 23, 1955, in order to correct a typographical error in such act, and to declare an emergency.

*Be it enacted by the General Assembly of the State of Ohio:*

SECTION 1. That section 1 of S. B. No. 206, entitled "An act to facilitate the construction of that portion of the state highway system known as the Millcreek Expressway through the city of St. Bernard", passed June 17, 1955, approved June 23, 1955, and filed in the office of the Secretary of State, June 23, 1955, be amended to read as follows:

Sec. 1. That the governor is authorized to transfer and convey all the right, title and interest of the state of Ohio in a parcel of land located in the city of St. Bernard in Hamilton county to the city of St. Bernard, in consideration of the passage, on March 18, 1954, by the city council of the city of St. Bernard of ordinance number 10, 1954, giving consent of the city of St. Bernard required by section 5521.01 of the Revised Code, for the construction of the Millcreek Expressway as a limited access highway or freeway through the city of St. Bernard. Said parcel of land is described as follows:

Situated in the city of St. Bernard, Hamilton county, Ohio.

Beginning at or near Station \*\*\* 12471 + 47.4 in the transit line of the F. H. Nichols Survey of the Miami and Erie Canal property and extending thence southwesterly with the lines of said canal property to Station 12513 + 16 of said survey and being all that portion of said canal property that is located between and at right angles to Stations 215 + 00 and 255 + 00 in the center line of the survey for the proposed Millcreek Expressway.

*over*

For further description of the above described property reference is hereby made to plat entitled scheme "D" of the Millcreek Expressway, prepared by Vogt, Ivers, Seaman and Associates dated July 1954; also to plat No. 249 of the F. H. Nichols Survey of said canal property now on file in the office of the Department of Public Works at Columbus, Ohio.

SECTION 2. That existing section 1 of S. B. No. 206, passed June 17, 1955, approved June 23, 1955, and filed in the office of the Secretary of State, June 23, 1955, is hereby repealed.

SECTION 3. This act is hereby declared to be an emergency measure necessary for the immediate preservation of the public peace, health and safety. The reason for such necessity lies in the fact that its immediate enactment into law will make it possible to file a corrected deed at the earliest possible time in lieu of the original deed filed in pursuance to S. B. No. 206, passed June 17, 1955, approved June 23, 1955, and filed in the office of the Secretary of State, June 23, 1955. Therefore this act shall go into immediate effect.

ROGER CLOUD,  
*Speaker of the House of Representatives.*  
JOHN W. BROWN,  
*President of the Senate.*

Passed June 29, 1956.  
Approved July 6, 1956.

FRANK J. LAUSCHE,  
*Governor.*

This act is of a special nature and does not require a code sectional number.  
OHIO LEGISLATIVE SERVICE COMMISSION  
John A. Sartory, Director

Filed in the office of the Secretary of State at Columbus, Ohio on the 9th day of July, A. D. 1956.

I hereby certify that the foregoing is a true copy of the engrossed bill.

*Ted W. Brown*  
TED W. BROWN,  
*Secretary of State.*

PARCEL 587-0057-0202 IS A REMAINDER FROM THE DESCRIBED

DEED: 3983-718

REC'D FOR TRANS

A41599

AUG 13 71 4 8 9 7 6 LST DEED - H 4.00

GENERAL WARRANTY DEED

199616

H. B. Fuller Company, a corporation, whose address is Industrial Court, St. Bernard, Hamilton County, Ohio 45217, for valuable consideration paid, grants, with general warranty covenants, to City of St. Bernard, an Ohio municipal corporation, whose address is 120 Washington Avenue, St. Bernard, Ohio 45217, the following

REAL PROPERTY Situated in the County of Hamilton in the State of Ohio:

All that lot of land in the City of St. Bernard situated in Section 16, Town 3, F.R. 2, Miami Purchase, City of St. Bernard, Hamilton County, Ohio, and more particularly described as follows:

Beginning at the intersection of the southerly line of Bank Street (25 ft. wide) with the westerly line of Andalus Subdivision as recorded in Plat Book 34, Page 14, Hamilton County, Ohio Records; thence North 86° 39' West, 968.95 feet to the westerly line of a 10 acre tract conveyed to the Valley Building and Construction Company by deed recorded in Deed Book 1740, Page 76 of the Hamilton County Recorder's Office; thence South 3° 21' West along said westerly line 200.00 feet to the real place of beginning;

thence South 3° 21' West, 474.54 feet; thence North 53° 01' East, 100.66 feet; thence North 59° 35' East, 100 feet; thence North 66° 24' East, 33.81 feet; thence North 3° 21' East, 340.59 feet; thence North 86° 39' West, 190.00 feet to the real place of beginning.

Subject to the following easements and restrictions:

Subject to an easement over such of the following described real estate as is included in the foregoing parcel and granting to the Grantee herein, or its successors and assigns, an easement over the remainder of the following described real estate which forms a right of way called hereinafter "Industrial Court":

All that 40 foot easement in the City of St. Bernard situated in Section 16, Township 3, Fractional Range 2, Miami Purchase, Hamilton County, Ohio. Beginning at a point in the southerly line of Bank Street (25 foot wide), 778.85 feet west of the intersection of the southerly line of Bank Street with the westerly line of Andalus Subdivision as recorded in Plat Book 34, page 14, of the Hamilton County, Ohio Records; thence North 86 degrees 39 minutes West along the southerly line of Bank Street, 40 feet; thence South 3 degrees 21 minutes West, 500 feet; thence South 86 degrees 39 minutes East, 40 feet; thence North 3 degrees 21 minutes East, 500 feet to the place of beginning.

Both of which easements are subject to the following conditions and usages, to all of which Grantee by acceptance of the within Deed agrees:

Examined & Complied Sec. 310, 312 R.C. Chapter 11  
Department (Sec. 310 and) Sec. 310.01 (1) 13  
JOS. L. DE COURCY, JR., AUDITOR  
HAMILTON COUNTY, OHIO

BOOK 3983 PAGE 718

FROST & JACOBS  
3300 DUNLOP TOWER  
611 WILMOT STREET  
CINCINNATI, OHIO 45202

TRANSFERRED

AUG 13 11:45

532-7

X

140

- a. Said easements shall be for ingress and egress and the use of sewer and water facilities;
- b. The road constructed thereon shall be maintained free of ruts and holes by all persons having a right in said easement and whose property abuts thereon; and each agrees to pay his proportionate share of yearly maintenance, including black topping when the same shall be desirable. Said road shall be inspected each year and if improvement or better drainage becomes proper, the same shall be considered maintenance and the cost paid by each abutting owner in the same proportion as the ratio of his frontage thereon bears to the total frontage;
- c. A lien shall be reserved on the within conveyed real estate for the payment of such maintenance costs;
- d. Each party agrees to join in a grant to the Cincinnati Gas & Electric Company, or other similar utility, of an easement for the installation of gas lines;
- e. Each party agrees at such time as the City of St. Bernard agrees to accept said "Industrial Court" as a City Street to join necessary documents to affect dedication of said street.

Subject to the restrictions in deed recorded in Docu Book 2628, page 480, page 479.

Prior Instrument References: Vol. 320, Page 383; Vol. 3219, Page 619; Vol. 321, Page 1731; Page 953.

Witness its hand this 25<sup>th</sup> day of July, 1974.

Signed and acknowledged in the presence of: H. B. FULLER COMPANY

*James R. Adams*  
Witness  
*Donald W. E. Rose*  
Witness

By *Robert J. Adams*  
Vice President

STATE OF OHIO )  
COUNTY OF HAMILTON )

Be it remembered, that on July 25<sup>th</sup>, 1974, before me, a Notary Public, personally appeared Robert J. Adams, Vice President of H. B. Fuller Company, the corporation, whose name is subscribed to and who executed this General Warranty Deed, and acknowledged the signing and execution of this General Warranty Deed, that he executed

this General Warranty Deed by authority of the Board of Directors,  
and on behalf, of H. B. Fuller Company; and that the signing and  
execution of this General Warranty Deed in his free and voluntary act  
and deed, his free act and deed as an officer, and the free and  
voluntary act and deed of H. B. Fuller Company.

In testimony whereof, I have hereunto subscribed my name  
and affixed my Notarial seal, on the day and year last foregoing.

*James Ralph Adams*



JAMES RALPH ADAMS  
Notary Public, State of Ohio  
My commission has no expiration date  
Section 147.03 R. C.

This instrument was prepared by James R. Adams, 2900 DuBois Tower,  
511 Walnut Street, Cincinnati, Ohio 45202, 513-621-8550.

*[Faint, illegible stamp]*

REC'D FOR RECORD  
JUDSON HOY, RECORDER  
HAMILTON COUNTY, OHIO

'74 AUG 13 PM 1:38

RECORDED \_\_\_\_\_ BK  
NO \_\_\_\_\_ PG \_\_\_\_\_

BOOK 3983 PAGE 720

FROST & JACOBI  
2900 DUBOIS TOWER  
511 WALNUT STREET  
CINCINNATI, OHIO 45202