PERFORMANCE MONITORING PLAN

HYDE PARK LANDFILL SITE
TOWN OF NIAGARA, NEW YORK

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1.0 INTRODUCTION

The Hyde Park Landfill Site (the Site) is located in the Town of Niagara, New York, Figure 1.1. The landfilled area (the Landfill) was operated from 1953 to 1975 by the Hooker Chemical Corporation. During the period of operation, the Landfill received chemical waste, including non-aqueous phase liquids (NAPL). The chemical wastes were primarily chlorinated organic compounds and phenols. Since 1975, the facility has been owned by the Occidental Chemical Corporation (OCC) and, since 1988, the facility has been managed by Miller Springs Remediation Management, Inc. (MSRM), an affiliate of OCC.

The Landfill was closed by OCC in 1975 and covered with a clay cap in 1978. In 1995, a final cap, including a subsurface synthetic membrane, was installed over the Landfill. Remedial systems were installed between 1978 and 1996 in the overburden and bedrock to control the flow of groundwater and NAPL. These systems have been operated and maintained since the time of installation. Based on performance evaluations completed by MSRM between 2000 and 2004, these systems satisfy the remedial performance objectives.

This Performance Monitoring Plan (PMP) documents the Site monitoring and reporting activities that will be performed to ensure that the remedial systems continue to operate effectively and thereby adhere to Agency regulations. This PMP has been completed in accordance with the Stipulation on Requisite Remedial Technology (RRT).

This PMP is organized as follows:

Section 1.0 Introduction
Section 2.0 Implementation
Section 3.0 Overburden Operations and Monitoring
Section 4.0 Bedrock Operations and Monitoring
Section 5.0 Community Monitoring
Section 6.0 Treatment System Monitoring
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Section 8.0 Maintenance Inspections

1.1 REMEDIAL ACTIONS

On April 30, 1982, the United States District Court (Court) approved a "Stipulation and Judgment Approving Settlement Agreement" (Settlement Agreement) between OCC and the United States Environmental Protection Agency (USEPA) and New York State Department of Environmental Conservation (NYSDEC). The Settlement Agreement required a Site geologic and hydrogeologic characterization. Conestoga-Rovers & Associates, Inc. (CRA) completed subsurface investigations at the Site between 1983 and 1986 (CRA, 1983a; 1984). These investigations identified the migration of dissolved phase contaminants and NAPL in the overburden and Lockport bedrock.

The requirements for Site remediation were presented in the *Stipulation on Requisite Remedial Technology Program* (the RRT), which was approved by the Court on August 11, 1986. The RRT defined the following remedial action elements/monitoring programs:

- Source Control System;
- Overburden Requisite Remedial Technology (RRT) System;
- Lockport Bedrock RRT NAPL Plume Containment System;
- Lockport Bedrock RRT Aqueous Phase Liquid (APL) Plume Containment System;
- Intermediate Formations Monitoring;
- Gorge Face Seep Program;
- Residential Community Monitoring Program;
- Bloody Run Creek Monitoring Program; and
- Collected Liquids and Treatment Plant.

The RRT also specified hydraulic, physical, and chemical monitoring programs for each remedial action element, as well as performance criteria. Figure 1.2 shows the location and extent of the various remedial action elements.

A Long-Term Monitoring Manual was prepared in 1998, and approved by the USEPA. That plan defined distinct monitoring programs for each of the RRT remedial action elements listed above.

Since 1993, the performance of the RRT remedial action elements have been tracked by OCC and MSRM and reported to the Agencies (the USEPA, NYSDEC, and New York State Department of Health, NYSDOH) in Quarterly and Annual reports. Each element satisfied the performance requirements of the RRT with the exception of the Lockport Bedrock RRT NAPL Plume Containment System. Hydraulic monitoring could not demonstrate 100% containment of the bedrock NAPL plume.

In 2000, MSRM initiated a review of the groundwater conditions in the Lockport bedrock. This review resulted in the completion of extensive additional investigations and the preparation of seven significant reports, as follows:

- *Site Characterization Report: Revised Geologic and Hydrogeologic Characterization* (SCR-G), February 2002
- *Site Characterization Report: Hydrologic Characterization* (SCR-H), February 2003
- *Site Characterization Report: Groundwater Flow Model* (SCR-M), May 2003
- *Remedial Characterization Report* (RCR-03), May 2003
- *Major Ions Study,* November 2003
- *Site Characterization Report: Bedrock Groundwater Quality* (SCR-Q), April 2004
- *Comprehensive Remedial Characterization Report* (RCR-04), August 2004

The results of these efforts demonstrated that the Lockport Bedrock RRT NAPL Plume Containment System satisfied the remedial objectives of the RRT.

1.2 MONITORING PROGRAMS

This PMP groups the remedial action elements into four monitoring programs:

- Overburden Monitoring: the RRT Source Control System, a series of production wells installed within the Landfill to recovery NAPL; and the Overburden RRT System, a pair of French-drain systems designed to control the lateral migration of dissolved phase constituents and NAPL in the overburden.

- Bedrock Monitoring: the Lockport Bedrock RRT APL and NAPL Plume Containment Systems; a number of purge wells that control lateral migration of dissolved phase constituents and NAPL in the bedrock; and the Bloody Run Creek Monitoring.

- Community Monitoring: to ensure that no current exposure to Site-related parameters is occurring at levels of concern. This program includes: the Gorge Face Seep Inspection Program, a regular inspection in the Niagara River gorge to ensure that Site parameters are not discharging in a publicly-accessible area; an APL flux monitoring program to ensure that the mass discharge to the Niagara River gorge is within permissible limits; the Bloody Run program to monitor contaminant migration via the Bloody Run Creek ; and a Residential Community Monitoring Program required to ensure that residents in the area are not exposed to Site-related constituents in the groundwater or in the vapors above the groundwater.

- Treatment System Monitoring: the Collected Liquids and Treatment Plant Monitoring.

The PMP eliminates the Intermediate Formations Monitoring. The Intermediate Formations are geologic units located beneath the Lockport bedrock, and separated from the Lockport bedrock by the Rochester Shale; an essentially impermeable formation. Based on the findings of previous Site investigations, the Site does not impact the Intermediate Formations. However conduits created by the installation of wells through the Rochester Shale into the Intermediate Formations could potentially allow site contamination to enter this depth of bedrock. Therefore, all Intermediate Formation wells will be properly sealed and abandoned by a licensed driller to eliminate the potential for downward contaminant migration. Abandonment procedures for these wells are included as Appendix A, FP-07a.

1.3 REGULATORY REQUIREMENTS

The original Site monitoring and remedial performance requirements for the Site were defined in the 1986 RRT document. Extensive remediation, investigation, and evaluation of the Site have been completed since the RRT was approved. The monitoring and performance requirements presented in this PMP were based on these studies and experience operating the remedial systems at the Site.

Section 10.4 of the RRT that states, "Following any reassessment per this Section 10.0, appropriate modification of this Stipulation may be made by agreement of EPA/State and OCC or by order of the Court." Upon agreement by the Agencies, the monitoring and performance requirements presented in this PMP will supersede those of the RRT.

1.4 SITE CONCEPTUAL GROUNDWATER MODEL

The following section presents the conceptual model for the groundwater system at the Site. The conceptual model is a summary of the findings of the SCR-G, SCR-H, and SCR-M. For additional details on the hydrogeologic conditions at the Site refer to these reports. The major elements of the Site conceptual model are as follows:

The hydrologic units of interest are the overburden and the Lockport bedrock;

- The overburden is a low permeability glacial till, except where it has been disturbed for the installation of subsurface utilities.
    - Vertically downward flow is dominant in the overburden; and

- Containment of the Site groundwater in the overburden is accomplished by a combination of the horizontal collection systems, and flow into the bedrock that is ultimately contained by groundwater recovery from the bedrock.

- The Lockport bedrock contains eleven bedding-parallel (nearly horizontal) groundwater flow zones, FZ-01 being the shallowest and FZ-11 being the deepest;

    - Vertically downward flow is dominant in the shallowest flow zones;

    - Horizontal flow is dominant in the deeper flow zones;

    - Local disruptions of flow conditions occur due to existing wells that are open across multiple flow zones;

    - Containment of Site groundwater is achieved by the bedrock purge wells under pumping conditions.

  Groundwater is recharged by precipitation, the New York Power Authority (NYPA) Forebay, and potentially the NYPA conduits; and

  Under non-pumping conditions, Site groundwater discharges to the Niagara River gorge, and potentially to the NYPA Forebay and conduits. It is possible that, at the same time, some flow zones may discharge to the NYPA Forebay and conduits while others are recharged by these features.

The eleven bedding-parallel flow zones were identified in the SCR-G based on Site geophysical studies and correlation with studies performed by Johnston (1964), Kappel and Tepper (1992), and Yager (1996). The hydraulic significance of the flow zones varies across the site and is discussed in detail in the SCR-H.

As of October 2004, 126 one-inch diameter piezometers had been installed to monitor eight of the eleven flow zones. Due to constructability issues, it was not practical to monitor all eleven flow zones. Flow zones FZ-03, FZ-08, and FZ-10 were not included in the monitoring. Flow zones FZ-03 and FZ-08 are in very close proximity to adjacent flow zones. The hydraulic properties measured in FZ-10 (after it was designated as a flow zone) are more like those of an aquitard than a flow zone. F-10 is currently considered part of the aquitard between FZ-09 and FZ-11. A program that monitors all flow zones but FZ-03, FZ-08, and FZ-10 does not hinder the understanding of the groundwater system at the Site.

1.5 EXISTING LONG-OPEN INTERVAL LOCKPORT BEDROCK WELLS.

Prior to the Site recharacterization that began in 2000, the Lockport Bedrock was characterized as having three intervals, the Upper, Middle, and Lower Bedrock. These monitoring wells had long open intervals, some were open for as much as 50 feet. Based on the Site recharacterization, eleven thin, bedding parallel flow zones have been identified and are monitored using short-screen, 1-inch diameter piezometers, as discussed in Section 1.4. Several of the Upper, Middle, and Lower Bedrock wells were retrofit with the 1-inch diameter piezometers. The Lockport Bedrock monitor wells not retrofit are no longer needed and may actually interfere with the interpretation of groundwater flow by locally interconnecting flow zones. Therefore, these long open interval wells should be abandoned.

Table 1.2 lists the Lockport Bedrock monitoring wells that will be abandoned. These wells will be abandoned according to Field Procedure FP-07a.

1.6 INTERMEDIATE FORMATIONS

Underlying the Lockport bedrock and the Rochester Shale are the Irondequoit and the Reynales Limestone, identified collectively as the Intermediate Formations. Seven Intermediate Formation monitoring wells (IFWs) were installed in 1989 to assess the water quality and hydraulic properties of the Intermediate Formations. In 1991, a sampling pump became lodged in IFW-1 and it was replaced with IFW-1R located approximately 30 feet to the west. Based on observations from the IFWs and the investigations completed since 2001, it is clear that there is no significant, if any, migration of Site-related parameters from the Lockport bedrock into the Intermediate Formations.

Figure 1.3 presents the locations of the IFWs and Table 1.3 presents the well construction specifications. These wells will be abandoned according to Field Procedure FP-07a.

1.7 BLOODY RUN CREEK

Bloody Run Creek, Figure 1.4, receives surface runoff from the Landfill and surrounding area. During Landfill operation, NAPL entered the storm sewer/surface drainage at the Landfill, flowed north into Blood Run Creek, and ultimately discharged into the Niagara River. The following bullets summarize the major remedial activities related to Bloody Run and completed between 1990 and 1995.

1. The open drainage between the Landfill and the Grief Brothers warehouse was excavated and replaced with a below grade, high density polyethylene (HDPE) culvert pipe.
2. Bloody Run flowed through a concrete drain pipe beneath the Grief Brothers warehouse. The pipe was video taped and cleaned.
3. A concrete catch basin was installed on the north side of the Grief Brothers warehouse.
4. The open streambed from the north side of the Grief Brothers warehouse to the south side of University Drive was excavated and replaced with clean fill. The streambed was lined with rip rap.
5. At University Drive, Bloody Run entered a storm sewer whose endpoint discharged to a concrete box culvert at Lewiston Road. The storm sewer was replaced with a HDPE pipe. From Sophomore Drive east, the original storm sewer and bedding material excavated. From Sophomore Drive to Lewiston Road the original storm sewer was left in place and plugged with concrete at each end.
6. The storm sewer along University Drive discharges into an enclosed concrete box culvert at Lewiston Road. This box culvert continues from Lewiston Road, down the gorge, and beneath the NYPA Access Road. The box culvert was cleaned.
7. From the NYPA Access Road to the Niagara River, the Bloody Run drainage follows a seep slope which is difficult to access. Accessible contamination was removed, and the channel was then covered with rock to prevent direct contact.
8. After the above activities were completed, NAPL was found in the catch basin on the north side of the Grief Brothers warehouse. The source was NAPL entering the concrete pipe beneath the warehouse (bullet 2). The concrete pipe was cleaned and slip-lined from the catch basin on the north side of the warehouse to the HPDE culvert pipe coming from the Landfill.

Four Bloody Run monitoring wells were installed into the upper bedrock in 1999. Groundwater samples from these wells were analyzed in 2000, 2001, and 2002 for chlorobenzene, monochlorotoluenes, 2,4,5-Trichlorophenol, and hexachlorobenzene (Bloody Run monitoring Parameters). All samples were non-detect with the exception of a 1.1 ug/L detection of chlorobenzene at BR-4 in 2000 which is well below the USEPA MCL for chlorobenzene of 100 ug/L. Based on these results, sampling from the Bloody Run monitoring wells will be limited to inclusion in the fifth-year monitoring event.

1.8 APL AND NAPL PLUME BOUNDARIES

The RRT defined boundaries for the APL and NAPL plumes in the overburden and bedrock in 1986. Figure 1.5 presents both plumes for the bedrock as defined in the RRT. The overburden APL plume boundary was modified from the RRT delineation in the vicinity of Bloody Run Creek in 1995 following installation and sampling the Bloody Run monitoring wells. The 1995 overburden APL plume is shown on Figure 1.6.

Following re-characterization of the Lockport bedrock between 2002 and 2004, NAPL plume boundaries were defined for each of the eleven flow zones. The NAPL plume boundaries were determined jointly by the Agencies, MSRM, and MSRM's consultants during a meeting on April 28 and 29, 2003. A memorandum describing the criteria for NAPL plume delineation, and maps of the NAPL plumes were presented in Appendix A of the RCR-03.

2.0 IMPLEMENTATION

This section summarizes the numerous activities to be performed at various frequencies to ensure that the remedial systems continue to operate effectively, as well as the procedures for doing so, and reporting requirements. The activities include sampling, inspections, monitoring flows and water levels, and the like. Details on each activity are presented in Sections 3 through 8 for the different components of the remedy.

2.1 ACTIVITY SUMMARY

Table 2.1 presents a complete summary of the monitoring and reporting activities defined in this PMP as well as pertinent comments. For each activity, Table 2.1 references where the activity is discussed in the report, and any pertinent tables and procedures. To the extent practicable, Table 2.1 is referred to for sampling requirements, duplicate descriptions of the requirements have been eliminated from the text of the PMP. Should there be conflicting sampling requirements in this PMP, Table 2.1 will take precedence.

2.2 FIELD PROCEDURES

Standard field procedures have been defined for sampling and measurement tasks. These procedures are numbered FP-XX and are referenced when a measurement or sampling task is discussed. The appropriate field procedures for the PMP are identified on Table 2.1. The field procedures are presented in Appendix A, and implementation of field activities are presented in Appendix B.

2.3 ANALYTICAL PARAMETERS

The analytical groups, or parameters, included in individual sampling events are defined on Table 2.1. These analytical groups, or parameters, were selected based on the findings of the SCR-Q, Major Ions report, the RCR-04, and comments from the EPA. Analytical requirements, e.g., quality assurance and controls, are presented in Appendix C of this PMP. Table C.1 in that appendix identifies laboratory analytical methodologies; Table C.2 presents parameter lists analytical groups, including: the Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), Organic Acids, and Pesticides.

The SCR-Q presented the first detailed groundwater quality sampling event completed at the Site since the mid 1980s. The SCR-Q sampling included analyses for the full target compound list of VOCs and SVOCs, plus organic acids and major ions. The SCR-Q report also presented a set of screening levels and compared these levels to the groundwater organic data. Table 2.2 presents the screening levels from the SCR-Q. Only Outer piezometers (piezometers located outside the perimeter of historical NAPL presence) were considered in this screening comparison. The Inner piezometers (locations within or near the Site NAPL plume) are expected to have higher chemical concentrations and are therefore not appropriate for monitoring the extent of APL migration.

Based on the comparison of the SCR-Q data with the screening levels, nine Site Organic Indicators (SOIs) were defined and are listed below. The SOIs are the parameters that exceeded a screening level in more than one Outer piezometer.

SOI	*Abbrev.*	*Comment*
Chlorendic Acid		Site-related organic acid
Benzene		Common petroleum hydrocarbon
1,1,2,2-Tetrachloroethane	1122PCA	Common industrial solvent
Tetrachloroethene	PCE	Common industrial solvent
Trichloroethene	TCE	Common industrial solvent
Cis-1,2-dichloroethene	Cis12DCE	Degradation product of PCE and TCE
Vinyl Chloride	VC	Degradation product of PCE and TCE
Bis(2-ethylhexyl)phthalate	BEHP	Common laboratory contaminant
Methylene Chloride	MC	Common laboratory contaminant

Of the SOIs, chlorendic acid is the most useful indicator parameter to monitor Site-related impacts to groundwater. Of the nine SOIs, only chlorendic acid was included in the RRT sampling requirements. Five of the SOIs are common industrial solvents (or their environmental degradation/breakdown products) while associated with the Landfill, they are also potentially related to nearby industries. Benzene is related to petroleum hydrocarbons and is associated with fuel releases. Two of the SOIs, MC and BEHP, are common laboratory contaminants.

Chlorendic acid is detected in the organic acids analysis. Therefore, the organic acids analysis is proposed for the most frequent sampling.

Sulfate is a key compound in the Site monitoring. As presented in the Major Ions Report, sulfate concentrations provide a relative age for the groundwater. This information is useful in assessing remedial performance.

2.4 MAINTENANCE INSPECTIONS

To ensure proper operation of the Site remedial actions, regular inspections of the Landfill cap, fence, and the monitoring wells will be completed. The scope of the inspections discussed in Section 8 of this PMP. Inspection procedures are described in Appendix A – Field Procedure FP-01b. Inspection frequency is defined on Table 2.1.

2.5 NOTIFICATIONS

The Agencies (Table 1.1) will be contacted at least 4 weeks prior to a Gorge Face Seep Inspection, and two weeks prior to all other sampling events described here.

2.6 REPORTING

Three types of reports will be prepared based on the monitoring defined in this PMP.

- Quarterly Operations Report
- Annual Site Remedial Performance Report
- Five-year Site Remedial Performance Report

The Quarterly Operations Report (Quarterly Report) will provide performance data necessary to ensure that the remediation systems are operating as designed, i.e., that the treatment system is effectively decontaminating the recovered groundwater, and the pumping systems are recovering the volume of water necessary to control the contaminant migration. Potentiometric surface maps will also be prepared for the overburden and the flow zones in the Lockport Bedrock. This report will be submitted to the Agencies within 30 days following the end of each quarter.

Site monitoring data will be reported in an Annual Site Remedial Performance Report (Annual Report). The Annual Report will provide a full year of monitoring data (analytical, water levels, and flow rates), and an assessment of the Overburden, Bedrock, and Community Monitoring data. The objective of the report is to provide an evaluation of the overall remedial performance. If appropriate, the Annual Report will include recommended modifications to the PMP. The Annual Report will be submitted within 90 days following the end of each calendar year.

The Five-Year Report will present a review of the Site conditions and a statistical evaluation of the analytical data collected over the preceding five years. The sampling parameters, frequency, and locations will be reassessed. The need to sampling the Inner piezometers (piezometers within of near the current or historical NAPL Plume boundaries) will be reviewed. The Five-Year Report will recommend any appropriate modifications to the PMP for the following five years. The first Five-Year Report will be due on April 30, 2012.

3.0 OVERBURDEN OPERATIONS AND MONITORING

The monitoring wells and the remedial action elements completed in the overburden are presented in Figure 1.6.

3.1 OPERATIONS

There are three active remediation systems installed in the overburden:

- The Source Control (SC) System;
- The Existing Barrier Collection System installed in 1978 (1978 BCS); and
- The Overburden Barrier Collection System installed in 1992 (1992 OBCS).

The SC System includes five recovery wells (SC-2 to SC-6)[1] completed within the Landfill to recover NAPL before it enters the Lockport Bedrock, and seven observation wells (OEW-1 to OEW-7) to monitor SC performance. The SC wells do not generate sufficient yield to be operated continuously. Based on past experience, wells SC-2, SC-3, and SC-4 have been pumped down to the top of the pump on a quarterly schedule. For the first year of this PMP, wells SC-2, SC-3, SC-4, SC-5, and SC-6 will be purged monthly. The purging frequency and wells purged will be reevaluated and discussed in the Annual Report. The total APL and NAPL recovered by these wells will be estimated based on the depth to water and NAPL thickness measurements collected each time an SC well is pumped down.

The 1978 BCS and 1992 OBCS are French-drain systems completed through the overburden to the top of bedrock. The 1978 BCS is an on-site system located along the Landfill perimeter to control and recover NAPL and groundwater. The 1992 OBCS is an off-site system intended primarily to control the migration of dissolved phase contaminants.

Quarterly water level monitoring of overburden wells surrounding the 1978 BCS and 1992 OBCS have always demonstrated an horizontal hydraulic gradient indicating groundwater flow toward the 1978 BCS and 1992 OBCS, and/or a downward hydraulic gradient indicating vertical flow from the overburden into the bedrock. These

[1] SC-1 is not pumped as the casing and screen have separated and a pump cannot be installed. Historical data indicate that this well did not yield significant NAPL and therefore, will be abandoned according to Field Procedure FP-07a rather than repaired.

conditions satisfied the requirements of the RRT. Table 2.1 defines the sampling frequency for these wells under this PMP.

Pumping from the 1978 BCS and 1992 OBCS occurs at three "wet wells" or sumps. One wet well is in the 1978 BCS and two are in the 1992 OBCS. In the 1978 BCS, pumping is controlled by high-low level switches that are physically set. The 1992 OBCS pumping is controlled electronically by adjusting set-points, target water levels in the wet wells. Pumping is cycled to maintain the set-points. To ensure continued performance of the overburden control systems, the set-points listed on Table 3.1 will be maintained. Water levels in wet wells C and D will be monitored continuously. As needed, adjustments to the set-points may be recommended in the Annual Reports.

3.2 MONITORING

All overburden groundwater monitoring will be performed in accordance with Implementation of Field Activities presented in Appendix B.

3.2.1 WATER LEVEL MONITORING

Groundwater levels will be measured in the overburden monitoring wells and in the overburden collection system manholes listed on Table 3.2. The monitoring frequency is defined on Table 2.1. The water level data will be evaluated and reported annually to ensure that the hydraulic gradients outside of the OBCS are either inward, toward the OBCS, or downward, into the Lockport bedrock.

Table 3.3 lists the monitoring requirements for the SC monitoring wells. In the SC recovery wells the water and NAPL levels will be measured each time the well is purged.

3.2.2 NAPL PRESENCE MONITORING

NAPL presence monitoring will be performed annually in overburden wells outside of the 1992 OBCS to ensure that NAPL is not bypassing the 1992 OBCS. Wells scheduled for NAPL presence monitoring are listed in Table 3.2.

3.2.3 GROUNDWATER QUALITY MONITORING

No groundwater quality monitoring is proposed for the overburden wells. The composite influent from the 1992 OBCS and 1978 BCS will be analyzed and reported as defined in Section 6, Treatment System Monitoring.

4.0 BEDROCK OPERATIONS AND MONITORING

Figure 4.1 presents the monitoring wells and the remedial action elements (purge wells) completed in the Lockport Bedrock. All bedrock groundwater monitoring described below will be performed in accordance with Implementation of Field Activities presented in Appendix B, and following the schedules presented on Table 2.1.

4.1 OPERATIONS

There are two active remediation systems in the Lockport bedrock:

- the NAPL Plume Containment System; and
- the APL Plume Containment System.

Both containment systems are operated by maintaining the water level in each purge well at a fixed “set-point”. Set-points have been defined to maintain a maximum sustainable pumping rate. Actual pumping rates from individual wells will vary seasonally to maintain the defined set-point. Pumping rates are controlled by adjusting the rotational speed of the pump or by cycling the pumping on and off; all control is computerized and water levels in the purge wells are continuously monitored. Table 4.1 presents target set-points and a typical pumping rate for each purge well.

In addition to maintaining target set-points in the purge wells, the water levels in flow zone FZ-09 in the area between the Landfill and the APL purge wells APW-1 and APW-2, will be maintained at 526 ft above mean sea level (msl), or lower. This level will ensure that the FZ-09 outcrop along the NYPA access road remains unsaturated. Water levels in flow zone piezometer PMW-1M-09, located west of the Landfill, will be monitored hourly via computerized recorder for this assessment.

Well set-points, observed water levels, and observed pumping rates for each of the purge wells will be reported in the Quarterly Reports. These data will be reported graphically to allow easy performance evaluation. Water levels from PMW-1M-09 will also be reported in the Quarterly Reports. If modifications to the well set-points or pumping rates are determined to be necessary, changes will be noted in the Quarterly Report.

4.2 MONITORING

4.2.1 BEDROCK WATER LEVEL MONITORING

Groundwater levels will be measured in the flow zone piezometers listed in Table 4.2

Water levels in piezometer PMW-1M-09 will be monitored hourly with an electronic water level recorder. The PMW-1M-09 data will be regularly evaluated to ensure that water levels are at or below 526 feet msl, as discussed previously in subsection 4.1.

4.2.2 NAPL PRESENCE MONITORING

Prior to the Site recharacterization activities that began in 2000 the Lockport Bedrock was conceptualized as having three flow intervals (Upper, Middle, and Lower Bedrock). There are over one hundred Lockport Bedrock monitoring wells in place that are no longer considered appropriate for water level or quality monitoring. As discussed in Section 1.5, these wells will be abandoned according to FP-07a. Until such time that these wells have been abandoned, water levels and NAPL presence will be monitored. Table 1.2 presents a list of the Lockport Bedrock wells to be monitored according to the schedule on Table 2.1, and eventually, abandoned.

4.2.3 GROUNDWATER QUALITY MONITORING

All groundwater quality sampling will be performed in as defined in Table 2.1, and in accordance with the Analytical Requirements presented in Appendix C. Groundwater quality sampling is currently scheduled at three frequencies:

- Quarterly;
- Annual (every 5 quarters); and
- Five-year.

These frequencies are subject to change based on evaluation of the data collected and approval by the Agency. The Quarterly sampling program will be reviewed and potentially revised to Semi-annual after eight quarters of sample have been completed and the data reviewed.

The 1-inch diameter flow zone piezometers are the primary monitoring points for the Lockport Bedrock. These piezometers are characterized as Inner or Outer piezometers:

- Inner piezometers are located within or near the limits of the current or historical NAPL plumes. These piezometers contain relatively high concentrations of Site-related parameters, greater then the MSRM screening levels, and concentrations are not expected to change significantly until the NAPL plumes have been recovered.
- Outer piezometers are located beyond the limits of the NAPL plume boundaries and concentrations may change in the short term. Monitoring these piezometers will provide information performance of the remedial elements at the Site. .

Approximately half of the piezometers yield insufficient water to provide a reliable groundwater quality sampling. These low-yield piezometer are not included in the sampling program. All of the Outer piezometers with sufficient yield for sampling are defined as Group A piezometers. Group B piezometers are piezometers in Group A that exceed a screening level, Table 2.2. Table 4.2 identifies the piezometers in Group A and Group B. Because they have exceeded a screening level, the Group B piezometers will be sampled more frequently than the Group A piezometers. Figures 4.2 to 4.9 present a map of each bedrock flow zone and identify which piezometers are to be sampled.

The Fifth-year monitoring program is intended to capture a comprehensive view of the Site. Therefore, in addition to the Group A piezometers, all operating bedrock APL and NAPL purge wells will be sampled.

4.3 BLOODY RUN CREEK MONITORING

As discussed in Section 2.3, with one exception, groundwater samples from the four Bloody Run Monitoring wells, Figure 1.4, have always been below groundwater quality screening levels. As a result, sampling is not considered necessary. These four wells will be monitored for VOCs, SVOCs, and Organic Acids during the Fifth-year monitoring event. Sampling in the Bloody Run Monitoring wells will be completed according to field procedure FP-04b.

The catch basin on the north side of the Greif Brothers warehouse will be checked annually for NAPL presence following field procedure FP-03a. NAPL presence results will be reported annually. This catch basin will also be sampled annually in accordance with field procedure FP-04d. This sample will be analyzed for organic acids and results will be included in the Annual Report.

Additional, more frequent monitoring and sampling may be performed pending any future land use changes (i.e., parking lots, dormitories, etc.).

5.0 COMMUNITY MONITORING

There are three programs that fall under community monitoring:

- Gorge Face Seep Inspection;
- APL Flux Monitoring;
- Community Well Monitoring.

All monitoring will be performed according to the schedule on Table 2.1 and in accordance with Implementation of Field Activities in Appendix B. There are no active remedial action elements for the Community Monitoring Program

5.1 GORGE FACE SEEP INSPECTION

The Niagara River Gorge is open to the public and is therefore an area of potential direct contact with Site-related compounds. With the operation of the bedrock remedial action elements, especially the APL Collection System, groundwater from the vicinity of the Landfill no longer discharges in the gorge. However, continuing the Gorge Face Seep Inspection will ensure that the potential for public exposure is minimized.

Under the former Site monitoring plan this inspection was completed on an annual basis. However, over the past several years there has been little or no changes in the seeps, no new seeps have been detected, and no concentrations of concern have been detected. Based on these historical results, the Gorge Face Seep Inspection is currently performed biennially rather than annually. Seep samples will be collected as requested by the Agencies based upon results of the seep inspections.

The Agencies (Table 1.1) will be contacted at least four weeks prior to a Gorge Face Seep Inspection. A MSRM representative will complete the walkover with all Agency representatives. The inspection normally takes place during the summer (August) and requires strenuous hiking in wooded and rocky terrain. Therefore all participants should prepare for these conditions. Table 5.1 lists recommended gear for the seep inspection. Figures 5.1 to 5.3 show the locations of the known gorge face seeps. Table 5.2 presents the approximate state plane coordinates of the seep locations.

As requested by the Agencies, seep locations may be identified for subsequent water sampling. Samples will be collected within one month of a written sampling request from the Agencies.

Sample results and a seep inspection summary will be included in the Annual Report.

5.2 APL PLUME FLUX MONITORING

The APL Plume Flux Monitoring is completed to ensure that select Site-related parameters are not discharging to the Niagara River Gorge at above the Flux Action Levels defined in the RRT. Table 5.3 presents the APL Flux Monitoring Parameters for the PMP and the Flux Action Levels.

The RRT defined and required analysis for two parameter groups in the RRT Plume Flux Monitoring Program:

APL Plume Flux Parameters, and
APL Plume Monitoring Parameters

The RRT list of parameters has been reduced for the PMP. The following parameters were eliminated from the RRT parameter lists for the following reasons:

- Chloroform was listed in the RRT with a Flux Action Level, however, the results of the SCR-Q demonstrated that chloroform was below the screening levels and is no longer considered a parameter of concern.
- For the following five parameters, there had never been any exceedences of screening levels in the APL Purge Wells (APWs) or APL Flux Monitoring Wells (AFWs):
    - Phenol
    - Benzene
    - 2-Chlorophenol
    - 2,4-Dichlorophenol
    - 2,4,5-Trichlorophenol

Only one of the five, benzene, has been detected above screening levels in any of the Outer piezometers. Benzene is highly biodegradable and it is not surprising that it was not found in the APWs or AFWs. As a result, the APL Plume Monitoring Parameters (with the exception of the hexacholorcyclohexanes) were dropped from the monitoring program.

5.3 COMMUNITY WELL MONITORING

Community Well Monitoring is performed in shallow bedrock and overburden wells in areas of potential public exposure to vapors of Site-related compounds. The potential pathway for a community exposure is through the volatilization of chemicals. Therefore, the monitoring is focused on vapor monitoring. Should vapor monitoring results suggest a potential volatilization issue, groundwater sampling will be performed.

Figure 5.4 shows the locations of the Community Monitoring Wells.

5.3.1 GROUNDWATER LEVEL MONITORING

Water levels will be measured in the community monitoring wells listed on Table 5.4 according to the schedule on Table 2.1.

5.3.2 VAPOR MONITORING

Vapor monitoring will be performed in the overburden community monitoring wells according to the schedule presented on Table 2.1. The monitoring has been scheduled to occur in the third quarter (July, August, or September) when temperature is high and volatilization potential is the greatest. Vapor monitoring will be performed according to FP-05a using an organic vapor analyzer (OVA) capable of detecting 0.010 parts per million by volume (ppmV) or lower, total VOCs. Should the stabilized OVA reading exceed 0.050 ppmV, a groundwater quality sample will be scheduled and collected from the well within two weeks and analyzed for the parameters listed in Table 21. The sampling results will be reported to the Agency within 30 days of sample collection. If necessary, additional action may be taken after consultation with the Agencies. Monitoring results will also be reported in the Annual Report.

5.3.3 GROUNDWATER QUALITY MONITORING

The Community Monitoring wells are not scheduled for regular groundwater sampling. As described under Soil Vapor Monitoring, a water quality sample will be collected from any overburden well that exhibits an OVA reading greater than 0.050 ppmV total VOCs.

6.0 TREATMENT SYSTEM MONITORING

The treatment system collects all of the liquids, groundwater, and NAPL, produced by the overburden and bedrock remediation systems. Purge and decontamination liquids generated during Site monitoring are also discharged to the Site treatment system. The water is treated and discharged to the City of Niagara Falls sanitary sewer system via Significant Industrial User (SIU) Permit #49. NAPL is stored on-Site until a sufficient quantity is available for transport to an approved hazardous waste facility.

6.1 OPERATIONS

The treatment system purifies approximately 50 million gallons of water each year. The treatment system effluent is monitored regularly to ensure compliance with the discharge requirements. There are nine locations in the system where water samples are collected to monitor system performance. Figure 6.1 presents the sample locations.

6.2 MONITORING

Table 6.1 presents the sampling frequency, location, and analyte list for the treatment system monitoring.

Sampling results will be reported in the Quarterly Reports. Volumes of APL and NAPL produced from the overburden and bedrock remediation systems will also be reported in the Quarterly Reports.

7.0 FIFTH-YEAR MONITORING EVENT

The monitoring program will be expanded every fifth year to include additional sample locations and analytical parameters. The fifth-year monitoring program will:

- Evaluate whether significant changes have occurred in analytical parameters not included in the Semi-annual and Annual programs;
- Provide a milestone for a more detailed evaluation of the Site conditions than completed in the Annual reports; and
- Provide a time to reassess the requirements of this PMP.

The additional locations to be sampled five years from the time that this plan is initiated, and the sample analyses to be completed, are listed on Table 7.1.

The results of this monitoring will be presented in the Five-Year Report, which is described in section 2.6.

8.0 MAINTENANCE INSPECTIONS

Maintaining the Site remedial elements is critical to the remedial performance. Therefore, regular inspections of the monitoring points (wells and piezometers), the Landfill cap, and the security fence surrounding the landfill have been included in the PMP, and are detailed in Appendix A - Field Procedure FP-01b. Monitoring frequency is defined on Table 2.1.

8.1 WELL AND PIEZOMETER INSPECTIONS

Annually, the active monitoring wells and piezometers will be inspected to ensure that the casings and caps are secure and in good condition; and well depths will be monitored for possible infilling.

Field inspection records will be maintained at the Hyde Park facility and will be available for inspection on request.

8.2 LANDFILL CAP INSPECTION

Maintaining the Landfill cap will minimize the potential for a breach of the cap, and ensure a long operational life. The cap is routinely inspected during field sampling events. This is an informal inspection. A formal inspection will be completed and documented as scheduled on Table 2.1.

Field inspection records will be maintained at the Hyde Park facility. The inspection information will not be included in any regular reporting, but will be available for inspection on request.

8.3 LANDFILL FENCE INSPECTION

Unauthorized access to the Landfill and treatment facility is controlled by the presence of a chain-link fence surrounding both. The fenced area is inspected informally every weekday by a walkover or drive-by inspection, and formally according to the schedule presented in Table 2.1. Any breach of the fence or locked gates is reported and quickly corrected.

Inspection procedures are described in Field Procedure FP-01b. Field inspection records will be maintained at the Hyde Park facility and will be available for inspection on request. The inspection information will not be included in any regular reporting.

Figures

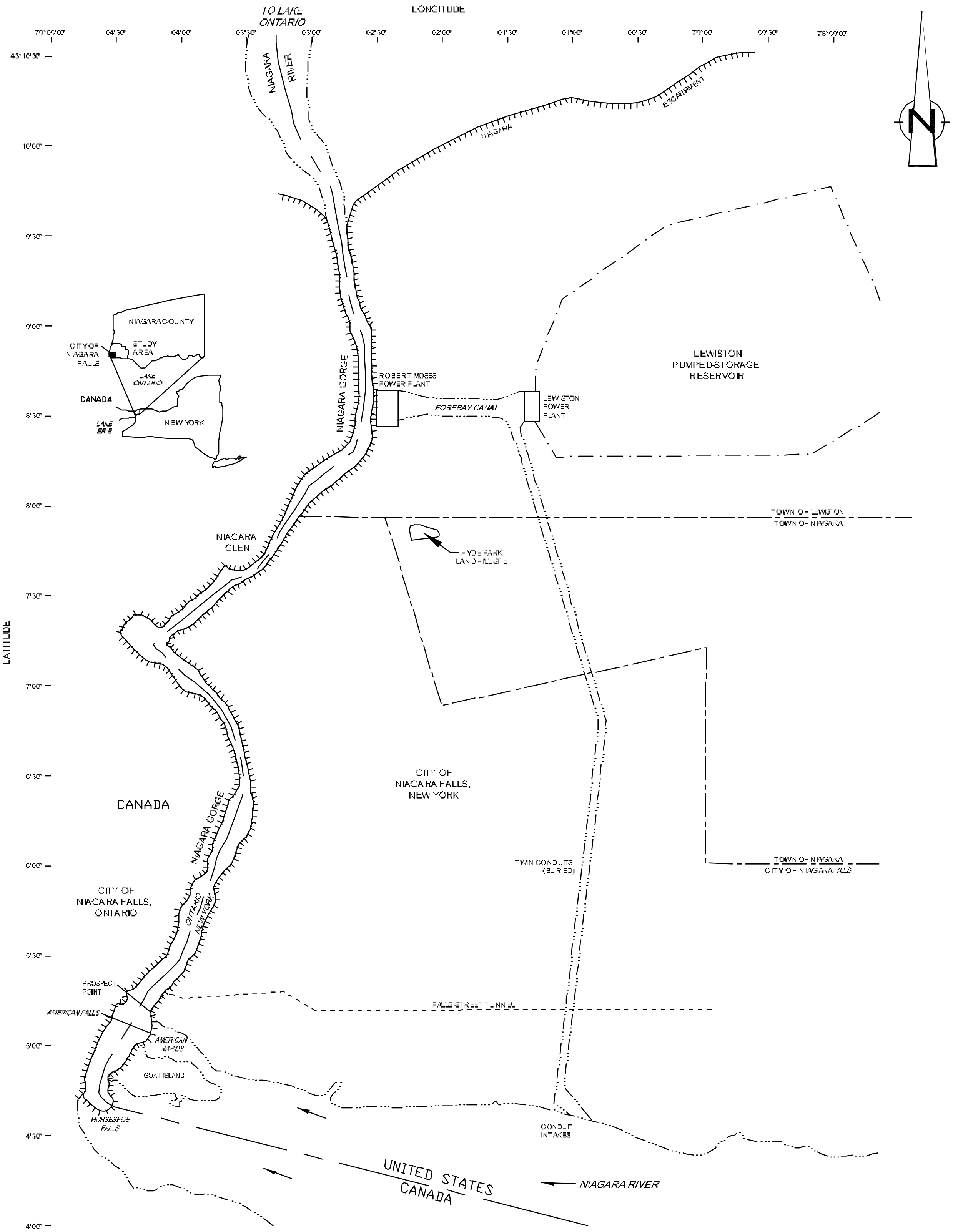


figure 1.1

SOURCE: MILLER, KAPPEL, 1987

SITE LOCATION
PERFORMANCE MONITORING PLAN
Hyde Park Landfill Site

OXY Miller Springs Remediation Management, Inc.

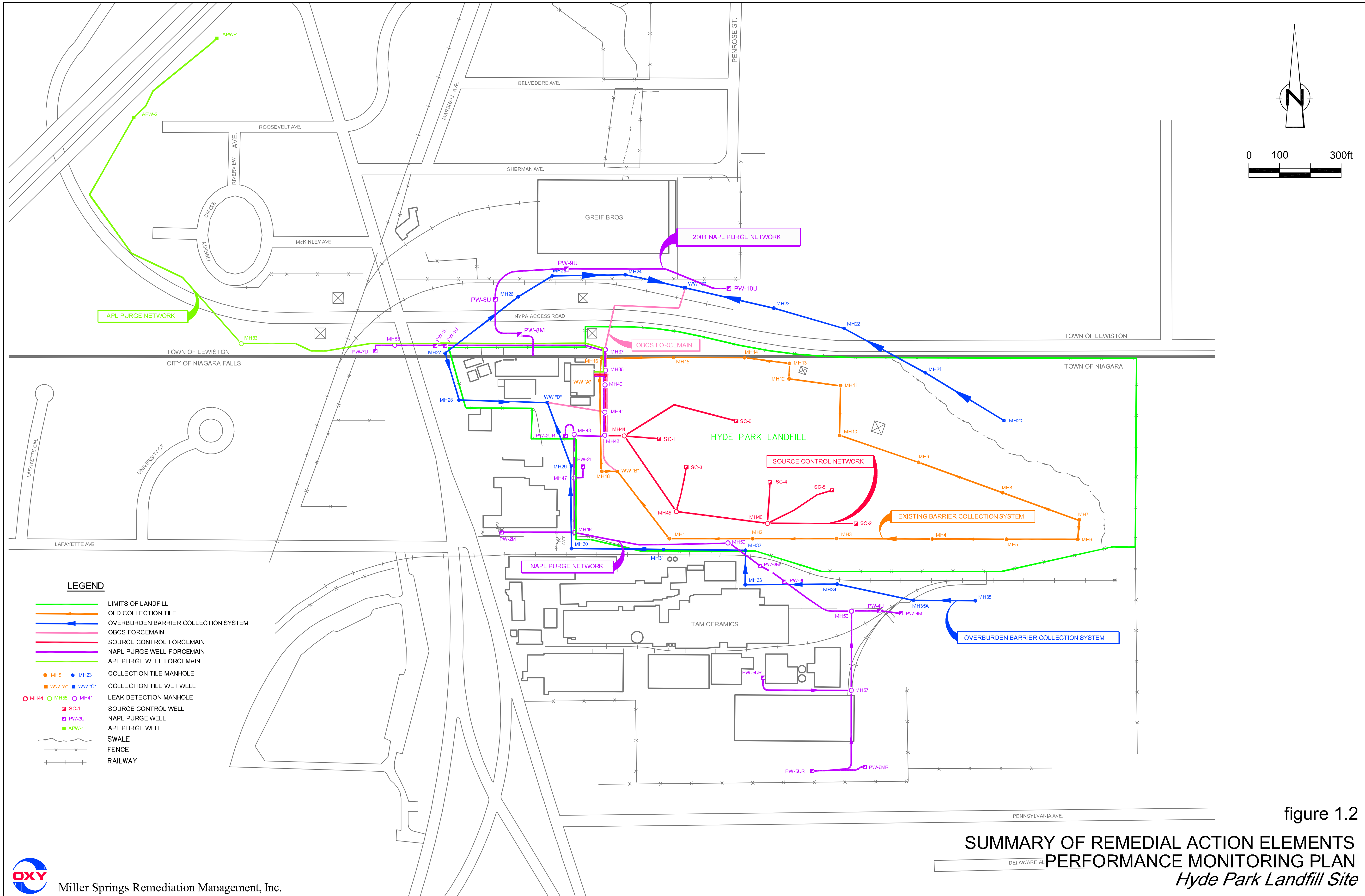
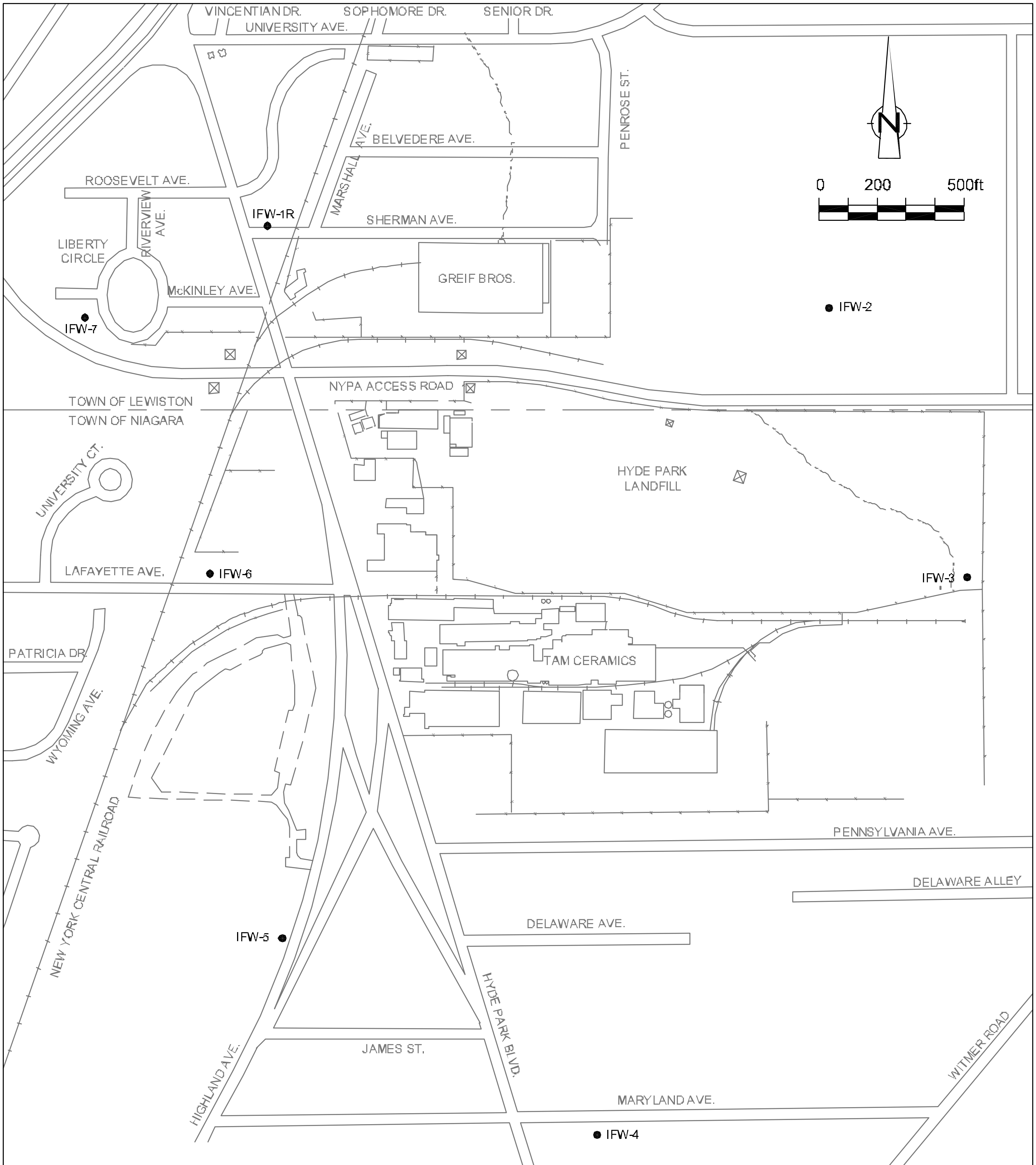


figure 1.2

SUMMARY OF REMEDIAL ACTION ELEMENTS
PERFORMANCE MONITORING PLAN
Hyde Park Landfill Site

Miller Springs Remediation Management, Inc.

01069-70(MISC001)GN-NF002 FEB 28/2005



NOTES:

1.) SITE BENCHMARK IS A P.K. NAIL SET IN THE EAST FACE OF A POWER POLE LOCATED AT THE WEST END OF THE EXISTING HYDE PARK LANDFILL, ELEVATION = 612.77. DATUM NOT VERIFIED.

LEGEND

SWALE

POWER TOWER

RAILWAY

IFW-2 INTERMEDIATE FORMATIONS WELL

figure 1.3

IFW MONITORING WELL LOCATIONS
PERFORMANCE MONITORING PLAN
Hyde Park Landfill Site

OXY Miller Springs Remediation Management, Inc.

01069-70(MISC001)GN-NF003 FEB 28/2005

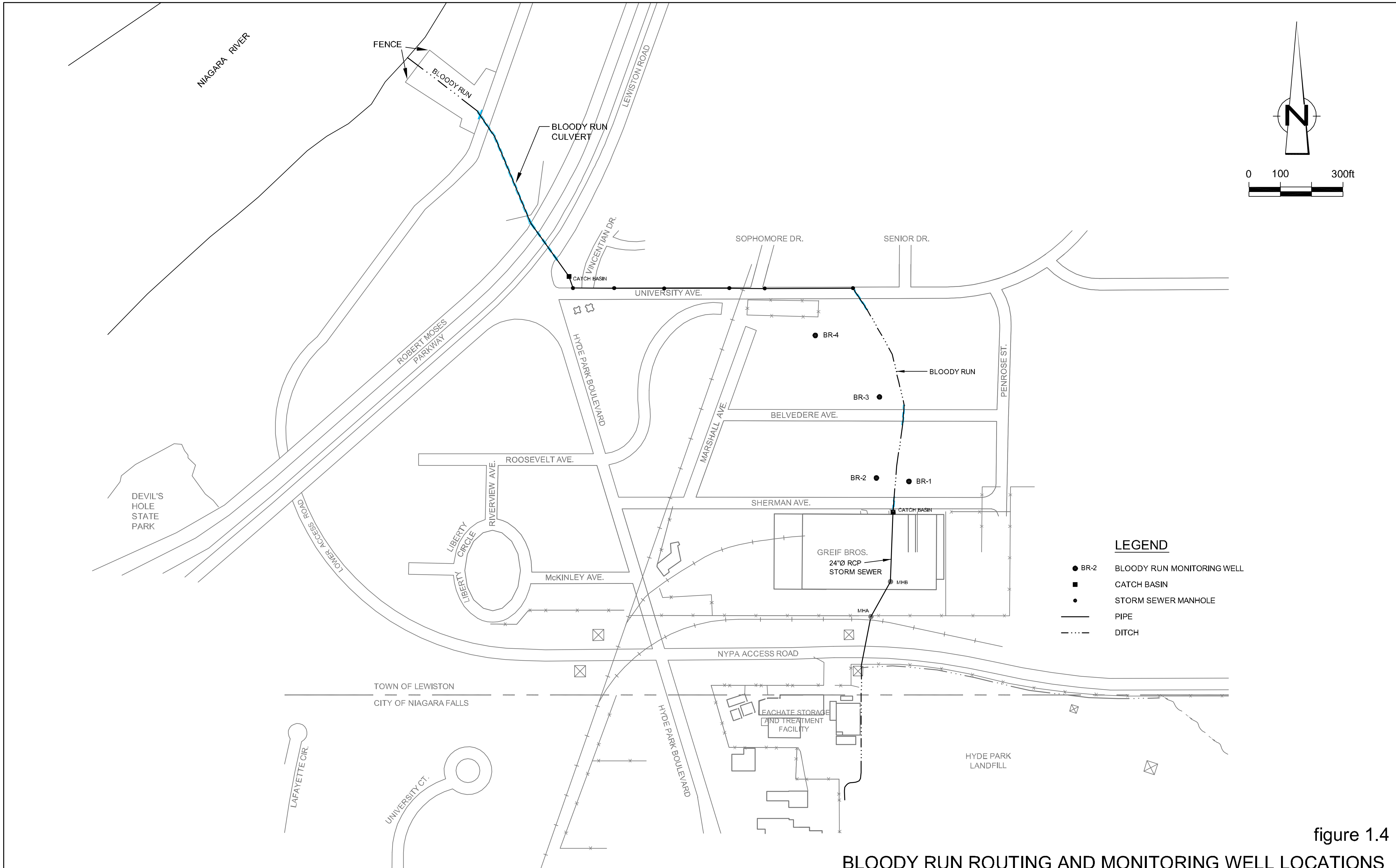


figure 1.4

BLOODY RUN ROUTING AND MONITORING WELL LOCATIONS
PERFORMANCE MONITORING PLAN
Hyde Park Landfill Site

OXY Miller Springs Remediation Management, Inc.

01069-70(MISC001)GN-NF004 FEB 28/2005

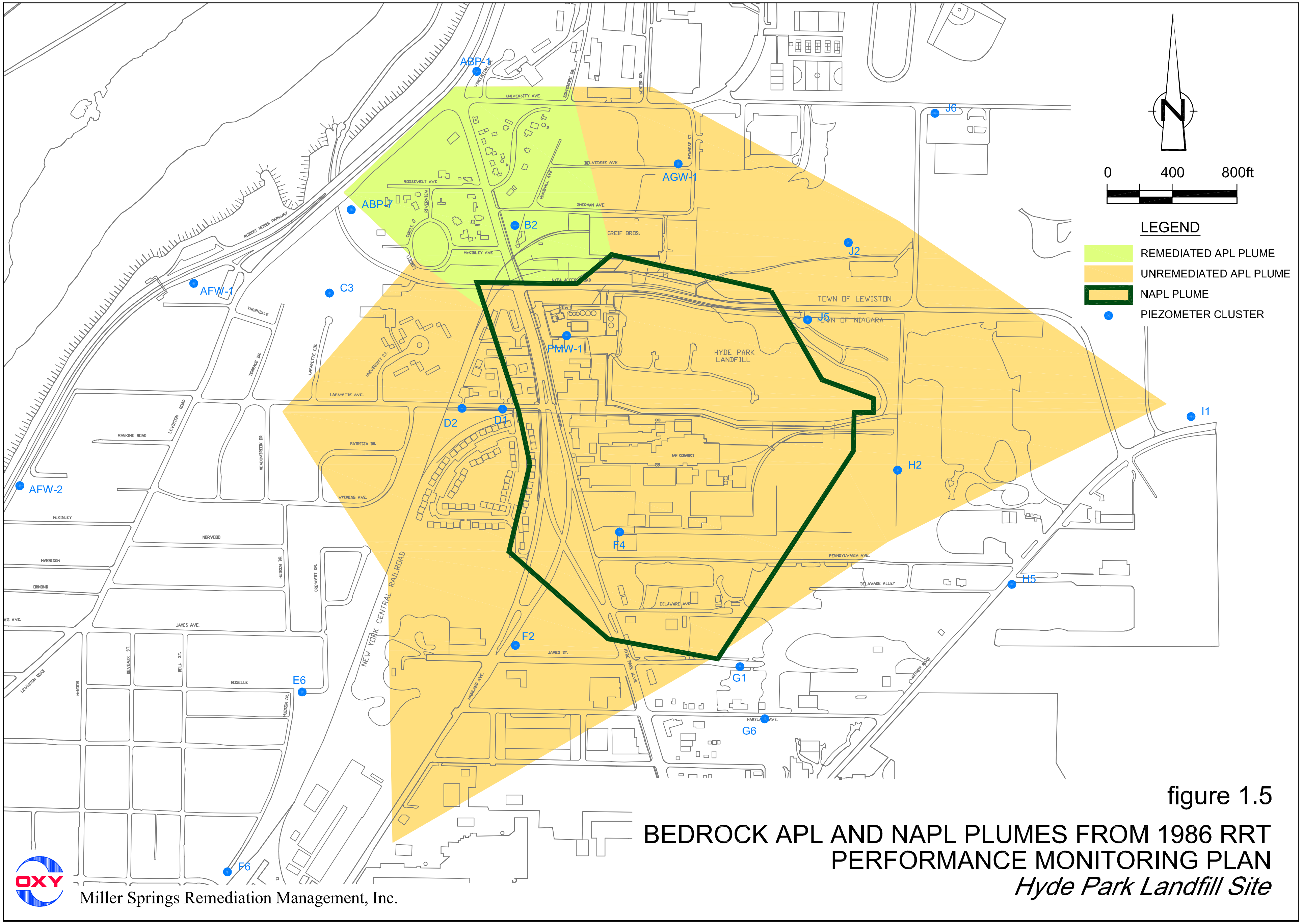


figure 1.5

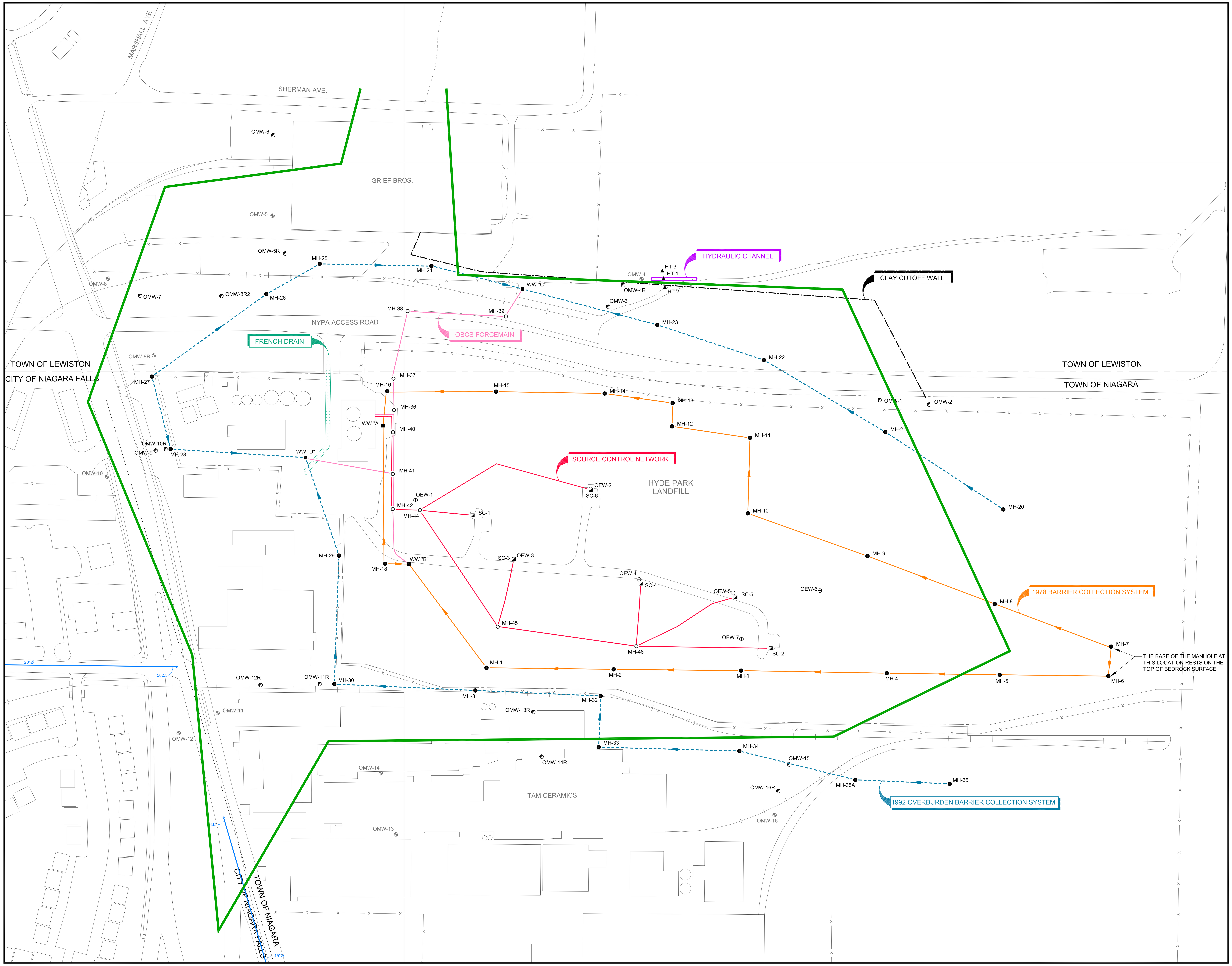
BEDROCK APL AND NAPL PLUMES FROM 1986 RRT PERFORMANCE MONITORING PLAN

Hyde Park Landfill Site

OXY

Miller Springs Remediation Management, Inc.

01069-70(MISC001)GN-NF005 FEB 28/2005



Nº	Revision	Date	Initial

N

0 50 100ft

LEGEND

PROPERTY BOUNDARY
MUNICIPAL BOUNDARY
RAILWAY
DITCH
FENCE
1978 BARRIER COLLECTION SYSTEM
1992 OVERBURDEN BARRIER COLLECTION SYSTEM
OVERBURDEN BARRIER COLLECTION SYSTEM FORCEMAIN
SOURCE CONTROL FORCEMAIN
CLAY CUTOFF WALL
1995 APL PLUME BOUNDARY
WW "A" COLLECTION TILE WET WELL
SC-1 SOURCE CONTROL WELL
OEW-2 SOURCE CONTROL SYSTEM MONITORING WELL
OMR-4R CURRENT OBCS HYDRAULIC MONITORING WELL
OMW-4 HISTORIC OBCS MONITORING WELL
MH-35 COLLECTION SYSTEM MANHOLE
MH-38 FORCEMAIN LEAK DETECTION MANHOLE
HT-1 HYDRAULIC TRENCH MONITORING WELL

NOTE:

1) SITE BENCHMARK IS A P.K. NAIL SET IN THE EAST FACE OF A POWER POLE LOCATED AT THE WEST END OF THE EXISTING HYDE PARK LANDFILL, ELEVATION = 612.77. DATUM NOT VERIFIED.

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

OCCIDENTAL CHEMICAL CORPORATION
NIAGARA FALLS, NEW YORK

HYDE PARK REMEDIAL PROGRAM

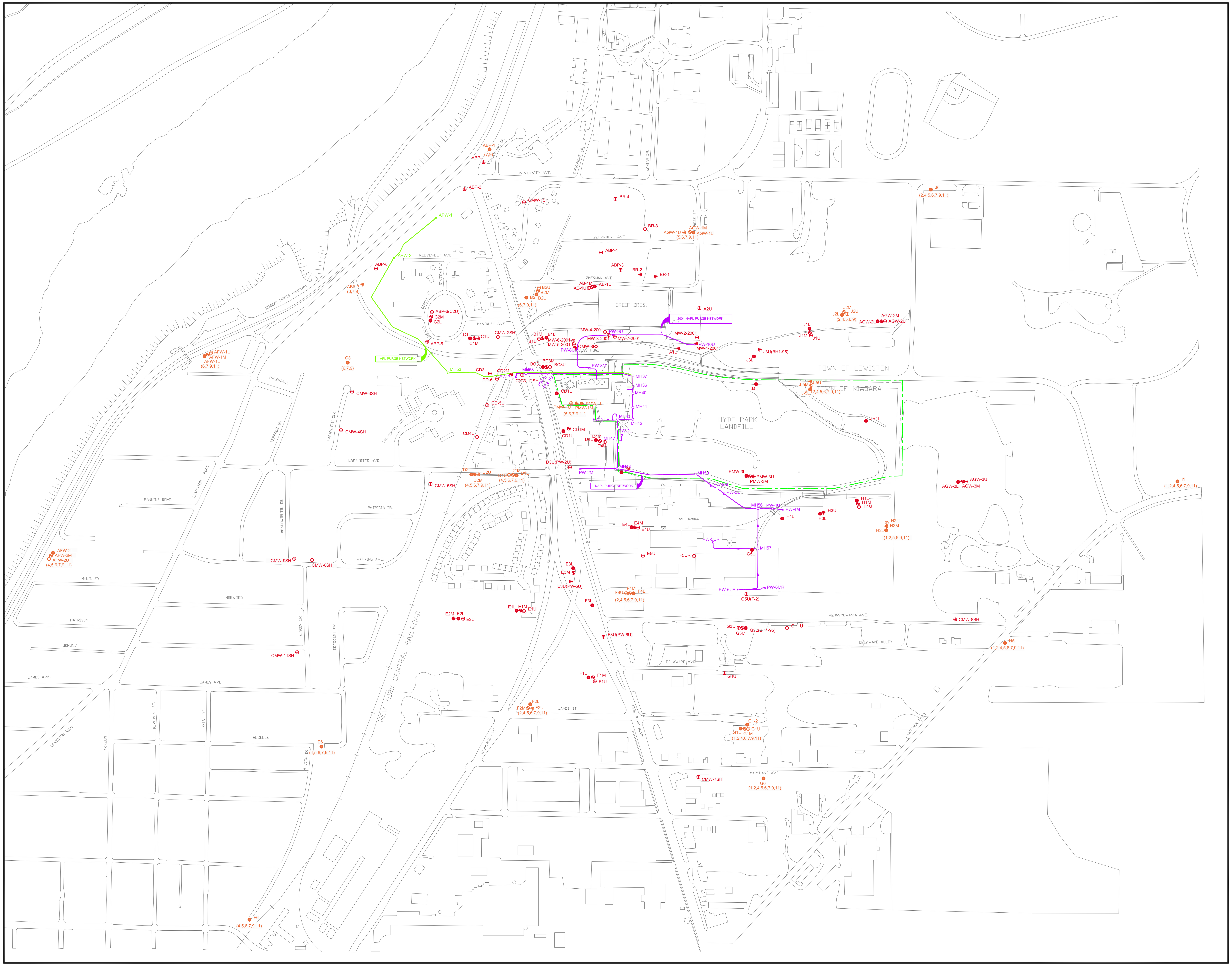
OVERBURDEN MONITORING WELLS AND COLLECTION SYSTEMS

OXY Miller Springs Remediation Management, Inc.

Source Reference:

Project Manager: J.T.	Reviewed By: J.T.	Date: DECEMBER 2004	
Scale: 1"=100'	Project Nº: 01069-70	Report Nº: MISC001	Figure Nº: 1.6

01069-70(MISC001)GN-NF011 FEB 28/2005



Nº	Revision	Date	Initial
1	REVISED PER AGENCY COMMENTS FROM 4/06	6/12/06	JCT

N

0 50 150ft

LEGEND

- LIMITS OF LANDFILL
- NAPL PURGE WELL FORCEMAIN
- APL PURGE WELL FORCEMAIN
- MH50 MH41 LEAK DETECTION MANHOLE
- PW-3U NAPL PURGE WELL
- APW-1 APL PURGE WELL
- SWALE
- 11 PIEZOMETER LOCATION ( ) INDICATES FLOW ZONES MONITORED
- CD-5U UPPER BEDROCK ZONE MONITORING WELL
- AB-1M MIDDLE BEDROCK ZONE MONITORING WELL
- J-5L LOWER BEDROCK ZONE MONITORING WELL

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

OCCIDENTAL CHEMICAL CORPORATION
NIAGARA FALLS, NEW YORK

HYDE PARK REMEDIAL PROGRAM

BEDROCK PIEZOMETERS, WELLS AND REMEDIAL ACTION ELEMENTS

OXY Miller Springs Remediation Management, Inc.

Source Reference:

Project Manager:	Reviewed By:	Date: DECEMBER 2004	
Scale: 1" = 100'	Project Nº: 01069-70	Report Nº: MISC001	Figure Nº: 4.1

01069-70(MISC001)GN-NF012 JUN 12/2006

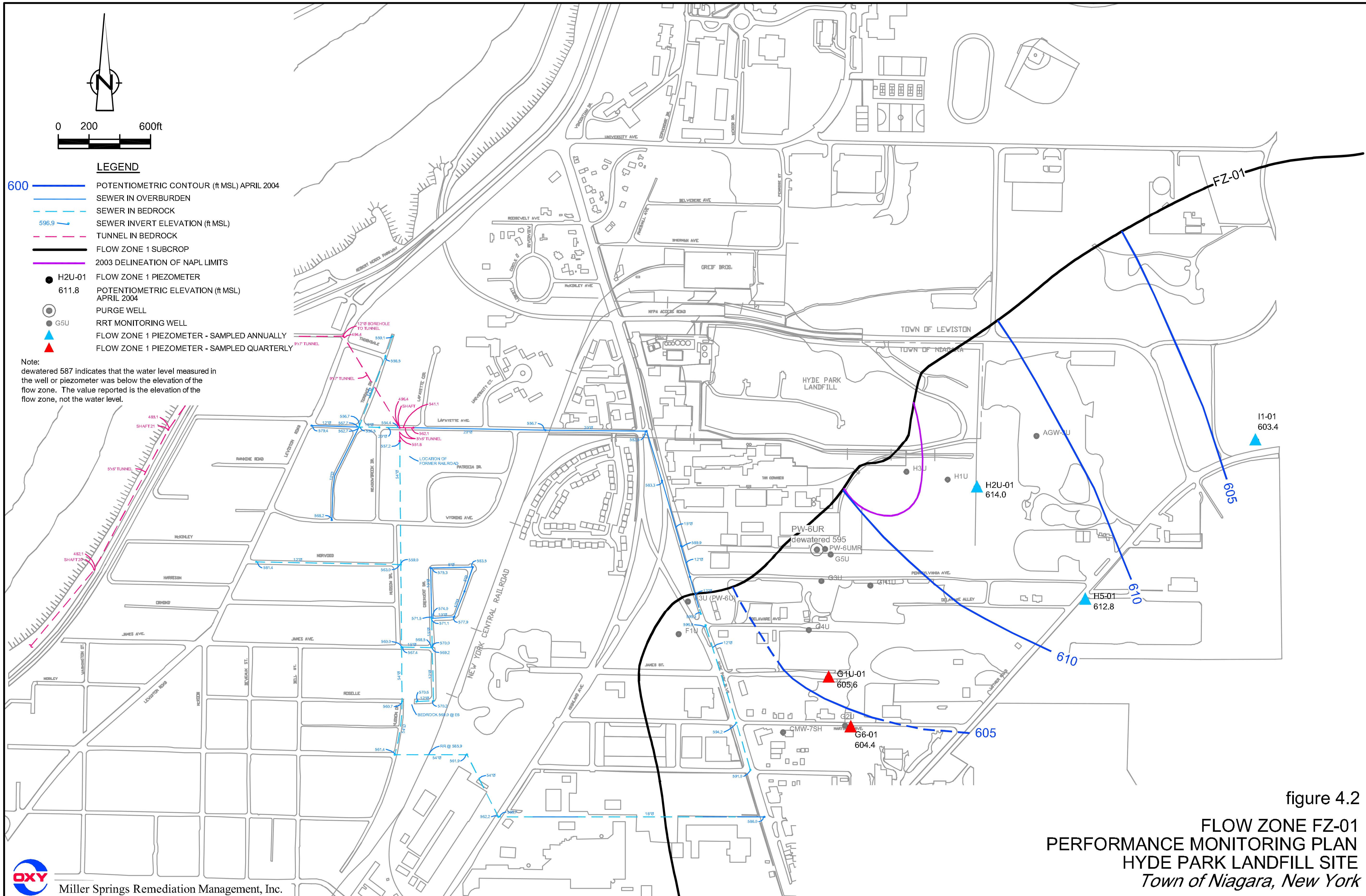


figure 4.2

FLOW ZONE FZ-01
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE
Town of Niagara, New York

Miller Springs Remediation Management, Inc.

01069-70(350)GN-NF009 JUN 23/2006

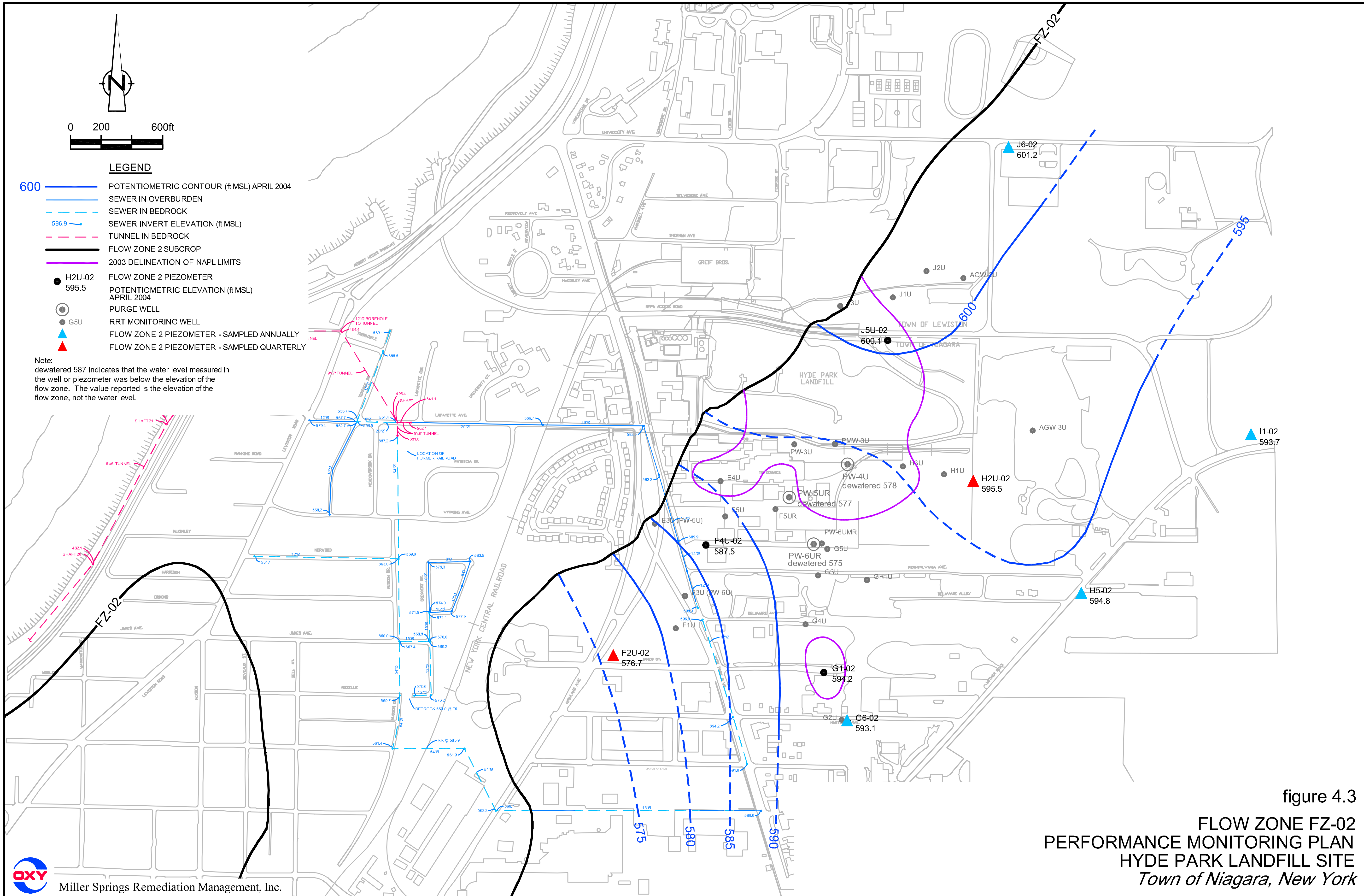


figure 4.3

FLOW ZONE FZ-02
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE
Town of Niagara, New York

01069-70(350)GN-NF010 JUN 23/2006

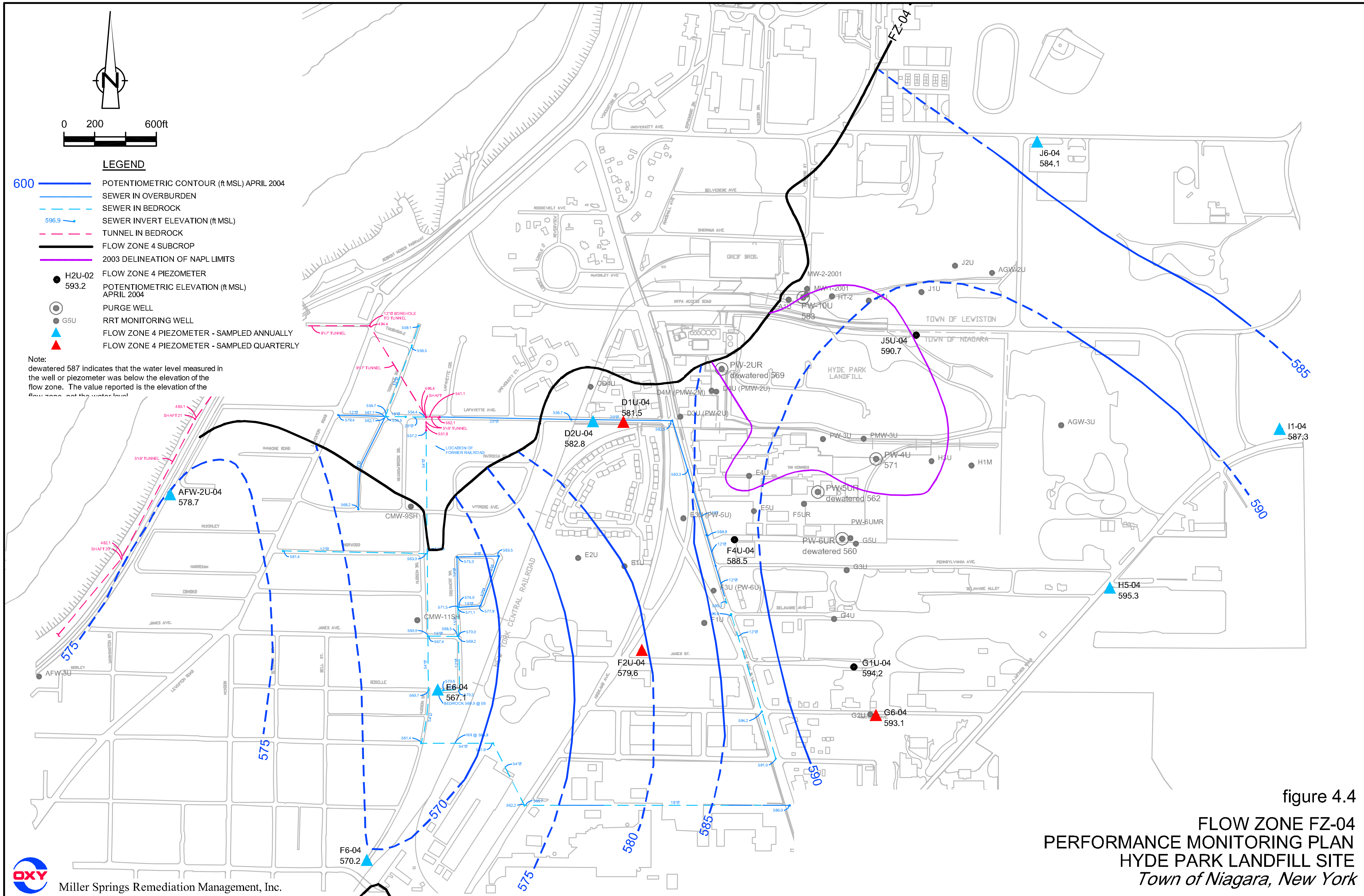


figure 4.4

FLOW ZONE FZ-04
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE
Town of Niagara, New York

01069-70(350)GN-NF011 JUN 23/2006

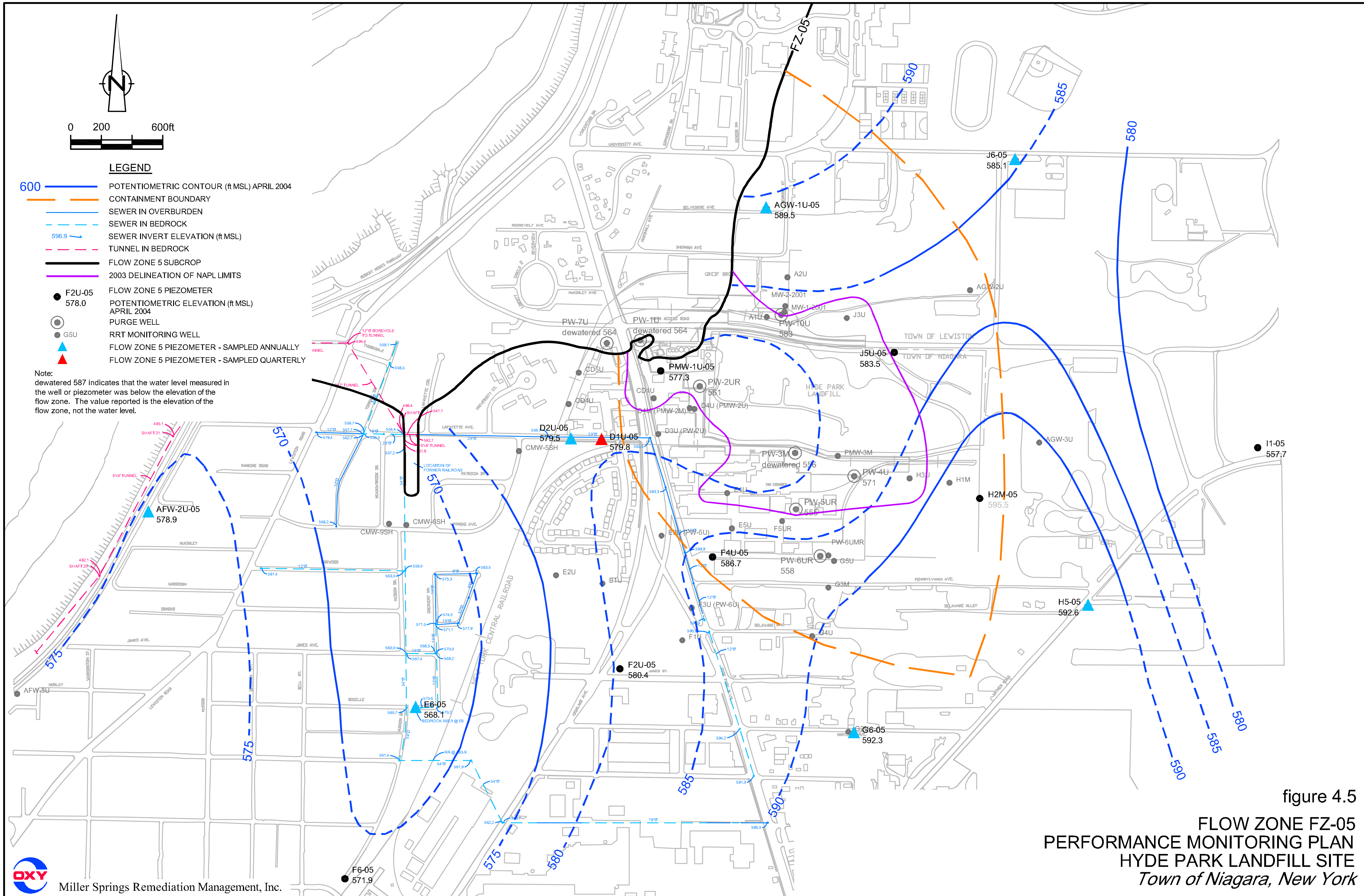


figure 4.5

FLOW ZONE FZ-05
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE
Town of Niagara, New York

01069-70(350)GN-NF012 JUN 23/2006

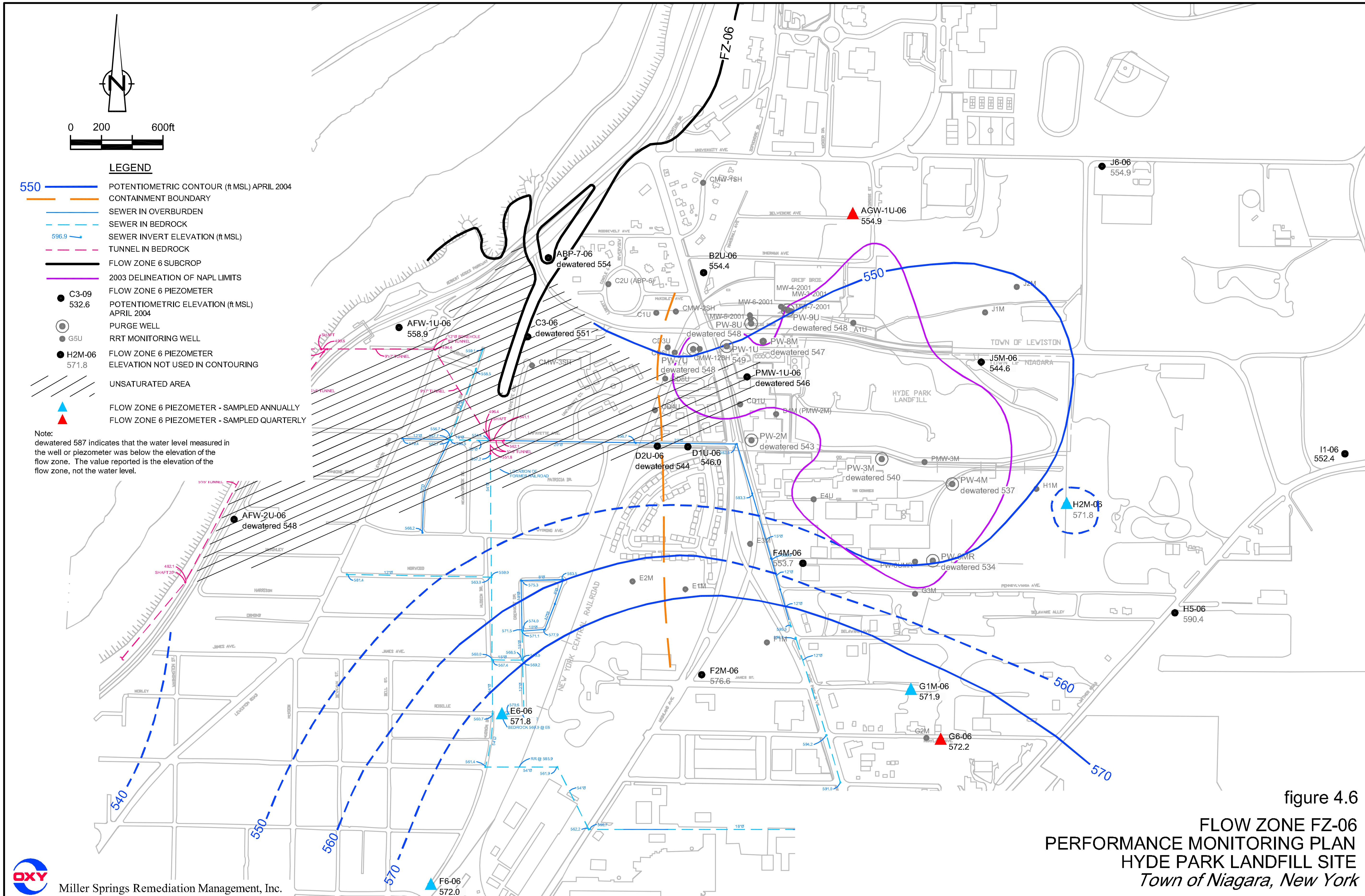


figure 4.6

FLOW ZONE FZ-06
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE
Town of Niagara, New York

01069-70(350)GN-NF013 JUN 23/2006

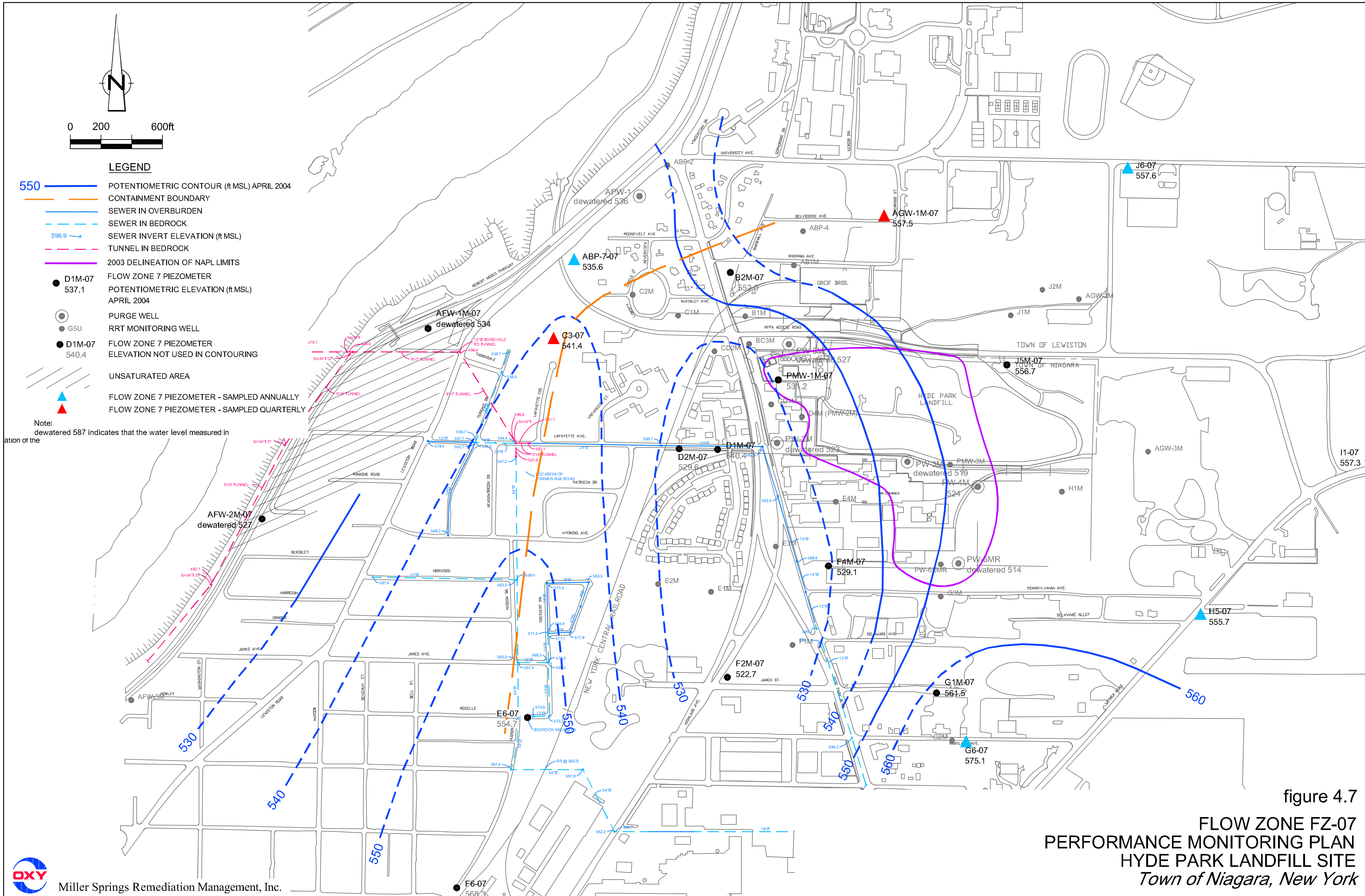


figure 4.7

FLOW ZONE FZ-07
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE
Town of Niagara, New York

OXY Miller Springs Remediation Management, Inc.

01069-70(350)GN-NF014 JUN 23/2006

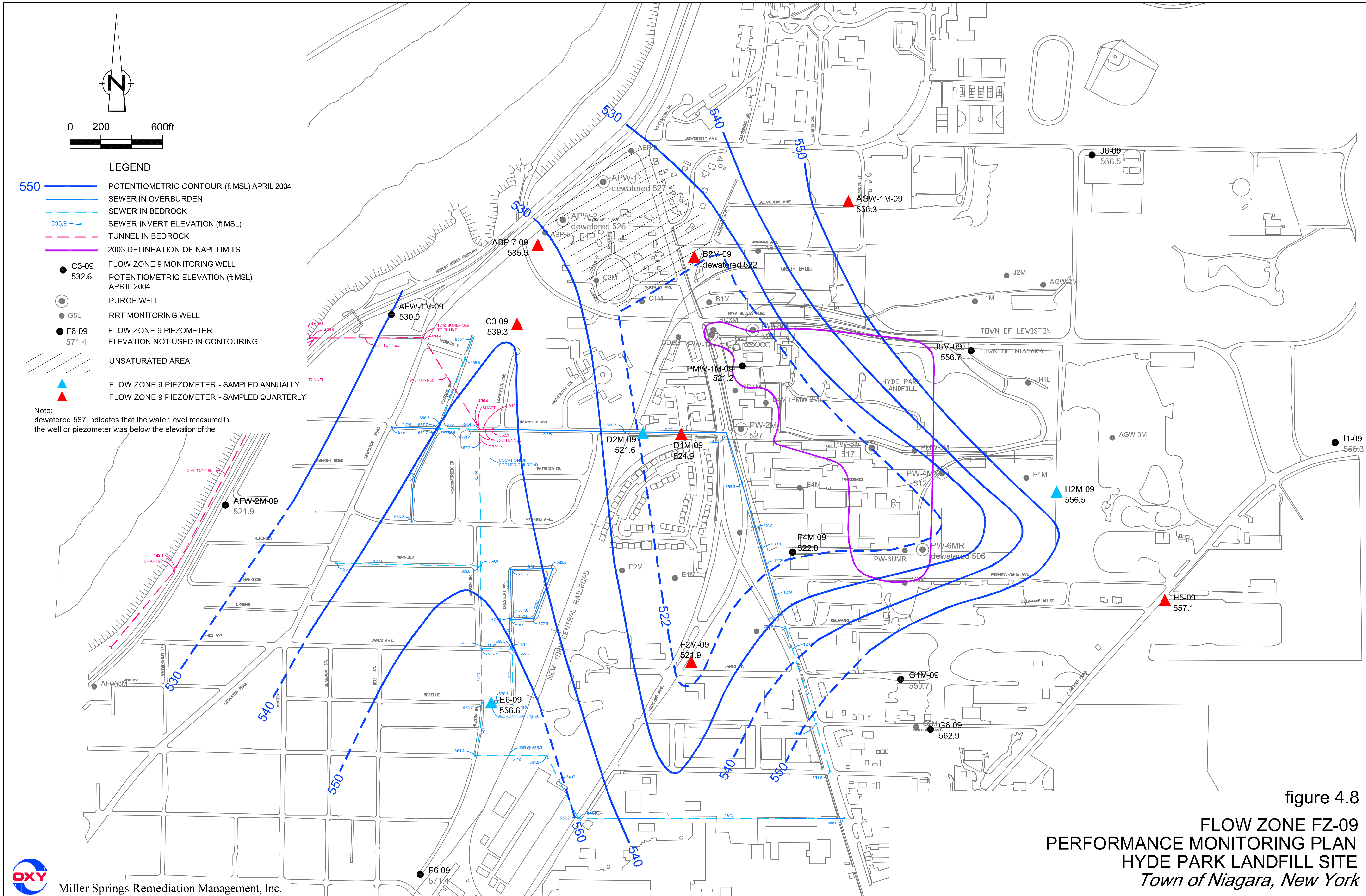


figure 4.8

FLOW ZONE FZ-09
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE
Town of Niagara, New York

01069-70(350)GN-NF015 JUN 23/2006

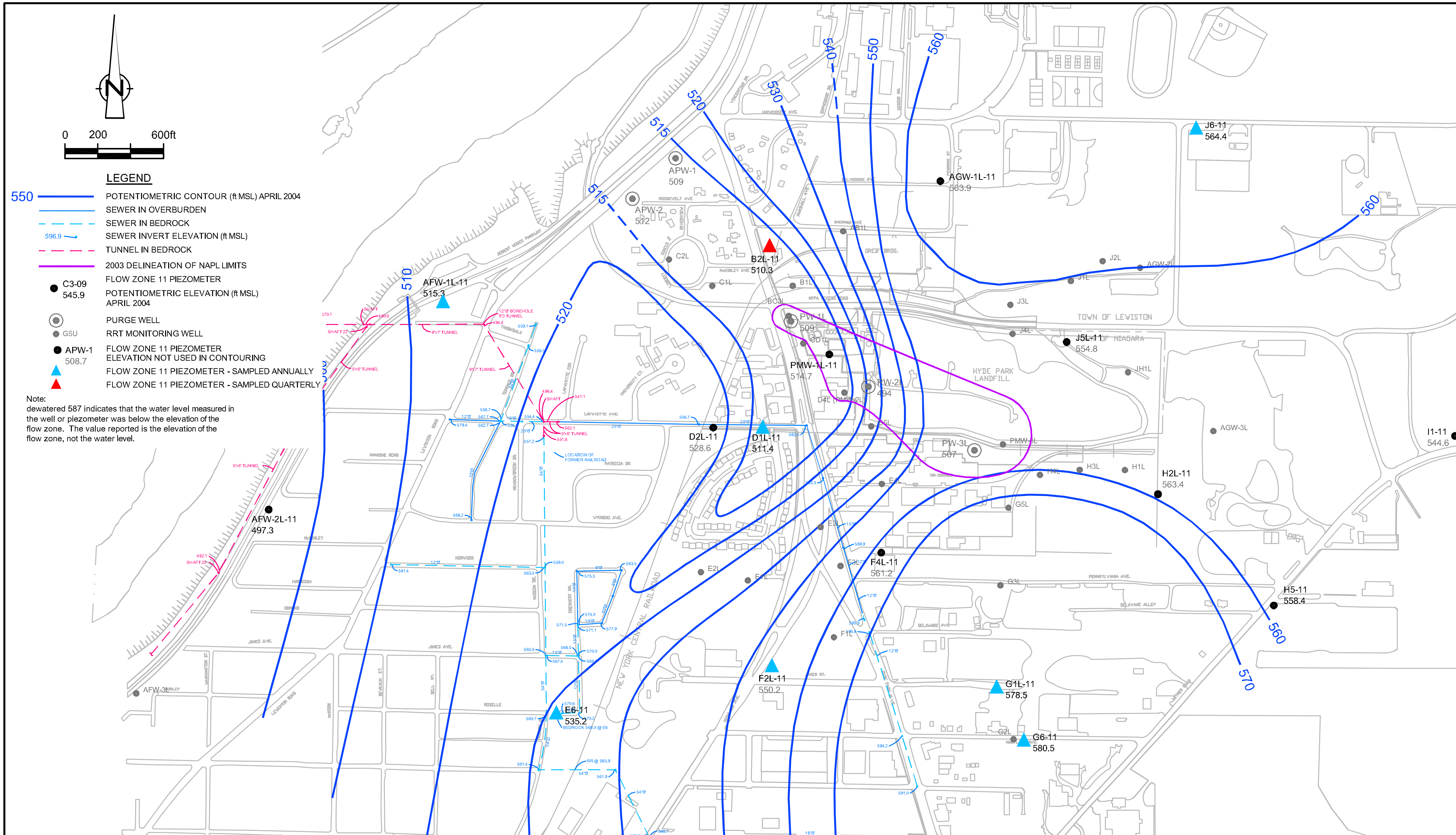


figure 4.9

FLOW ZONE FZ-11
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE
Town of Niagara, New York

OXY Miller Springs Remediation Management, Inc.

01069-70(350)GN-NF016 JUN 23/2006

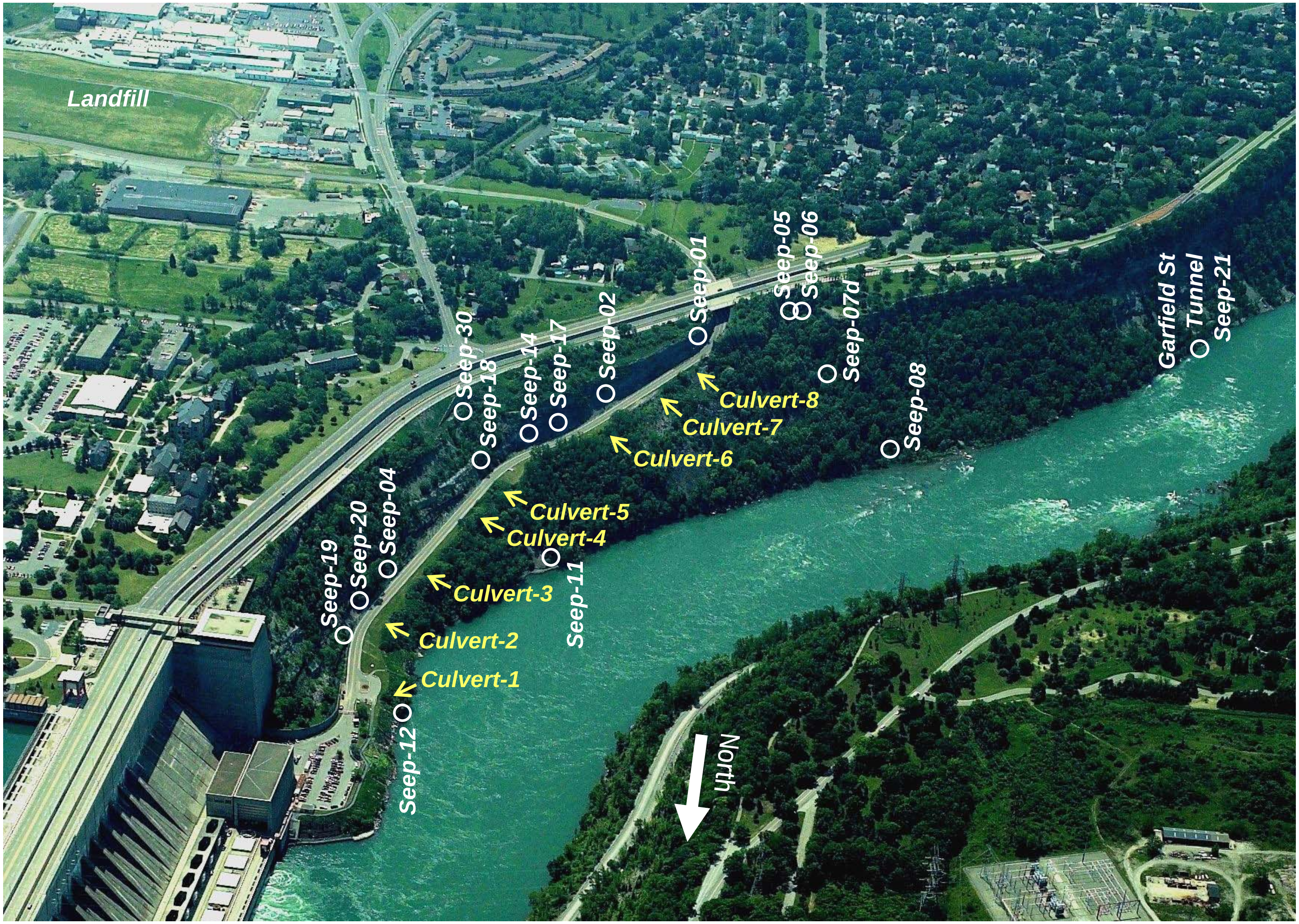


figure 5.1
SEEP LOCATIONS - OVERVIEW
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE
Town of Niagara, New York

Miller Springs Remediation Management, Inc.

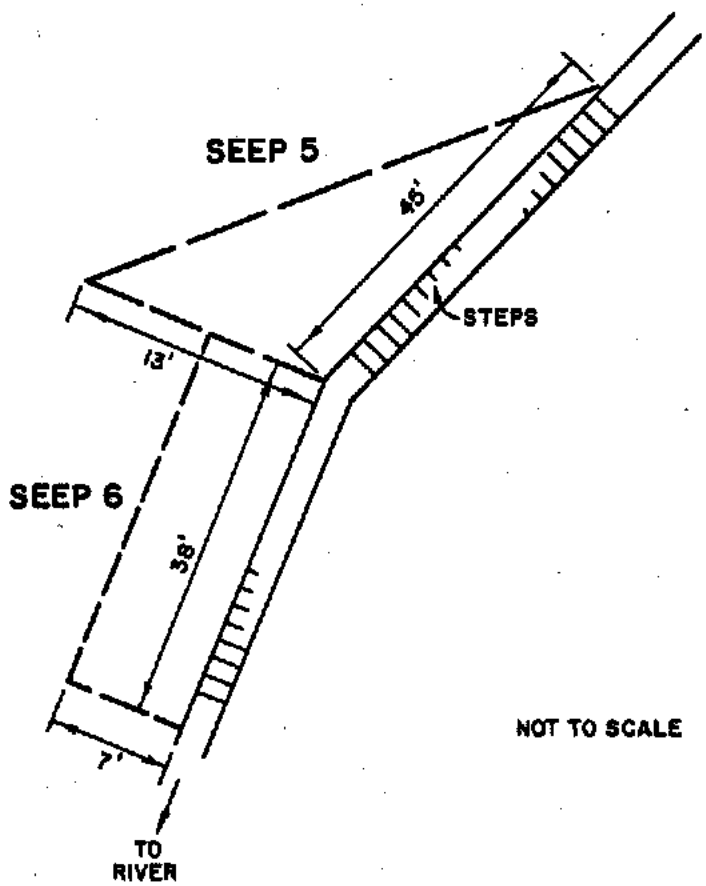


figure 5.2

SEEP LOCATIONS - UPPER DEVIL'S HOLE
PERFORMANCE MONITORING PLAN
Hyde Park Landfill Site

Miller Springs Remediation Management, Inc.

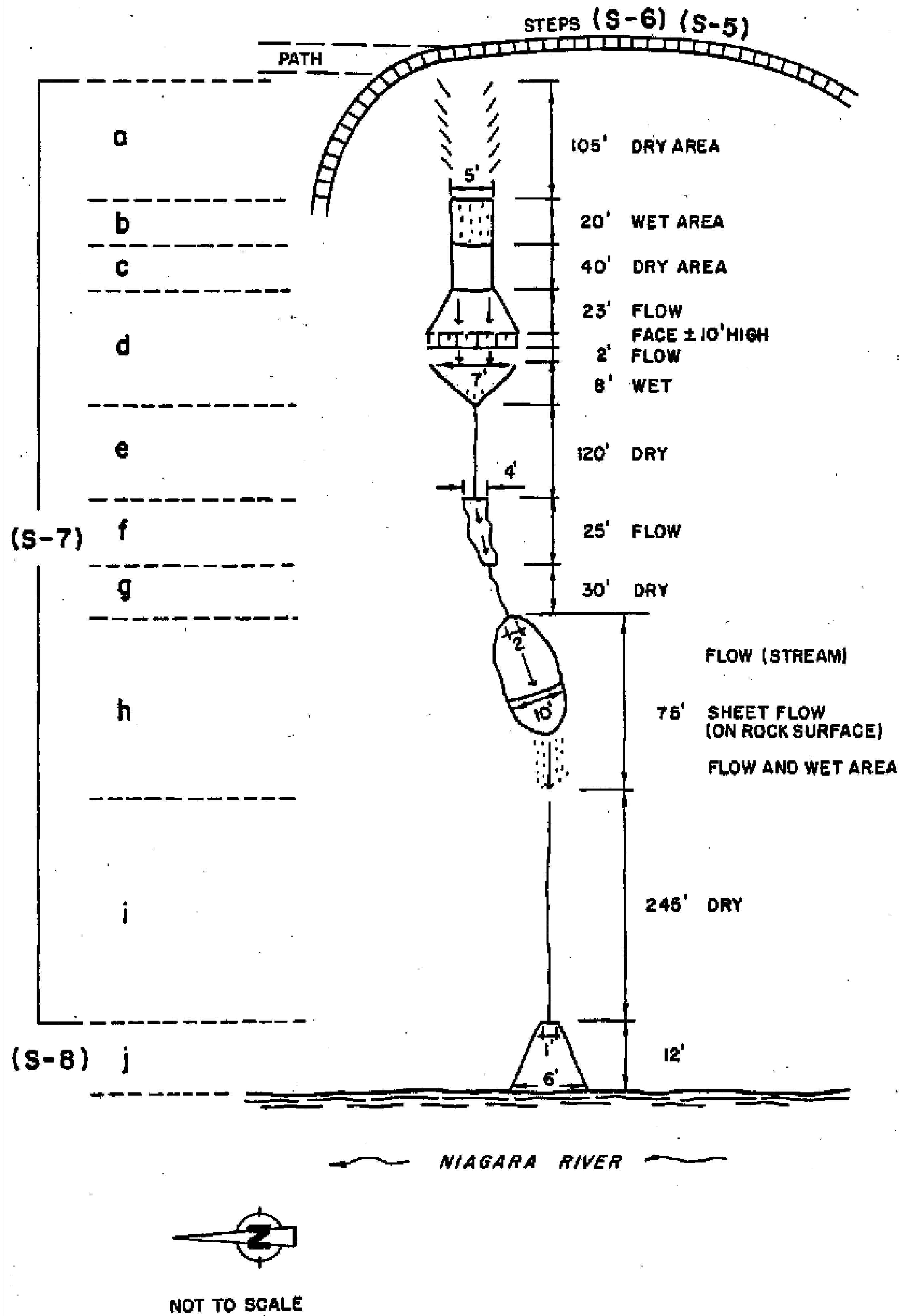


figure 5.3

SEEP LOCATIONS - LOWER DEVIL'S HOLE
PERFORMANCE MONITORING PLAN
Hyde Park Landfill Site

Miller Springs Remediation Management, Inc.

01069-70(MISC001)GN-NF009 FEB 28/2005

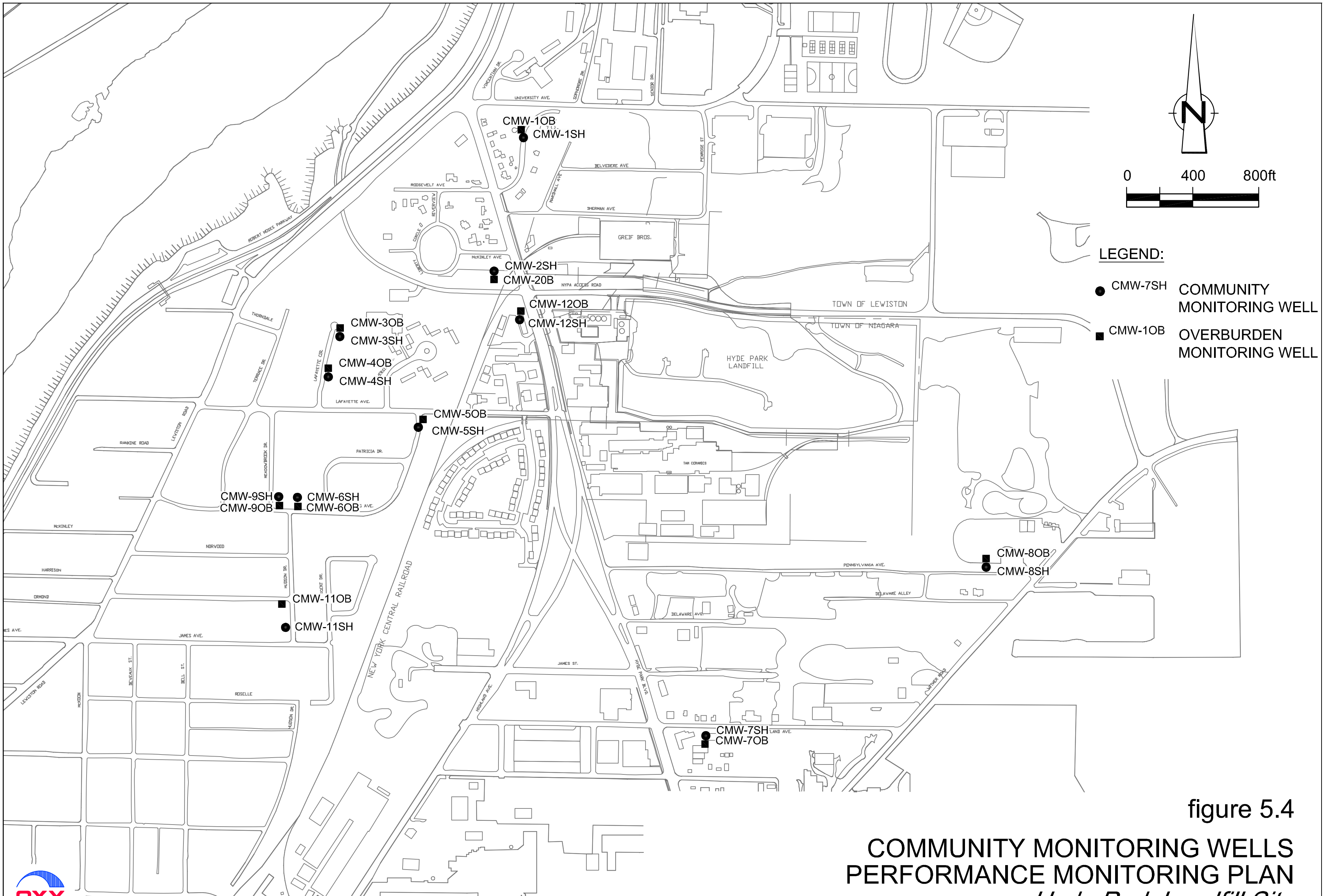


figure 5.4

COMMUNITY MONITORING WELLS
PERFORMANCE MONITORING PLAN
Hyde Park Landfill Site

OXY Miller Springs Remediation Management, Inc.

01069-70(MISC001)GN-NF010 FEB 28/2005

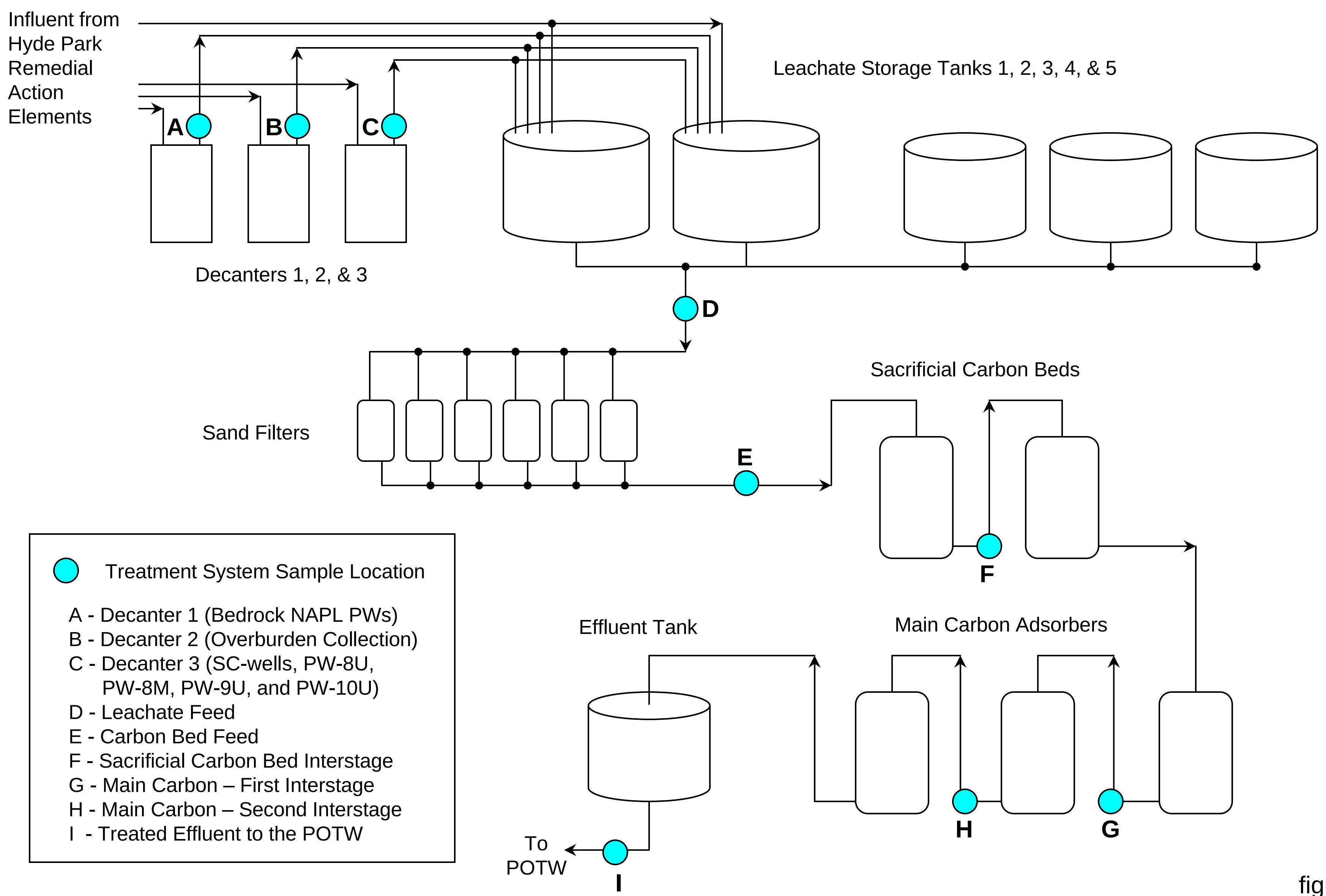


figure 6.1

TREATMENT SYSTEM: WATER SAMPLE LOCATIONS

PERFORMANCE MONITORING PLAN

HYDE PARK LANDFILL SITE

Town of Niagara, New York

Miller Springs Remediation Management, Inc.

Tables

TABLE 1.1
PROJECT CONTACTS
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

Miller Springs Remediation Management

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Lexington, KY 40509

Operations Manager

Mr. Scott Parkhill - (716) 283-0111 x21
Fax - (716) 283-2856
Miller Springs Remediation Management, Inc.
805 97th Street
Niagara Falls, NY 14304

Facility Coordinator

Mr. Don Booth - (716) 282-1862
Fax - (716) 282-1897
Miller Springs Remediation Management
Hyde Park Landfill
4825 Hyde Park Boulevard
Niagara Falls, NY 14305

Field Sampling Manager

Mr. Darrell Crockett - (716) 283-0111 x22 or (716) 998-5804
Fax - (716) 283-2856
Miller Springs Remediation Management, Inc.
805 97th Street
Niagara Falls, NY 14304

TABLE 1.1
PROJECT CONTACTS
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

Conestoga Rovers & Associates Contacts

Project Manager

Mr. James Thornton - (716) 297-6150
Fax - (716) 297-2265
Conestoga Rovers & Associates
2055 Niagara Falls Boulevard, Suite 3
Niagara Falls, NY 14304

Laboratory Coordinator

Ms. Susan Scrocchi - (716) 206-0202 Ext 229
Fax - (716) 206-0201
Conestoga Rovers & Associates
2371 George Urban Boulevard
Depew, NY 14043

Agency Representatives

United States Environmental Protection Agency

Ms. Gloria Sosa - (212) 637-4283
Fax (212) 637-4284
U.S. EPA, Region II
Site Investigation L & C Branch
290 Broadway, 20th Floor
New York, NY 10007-1866

New York State Department of Environmental Conservation

Mr. William Welling - (518) 402-9638
Fax (518) 402-9022
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, NY 12233-7013

Mr. Brian Sadowski - (716) 851-7220
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, NY 14203-2999

TABLE 1.1
PROJECT CONTACTS
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

New York State Dept of Health

Mr. Matt Forcucci - (716) 847-4385
New York State Department of Health
584 Delaware Avenue
Buffalo, NY 14202-1295

Earth Tech / TAMS - Contractor to the US EPA

Ms. Tamara Raby and Mr. James Kaczor - (716) 836-4506
Fax - (716) 834-8785
Earth Tech / TAMS
University Corporate Centre
100 Corporate Parkway
Suite 341
Amherst, NY 14226

TABLE 1.2
LOCKPORT BEDROCK MONITORING WELLS
PERFORMANCE MONITORING PLAN
HYDE PARK

Well ID	Well Type	Purpose	East	North	Grade (ft msl)	Ref Elev (ft msl)	Complete Date	Type	Open Top (fbg)	Open Bottom (fbg)
A1U	Bedrock Monitoring	RRT	1,027,273	1,141,711	598.00	600.35	Apr 1999	corehole	26.7	56.7
A2U	Bedrock Monitoring	RRT	1,027,408	1,141,970	593.51	593.51	May 1999	corehole	22.0	52.1
AB1L	Bedrock Monitoring	RRT	1,026,738	1,142,109	587.97	590.05	Sep 2001	corehole	79.0	97.5
AB1M	Bedrock Monitoring	RRT	1,026,720	1,142,105	588.00	589.44	Aug 2001	corehole	43.5	85.5
AB1U	Bedrock Monitoring	RRT	1,026,699	1,142,099	587.90	589.53	Sep 2001	corehole	30.5	45.0
ABP-2	Bedrock Monitoring	RRT	1,025,904	1,142,732	574.90	576.00	Jun 1994	corehole	17.2	47.2
ABP-3	Bedrock Monitoring	RRT	1,026,903	1,142,216	591.10	592.41	May 1994	corehole	28.5	59.9
ABP-4	Bedrock Monitoring	RRT	1,026,778	1,142,327	588.10	589.41	May 1994	corehole	27.0	59.0
ABP-5	Bedrock Monitoring	RRT	1,025,664	1,141,755	589.30	590.44	Jul 1994	corehole	28.0	56.6
ABP-8	Bedrock Monitoring	RRT	1,025,336	1,142,224	575.10	576.43	Jul 1994	corehole	41.0	61.6
AGW-2L	Bedrock Monitoring	RRT	1,028,550	1,141,886	608.40	611.24	Jun 1991	corehole	107.6	130.7
AGW-2M	Bedrock Monitoring	RRT	1,028,575	1,141,886	608.70	610.39	Aug 1991	corehole	65.0	107.0
AGW-2U	Bedrock Monitoring	RRT	1,028,598	1,141,886	608.80	610.94	Aug 1991	corehole	14.6	64.0
AGW-3L	Bedrock Monitoring	RRT	1,029,067	1,140,857	628.30	628.15	Sep 1991	corehole	135.7	154.7
AGW-3M	Bedrock Monitoring	RRT	1,029,093	1,140,859	627.41	627.41	Aug 1991	corehole	77.2	132.2
AGW-3U	Bedrock Monitoring	RRT	1,029,116	1,140,860	627.10	626.64	Aug 1991	corehole	8.7	75.4
B1L	Bedrock Monitoring	RRT	1,026,428	1,141,781	589.70	592.24	Mar 1991	corehole	84.0	104.0
B1M	Bedrock Monitoring	RRT	1,026,403	1,141,778	589.50	591.31	Jun 1991	corehole	58.0	83.0
B1U	Bedrock Monitoring	RRT	1,026,380	1,141,774	589.80	592.40	Jun 1991	corehole	29.3	57.0
BC3L	Bedrock Monitoring	RRT	1,026,406	1,141,592	595.00	594.70	Oct 1995	corehole	86.5	106.5
BC3M	Bedrock Monitoring	RRT	1,026,428	1,141,593	595.10	596.55	Oct 1995	corehole	65.0	86.0
BC3U	Bedrock Monitoring	RRT	1,026,451	1,141,592	595.20	594.93	Oct 1995	corehole	35.0	64.4
BH7-95	Bedrock Monitoring	RRT					Apr 1995	corehole	10.8	71.0
C1L	Bedrock Monitoring	RRT	1,025,938	1,141,776	591.40	593.16	Jan 1991	corehole	82.4	104.0
C1M	Bedrock Monitoring	RRT	1,025,967	1,141,778	591.50	594.04	May 1991	corehole	56.5	81.5
C1U	Bedrock Monitoring	RRT	1,025,991	1,141,777	591.60	593.66	May 1991	corehole	28.5	55.5
C2L	Bedrock Monitoring	RRT	1,025,674	1,141,937	590.20	589.69	Feb 1991	corehole	80.7	101.0
C2M	Bedrock Monitoring	RRT	1,025,670	1,141,913	590.10	589.90	Jul 1991	corehole	56.5	80.0
C2U	Bedrock Monitoring	RRT	1,025,694	1,141,944	590.08	590.08	Jul 1991	corehole	30.6	55.6

TABLE 1.2
LOCKPORT BEDROCK MONITORING WELLS
PERFORMANCE MONITORING PLAN
HYDE PARK

Well ID	Well Type	Purpose	East	North	Grade (ft msl)	Ref Elev (ft msl)	Complete Date	Type	Open Top (fbg)	Open Bottom (fbg)
CD1L	Bedrock Monitoring	RRT	1,026,494	1,141,425	596.82	596.63	May 1999	corehole	87.0	109.1
CD1M	Bedrock Monitoring	RRT	1,026,572	1,141,199	597.08	596.83	May 1999	corehole	63.0	88.0
CD1U	Bedrock Monitoring	RRT	1,026,537	1,141,182	597.03	596.86	May 1999	corehole	35.4	63.6
CD2M	Bedrock Monitoring	RRT	1,026,203	1,141,545	596.10	598.30	May 2000	corehole	65.2	89.8
CD2U	Bedrock Monitoring	RRT	1,026,224	1,141,544	596.10	597.61	Dec 1999	corehole	34.0	64.0
CD3U	Bedrock Monitoring	RRT	1,026,065	1,141,551	593.40	595.41	Apr 2000	corehole	31.5	61.7
CD4U	Bedrock Monitoring	RRT	1,025,982	1,141,144	588.00	588.85	Nov 2000	corehole	13.7	44.0
CD5U	Bedrock Monitoring	RRT	1,026,049	1,141,349	588.17	588.38				
CD6U	Bedrock Monitoring	RRT	1,026,111	1,141,518	588.61	588.71				
D3U	Bedrock Monitoring	RRT	1,026,579	1,140,950	600.00	600.02				
D4L	Bedrock Monitoring	RRT	1,026,741	1,141,117	598.60	600.09		corehole	98.1	126.6
D4M	Bedrock Monitoring	Was PMW-2M	1,026,771	1,141,119			Jun 1999			
D4U	Bedrock Monitoring	RRT	1,026,801	1,141,105	598.40	598.09				
D5L	Bedrock Monitoring	RRT	1,026,908	1,140,919	599.10	598.81	Nov 1995	corehole	98.0	120.0
D-6	Bedrock Monitoring	Aquifer Survey	1,026,874	1,140,919	599.00		May 1983	corehole	17.8	38.0
D-6-1	Bedrock Monitoring	RRT	1,026,960	1,140,879	599.00		Sep 1983	corehole	20.0	66.5
E1L	Bedrock Monitoring	RRT	1,026,236	1,140,032	594.00	596.59	Apr 1991	corehole	95.0	118.7
E1M	Bedrock Monitoring	RRT	1,026,260	1,140,033	594.30	596.25	May 1991	corehole	54.0	94.0
E1U	Bedrock Monitoring	RRT	1,026,283	1,140,029	594.40	596.57	May 1991	corehole	18.9	54.0
E2L	Bedrock Monitoring	RRT	1,025,869	1,140,029	591.30	592.36	Jan 1993	corehole	89.5	116.5
E2M	Bedrock Monitoring	RRT	1,025,836	1,140,030	591.20	593.70	Jan 1993	corehole	48.2	88.5
E2U	Bedrock Monitoring	RRT	1,025,901	1,140,029	591.70	592.46	Jan 1993	corehole	14.0	47.5
E3L	Bedrock Monitoring	RRT	1,026,600	1,140,304	593.10	592.90	Aug 1993	corehole	96.0	119.0
E3M	Bedrock Monitoring	RRT	1,026,602	1,140,274	593.80	593.70	Sep 1995	corehole	49.0	94.0
E3U	Bedrock Monitoring	RRT	1,026,584	1,140,219	595.00	591.61	Aug 1993	corehole	15.3	50.0
E4L	Bedrock Monitoring	RRT	1,026,973	1,140,568	598.20	597.64	Oct 1995	corehole	101.0	119.8
E4M	Bedrock Monitoring	RRT	1,026,992	1,140,566	598.30	597.98	Mar 1996	corehole	61.0	99.5
E4U	Bedrock Monitoring	RRT	1,027,015	1,140,564	598.50	598.23	Oct 1995	corehole	15.3	60.0
E5U	Bedrock Monitoring	RRT	1,027,046	1,140,385	598.63	598.27	Nov 1999	corehole	16.5	57.5

TABLE 1.2
LOCKPORT BEDROCK MONITORING WELLS
PERFORMANCE MONITORING PLAN
HYDE PARK

Well ID	Well Type	Purpose	East	North	Grade (ft msl)	Ref Elev (ft msl)	Complete Date	Type	Open Top (fbg)	Open Bottom (fbg)
F1L	Bedrock Monitoring	RRT	1,026,681	1,139,632	602.00	604.32	Oct 1991	corehole	111.4	131.8
F1M	Bedrock Monitoring	RRT	1,026,711	1,139,633	602.60	602.38	Oct 1991	corehole	65.5	110.5
F1U	Bedrock Monitoring	RRT	1,026,723	1,139,606	603.40	603.11	Oct 1991	corehole	2.8	65.0
F3L	Bedrock Monitoring	RRT	1,026,722	1,140,067	597.59	597.41	Aug 1993	corehole	105.5	120.4
F3U	Bedrock Monitoring	RRT	1,026,794	1,139,865	603.30	609.76		corehole	4.7	60.0
F-4-1	Bedrock Monitoring	RRT	1,027,359	1,140,766	600.80		Oct 1983	corehole	18.0	32.0
F-4-2	Bedrock Monitoring	RRT	1,027,225	1,140,827	600.50		Oct 1993	corehole	79.2	95.0
F-4A	Bedrock Monitoring	RRT	1,027,322	1,140,838	601.20		Aug 1983	corehole	12.6	28.0
F5U	Bedrock Monitoring	RRT	1,027,467	1,140,444	604.80	595.03	Apr 1996	corehole	12.0	61.0
F5UR	Bedrock Monitoring	RRT	1,027,373	1,140,382	604.85	604.63	Apr 1996	corehole	9.0	58.7
G2L	Bedrock Monitoring	RRT	1,027,777	1,139,009	609.80	609.55	Mar 1991	corehole	124.0	141.1
G2M	Bedrock Monitoring	RRT	1,027,749	1,139,012	610.10	609.87	Aug 1991	corehole	70.0	123.0
G2U	Bedrock Monitoring	RRT	1,027,805	1,139,010	609.10	608.87	Aug 1991	corehole	11.8	69.0
G3L	Bedrock Monitoring	RRT	1,027,697	1,139,949	617.70	620.67	Apr 1995	corehole	128.0	147.0
G3M	Bedrock Monitoring	RRT	1,027,675	1,139,949	617.00	618.76	Sep 1995	corehole	63.5	126.0
G3U	Bedrock Monitoring	RRT	1,027,651	1,139,950	616.70	619.23	Sep 1995	corehole	13.0	63.0
G4U	Bedrock Monitoring	RRT	1,027,569	1,139,632	610.60	620.31	May 1998	corehole	13.3	71.5
G5L	Bedrock Monitoring	RRT	1,027,746	1,140,422	605.46	605.46	Nov 1999	corehole	115.0	133.5
G5U	Bedrock Monitoring	RRT	1,027,709	1,140,138	610.60	613.10	Apr 1995	corehole	13.3	71.5
GH1U	Bedrock Monitoring	RRT	1,027,969	1,139,921	619.50	620.51	May 1996	corehole	8.2	58.5
H1L	Bedrock Monitoring	RRT	1,028,456	1,140,652	618.90	620.84	Feb 1991	corehole	128.0	143.0
H1M	Bedrock Monitoring	RRT	1,028,464	1,140,631	619.40	621.74	May 1991	corehole	58.0	127.0
H1U	Bedrock Monitoring	RRT	1,028,472	1,140,610	619.80	621.53	May 1991	corehole	13.0	57.0
H-2	Bedrock Monitoring	Aquifer Survey	1,028,563	1,140,287	619.40		Feb 1983	corehole	98.4	162.0
H-3	Bedrock Monitoring	Aquifer Survey	1,028,383	1,140,591	616.10		May 1983	corehole	96.4	145.0
H3L	Bedrock Monitoring	RRT	1,028,182	1,140,654	612.90	614.95	Nov 1995	corehole	118.0	138.0
H3U	Bedrock Monitoring	RRT	1,028,204	1,140,660	613.70	615.05	Nov 1995	corehole	11.8	72.0
H4L	Bedrock Monitoring	RRT	1,027,938	1,140,622	611.20	613.82	Jul 1996	corehole	113.0	133.2
HT-2	Bedrock Monitoring	RRT	1,027,555	1,141,733	600.20		Feb 1995	corehole	20.5	37.5

TABLE 1.2
LOCKPORT BEDROCK MONITORING WELLS
PERFORMANCE MONITORING PLAN
HYDE PARK

Well ID	Well Type	Purpose	East	North	Grade (ft msl)	Ref Elev (ft msl)	Complete Date	Type	Open Top (fbg)	Open Bottom (fbg)
I-5A	Bedrock Monitoring									
I-5B	Bedrock Monitoring									
J-1	Bedrock Monitoring	Aquifer Survey	1,028,893	1,142,112	610.10		Dec 1982			
J1L	Bedrock Monitoring	RRT	1,028,128	1,141,806	606.80	609.78	Mar 1991	corehole	102.5	122.5
J1M	Bedrock Monitoring	RRT	1,028,131	1,141,779	606.90	609.09	Apr 1991	corehole	46.4	88.0
J1U	Bedrock Monitoring	RRT	1,028,138	1,141,761	606.90	608.86	Apr 1991	corehole	16.1	45.4
J2L	Bedrock Monitoring	RRT	1,028,321	1,141,927	608.00	610.53	Apr 1991	corehole	101.8	124.7
J3L	Bedrock Monitoring	RRT	1,027,758	1,141,661	600.20	602.71	Oct 1995	corehole	100.5	120.5
J3U	Bedrock Monitoring	RRT	1,027,795	1,141,705	600.30	603.10	Feb 1995	corehole	15.2	45.0
J4L	Bedrock Monitoring	RRT	1,027,772	1,141,483	599.90	600.69	Nov 1995	corehole	102.5	122.0
JH1L	Bedrock Monitoring	RRT	1,028,476	1,141,249	624.40	626.43		corehole	111.0	147.3
MW-1-2001	Bedrock Monitoring	RRT	1,027,389	1,141,744	595.41	597.16	Jul 2001	corehole	17.0	37.5
MW-2-2001	Bedrock Monitoring	RRT	1,027,394	1,141,783	594.42	596.04	Jul 2001	corehole	22.5	34.9
MW-3-2001	Bedrock Monitoring	RRT	1,026,827	1,141,799	589.76	591.26	Jul 2001	corehole	32.0	49.6
MW-4-2001	Bedrock Monitoring	RRT	1,026,803	1,141,817	588.82	590.90	Jul 2001	corehole	32.0	50.3
MW-5-2001	Bedrock Monitoring	RRT	1,026,604	1,141,738	591.69	593.11	Jul 2001	corehole	34.5	50.0
MW-6-2001	Bedrock Monitoring	RRT	1,026,600	1,141,761	591.16	592.66	Jul 2001	corehole	34.5	50.0
MW-7-2001	Bedrock Monitoring	RRT	1,026,867	1,141,787	590.28	591.86				
OW1-78	Bedrock Monitoring	Pre Consent Order	1,026,731	1,141,587	593.35		Sep 1978	corehole	45.9	50.2
OW4-78	Bedrock Monitoring	Pre Consent Order	1,026,948	1,141,746	591.66		Sep 1978			
OW7-78	Bedrock Monitoring	Pre Consent Order	1,028,425	1,141,261	609.66		Sep 1979	corehole	17.3	20.8
OW11-79	Bedrock Monitoring	Pre Consent Order	1,029,051	1,140,872			Sep 1979			
OW13-79	Bedrock Monitoring	Pre Consent Order	1,026,868	1,141,112	598.40		Sep 1979	screen	28.9	33.9
OW18-79	Bedrock Monitoring	Pre Consent Order	1,026,436	1,141,517			Oct 1979	corehole	78.0	85.5
OW20-79	Bedrock Monitoring	Pre Consent Order	1,026,436	1,141,517			Oct 1979			
OW22-80	Bedrock Monitoring	Pre Consent Order	1,027,085	1,142,512			Jan 1980			
OW24-80	Bedrock Monitoring	Pre Consent Order	1,028,336	1,140,781	613.70		Jul 1980	screen	16.5	21.5
OW26-80	Bedrock Monitoring	Pre Consent Order	1,027,680	1,140,889	603.80		Jul 1980	screen	20.5	25.5
OW28-80	Bedrock Monitoring	Pre Consent Order	1,027,054	1,140,831	598.30		Jul 1980	screen	24.5	29.5

TABLE 1.2
LOCKPORT BEDROCK MONITORING WELLS
PERFORMANCE MONITORING PLAN
HYDE PARK

Well ID	Well Type	Purpose	East	North	Grade (ft msl)	Ref Elev (ft msl)	Complete Date	Type	Open Top (fbg)	Open Bottom (fbg)
PMW-2L	Bedrock Monitoring	RRT	1,026,745	1,141,125	598.60	600.09	May 1991	corehole	98.1	126.6
PMW-2U	Bedrock Monitoring	RRT	1,026,802	1,141,113	598.40		May 1991	corehole	21.0	54.5
PMW-3L	Bedrock Monitoring	RRT	1,027,709	1,140,896	604.60	606.51	Apr 1991	corehole	108.4	126.1
PMW-3M	Bedrock Monitoring	RRT	1,027,732	1,140,893	605.10	607.47	May 1991	corehole	48.8	106.5
PMW-3U	Bedrock Monitoring	RRT	1,027,756	1,140,892	604.90	607.30	Apr 1991	corehole	9.9	47.8
RW3UM	Recharge Well	RRT	1,027,512	1,140,799	602.13	593.93				

List includes all Lockport Bedrock wells that have not been abandoned, retrofit with 1-inch piezometers, or modified and the well ID changed (e.g., PMW-2M is now D4M)
Some of these wells, particularly those installed before 1990, may have already been abandoned but not recorded in the project database.
Missing coordinates, dates, and elevations will be determined prior to abandonment and the table will be updated upon completion of the abandonment.
All locations well be inspected following the standard inspection field procedures before abandonment is initiated.

TABLE 1.3
INTERMEDIATE FORMATION WELL (IFW) SUMMARY
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

WELL ID	GRADE (ft msl)	BOTTOM OF 2-INCH CASING DEPTH (ft below grade)	BOTTOM OF 2-INCH CASING ELEVATION (ft msl)	BOTTOM OF BOREHOLE DEPTH (ft below grade)	BOTTOM OF BOREHOLE ELEVATION (ft msl)
IFW-1	586.1	151.7	434.5	176.8	409.4
IFW-1R	586.1	151.7	434.5	176.8	409.4
IFW-2	607.3	179.9	427.4	205.2	402.1
IFW-3	619.3	199.9	419.4	226.8	392.5
IFW-4	612.2	205.8	406.4	229.7	382.5
IFW-5	596.1	177.4	418.7	207.0	389.1
IFW-6	592.3	164.2	428.1	191.3	401.0
IFW-7	590.0	155.9	434.1	180.2	409.8

AMSL - Above Mean Sea Level

TABLE 2.1
ACTIVITY SUMMARY
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

Frequency*	Activity	Program	Location Description	Table / Reference	Number of Sample Locations	Field Procedure	Report Section	Report	Analytical Parameter Suite/Comment
Continuous	APL Sampling	Treatment	Treated Effluent	Table 6.1	1	PLC	6.2	Annual	pH
	Total Water Flow	Treatment	Treated Effluent	Table 6.1	1	PLC	6.2	Annual	Total Water Flow
	Water Level Measurement	Bedrock	NAPL & APL Purge Wells		19	PLC	4.1	Annual	
	Water Level Measurement	Overburden	Wet Wells		2	PLC	3.1	Annual	
Hourly	Water Level Measurement	Bedrock	Bedrock Piezometer PMW-1M-09		1	transducer	4.2	Quarterly	
Daily	Total Water Flow	Overburden	Decanters		1	PLC	6.2	Quarterly	SIU Permit
	Total Water Flow	Bedrock	Decanters			PLC	6.2	Quarterly	SIU Permit
Weekly	APL Sampling	Treatment	Carbon Interstage	Table 6.1	1	FP-04a	6.2	Quarterly	VOCs
	APL Sampling	Treatment	Treated Effluent	Table 6.1	1	FP-04a	6.2	Quarterly	VOCs, Total Phenolics
	Fence Inspections	Maintenance				FP-01b		NR	Inspection form in FP-01b
Monthly	Purge NAPL	Overburden	Souce Control NAPL Recovery Wells	Table 3.2	5		3.1	Annual	Frequency of pumping is subject to change.
	Water Level Measurement	Overburden	Souce Control NAPL Recovery Wells	Table 3.2	5	FP-02a	3.1	Annual	Frequency of pumping is subject to change.
	NAPL Thickness	Overburden	Souce Control NAPL Recovery Wells	Table 3.2	5	FP-03b	3.1	Annual	Frequency of pumping is subject to change.
Quarterly	Hand Water Level Measurement	Bedrock	All Bedrock Piezometers		126	FP-02a	4.2	Quarterly	
	Hand Water Level Measurement	Bedrock	Bedrock Monitoring Wells	Table 1.2	122	FP-02a	4.2	Quarterly	These wells are are to be abandoned
	Hand Water Level Measurement	Community	Bedrock Monitoring Wells	Table 5.4	11	FP-02a	5.3	Quarterly	
	Hand Water Level Measurement	Community	Overburden Monitoring Wells	Table 5.4	10	FP-02a	5.3	Quarterly	
	Hand Water Level Measurement	Overburden	Manholes	Table 3.2	19	FP-02a	3.2	Quarterly	
	Hand Water Level Measurement	Overburden	OBCS Overburden Monitoring Well	Table 3.2	16	FP-02a	3.2	Quarterly	
	Hand Water Level Measurement	Overburden	Source Control Monitoring Wells	Table 3.3	7	FP-02a	3.2	Quarterly	
	NAPL Thickness	Overburden	Source Control Monitoring Wells	Table 3.3	7	FP-03b	3.2	Annual	
	NAPL Volumes	Treatment	Decanters		3		6.1	Annual	
	APL Sampling	Bedrock	Group B Bedrock Piezometers	Table 4.2	20	FP-04c	4.2	Annual	Organic Acids
	APL Sampling	Treatment	Leachate Feed	Table 6.1	1	FP-04a	6.1	Annual	VOCs, SVOCs, organic acids
	APL Sampling	Treatment	Sac Bed Interstage	Table 6.1	1	FP-04a	6.1	Annual	PCBs, dioxins/furans
	APL Sampling	Treatment	Treated Effluent	Table 6.1	1	FP-04a	6.1	Annual	SIU Permit, Total Phosphorous
	Report	Site-Wide							Report Data; Graph Water Levels
Annual	APL Sampling	Bedrock	Open Catch Basin		1	FP-04d	4.3	Annual	Organic Acids
(Every 5th Q)	APL Sampling	Bedrock	Group A Bedrock Piezometers	Table 4.2	62	FP-04c	4.2	Annual	VOCs, SVOCs, Organic Acids, Sulfate
	APL Plume Flux Composite Sample	Community	APL Flux Piezometers and Purge Wells	Table 5.3	1	Appendix D	5.2	Annual	APL Flux Monitoring Parameters (Table 5.3)
	NAPL Presence	Bedrock	Bedrock Monitoring Wells	Table 4.3	44	FP-03a	4.2	Annual	These wells are are to be abandoned
	NAPL Presence	Bedrock	Open Catch Basin		1	FP-03a	4.3	Annual	
	Vapor Monitoring	Community	Overburden Monitoring Wells	Table 5.4	10	FP-05a	5.3.2	Annual	OVA Screening in third quarter (Note: if OVA>0.050 ppmV see report Section 5.3.2)
	NAPL Presence	Overburden	Manholes	Table 3.2	19	FP-03a	3.2	Annual	
	NAPL Presence	Overburden	OBCS Overburden Monitoring Well	Table 3.2	16	FP-03a	3.2	Annual	
	Well Inspections	Maintenance				FP-01b	8.1	Annual	
	Cap Inspection	Maintenance				FP-01b	8.2	NR	Completed in April
	Report	Site-Wide							Data, Evalutations, Recommendations
Biennial	Gorge Face Seep Inspection	Community	Seeps	Table 5.2	1		5.1	Annual	As requested, Organic Acids
Five-Year	APL Sampling	Bedrock	Bloody Run Monitoring Wells	Table 7.1	4	FP-04b	4.3	Five-Year	VOCs, SVOCs, Organic Acids
	APL Sampling	Bedrock	Operating APL & NAPL Purge Wells	Table 7.1;4.1	19	FP-04a	4.2	Five-Year	VOCs, SVOCs, Organic Acids, Sulfate
	Report	Site-Wide							Stastistical Evaluation & Recommendations

* Monitoring frequency will be reevaluated after 2 years of sampling and in the Five-Year Report.

PLC - Programmable Logic Controllers

NR - Not Reported, data available on request

TABLE 2.2
SUMMARY OF SCREENING LEVELS
FROM THE SCR-Q
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

Parameters	*Units*	*Screening Value*	*Source*
VOAs			
1,1,1-Trichloroethane	µg/L	200	EPA-MCL
1,1,2,2-Tetrachloroethane	µg/L	0.053	R3-RBC [C]
1,1,2-Trichloroethane	µg/L	5	EPA-MCL
1,1-Dichloroethane	µg/L	800	R3-RBC [NC]
1,1-Dichloroethene	µg/L	7	EPA-MCL
1,2,3-Trichlorobenzene	µg/L	5	NYCRR Title 6
1,2,4-Trichlorobenzene	µg/L	70	EPA-MCL
1,2-Dichlorobenzene	µg/L	600	EPA-MCL
1,2-Dichloroethane	µg/L	5	EPA-MCL
1,2-Dichloropropane	µg/L	5	EPA-MCL
1,3,5-Trichlorobenzene	µg/L	5	NYCRR Title 6
1,3-Dichlorobenzene	µg/L	180	R3-RBC [NC]
1,4-Dichlorobenzene	µg/L	75	EPA-MCL
2-Butanone (Methyl Ethyl Ketone)	µg/L	7000	R3-RBC [NC]
2-Chlorotoluene	µg/L	120	R3-RBC [NC]
2-Hexanone	µg/L	50	NYCRR Title 10
3-Chlorotoluene	µg/L	120 ***	R3-RBC [NC]
4-Chlorotoluene	µg/L	120 ***	R3-RBC [NC]
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	µg/L	6300	R3-RBC [NC]
Acetone	µg/L	5500	R3-RBC [NC]
Benzene	µg/L	5	EPA-MCL
Bromodichloromethane	µg/L	80	EPA-MCL
Bromoform	µg/L	80	EPA-MCL
Bromomethane (Methyl Bromide)	µg/L	8.5	R3-RBC [C]
Carbon disulfide	µg/L	1000	R3-RBC [NC]
Carbon tetrachloride	µg/L	5	EPA-MCL
Chlorobenzene	µg/L	100	EPA-MCL
Chloroethane	µg/L	3.6	R3-RBC [C]
Chloroform (Trichloromethane)	µg/L	80	EPA-MCL
Chloromethane (Methyl Chloride)	µg/L	190	R3-RBC [NC]
cis-1,2-Dichloroethene	µg/L	70	EPA-MCL
cis-1,3-Dichloropropene	µg/L	0.44	R3-RBC [C]
Dibromochloromethane	µg/L	80	EPA-MCL
Dichlorodifluoromethane (CFC-12)	µg/L	350	R3-RBC [C]
Ethylbenzene	µg/L	700	EPA-MCL
Methylene chloride	µg/L	30	NJDEP-GWQS
m-Monochlorobenzotrifluoride	µg/L	5	NYCRR Title 6
o-Monochlorobenzotrifluoride	µg/L	50	NYCRR Title 10
p-Monochlorobenzotrifluoride	µg/L	50	NYCRR Title 10
Styrene	µg/L	100	EPA-MCL
Tetrachloroethene	µg/L	5	EPA-MCL
Toluene	µg/L	1000	EPA-MCL
trans-1,2-Dichloroethene	µg/L	100	EPA-MCL
trans-1,3-Dichloropropene	µg/L	0.44	R3-RBC [C]
Trichloroethene	µg/L	5	EPA-MCL
Vinyl chloride	µg/L	2	EPA-MCL
Xylene (total)	µg/L	10000	EPA-MCL

TABLE 2.2
SUMMARY OF SCREENING LEVELS
FROM THE SCR-Q
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

Parameters	*Units*	*Screening Value*	*Source*
Organic Acids			
2-Chlorobenzoic acid	mg/L	7.3	R3-RBC [NC]
3-Chlorobenzoic acid	mg/L	7.3 ***	R3-RBC [NC]
4-Chlorobenzoic acid	mg/L	7.3 ***	R3-RBC [NC]
Benzoic acid	mg/L	150	R3-RBC [NC]
Chlorendic acid	mg/L	0.05	NYCRR Title 10
SVOAs			
1,2,4-Trichlorobenzene	µg/L	70	EPA-MCL
1,2-Dichlorobenzene	µg/L	600	EPA-MCL
1,3-Dichlorobenzene	µg/L	180	R3-RBC [NC]
1,4-Dichlorobenzene	µg/L	75	EPA-MCL
2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether)	µg/L	0.26	R3-RBC [C]
2,4,5-Trichlorophenol	µg/L	3700	R3-RBC [NC]
2,4,6-Trichlorophenol	µg/L	6.1	R3-RBC [C]
2,4-Dichlorophenol	µg/L	110	R3-RBC [C]
2,4-Dimethylphenol	µg/L	730	R3-RBC [NC]
2,4-Dinitrophenol	µg/L	73	R3-RBC [NC]
2,4-Dinitrotoluene	µg/L	73	R3-RBC [NC]
2,6-Dinitrotoluene	µg/L	37	R3-RBC [NC]
2-Chloronaphthalene	µg/L	490	R3-RBC [NC]
2-Chlorophenol	µg/L	30	R3-RBC [NC]
2-Methylnaphthalene	µg/L	120	R3-RBC [NC]
2-Methylphenol	µg/L	1800	R3-RBC [NC]
2-Nitroaniline	µg/L	110	R3-RBC [NC]
2-Nitrophenol	µg/L	50	NYCRR Title 10
3,3'-Dichlorobenzidine	µg/L	0.15	R3-RBC [C]
3-Nitroaniline	µg/L	3.3	R3-RBC [C]
4,6-Dinitro-2-methylphenol	µg/L	3.7	R3-RBC [NC]
4-Bromophenyl phenyl ether	µg/L	50	NYCRR Title 10
4-Chloro-3-methylphenol	µg/L	50	NYCRR Title 10
4-Chloroaniline	µg/L	150	R3-RBC [NC]
4-Chlorophenyl phenyl ether	µg/L	50	NYCRR Title 10
4-Methylphenol	µg/L	180	R3-RBC [NC]
4-Nitroaniline	µg/L	3.3	R3-RBC [C]
4-Nitrophenol	µg/L	50	NYCRR Title 10
Acenaphthene	µg/L	370	R3-RBC [NC]
Acenaphthylene	µg/L	310	MOE-GW1
Anthracene	µg/L	1800	R3-RBC [NC]
Benzo(a)anthracene	µg/L	0.092	R3-RBC [C]
Benzo(a)pyrene	µg/L	0.2	EPA-MCL
Benzo(b)fluoranthene	µg/L	0.092	R3-RBC [C]
Benzo(g,h,i)perylene	µg/L	310	MOE-GW1
Benzo(k)fluoranthene	µg/L	0.92	R3-RBC [C]
bis(2-Chloroethoxy)methane	µg/L	5	NYCRR Title 6
bis(2-Chloroethyl)ether	µg/L	0.0096	R3-RBC [C]
bis(2-Ethylhexyl)phthalate	µg/L	6	EPA-MCL
Butyl benzylphthalate	µg/L	7300	R3-RBC [NC]
Carbazole	µg/L	50	NYCRR Title 10

TABLE 2.2
SUMMARY OF SCREENING LEVELS
FROM THE SCR-Q
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

Parameters	*Units*	*Screening Value*	*Source*
SVOAs continued			
Chrysene	µg/L	9.2	R3-RBC [C]
Dibenz(a,h)anthracene	µg/L	0.0092	R3-RBC [C]
Dibenzofuran	µg/L	12	R3-RBC [NC]
Diethyl phthalate	µg/L	29000	R3-RBC [NC]
Dimethyl phthalate	µg/L	370000	R3-RBC [NC]
Di-n-butylphthalate	µg/L	3700	R3-RBC [NC]
Di-n-octyl phthalate	µg/L	1500	R3-RBC [NC]
Fluoranthene	µg/L	1500	R3-RBC [NC]
Fluorene	µg/L	240	R3-RBC [NC]
Hexachlorobenzene	µg/L	1	EPA-MCL
Hexachlorobutadiene	µg/L	0.86	R3-RBC [C]
Hexachlorocyclopentadiene	µg/L	50	EPA-MCL
Hexachloroethane	µg/L	4.8	R3-RBC [C]
Indeno(1,2,3-cd)pyrene	µg/L	0.092	R3-RBC [C]
Isophorone	µg/L	70	R3-RBC [C]
Naphthalene	µg/L	6.5	R3-RBC [NC]
Nitrobenzene	µg/L	3.5	R3-RBC [NC]
N-Nitrosodi-n-propylamine	µg/L	0.0096	R3-RBC [C]
N-Nitrosodiphenylamine	µg/L	14	R3-RBC [C]
Pentachlorophenol	µg/L	1	EPA-MCL
Phenanthrene	µg/L	310	MOE-GW1
Phenol	µg/L	11000	R3-RBC [NC]
Pyrene	µg/L	180	R3-RBC [NC]

Notes:

** Due to the need to dilute samples, especially those from the purge wells, which contained elevated concentrations of key compounds, the reporting limits were often raised, in some cases up to 100 times. Therefore, the purge wells sample results that were reported as not-detected at an elevated laboratory reporting limit equal to at least twice the screening value have been counted in addition to positive detections. This is to account for locations were there is a high potential that the compound is present in the purge well, but not detected due to laboratory methods.

*** As the only screening levels for these parameters were availble through NYCRR Title 10, which is based solely on the dectection limits, screening levels of surrogate chemical were obtained from R3-RBC

Source for Screening Criteria (presented by selection priority)

EPA-MCL => USEPA Maximum Contaminant Levels

R3-RBC => EPA Region II Risk-based Concentrations, injestion of tap water. [C] or [NC] indicates carcinogenic or non-carcinogenic risk evaluation.

MOE-GWI => Ontario Ministry of the Environment GW-1 Drinking Water Standard

NYCRR => State of New York Codes, Rules, and Regulations. Title 6 = Groundwater Standards/Guidance Values; Title 10 = Drinking Water Standards.

TABLE 3.1
OVERBURDEN WET WELL SET-POINTS
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

PUMPING LOCATION	COLLECTION SYSTEM	SET-POINT (ft msl)
Wet Well A	1978 BCS	fixed level switches
Wet Well B	1978 BCS	Not Pumped
Wet Well C	1992 OBCS	583
Wet Well D	1992 OBCS	580

TABLE 3.2
OVERBURDEN MONITORING LOCATIONS
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

WELLS	MANHOLES
OMW-1	MH-20
OMW-2	MH-21
OMW-3	MH-22
OMW-4R	MH-23
OMW-5R	Wet Well C
OMW-6	MH-24
OMW-7	MH-25
OMW-8R2	MH-26
OMW-9	MH-27
OMW-10R	MH-28
OMW-11R	Wet Well D
OMW-12R	MH-29
OMW-13R	MH-30
OMW-14R	MH-31
OMW-15	MH-32
OMW-16R	MH-33
	MH-34
	MH-35A
	MH-35

Water Level Measurements should be completed for Wells and Manholes on the same day.

TABLE 3.3
SOURCE CONTROL MONITORING WELLS AND RECOVERY WELLS
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

NAPL RECOVERY WELL	MONITORING WELL
	OEW-1
SC-2	OEW-2
SC-3	OEW-3
SC-4	OEW-4
SC-5	OEW-5
SC-6	OEW-6
	OEW-7

TABLE 4.1
BEDROCK PURGE WELL SET-POINTS
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

PURGE WELL	GRADE (ft msl)	TOP OF OPEN INTERVAL (ft msl)	BOTTOM OF OPEN INTERVAL (ft msl)	PUMP SET POINT (ft msl)	AVERAGE FLOW RATE (gpm)
APW-1	569	555	492	509	1.4
APW-2	574	531	497	512	0.4
PW-1U	597	565	535	545	0.4
PW-1L	597	525	487	497	13.5
PW-2UR	598	576	546	559	1.5
PW-2M	598	544	498	511	32.9
PW-2L	600	506	482	495	0.2
PW-3M	601	556	496	518	0.1
PW-3L	603	497	476	495	5.9
PW-4U	608	595	551	572	0.7
PW-4M	610	549	499	525	0.0
PW-5UR	605	593	544	556	3.6
PW-6UR	611	599	549	558	1.4
PW-6MR	612	546	493	503	4.2
PW-7U	597	563	533	540	0.7
PW-8U	594	563	538	550	0.9
PW-8M	597	553	507	520	0.3
PW-9U	592	562	537	542	1.4
PW-10U	598	579	551	565	3.0

TABLE 4.2
APL SAMPLING SCHEDULE
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

TYPE	PIEZOMETER ID	FLOW ZONE	Group A	Group B	TRANSMISSIVITY (ft2/day)
Outer	G1U-01	1	X	X	66.000
Outer	G6-01	1	X	X	70.000
Outer	H2U-01	1	X		80.000
Outer	H5-01	1	X		75.000
Outer	I1-01	1	X		0.500
Outer	F2U-02	2	X	X	30.000
Inner	F4U-02	2			14.000
Inner	G1-02	2			0.700
Outer	G6-02	2	X		240.000
Outer	H2U-02	2	X	X	0.500
Outer	H5-02	2	X		1.600
Outer	I1-02	2	X		9.000
Inner	J2U-02	2			44.000
Inner	J5U-02	2			75.000
Outer	J6-02	2	X		71.000
Outer	AFW-2U-04	4	X		77.000
Outer	D1U-04	4	X	X	49.000
Outer	D2U-04	4	X		28.500
Outer	E6-04	4	X		1.400
Outer	F2U-04	4	X	X	422.000
Inner	F4U-04	4			0.300
Outer	F6-04	4	X		40.200
Outer	G1U-04	4			0.009
Outer	G6-04	4	X	X	190.000
Outer	H5-04	4	X		0.600
Outer	I1-04	4	X		3.100
Inner	J2U-04	4			140.000
Inner	J5U-04	4			0.010
Outer	J6-04	4	X		4.000
Outer	AFW-2U-05	5	X		13.000
Outer	AGW-1U-05	5	X		360.000
Outer	D1U-05	5	X	X	21.900
Outer	D2U-05	5	X		30.300
Outer	E6-05	5	X		0.700
Outer	F2U-05	5			0.070
Inner	F4U-05	5			0.030
Outer	F6-05	5			0.300
Outer	G6-05	5	X		8.000
Outer	H2M-05	5			0.001
Outer	H5-05	5	X		16.000
Outer	I1-05	5			0.200
Inner	J2U-05	5			300.000
Inner	J5U-05	5			66.000
Outer	J6-05	5	X		64.000
Inner	PMW-1U-05	5			2.100

TABLE 4.2
APL SAMPLING SCHEDULE
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

TYPE	PIEZOMETER ID	FLOW ZONE	Group A	Group B	TRANSMISSIVITY (ft2/day)
Outer	ABP-7-06	6			0.500
Outer	AFW-1U-06	6			2.300
Outer	AFW-2U-06	6			0.300
Outer	AGW-1U-06	6	X	X	6.700
Outer	B2U-06	6			0.001
Outer	C3-06	6			0.070
Outer	D1U-06	6			1.000
Outer	D2U-06	6			0.440
Outer	E6-06	6	X		218.000
Outer	F2M-06	6			0.001
Inner	F4M-06	6			0.007
Outer	F6-06	6	X		134.000
Outer	G1M-06	6	X		58.000
Outer	G6-06	6	X	X	79.000
Outer	H2M-06	6	X		16.000
Outer	H5-06	6			0.040
Outer	I1-06	6			0.060
Inner	J2M-06	6			280.000
Inner	J5M-06	6			11.000
Outer	J6-06	6			0.001
Inner	PMW-1U-06	6			0.001
Outer	ABP-1-07	7			0.001
Outer	ABP-7-07	7	X		1.500
Outer	AFW-1M-07	7			0.001
Outer	AFW-2M-07	7			0.001
Outer	AGW-1M-07	7	X	X	140.000
Outer	B2M-07	7			0.050
Outer	C3-07	7	X	X	13.000
Outer	D1M-07	7			0.300
Outer	D2M-07	7			0.001
Outer	E6-07	7			0.150
Outer	F2M-07	7			0.001
Inner	F4M-07	7			0.001
Outer	F6-07	7			0.001
Outer	G1M-07	7			0.004
Outer	G6-07	7	X		1.100
Outer	H5-07	7	X		219.000
Outer	I1-07	7	X		39.500
Inner	J5M-07	7			220.000
Outer	J6-07	7	X		65.000
Inner	PMW-1M-07	7			0.001

TABLE 4.2
APL SAMPLING SCHEDULE
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

TYPE	PIEZOMETER ID	FLOW ZONE	Group A	Group B	TRANSMISSIVITY (ft2/day)
Outer	ABP-1-09	9	X		2.600
Outer	ABP-7-09	9	X	X	67.000
Outer	AFW-1M-09	9			0.600
Outer	AFW-2M-09	9			0.001
Outer	AGW-1M-09	9	X	X	150.000
Outer	B2M-09	9	X	X	38.000
Outer	C3-09	9	X	X	117.000
Outer	D1M-09	9	X	X	184.000
Outer	D2M-09	9	X		160.400
Outer	E6-09	9	X		4.900
Outer	F2M-09	9	X	X	110.000
Inner	F4M-09	9			30.000
Outer	F6-09	9			0.001
Outer	G1M-09	9			0.001
Outer	G6-09	9			0.003
Outer	H2M-09	9	X		16.000
Outer	H5-09	9	X	X	132.000
Outer	I1-09	9			0.001
Inner	J2M-09	9			1.700
Inner	J5M-09	9			150.000
Outer	J6-09	9			0.002
Inner	PMW-1M-09	9			57.600
Outer	AFW-1L-11	11	X		3.200
Outer	AFW-2L-11	11			0.007
Outer	AGW-1L-11	11			0.005
Outer	B2L-11	11	X	X	16.000
Outer	D1L-11	11	X		15.200
Outer	D2L-11	11			2.100
Outer	E6-11	11	X		68.200
Outer	F2L-11	11	X		1.300
Inner	F4L-11	11			0.001
Outer	F6-11	11	X		13.800
Outer	G1L-11	11	X		55.000
Outer	G6-11	11	X		1.600
Outer	H2L-11	11			0.100
Outer	H5-11	11			1.300
Outer	I1-11	11			0.001
Inner	J5L-11	11			7.000
Outer	J6-11	11	X		21.000
Inner	PMW-1L-11	11			1.400

* May change to semiannual after 8 Quarters

Summary: 101 Outer & 25 Inner Piezometers
20 Semi-Annual Samples
62 Annual Samples

Group A Outer piezomter with sufficient yield to provided a representative sample.
Group B Group A piezometer that also exceeded a MSRM screening level.

TABLE 4.3
BEDROCK MONITORING WELLS - SCHEDULE
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

MONITORING LOCATION
A1U
A2U
B1L
B1M
B1U
BC3L
BC3M
BC3U
C1L
C1M
C1U
CD1L
CD1M
CD1U
CD2U
CD3U
D3U
D4L
D4U
D5L
E3U
E4L
E4U
E5U
F1M
F5UR
G1L
G1M
G3L
G3M
G3U
G4U
GH1U
H1L
H1M
H1U
H3L
H3U
J1M
J1U
J2M
J3L
J3U
J4L

TABLE 5.1
PERSONAL PROTECTIVE EQUIPMENT FOR THE GORGE FACE SEEP INSPECTION
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

The Gorge Face Seep Inspection is a strenuous hike and is typically completed on a hot and dry summer day. The inspection cannot be completed during rainy weather as the seeps would not be visible. The hike begins at the top of the gorge and follows the NYPA access road down to the Niagara River. The inspection then follows a trail along the Niagara River and back to the top of the gorge via the Devil's Hole trail/stairway. All participants in this inspection should be prepared for the strenuous activity and hot weather. There is no requirement that participants be OSHA Hazwopper (40 hour) trained. The following list provides suggested clothing and accessories.

Wear:
- Light-weight long pants
- Long-sleeved, light weight shirt
- Sunscreen
- Hat with a brim (a hardhat must be worn during the portion of the inspection along the NYPA access road)
- Sunglasses
- Hiking boots

Carry in a backpack:
- 1 to 2 liters of drinking water

TABLE 5.2
STATE PLANE COORDINATES FOR SEEP LOCATIONS
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

Location	NY State Plane Easting (ft)	NY State Plane Northing (ft)
Seep-01	*	*
Seep-02	1,025,546	1,142,966
Seep-03	1,025,797	1,143,232
Seep-04	1,026,009	1,143,839
Seep-05	1,024,901	1,142,119
Seep-06	1,024,897	1,142,168
Seep-07	*	*
Seep-07d	1,024,898	1,142,356
Seep-07ef	1,024,809	1,142,418
Seep-07h	1,024,801	1,142,497
Seep-07i	1,024,592	1,142,656
Seep-08	1,024,553	1,142,686
Seep-11	1,025,518	1,143,416
Seep-12	1,025,985	1,144,355
Seep-14	1,025,721	1,143,123
Seep-17b	1,025,560	1,142,997
Seep-17b1a	1,025,649	1,143,075
Seep-18a	1,025,793	1,143,317
Seep-19	1,026,002	1,144,167
Seep-20	1,026,063	1,143,978
Seep-21	1,024,499	1,143,507

Seep coordinates were determined with a hand-held GPS unit in 2004.
Accuracy is approximately +/- 30 ft.

* Coordinates will be collected during next seep inspection.

TABLE 5.3
ANALYTICAL PARAMETERS FOR APL FLUX MONITORING
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

Parameters for APL Plume Flux Monitoring	RRT Flux Action Level	RRT Detection Level
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.5 grams per year	0.5 ng/L
Polychlorinatedbiphenyls as Aroclor 1248	0.005 pounds per day	1 ug/L
Pesticides as follows:		
Hexachlorocyclohexanes: α-BHC, β-BHC, δ-BHC, γ-BHC(Lindane)	none defined	
Mirex	0.005 pounds per day	1 ug/L

TABLE 5.4
COMMUNITY MONITORING WELLS
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

OVERBURDEN	BEDROCK
CMW- 1OB	CMW- 1SH
CMW- 2OB	CMW- 2SH
CMW- 3OB	CMW- 3SH
CMW- 4OB	CMW- 4SH
CMW- 5OB	CMW- 5SH
CMW- 6OB	CMW- 6SH
CMW- 7OB	CMW- 7SH
CMW- 8OB	CMW- 8SH
CMW- 9OB	CMW- 9SH
	CMW-11SH
CMW-12OB	CMW-12SH

TABLE 6.1
TREATMENT SYSTEM SAMPLE LOCATIONS AND MONITORING SCHEDULE
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

FREQUENCY	SAMPLE LOCATION	ANALYTICAL PARAMETERS
CONTINUOUS		
I.	Treatment System Effluent	Total Flow
I.	Treatment System Effluent	pH
WEEKLY		
G.	Main Carbon - First Interstage	VOCs
I.	Treatment System Effluent	VOCs, Total Phenolics
QUARTERLY		
D.	Leachate Feed	VOCs, SVOCs, Organic acids
F.	Sacrificial Carbon Bed Interstage	PCBs, dioxin/furans
I.	Treatment System Effluent	Total Phosphorus

Notes:

The Treatment System Effluent is monitored by the City of Niagara Falls POTW five times per quarter for TSS and SOC.

Abbreviations

VOCs Volatile Organic Compounds
SVOCs Semi-Volatile Organic Compounds
PCBs Polychlorinated biphenyls

TABLE 7.1
ADDITIONAL FIFTH-YEAR SAMPLING LOCATIONS/ANALYTES
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

MONITORING LOCATION	ANALYTICAL
BR-1	VOCs, SVOCs, Organic Acids
BR-2	VOCs, SVOCs, Organic Acids
BR-3	VOCs, SVOCs, Organic Acids
BR-4	VOCs, SVOCs, Organic Acids
All sampled piezometers (Table 4.2)	VOCs, SVOCs, Organic Acids, Sulfate
All purge wells (Table 4.1)	VOCs, SVOCs, Organic Acids, Sulfate

Appendices

APPENDIX A

FIELD PROCEDURES

FP-01a: Waste Management

Disposables (PPE, towels, tubing, etc…)

All field disposables will be placed in 55-gallon drums at the OCC Love Canal Facility for management as Hazardous Solid Waste.

Purge Water

All purge water from sampling will be disposed of at the OCC Hyde Park water treatment plant. Water will be discharged to the containment area in the Drum Barn or outside loading pads. These locations all connect to the treatment system.

Decon Liquids

Alconox Wash: All decon wash is contained and disposed of in Love Canal or Hyde Park the same as purge water.

Solvents: minimal volumes of solvents are used. Small quantities of solvents (CITRI-CLEAN and Halso 99) that are spilled during decon may be washed into the decon containment area. These areas are connected to the site water treatment system.

NAPL/solvent coated Disposables (PPE, towels, tubing, etc…)

NAPL coated disposables will be managed in the same manner as described above for non-NAPL coated disposables.

FP-01b: Maintenance Inspections

Monitoring Wells

Each monitoring well and piezometer should be inspected annually to ensure that the cap is secure from unauthorized entry, that rain and surface water cannot enter the casing, and that the well/piezometer condition is satisfactory for the desired monitoring objectives, including the monitoring of total well depths for possible infilling. A "Well Maintenance Inspection Form" (attached to this Field Procedure), or a similar form, should be completed during each inspection. The inspection forms should be copied or scanned to an Adobe Acrobat PDF format, and stored in the Project File at the Site.

Upon completing the inspection, a memo should be prepared which documents the inspection findings, including a summary of required maintenance items, if needed.

The memo, as well as copies of the Well Maintenance Inspection Forms, should be delivered to the Facility Coordinator and the CRA Project Manager (either electronic or hard copy is acceptable).

Landfill Cap

The following list summarizes the areas for Landfill Cap inspection.

Feature	**Inspect for:**
Vegetation and Topsoil	erosion, bare areas, washouts, dead/dying vegetation, remove woody growth
Access Roads	erosion, obstructions, potholes, puddles, debris
Drainage Ditches	sediment buildup, erosion, condition of erosion protection, obstructions, dead/dying vegetation
Drainage Culverts	obstructions, plugging
Rip Rap	missing, erosion, excessive vegetation or woody growth

All personnel should be aware of these inspection guidelines. If problems are identified at any time, the Facility Coordinator should be notified and the problem promptly corrected. Log sheets for this inspection are available in the treatment system control room at the Site. Inspection forms should be stored in the Project file at the Site.

Landfill Fence

Access to the landfill (e.g. fences and gates) should be secure. Gates must be intact and locked, and the fence must be free of openings that would allow access. All posted signs on the fence should be secure and readable.

All personnel should be aware of these access security requirements and should report any breach in the fence or gates immediately. Problems should be promptly corrected. If the fence or locks appear to have been intentionally cut for access, the breach must be documented for the Project file and the Facility Coordinator immediately notified.

A drive-by inspection of the fence shall be competed each weekday. A formal inspection of the fence shall be completed and documented weekly. Completed inspection forms will be stored in the Project file at the Site.

MILLER SPRINGS REMEDIATION MANAGEMENT, INC.

Well Maintenance Inspection Form

WELL/PIEZOMETER ID # ____

AREA: ____

DATE: ____________________

SAMPLING CREW: ____

DEPTH TO WATER: ____________________ NAPL DEPTH: ____________________

SOUNDED DEPTH: ____________________ LABEL TYPE: ____________________

INSTALLED DEPTH: ____________________

WINTER MARKING: ____

ROAD BOX CONDITION: ____

GROUT SEAL: ____

LID/CENTER BOLT: ____

EXPANDABLE CAP: ____

LID BOLTS: ____

PROTECTIVE CASING: ____

LABELED: ____

REMARKS/OBSERVATIONS:

FP-02a: Groundwater Level Measuring Procedure

Equipment

1. Personal Protective Equipment (according to the Site Health and Safety Plan),
2. keys to the wells/piezometers,
3. water level indicator,
4. low phosphate soap (Alconox or equivalent),
5. Decon Solvents (Citri-Clean and Halso 99)
6. distilled water,
7. paper towels,
8. buckets,
9. water level measurement form or log-book,
10. pens with water proof ink,
11. trash bags, a site map,
12. a table of well/piezometer depths and previous water level(s).

Pre-field Activities

1. All personnel making depth to water measurements should have reviewed the Site Health and Safety Plan, have up-to-date OSHA Health and Safety training, have up-to-date medical monitoring, and have reviewed this field procedure within one year or performing this task.
2. Collect Equipment.
3. Using a glass of water, check that the water level indicator is functioning. Measure the distance from the reference point on the indicator probe to the 2-foot mark on the tape – this should be 2 feet.
4. Decontaminate the water level indicator. Wash the probe and entire length of the tape with a low phosphate soap solution followed by a tap water rinse. Dry with a clean cloth or paper towel. If the tape or probe have been in contact with NAPL, remove NAPL with a rag soaked in Citri-Clean, followed by the soap wash described above and a water rinse. If necessary, Halso 99 can be used if Citri-Clean does not properly decontaminate the tape and/or probe. Any liquid wastes will be contained and disposed of as described below.

Field Procedures

1. Check well/piezometer ID.
   - If there is any uncertainty that the correct well/piezometer is being measured, measure the total depth of the well using a separate tape with a solid weight. Compare the measured depth to the reported depth, recorded depth of that well.

2. Check condition of the protective housing, casing, cement, etc. and make notes as necessary. (Serious problems regarding the well condition should be called in to the project manager, e.g., the protective housing has been broken into. Problems that require general maintenance should be documented and added to the Well Maintenance List.
3. Remove cap from well, if there was a sound of air entering or escaping make a note of this and check to see of the there is a vent hole in the cap.
4. Check for the measuring point mark on the well riser and for any sharp edges, which may damage the indicator tape.
5. Slowly lower the water level indicator probe until contact with the water surface is indicated, either by audible alarm or by light. To the extent possible, avoid dragging the indicator cable on the top edge of the well casing, this can damage the cable and potentially introduce shavings from the cable into the well/piezometer.
6. Read the depth to water at the measuring point and record the measurement.
7. Retract the tape by winding onto the spool, holding a clean paper towel to remove water and/or debris.
8. For newly installed wells and wells with known contamination, decontaminate the probe and tape between wells with soap and water wash. Rinse with distilled or deionized water. If necessary, decon solvents may be used to remove heavy contamination.
9. Replace the well cap and relock the well.

Note: Whenever possible, water level measurements should be collected from least to most contaminated wells.

Decontamination of the Water Level Tape

At the end of each day, decontaminate the water level indicator as described under Pre-field Preparation, above.

Disposal of Wastes

All solid waste materials from monitoring will be placed in a plastic garbage bag. At the end of each day, these wastes will be placed in an approved/labeled 55-gallon waste disposal drum at the Love Canal facility for management according to field procedure FP-01.

Reporting

Field data will be entered into the field database management system or an Excel spreadsheet. The MSRM Field Manager will specify formats and procedures.

FP-03a: NAPL Presence Check

Equipment

1. Personal Protective Equipment
2. 200′ measuring tape with weighted end and cotton rope attachment to help determine NAPL presence.
3. Low phosphate soap
4. Solvents: CITRI-CLEAN and Halso 99
4. Tap water
5. Paper towels
6. Buckets
7. NAPL presence form or log-book
8. Site-map
9. Well-depth information.

Field Procedure

1. Check well ID against Site map to determine if you have the correct well.
   - If there is any uncertainty that the correct well/piezometer is being measured, measure the total depth of the well using a separate tape with a solid weight. Compare the measured depth to the reported depth, recorded depth of that well.
2. Inspect well condition and note apparent problems requiring maintenance.
3. Remove cap from well and check for the measuring point mark on the well riser. Check for any rough or sharp edges that might damage the measuring tape.
4. Lower the weighted tape down into the center of the well until contact with the bottom of the well. Verify this by checking the depth of the tape against the known well depth.
5. Retract the tape to the top to check amount of NAPL present on the measuring tape. If no NAPL is present, check the attached rope for any light-phase NAPL.
6. Note the NAPL presence (yes or no) on the form or in the log-book.
7. Replace well cap.
8. Decontaminate tape. Tape will be wiped clean with paper towels and rinsed with water. If necessary, wipe tape with a rag soaked in Citri-Clean or Halso 99. Wipe solvents from the tape with clean paper towels and rinsed with water.

9. Replace cotton rope with a clean piece of rope between well measurements to avoid cross-contamination.

Disposal of Wastes

All waste materials from monitoring will be placed in a plastic garbage bag. At the end of each day, these wastes will be placed in an approved/labeled 55-gallon waste disposal drum at the Love Canal facility for management according to field procedure FP-01.

Reporting

Field data will be entered into the field database management system or an Excel spreadsheet. The MSRM Field Manager will specify formats and procedures.

FP-3b: NAPL Thickness Measurement Procedure

Equipment

1. Personal Protective Equipment
2. NAPL thickness form or log-book
3. Site map, and 200′ measuring tape with 1 foot of ¼ inch rebar. Attached rebar to the measuring tape with duct tape.
4. Solvent and rags/paper towels for cleaning NAPL from the tape and rebar.

Field Procedure

1. Lower the measuring tape until the rebar contacts the bottom of the well.
2. Record the depth to the bottom of the well from top of casing (or the appropriate reference used for water level measurements).
3. Slowly rewind tape and record NAPL thickness based on visual inspection of NAPL on the tape or rebar.
4. Clean the rebar and/or tape with a rag soaked in Halso 99.
5. Repeat for next well.

Disposal of Wastes

All waste materials from sampling will be placed in a plastic garbage bag. At the end of each day, these wastes will be placed in an approved/labeled 55-gallon waste disposal drum at the Love Canal facility for management according to field procedure FP-01.

Reporting

Field data will be entered into the field database management system or an Excel spreadsheet. The MSRM Field Manager will specify formats and procedures.

FP-04a: APL Sampling - Pressurized Taps

Equipment:

Personal Protective Equipment

Bucket for purge water.

Pre-Field Activities:

1. Contact laboratory for sample bottles.
2. Complete bottle labels and apply to sample bottles.
3. Complete Chain of Custody forms.

Sample Collection Procedure:

1. Identify proper sample tap.
2. Place purge bucket under sample tap.
3. Slowly open sample valve and purge enough into bucket to sufficiently clear the line of stagnant water.
4. Place sample bottle under the tap and close-down the valve to achieve a slow, steady stream of water.
5. Fill sample bottles.
6. Close sample tap valve.

Disposal of Wastes:

All waste materials from sampling will be placed in a plastic garbage bag. At the end of each day, these wastes will be placed in an approved/labeled 55-gallon waste disposal drum at the Love Canal facility for management according to field procedure FP-01.

Reporting:

Field data will be entered into the field database management system or an Excel spreadsheet. The MSRM Field Manager will specify formats and procedures.

A copy of the Chain of Custody forms must be sent to the Laboratory Coordinator.

FP-04b: APL Sampling – 3 Well Volume Method

Equipment

1. Personal Protective Equipment.
2. Purging equipment: water level meter, pumps (Grundfos, peristaltic pumps, hand bailers, or bladder pumps), generator, and compressor. Enough decontaminated pumps will be taken to the field to complete the day's sampling schedule. Water storage tank for purge water.
3. Field Parameter Monitoring Instruments: Multi-parameter (pH, specific conductance, and temperature) flow-through cell.
4. Decon Equipment/Supplies: Sheet plastic low phosphate soap (Alconox), distilled water, paper towels, & buckets.
5. APL sampling forms or field notebook, and a Site map.

Pre-Field Activities

1. At least four weeks prior to the sampling effort, complete appropriate sampling forms and submit to the CRA Laboratory Coordinator.
2. Contact laboratory to acquire sample bottles.
3. Prepare bottle labels (list of wells/piezometers to sample is in the Site Sampling/Monitoring Work Plan.
4. Complete Chain of Custody forms.
5. Print field log/data recording sheets (pre-printed with location IDs).
6. Calibrate pH and specific conductance instruments, and record calibration results.
7. Decontaminate enough pumps to complete at least one day's sampling schedule. For peristaltic pumps, decon is replacement of used tubing with new tubing cleaned by the manufacturer. For inertial pumps (WaTerra), decon the check valves and replace the tubing. The following procedure is for any submersible pumps. Wearing appropriate PPE:
    - Remove all visible sediment / soil by hand brush scrubbing or power washing.
    - Remove drain plug from pump and drain trapped water. Replace the drain plug.
    - Submerge pump in a 5-gallon bucket of low-phosphate soap water and recirculate soap solution for 5 minutes.
    - Remove drain plug from pump and drain trapped water. Replace the drain plug.

- Submerge pump in a 5-gallon bucket of tap water and recirculate water for 5 minutes.
- Rinse equipment with tap water.
- An equipment blank may be required. The equipment blank is collected by pumping one gallon of DI water through the clean pump. Equipment blanks should be managed consistent with water samples as described below.
- Following decontamination, the pumps shall be wrapped in foil and stored for the next use.

If the pump is contaminated with NAPL, the pump will be cleaned outside with Halso 99 or Citri-Clean, pressure-washed outside, the drain plug removed to drain residual water and replaced, run through a 5-minute recirculation with a Citri-Clean solution, and than pressure-washed. Following this aggressive cleaning, the procedure defined above will be completed.

<u>**Field Procedures**</u>

1. Measure water level and record on the field log. Determine the volume of water to be purged according to formulas on the sample collection forms.
2. Install pump into well for purging. Lower pump deep enough that the well/piezometer does not go dry during the purging, the vertical location of the pump is not critical for a 3-well volume purge.
   - Purge tubing is dedicated to each well and remains in the well between sampling events. A decontaminant pump will be used for each well purging. The dedicated tubing is pulled from the well and connected the decontaminated pump.
   - Care must be taken to ensure that the dedicated tubing is not contaminated when it is removed from the well, and that no debris is introduced to the well when the pump is lowered.
   - Pumps are not field decontaminated. Pumps are decontaminated nightly at the Love Canal Drum Barn.
3. Start pump and purge as follows:
   - Start pump and adjust flow rate to a rate sustainable by the well. The goal of the sampling is to purge and sample without drying up the well/piezometer.
   - Monitor field parameters (pH, specific conductance, and temperature), water level, and pumping rate, and recorded in the field log including the time of the measurements. One set of readings will be taken at the start of purging and an additional set will be taken after removal of each standing well volume.

- o If the well goes dry, purge three consecutive days to dryness and then sample. Full recovery is not necessary. Sampling can commence on day 3 if water is available and can be conducted over the next 4 days if required to fill the sample bottles.
- o If the well goes dry, a sustainable pumping rate should be determined for future sampling events. Contact the MSRM and CRA project manager regarding adjustment of pumping rates.

4. Samples shall be collected directly from the pump discharge.
   - Note: If possible, sampling in the rain should be avoided to avoid cross-contamination from airborne contaminants picked up by the precipitation.
   - Wells should be sampled beginning with lowest concentration wells, progressing to highest concentrations. This minimizes the potential for cross-contamination.
7. Securely pack samples is ice filled coolers for shipment to the appropriate laboratory. Coolers must:
   - have chain-of-custody forms in a zip-lock bag in the cooler, and
   - be securely taped closed with security seals across the cooler opening.
8. Remove pump and disconnect from purge tubing. Purge tubing should be returned to the well.
   - Care must be taken to ensure that the dedicated tubing is not contaminated when it is removed from the well, and that no debris is introduced to the well when the pump is lowered.
8. Manage purge water and sampling disposables as described below.

Disposal of Wastes

All solid waste materials from monitoring will be placed in a plastic garbage bag. At the end of each day, these wastes will be placed in an approved/labeled 55-gallon waste disposal drum at the Love Canal facility. Purge water and decon liquids will be collected. Solid and liquid wastes will be managed according to field procedure FP-01.

Reporting

Field data will be entered into the field database management system or an Excel spreadsheet. The MSRM Field Manager will specify formats and procedures.

A copy of the Chain of Custody forms must be sent to the Laboratory Coordinator.

FP-04c: APL Sampling - T_{95} Piezometer Sampling Method

Background

The T_{95} Purge Sampling Protocol is designed to collect a representative groundwater sample from the Hyde Park piezometers. The protocol specifies a Recommended pumping rate and a fixed purge time. The purge time and rate based on a mathematical analysis to ensure that more than 95% of the water sampled is collected from the formation outside of the well, and less than 5% from wellbore storage. The protocol has been reviewed and approved for the Hyde Park Site by the USEPA.

An important element of the T_{95} sampling protocol is consistency. A table is included with this field procedure defining a purge time and pumping rate for each piezometer. The purge time and pumping rate are to be followed as closely as possible; field testing has proven that the recommended purge rates can be sustained. If a field sampling pump cannot provide the recommended pumping rate, then a different sampling pump should be acquired.

The time (t_{95}) to achieve this target was calculated based on a piezometer-specific transmissivity and storage coefficient determined prior to the sampling event. The maximum purge rate was determined based on the available drawdown (static water level – top of the well screen) in the piezometer. A upper limit of 1.0 L/min was defined for purging. For piezometers with a calculated t_{95} less than 5 minutes, a 5-minute minimum purge time is required; this ensures that the entire screened interval will be flushed with formation water. As a practical limit, piezometers requiring more that 90 minutes to purge were eliminated from the sampling program. Piezometers that exceed this time limit are either in very low transmissivity areas of the formation, or have very little standing water.

In the event that it is not possible to purge at the pumping rate recommended on the attached table, a minimum purge volume must be calculated. The calculation is included near the end of this field procedure. Reducing the pumping rate from the values listed on the attached table will require calculations to be performed in the field and may significantly increase the time to collect samples. Any deviations from the sampling requirements are acceptable only on a temporary basis, and only if sampling cannot be delayed until proper equipment is available.

Equipment

Personal Protective Equipment, pumps and tubing, flow-through cell, water level indicator, paper towels, keys, sample recording forms or a field notebook, Site map.

The Hyde Park piezometers are 1-inch diameter stainless steel or PCV with a 2-foot long screen. They will be purged using a small diameter pump, e.g., WaTerra inertial pump or bladder pump less than 1-inch in diameter. Peristaltic pumps are not acceptable.

Field Preparation

1. At least four weeks prior to the sampling effort, complete appropriate sampling forms and submit to the CRA Laboratory Coordinator.

2. Prepare labels for sample bottles and apply labels to bottles.

3. Calibrate Flow-Through Cell instrument according to the manufacture's specifications.

4. Decontaminate sampling pumps. There should be a sufficient number of pumps to complete a full day of sampling. The pumps would all be decontaminated together at the end or beginning of each day. Bladder pumping will be decontaminated as follows:

    - Remove all visible sediment / soil by hand brush scrubbing or power washing.
    - Disassemble pump and wash parts in a low-phosphate soap water solution.
    - Replace the pump bladder.
    - Reassemble the pump.
    - Submerge pump in a 5-gallon bucket of tap water and recirculate water for 5 minutes.
    - Purge 1 gallon of DI water through the pump.
    - Rinse equipment with tap water.
    - If an equipment blank is required, pumping one gallon of DI water through the clean pump and a sample of the DI water discharge collected. Equipment blanks should be managed consistent with water samples as described below.
    - Following decontamination, the pumps shall be wrapped in foil and stored for the next use.
    - Pump discharge tubing will be either dedicated to the piezometers, or new tubing will be used for each sample.
    - Document decontamination of each pump.

    The Waterra inertial pump is decontaminated by washing the check valve in a low-phosphate water solution and rinsing with DI water. Discharge tubing will be either dedicated to the piezometers, or new tubing will be used for each sample.

5. Acquire table of locations to be sampled including total piezometer depth.

Field Procedures

1. Identify the piezometer of interest. Inspect for damage or problems that require maintenance of may compromise the integrity of the water sample to be collected.

2. Collect and record a depth to water measurement.

3. Lower pump intake to the screened interval of the piezometer (1 foot above the bottom of the piezometer).

4. Begin purging and adjust pumping rates as soon as possible.

    - Pumping rate should be adjusted to match, or be slightly less than, the defined maximum pumping rates. Pumping at higher rates to purge or sample will cause the piezometer to go dry.

    - During purging, the following field parameters will be collected:

        - pH, DO, eH, temperature, and conductivity using a flow-through cell; and

        - total water volume purged.

    - Field parameter measurements should be recorded at 1-minute intervals for the first 5 minutes, and at a regular interval determined by field personnel after 5 minutes. The total volume purged should be checked with a graduated container. The container should have 1-liter or smaller graduations.

    - The piezometers must be purged for the predefined t_{95} time before sample collection is initiated. Stabilization of field parameters is not a requirement or an endpoint for purging.

    - **If a piezometer goes dry during the purging DO NOT COLLECT A SAMPLE. The field data should be compiled and sent to the CRA project manager at the end of the sampling day. The data will be reviewed and a revised pumping rate will be proposed. Based on the review, the piezometer may be purged again using a lower pumping rate.**

5. Following purging, the flow through cell should be removed from the pump discharge and sample containers shall be filled directly from the pump discharge. The total volume of sample collected and the time that the last sample bottle was filled shall be recorded. The pumping rate used to purge the piezometer must be maintained during sampling. The defined purge rate for each piezometer is the maximum sustainable pumping rate, the piezometer will likely go dry at a higher pumping rate.

6. Securely pack samples is ice filled coolers for shipment to the appropriate laboratory. Coolers must:

    - have chain-of-custody forms in a zip-lock bag in the cooler, and

- be securely taped closed with security seals across the cooler opening.

7. Manage purge water and sampling disposables as described below.

Pumping less than the Recommended Pumping Rates

Purging at less than the maximum pumping rate is acceptable only on a temporary basis and only if: a. sampling cannot be delayed, or b. the piezometer can no longer sustain the recommended pumping rates.

The t_{95} time is dependent on the transmissivity and well construction, but it is independent of the pumping rate. When pumping rates are reduced however, a minimum volume to pump becomes an issue. An extreme example demonstrates the issue. For a well with a t_{95} of 5 minutes, purging at 1 mL/min the water will result in a stabilized water level after 5 mL of water have been recovered. The 2-foot long, 1-inch diameter piezometer screen contains 320 mL of water. The 5 mL purge volume has not flushed the pre-purge water from the screened interval. It is recommended that at a minimum, three full screen volumes are pumped before sampling. If both the minimum purge volume and the t_{95} time are satisfied, then the screen has been flushed and >=95% of the water entering the pump intake is formation water.

The minimum purge volume has been set equal to the volume of water removed from wellbore storage during purging, plus three screen volumes. Three screen volumes is three times the volume per foot in a 2-foot long screen, or six times the volume in a 1-inch diameter pipe. The volume taken from wellbore storage is dependent on the stabilized drawdown in the piezometer. Previous analyses have shown that the stabilized drawdown in the 1-inch piezometers is approximately:

s_w = 0.083 Q/T

Where
s_w = stabilized drawdown (ft)
Q = pumping rate (mL/min)
T = transmissivity (ft^2/day)

There minimum purge volume is then:

V_{purge} = V_{ft} * (6 + 0.083 Q/T)

Where
V_{ft} = volume per foot of the 1-inch diameter pipe = 160 mL/ft

V_{purge} = 160 mLft * (6 + 0.083 Q/T)

Sample Calculation for G1-02:

Q recommended = 216 ml/min but assume that Q actual = 50 ml/min
T = 0.7 ft^2/day

V_{purge} = 160 * (6 + 0.083*50/0.7)

$= 160 * (6 + 5.9)$
$= 1900$ ml

For G1-02, pumping this volume at 50 ml/min takes 38 min. For G1-02, t_{95} is 47.1 min. The well is ready to sample as soon as the minimum purge volume, and t_{95} have been satisfied, i.e., after 47.1 minutes. If the pumping rate were 20 ml/min, then V_{purge} would be 1190 ml and would take 67 minutes to purge at 20 ml/min. Then, the V_{purge} is the limiting factor, not t_{95}. In general, if:

Q (ml/min) < 48 T (ft^2/day) or Q (ml/min) < 1580 / t_{95} (min)

Then, minimum purge volume will take precedence over the t_{95}.

REMINDER: NEVER INCREASE PUMPING RATES AFTER THE PURGING REQUIREMENTS HAVE BEEN SATISFIED. THE SYSTEM HAS STABILIZED FOR THE PURGE RATE USED (OR A LOWER RATE), BUT IT IS NOT STABLIZED IF THE PUMPING RATE IS INCREASED.

Disposal of Wastes

All solid waste materials from monitoring will be placed in a plastic garbage bag. At the end of each day, these wastes will be placed in an approved/labeled 55-gallon waste disposal drum at the Love Canal facility. Purge water and decon liquids will be collected. Solid and liquid wastes will be managed according to field procedure FP-01.

Reporting

Field data will be entered into the field database management system or an Excel spreadsheet. The MSRM Field Manager will specify formats and procedures.
A copy of the Chain of Custody forms must be sent to the Laboratory Coordinator.

FP-04c
PIEZOMETER SAMPLE RATES AND DURATION
PERFORMANCE MONITORING PROGRAM

Location	Flow Zone	Transmissivity (ft^2/day)	Typical Water over Screen (ft)	Sustainable Pumping Rate (mL/min)	Recommended Pumping Rate (mL/min)	t_{95} Time1[a] (min)	Time2[b] (min)	Recommended Purge Time[c] (min)	Total Volume Purged (L)
G1U-01	1	66	13.5	10,740	1,000	0.5	**1.2**	**5**	5.0
G6-01	1	70	12.6	10,564	1,000	0.5	**1.2**	**5**	5.0
H2U-01	1	80	18.1	17,396	1,000	0.4	**1.1**	**5**	5.0
H5-01	1	75	17.8	16,032	1,000	0.4	**1.1**	**5**	5.0
I1-01	1	0.5	12.9	77	77	**66**	39	**66**	5.1
F2U-02	2	30	1.9	677	677	1.1	**1.9**	**5**	3.4
F4U-02	2	14	9.9	1,659	1,000	**2.4**	1.9	**5**	5.0
G1-02	2	0.7	25.8	217	217	**47**	23	**47**	10.2
G6-02	2	240	27.9	80,401	1,000	0.1	**1.0**	**5**	5.0
H2U-02	2	0.5	18.1	109	109	**66**	35	**66**	7.2
H5-02	2	1.6	22.5	432	432	**21**	11	**21**	8.9
I1-02	2	9	13.6	1,471	1,000	**3.7**	2.4	**5**	5.0
J2U-02	2	44	9.5	5,033	1,000	0.8	**1.3**	**5**	5.0
J5U-02	2	75	14.7	13,226	1,000	0.4	**1.1**	**5**	5.0
J6-02	2	71	3.4	2,921	1,000	0.5	**1.1**	**5**	5.0
AFW-2U-04	4	77	2.3	2,171	1,000	0.4	**1.1**	**5**	5.0
D1U-04	4	49	9.4	5,539	1,000	0.7	**1.2**	**5**	5.0
D2U-04	4	28.5	9.4	3,208	1,000	1.2	**1.4**	**5**	5.0
E6-04	4	1.4	4.5	75	75	**24**	22	**24**	1.8
F2U-04	4	422	20.4	103,279	1,000	0.1	**1.0**	**5**	5.0
F4U-04	4	0.3	26.2	94.28	94	**110**	55	**110**	10.4
F6-04	4	40.2	16.8	8,118	1,000	0.8	**1.3**	**5**	5.0
G1U-04	4	0.009	37.5	4.06	4.1	**3,667**	1,717	**3,667**	14.9
G6-04	4	190	40.3	91,914	1,000	0.2	**1.0**	**5**	5.0
H5-04	4	0.6	37.5	271	271	**55**	26	**55**	14.9
I1-04	4	3.1	26.5	988	988	**11**	5.3	**11**	10.5
J2U-04	4	140	44.8	75,296	1,000	0.2	**1.1**	**5**	5.0
J5U-04	4	0.01	20.3	2.44	2.4	**3,300**	1,726	**3,300**	8.1
J6-04	4	4	6.0	287	287	**8.3**	6.7	**8**	2.4
AFW-2U-05	5	13	10.2	1,595	1,000	**2.5**	2.0	**5**	5.0
AGW-1U-05	5	360	16.6	71,915	1,000	0.1	**1.0**	**5**	5.0
D1U-05	5	21.9	18.0	4,743	1,000	1.5	**1.6**	**5**	5.0
D2U-05	5	30.3	16.6	6,047	1,000	1.1	**1.4**	**5**	5.0
E6-05	5	0.7	16.4	138	138	**47**	26	**47**	6.5
F2U-05	5	0.07	29.0	24.36	24	**471**	230	**471**	11.5
F4U-05	5	0.03	31.7	11.41	11.41	**1,100**	528	**1,100**	12.6

FP-04c
PIEZOMETER SAMPLE RATES AND DURATION
PERFORMANCE MONITORING PROGRAM

Location		Flow Zone	Transmissivity (ft^2/day)	Typical Water over Screen (ft)	Sustainable Pumping Rate (mL/min)	Recommended Pumping Rate (mL/min)	t_{95} Time1[a] (min)	Time2[b] (min)	Recommended Purge Time[c] (min)	Total Volume Purged (L)
F6-05		5	0.3	24.7	89	89	**110**	55	**110**	9.8
G6-05		5	8	48.2	4,632	1,000	**4.1**	2.6	**5**	5.0
H2M-05		5	0.001	42.0	0.51	0.51	**33,000**	15,228	**33,000**	16.7
H5-05		5	16	43.3	8,327	1,000	**2.1**	1.8	**5**	5.0
I1-05		5	0.2	3.9	9.41	9.4	165	**169**	**169**	1.6
J2U-05		5	300	16.8	60,560	1,000	0.1	**1.0**	**5**	5.0
J5U-05		5	66	20.6	16,342	1,000	0.5	**1.2**	**5**	5.0
J6-05		5	64	13.2	10,176	1,000	0.5	**1.2**	**5**	5.0
PMW-1U-05		5	2.1	13.4	338	338	**16**	9.2	**16**	5.3
ABP-7-06	dry	6	0.5	0.1	0.54	0.5	66	**1,818**	**1,818**	1.0
AFW-1U-06	dry	6	2.3	0.4	12.40	12	14	**83**	**83**	1.0
AFW-2U-06	dry	6	0.3	0.0	0.36	0.4	110	**2,708**	**2,708**	1.0
AGW-1U-06		6	6.7	1.3	103	103	4.9	**11**	**11**	1.2
B2U-06		6	0.001	2.4	0.03	0.03	33,000	**46,843**	**46,843**	1.3
C3-06	dry	6	0.07	0.0	0.08	0.08	471	**11,604**	**11,604**	1.0
D1U-06	dry	6	1	1.0	12.10	12.10	33	**93**	**93**	1.1
D2U-06	dry	6	0.44	0.4	1.97	2.0	75	**518**	**518**	1.0
E6-06		6	218	31.9	83,451	1,000	0.2	**1.0**	**5**	5.0
F2M-06		6	0.001	51.0	0.61	0.6	**33,000**	14,896	**33,000**	20.2
F4M-06		6	0.007	17.2	1.45	1.4	**4,714**	2,568	**4,714**	6.8
F6-06		6	134	35.1	56,529	1,000	0.2	**1.1**	**5**	5.0
G1M-06		6	58	36.8	25,656	1,000	0.6	**1.2**	**5**	5.0
G6-06		6	79	45.0	42,745	1,000	0.4	**1.1**	**5**	5.0
H2M-06		6	16	45.9	8,829	1,000	**2.1**	1.8	**5**	5.0
H5-06		6	0.04	25.6	12.33	12	**825**	411	**825**	10.2
I1-06		6	0.06	15.5	11.21	11.21	**550**	308	**550**	6.2
J2M-06		6	280	3.5	11,708	1,000	0.1	**1.0**	**5**	5.0
J5M-06		6	11	1.4	192	192	3.0	**6.2**	**6**	1.2
J6-06		6	0.001	7.7	0.09	0.09	**33,000**	23,688	**33,000**	3.1
PMW-1U-06		6	0.001	1.4	0.02	0.02	33,000	**70,243**	**70,243**	1.2
ABP-1-07		7	0.001	2.9	0.03	0.03	33,000	**41,111**	**41,111**	1.1
ABP-7-07		7	1.5	1.0	18.72	19	22	**60**	**60**	1.1
AFW-1M-07	dry	7	0.001	0.0	0.00	0.00	33,000	**812,271**	**812,271**	1.0
AFW-2M-07	dry	7	0.001	0.0	0.00	0.00	33,000	**812,271**	**812,271**	1.0
AGW-1M-07		7	140	22.3	37,507	1,000	0.2	**1.1**	**5**	5.0
B2M-07		7	0.05	18.2	10.95	11	**660**	354	**660**	7.2

FP-04c
PIEZOMETER SAMPLE RATES AND DURATION
PERFORMANCE MONITORING PROGRAM

Location		Flow Zone	Transmissivity (ft^2/day)	Typical Water over Screen (ft)	Sustainable Pumping Rate (mL/min)	Recommended Pumping Rate (mL/min)	t_{95} Time1[a] (min)	Time2[b] (min)	Recommended Purge Time[c] (min)	Total Volume Purged (L)
C3-07		7	13	6.5	1,019	1,000	**2.5**	2.0	**5**	5.0
D1M-07		7	0.3	12.1	43.78	44	**110**	66	**110**	4.8
D2M-07		7	0.001	2.4	0.03	0.03	33,000	**46,995**	**46,995**	1.3
E6-07		7	0.15	34.9	62.82	63	**220**	104	**220**	13.8
F2M-07		7	0.001	37.9	0.46	0.5	**33,000**	15,437	**33,000**	15.0
F4M-07		7	0.001	19.8	0.24	0.2	**33,000**	17,365	**33,000**	7.8
F6-07		7	0.001	59.9	0.72	0.7	**33,000**	14,661	**33,000**	23.8
G1M-07		7	0.004	42.6	2.05	2.0	**8,250**	3,801	**8,250**	16.9
G6-07		7	1.1	60.9	804	804	**30**	13	**30**	24.1
H5-07		7	219	39.0	102,663	1,000	0.2	**1.0**	**5**	5.0
I1-07		7	39.5	39.2	18,591	1,000	0.8	**1.3**	**5**	5.0
J5M-07		7	220	31.2	82,463	1,000	0.2	**1.0**	**5**	5.0
J6-07		7	65	23.4	18,247	1,000	0.5	**1.2**	**5**	5.0
PMW-1M-07	dry	7	0.001	0.0	0.00	0.00	33,000	**812,271**	**812,271**	1.0
ABP-1-09		9	2.6	3.7	115	115	13	**13**	**13**	1.5
ABP-7-09		9	67	7.7	6,166	1,000	0.5	**1.2**	**5**	5.0
AFW-1M-09	dry	9	0.6	0.0	0.72	0.7	55	**1,354**	**1,354**	1.0
AFW-2M-09		9	0.001	5.0	0.06	0.06	**33,000**	29,337	**33,000**	2.0
AGW-1M-09		9	150	33.3	60,019	1,000	0.2	**1.0**	**5**	5.0
B2M-09	dry	9	38	0.0	45.66	46	0.9	**21**	**21**	1.0
C3-09		9	117	14.5	20,334	1,000	0.3	**1.1**	**5**	5.0
D1M-09		9	184	3.2	7,093	1,000	0.2	**1.0**	**5**	5.0
D2M-09		9	160.4	2.8	5,436	1,000	0.2	**1.0**	**5**	5.0
E6-09		9	4.9	53.7	3,159	1,000	**6.7**	3.7	**7**	6.7
F2M-09		9	110	14.3	18,892	1,000	0.3	**1.1**	**5**	5.0
F4M-09		9	30	10.6	3,834	1,000	1.1	**1.4**	**5**	5.0
F6-09		9	0.001	28.4	0.34	0.3	**33,000**	16,140	**33,000**	11.3
G1M-09		9	0.001	45.8	0.55	0.6	**33,000**	15,072	**33,000**	18.2
G6-09		9	0.003	68.2	2.46	2.5	**11,000**	4,833	**11,000**	27.0
H2M-09		9	16	47.1	9,050	1,000	**2.1**	1.8	**5**	5.0
H5-09		9	132	50.6	80,247	1,000	0.3	**1.1**	**5**	5.0
I1-09		9	0.001	15.8	0.19	0.19	**33,000**	18,388	**33,000**	6.3
J2M-09		9	1.7	31.9	652	652	**19**	9.3	**19**	12.7
J5M-09		9	150	40.7	73,301	1,000	0.2	**1.0**	**5**	5.0
J6-09		9	0.002	33.9	0.81	0.8	**16,500**	7,842	**16,500**	13.4
PMW-1M-09		9	57.6	1.2	802	802	0.6	**1.4**	**5**	4.0

FP-04c
PIEZOMETER SAMPLE RATES AND DURATION
PERFORMANCE MONITORING PROGRAM

Location	Flow Zone	Transmissivity (ft^2/day)	Typical Water over Screen (ft)	Sustainable Pumping Rate (mL/min)	Recommended Pumping Rate (mL/min)	t_{95} Time1[a] (min)	Time2[b] (min)	Recommended Purge Time[c] (min)	Total Volume Purged (L)
AFW-1L-11	11	3.2	11.8	454.66	455	**10**	6.3	**10**	4.7
AFW-2L-11	11	0.007	3.0	0.26	0.3	4,714	**5,667**	**5,667**	1.4
AGW-1L-11	11	0.005	63.1	3.79	3.8	**6,600**	2,919	**6,600**	25.0
B2L-11	11	16	13.3	2,548	1,000	**2.1**	1.8	**5**	5.0
D1L-11	11	15.2	17.8	3,254	1,000	**2.2**	1.8	**5**	5.0
D2L-11	11	2.1	40.8	1,031	1,000	**16**	7.3	**16**	15.7
E6-11	11	68.2	55.6	45,530	1,000	0.5	**1.2**	**5**	5.0
F2L-11	11	1.3	77.9	1,216	1,000	**25**	11	**25**	25.4
F4L-11	11	0.001	55.5	0.67	0.67	**33,000**	14,768	**33,000**	22.0
F6-11	11	13.8	63.1	10,463	1,000	**2.4**	1.9	**5**	5.0
G1L-11	11	55	106.7	70,534	1,000	0.6	**1.2**	**5**	5.0
G6-11	11	1.6	105.1	2,021	1,000	**21**	9.3	**21**	20.6
H2L-11	11	0.1	56.8	68.30	68	**330**	147	**330**	22.5
H5-11	11	1.3	95.6	1,494	1,000	**25**	11	**25**	25.4
I1-11	11	0.001	40.6	0.49	0.5	**33,000**	15,294	**33,000**	16.1
J5L-11	11	7	67.8	5,706	1,000	**4.7**	2.9	**5**	5.0
J6-11	11	21	72.9	18,399	1,000	1.6	**1.6**	**5**	5.0
PMW-1L-11	11	1.4	20.5	345.68	346	**24**	12	**36**	12.4

Notes:
a. Time1 is the time required for the formation to contribute 95% of the water to the pump - this time is independent of pumping rate.
b. Time2 is the time required to remove wellbore storage plus 3 screen volumes at Recommended Pumping Rate
c. Recommended Purge Time at the Recommended Pumping Rate = Maximim of Time1, Time2, or 5 minutes, whichever is greater

Note: the piezometer must be purged to satisfy both the Time1 (or t_{95}) and a minimum purge volume.
If the purge flow rate is less than Recommended Pumping Rate, then calculate a minimum purge a volume as follows:
Vpurge = 160 * (6+0.083*Q/T)
Where
Vpurge is in ml
Q is the actual pumping rate in ml/min
T is transmissivity in ft^2/day

Q and A indicate a quarterly or an Annual Sample
"dry" indicates that this well is generally dewatered and it cannot be sampled.

FP-04d: APL Sampling - Surface Water and Seeps

Equipment Needs:

Personal Protective Equipment, sample bottles.

Pre-Field Activities:

1. Contact laboratory to acquire sample bottles.
2. Prepare bottle labels (list of wells/piezometers to sample is in the Site Sampling/Monitoring Work Plan.
3. Complete Chain of Custody forms.

Sample Collection Procedure:

- Place sample bottle under seep or surface stream to be sampled.
  - In shallow running water, look for a flow with minimal aeration.
  - If possible, submerge the entire sample bottle and expel all air.
- Securely pack samples is ice filled coolers for shipment to the appropriate laboratory. Coolers must:
  - have chain-of-custody forms in a zip-lock bag in the cooler, and
  - be securely taped closed with security seals across the cooler opening.

Reporting

Field data will be entered into the field database management system or an Excel spreadsheet. The MSRM Field Manager will specify formats and procedures.

A copy of the Chain of Custody forms must be sent to the Laboratory Coordinator.

FP-05a: Vapor Sampling - Community Monitoring Wells

Equipment Needs:

Personal Protective Equipment, Organic Vapor Analyzer (OVA), Tubing, Site map.

Pre-Field Activities

1. Install vapor monitoring caps (Figure Attached) on all Community monitoring wells at least one month before vapor sampling. Only the overburden wells need these caps.
2. Connect 5 feet of clean sample tubing to the OVA.
3. Calibrate the OVA according to the manufacture's recommendations, with sample tubing connected.

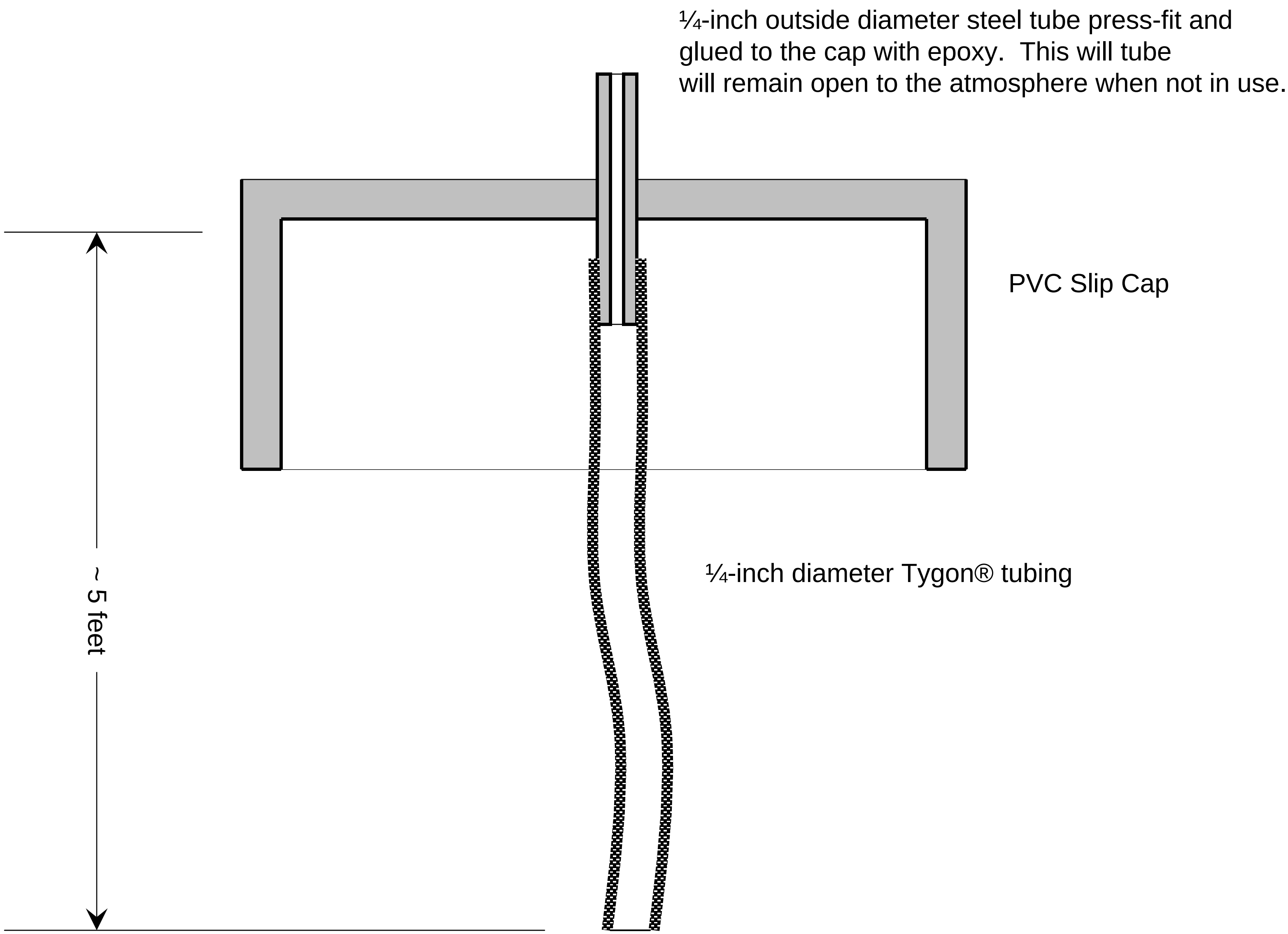
Sample Collection Procedure (at each well):

- Locate proper well and open flush-mount access. DO NOT REMOVE VAPOR SAMPLING CAP UNTIL AN OVA READING HAS BEEN COLLECTED.
- Start the OVA pump. Before connecting sample tubing to the cap, collect and record an ambient OVA reading.
- Record OVA readings at one-minute intervals for 10 minutes.
- Remove OVA
- Remove Vapor Sampling Cap.
- Measure depth to water and record.
- Close and lock the well.

Notes:

The vapor sampling protocol is defined to collect vapor near the end of the sample tubing. The purge time for sampling must be long enough to evacuate one tubing volume, but not long enough to draw vapors from outside of the well. The Community Monitoring Wells are 12-inch diameter wells. A sampling pump operating at 400 cc/minute will evacuate a one-foot column of air from a 12-inch diameter pipe in about 55 minutes. Pumping 400 cc/min will evacuate a 10-foot length of a 0.25-inch ID tubing (5 feet in the well and 5 feet to the OVA) in approximately 15 seconds. The sampling schedule, 1-iminute intervals for 10 minutes, with the intake 5 feet below the top of the well casing will ensure that the connecting tubing has been purged for the first sample at 1 minute, and that no atmospheric air will be drawn into the OVA.

Pipe/Tube ID (inches)	Volume (cc/foot)
0.25	10
0.5	39
1	154
2	618
4	2,471
6	5,560
12	22,240



FP-05a
VAPOR MONITORING CAP
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE
Town of Niagara, New York

Miller Springs Remediation Management, Inc.

FP-06: Decontamination Cleaners

The following cleaners/solvents are used for decontamination. A short summary of the use and precautions to follow when using these cleaners is presented for each cleaner. These summaries are not complete - the manufacturer's guidelines and MSDSs should be read and understood before using these cleaners.

Low-Phosphate Soap: Alconox

Alconox is formulated to be "free rinsing" (e.g. easily rinsed off with running tap or distilled water) with virtually no redeposition of removed (and unwanted) materials, all of which translates to virtually a complete absence of any residues.

Use Alconox at a 1% solution, 2 ½ tablespoons (1 ¼ oz.) per gallon of cold, warm, or hot water. Not for spray machines, Alconox will foam. For critical cleaning, do final or all rinsing in distilled, deionized, or purified water.

Alconox has a shelf life of 2 years after the date of manufacture.

Citri-Clean

CITRI-CLEAN is reportedly safer to use than chlorinated solvents such as Halso 99. However, wear protective gloves and goggles when using CITRI-CLEAN. Do not use near fire, flame, spark or ignition source. It is harmful if swallowed.

Heavily caked grease/NAPL areas should be scraped prior to application.

Standard dilution is 20 oz. of CITRI-CLEAN concentrate in 1 gal. of water. CITRI-CLEAN may by used up to 100% concentrate to remove heavy contamination. CITRI-CLEAN can be applied with sprayers and other conventional means. Allow to stand for 2-10 min. Scrub contaminated area. Flush with water and vacuum loose particles. Reapply to areas where stains remain or where heavy accumulations of oil, grease or other contaminants have occurred.

Halso 99

Halso 99 should be used only to remove NAPL. Halso 99 is the Oxy trade name for the chlorinated solvent, monochlorotoluene. It should be handled with care. It should not be used on equipment that will be used for sampling piezometers or wells that are not impacted by NAPL. Monochlorotoluene is a contaminant in the groundwater and the use of Halso 99 could create low concentrations of monochlorotoluene in water samples.

From the MSDS sheet:

> Avoid breathing vapor, use with adequate ventilation. Wear NIOSH/MSHA approved respiratory protection if there is potential for exposure above the exposure limits. Do not get in eyes, on skin or clothing. Wear personal protective equipment as described in Exposure Controls/Personal Protection (Section 8) of the MSDS. Wash thoroughly with

soap and water after handling. Keep away from heat, sparks, pilot lights, welding operations and open flame. Do not eat, drink or smoke in areas where this material is used. Ground all equipment.

Vapors are heavier than air and will tend to collect in low areas. Avoid use in confined spaces. Areas of poor ventilation could contain concentrations high enough to cause unconsciousness and death. Use approved supplied air respirator following manufacturer's recommendations where vapors may be generated. Do not reuse containers.

Avoid contact with oxidizing agents. [Examples of common oxidizing agents are: sodium hypochlorite (bleach), hydrogen peroxide, potassium permanganate.]

FP-07: Monitoring Well Decommissioning Procedure

The draft document, *Groundwater Monitoring Well Decommissioning Procedures,* (NYDEC Guidance) provides guidelines for decommissioning (abandoning, plugging) environmental monitoring wells when they are no longer needed or when their integrity is suspect or compromised. The following procedure summarizes these guidelines as they apply to the Hyde Park Site.

Preparation

Well information including: current conditions, well logs, and laboratory analytical data collected from soil and/or groundwater will be reviewed. This information will provide the planning health and safety protocol, an appropriate abandonment technique, and for real-time decisions that may be made during the decommissioning process.

Two weeks prior to site mobilization, the property owner and all other interested parties including governing regulatory agencies will be notified of well decommissioning project.

Selection of Well Decommissioning Method

The primary rationale for well decommissioning is to prevent contaminant migration along the disturbed construction zone created by the original well boring. This requires selection of a procedure that considers such factors as:

- Hydrogeological conditions at the well site
- Presence/absence of contamination in the groundwater
- Original well construction details

The four primary decommissioning procedures are:

1. Grouting the casing in-place
2. Perforating the casing followed by grouting in-place
3. Casing pulling
4. Overdrilling

Detailed discussion of the decommissioning selection processes and methods are presented in the NYSDEC Guidance. Based on a review of the NYSDEC Guidance, grouting-in-place appears to the most appropriate technology for bedrock monitoring wells and piezometers at the Site.

Grouting In-Place: Bedrock Monitoring Wells

Grouting in-place is the simplest decommissioning procedure. This method is preferred for bedrock wells with casings 2 inches or greater in diameter. The method involves filling the casing and open interval with a cement-bentonite grout. Unless special conditions exist such as grout flowing into fractures and not filling the borehole, or grout entry into the filter pack of a screened well is desired, the flowing grout mixture will be used:

One 94-pound bag of Type I Portland Cement
3.9 pounds powdered Bentonite
7.8 gallons of water

Based on past experience at the Site, where there is significant vertical flow in the open interval of a well, the flow may create “piping” conditions, an erosion of the cement-bentonite grout described. The piping may result in an interconnection of flow zones within the abandoned well. Therefore, in wells with significant vertical flow, MSRM will modify the NYSDEC procedure as described below. The MSRM procedure is satisfactory for all wells, however, it is more time consuming than NYSDEC procedure. In wells with no apparent vertical flow, the NYSDEC Groundwater Monitoring Well Decommissioning Procedures may be followed.

NYSDEC Procedure

The grout mixture will be placed using a tremie pipe at least one-inch in diameter lowered to within 5 feet of the bottom of the borehole. The borehole will be filled with the grout mixture to the top of bedrock or five feet below grade, whichever is closer to grade. Any groundwater displaced during the placement of grout should be containerized and properly disposed of.

The grout should be allowed to set for 24 hours. The casing is then cut off at five feet below grade or at the top of bedrock. If the grout level has settled from the target 5 feet below grade or top of bedrock, then additional grout should be added. To allow future location of the abandoned well, an iron marker detectable with a metal detector must be left in place. If steel casing (carbon or stainless) is left in the ground, this is a sufficient marker. Otherwise, a marker such as a large bolt should be placed on top of the grout. After adding the grout and iron marker, the unfilled portion of the borehole will be filled to ground surface with material appropriate to the intended land use. For example, concrete or asphalt will be patched with concrete or asphalt of the same type and thickness; grassed areas will be seeded; and topsoil – similar to native soil – will be used to restore the site.

MSRM Modification for Wells with Significant Vertical Flow

The MSRM modification replaces the cement-bentonite grout in the well open interval with bentonite chips. The well open interval will be filled with bentonite chip at least 2 feet into the well casing. The chips will be introduced in 5-foot lifts. A predetermined volume of bentonite chips will be added to the well to create a 5-foot thickness of bentonite. Following the addition of each lift, a heavy cylindrical "tamp" will be lowered on a cable to the top of the bentonite chips and allowed to rest on the bentonite chips. The purpose of the tamp is to ensure that the bentonite chips are fully in place. A tape measure attached to the top of the tamp will be used to check that the actual thickness of bentonite is consistent with the expected thickness for the volume of chips added. The addition of bentonite chips will continue until the seal extends at least 2 feet into the well casing.

Grouting In-Place: 1-inch diameter Bedrock Piezometers

Abandonment of the 1-inch diameter bedrock piezometers will conform to the procedures identified above for a bedrock monitoring well, with the following exceptions.

Because a 1-inch diameter tremie pipe will not fit down the borehole, a smaller diameter tremie pipe will be used. Also, a thinner grout will be used to flow in the smaller diameter tremie pipe as well as to enter the screened interval:

One 94-pound bag of Type III Portland Cement
3.9 pounds powdered Bentonite
7.8 gallons of water

All other abandonment procedures will conform to the above defined procedures for a bedrock monitoring well. Because the screened interval in the 1-inch diameter piezometers is only 2 feet long, there is no concern for interconnection of flow zones and no need to use the MSRM modification to the NYSDEC decommissioning procedures.

Field Oversight and Documentation

The on-site inspector will document all well decommissioning activities according to procedures outlined in Appendix B-3. Additionally, records and forms will be maintained for the duration of the well decommissioning project, including the Monitoring Well Field Inspection Log and the Well Decommissioning Record. Additional well decommissioning forms available via NYSDEC include the Inspector's Daily Report, Problem Identification Report, and the Corrective Measures Report. Samples of these forms are presented at the end of this appendix.

All solid waste materials generated during the well decommissioning process will be disposed of properly.

APPENDIX B

IMPLEMENTATION OF FIELD ACTIVITIES

B. IMPLEMENTATION OF FIELD ACTIVITIES

B.1 PREPARATION FOR FIELD SAMPLING ACTIVITIES

B.1.1 NOTIFICATION

The Gorge Face Seep Inspection requires the participation of Agency personnel, therefore, Agency personnel will be notified four weeks prior to each event. The Agency will be notified two weeks prior to all other field activities described in this PMP, as well. For the safety of all field personnel, Agency representatives observing or participating in a monitoring event must conform to appropriate health and safety practices. Agency representatives are welcome to observe or participate in any monitoring event or visit the Site at any time.

B.1.2 TRAINING

All personnel performing field monitoring/sampling are required to have completed 40 hours of health and safety training in compliance with OSHA 1910.120. Annually, an 8-hour health and safety training class must be attended to maintain compliance with current OSHA 1910.120 requirements. Further, all field personnel must be familiar with the health and safety requirements defined in the Site-Specific Health and Safety Plan for Operation and Maintenance Activities. A copy of this plan is available at both the GSHI Hyde Park an Love Canal offices.

Field personnel must be thoroughly trained before using any field sampling equipment that they are responsible to operate. This includes the operation and calibration of all instruments. Field personnel must review, understand, and conform to the appropriate field procedures presented in Appendix B.

B.1.3 EQUIPMENT PREPARATION

Approximately two to four weeks prior to sampling, the equipment required for the monitoring program should be checked to ensure that it is clean and operates properly. Any missing or broken equipment or accessories should be replaced or repaired. The equipment condition, and calibration if necessary, will also be checked prior to use in the field.

Most instruments require routine calibration. Calibration may be performed as part of routine equipment maintenance or during field activities. Recommended calibration schedules are normally provided in equipment owner's manuals. Vendors' data and/or user manuals are available on Site for all equipment. Records of calibrations performed as part of routine equipment maintenance, as well as factory calibrations, should be maintained in GSHI files.

B.1.4 SAMPLE CONTAINERS

Bottles for all regularly scheduled sampling events will be provided by the laboratory. The MSRM Field Sampling Manager is responsible for contacting the laboratory to order the appropriate sample bottles, with preservatives if required.

B.2 GENERAL FIELD PROCEDURES

Certain activities can adversely affect sample quality; therefore, it is imperative that the following rules are obeyed during implementation of field activities:

- do not smoke;
- do not use insect repellents;
- do not use wasp/hornet spray near a well;
- do not use aftershaves, cologne, or astringents;
- be aware of wind direction. Do not run vehicle or small engines upwind of a well being sampled;
- be cognizant of traffic fumes and nearby activities. Suspend sampling if fumes are strong. Make a notation of any such observations on the field log; and
- do not handle or pour gasoline or fuel oils near sampling locations.

B.2.1 HEALTH AND SAFETY

All sampling personnel shall have read the Site-Specific Health and Safety Plan for Operation and Maintenance Activities. Health and safety monitoring requirements and appropriate personal protective equipment (PPE) are defined in that plan. A copy of the plan is available at both the GSHI Hyde Park and Love Canal offices.

During sample collection or monitoring, basic health and safety rules listed below should be applied.

- Wear; at minimum, a modified OSHA Level D PPE: Safety glasses, long sleeve shirts, full length pants, and industrial quality work boots.
- Wear hard hats in any areas where there is a potential for objects falling from overhead, or where there is fixed piping or obstructions at head level.
- Do not eat, drink, or smoke during sampling.
- Be aware of potential slip, trip, and fall hazards and uneven terrain.
- Be aware of the hazards of working with portable machinery, electrically operated equipment, gasoline powered equipment, and high-pressure air.
- Use proper lifting techniques when lifting is required.
- Be aware of moving vehicles when sampling place along roads; use safety cones and a flagman as necessary.
- Handle sediment and water removed during sampling activities as if contaminated.
- Use caution when opening protective covers on wells as wasps, hornets, bees, snakes, or other wildlife may be present.

B.2.2 FIELD CALIBRATION OF EQUIPMENT

In addition to factory/laboratory calibration of field equipment, certain instruments require field calibration prior to use and as field conditions (temperature, humidity, wind, etc.) change throughout the day. The schedule for such calibration is generally defined by the manufacturer. The manufacture's recommendations should be available to field personnel for review and should be conformed to, to the extent practicable.

B.2.3 CLEANING/DECONTAMINATION REQUIREMENTS

Any equipment not dedicated for use at a specific location must be cleaned prior to use and decontaminated between sampling locations. Cleaning/decontamination protocols are defined in the appropriate Field Procedures.

B.2.4 INVESTIGATION DERIVED WASTE

During investigation and remediation activities at the Site various waste streams are generated including: solid disposals (i.e., Tyveks, gloves, tubing, etc.), purge water, decontamination fluids, and potentially NAPL. Proper management of wastes are defined in Field Procedure FP-01a.

B.3 DOCUMENTATION

Field conditions, collection and handling of samples, as well as information regarding each sample collected will be recorded and stored on standardized forms and/or in a designated project field notebook, paper or electronic Certain information is recorded in the field directly on a standardized form (e.g., Groundwater Field Sample Purge Record form or Chain-of-Custody form), and some is recorded and remains in the field notebook (i.e., weather conditions, description of site activities, etc.). This type of documentation along with chain-of-custody documentation provides a permanent record of all significant activities completed during a field investigation. All notebooks and logs should be completed using waterproof pens to prevent smudging if the notes get wet in the field. Once complete, the notebooks, standardized forms, and logs should be signed and dated on the bottom of each page. All field notes shall be stored at the Miller Springs office at Love Canal.

B.3.1 FIELD NOTEBOOK/RECORDS

The field team may use bound notebooks, sample collection logs, or electronic notebooks to record daily logs, sampling events and field observations. Regardless of the media, entries should be dated and signed (or initialed) by the person making the entry. Entries on paper should be made with waterproof ink. The type of information to be recorded in the field includes:

- date;
- time;
- field calibrations performed during the sampling;
- location/sample ID;
- weather conditions (temperature, cloud cover, humidity, wind, etc.);
- sample crew and/or Agency names;
- work progress;
- control samples;

- delays; and
- comments:
  - unusual situations;
  - well damage;
  - departure from established QA/QC field procedures;
  - instrument problems; and
  - accidents.

B.3.2 SAMPLE IDENTIFICATION

Sample labels shall be affixed to each sample container (not the caps). The labels shall be completed in waterproof ink. All labels, including self-adhesive labels, should be taped to the sample containers with clear package sealing tape. The labels will include the following information:

- sample number/identification code;
- name/initials of collector;
- date and time of collection;
- Site name;
- project number;
- required analysis; and
- type of preservation (if applicable).

B.4 SAMPLE CUSTODY

The Field Personnel are responsible for the care and custody of the samples collected until they are personally delivered to the analytical laboratory or entrusted to a courier. Immediately upon collection, samples requiring refrigeration will be placed in an insulated cooler and chilled with ice to maintain a temperature of approximately 4°C. Packing materials are required to prevent bottle breakage. Samples that are not shipped to the laboratory on the same day must be monitored to ensure that the 4°C temperature is maintained. Care must also be taken to ensure that the samples do not freeze in cold weather.

B.4.1 CHAIN-OF-CUSTODY DOCUMENTATION

Sample custody procedures are designed to provide documentation of preparation, handling, storage and shipping of collected samples. In order to maintain the integrity of samples, chain-of-custody procedures will be followed. The Chain-of-Custody procedures are designed to ensure that:

- the samples are not tampered with;
- all persons handling the samples can be traced; and
- all persons handling the samples are accountable.

Chain-of-custody forms will be completed to the fullest extent possible prior to sample shipment. These forms will include the following information:

- sample number;
- time collected;
- date collected;
- sample matrix;
- number of containers;
- parameters to be tested;
- preservative (if applicable); and
- name of sampler.

These forms should be filled out in a legible manner, using waterproof ink, and should be signed by the sampler. Similar information will be provided on the sample label, which is securely attached to the sample bottle. In addition, separate sampling forms will be used to document collection, filtration, and preparation procedures.

B.4.2 TRANSFER OF CUSTODY AND SHIPMENT

The following procedures will be used when transferring custody of samples:

- Samples will always be accompanied by a Chain-of-Custody record. When transferring samples, the individuals relinquishing and receiving them will sign, date, and note the time on the record. This record documents sample custody transfer from the sampler, often through another person, to the laboratory. Upon arrival at the laboratory, internal custody procedures will be followed;
- Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis, with a separate custody record accompanying each shipment. Shipping containers will be sealed for shipment to the laboratory. At least one copy of the Chain-of-Custody should be sealed

within the shipping container. One copy should be retained at the Site and a photocopy should be transmitted to the Laboratory Coordinator listed on Table 1.1. The method of shipment, courier name, and other pertinent information will be entered in the remarks section of the custody record;

- All shipments will be accompanied by the Chain-of-Custody record, which identifies the contents of the containers. The original record will accompany the shipment and a copy will be retained by the field sampler; and
- Proper documentation will be maintained for shipments by common carrier (i.e., waybills or bills of lading). (Note: Most common carriers, i.e., FedEx or UPS) will <u>not</u> sign chain-of-custody records).

B.4.3 SAMPLE SHIPMENT PROCEDURES

The following procedures will be followed when shipping samples for laboratory analysis:

- Samples requiring refrigeration will be promptly chilled with ice or "Blue Ice" to a temperature of 4 °C (±2°C) and packaged (with bubble wrap to prevent bottle breakage) in an insulated cooler for transport to the analytical laboratory;
- Only shipping containers which meet all applicable State and Federal standards for safe shipment will be used;
- The shipping containers will be sealed with tape and a Chain-of-Custody seal. Tape is wrapped around the cooler in two locations (across hinges) and the custody seal placed across the cooler opening. This allows the receiver to quickly identify any tampering that may have taken place during transport to the laboratory;
- A copy of the field Chain-of-Custody document will be placed inside the shipping container in a sealed plastic envelop (Ziploc bag); and
- Shipment of all analytical samples will be by overnight courier. Samples should be shipped to the laboratory within 48 hours of collection.

B.5 FIELD AUDITS

During data collection activities, an unannounced field audit may be conducted to determine whether proper field procedures are being adhered to.

APPENDIX C

ANALYTICAL REQUIREMENTS

C. ANALYTICAL REQUIREMENTS

C.1 ANALYTICAL METHODS

The analytes for each monitoring program are discussed with the PMP. Table C.1 summarizes the analytical methods to be used for each of the analyses. Table C.2 presents the analytes to be reported under each methodology.

C.2 ANALYTICAL QUALITY ASSURANCE /QUALITY CONTROL

To ensure certainty in the data generated during monitoring at the Site, quality assurance/quality control sampling will be implemented as specified below.

C.2.1 FIELD DUPLICATE SAMPLES

Field duplicate samples are used to assess field sampling and laboratory analytical repeatability. Field duplicate samples are to be collected at a frequency of one for each ten grab samples submitted for analyses. Field duplicates will be submitted "blind" to the laboratory. That is, a name shall be assigned that is different than the original sample name, and should not contain the abbreviation “DUP”. Names should not be used that might cause confusion with other sample locations, or potential sample locations (i.e. future piezometers).

C.2.2 MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

Matrix Spike/Matrix Spike Duplicate Samples (MS/MSD) are submitted to allow the laboratory to assess potential interference with the analytical results related to the composition of the sample matrix. MS/MSD samples require extra volume to be collected and submitted with an investigative sample to allow the laboratory to perform internal QA/QC testing of method precision and accuracy. MS/MSD samples are to be submitted at a frequency of one per 20 samples or one per week, whichever is more frequent.

C.2.3 RINSE BLANK SAMPLES

Rinse blanks from the disposable nitrile gloves, the vinyl tubing, the disposable bailers, and from an item of cleaned, non-dedicated sampling equipment will be collected to analyze for trace contaminants that may be attributable to these materials. These samples will be collected by rinsing the above equipment with deionized water from the on-Site deionizer and collecting the rinse water into a set of sample containers. Rinse blanks will be analyzed for the same parameters as the investigative samples.

C.2.4 TRIP BLANK SAMPLES

Trip blank samples consisting of analyte-free water will be submitted to the laboratory for VOC analyses at a frequency of one per each sample shipment container of aqueous VOC samples. Trip blanks will be provided by the Contract Laboratory.

The laboratory will ship trip blank samples (analyzed for VOCs only) to the Site and the trip blanks will be shipped back to the laboratory without being opened in the field. Trip blank analyses will provide a measure of potential cross-contamination of samples during shipment, handling, and from ambient conditions at the Site.

C.2.5 BOTTLES, SAMPLE PRESERVATION, AND HOLDING TIMES

Sample containers will be provided by the Contract Laboratory. Preservation and holding times required for each analysis will be provided by the designated Laboratory Coordinator on Table 1.1.

C.2.6 CONTRACT LABORATORY

The laboratory providing contract analytical services for analysis of samples shall be an independent commercial laboratory which has current New York State Department of Health Certification to perform environmental analyses for the parameters required. Analytical arrangements will be made by the Laboratory Coordinator.

TABLE C.1
ANALYTICAL METHODS
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

Parameter Group	Method
Volatile Organic Compounds	SW-846 8260
Semi-Volatile Organic Compounds	SW-846 8270
Pesticides	SW-846 8081
Polychlorobiphenyls as Aroclor 1248	EPA 680
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	SW-846 8290
Chloride	EPA 300
Total Organic Carbon (TOC)	EPA 415.1
Phosphorous	EPA 365
Total Phenolics	EPA 420.2
Organic Acids	OxyChem HPLC Method
Sulfate	EPA 300

TABLE C.2
PARAMETERS BY ANALYTICAL METHOD
PERFORMANCE MONITORING PLAN
HYDE PARK LANDFILL SITE

Method	VOC Parameters	
8260B		
	1,1,1-Trichloroethane	Ethylbenzene
	1,1,2,2-Tetrachloroethane	Methylene chloride
	1,1,2-Trichloroethane	m-Monochlorobenzotrifluoride
	1,1-Dichloroethane	o-Monochlorobenzotrifluoride
	1,1-Dichloroethene	p-Monochlorobenzotrifluoride
	1,2,4-Trichlorobenzene	Styrene
	1,2-Dichlorobenzene	Tetrachloroethene
	1,2-Dichloroethane	Toluene
	1,2-Dichloropropane	trans-1,2-Dichloroethene
	1,3-Dichlorobenzene	trans-1,3-Dichloropropene
	1,4-Dichlorobenzene	Trichloroethene
	2-Chlorotoluene	Trichlorofluoromethane
	3-Chlorotoluene	Vinyl acetate
	4-Chlorotoluene	Vinyl chloride
	Benzene	Xylene (total)
	Bromodichloromethane	
	Bromoform	
	Bromomethane (Methyl Bromide)	
	Carbon disulfide	
	Carbon tetrachloride	
	Chlorobenzene	
	Chloroethane	
	Chloroform (Trichloromethane)	
	Chloromethane (Methyl Chloride)	
	cis-1,2-Dichloroethene	
	cis-1,3-Dichloropropene	
	Dichlorodifluoromethane	

Method	SVOC Parameters
8270C	
	2,4,6-Trichlorophenol
	2,4-Dichlorophenol
	2,4-Dimethylphenol
	2,4-Dinitrophenol
	2-Chloronaphthalene
	2-Chlorophenol
	2-Nitrophenol
	4,6-Dinitro-2-methylphenol
	4-Chloro-3-methylphenol
	4-Nitrophenol
	Acenaphthene
	Acenaphthylene
	Anthracene
	Benzo(a)anthracene
	Benzo(a)pyrene
	Benzo(b)fluoranthene
	Benzo(g,h,i)perylene
	Bis(2-chloroethoxy) methane
	Bis(2-ethylhexyl) phthalate
	Butyl benzyl phthalate
	Chrysene
	Dibenz(a,h)anthracene
	Diethyl phthalate
	Dimethyl phthalate
	Di-n-butyl phthalate
	Di-n-octyl phthalate
	Fluoranthene
	Fluorene
	Hexachlorobenzene
	Hexachlorobutadiene
	Hexachlorocyclopentadiene
	Hexachloroethane
	Indeno(1,2,3-cd)pyrene
	Isophorone
	Naphthalene
	Octachlorocyclopentene
	Pentachlorophenol
	Phenanthrene
	Phenol
	Pyrene

Method	Organochlror Pesticide Parameters
8081A	
	4,4'-DDD
	4,4'-DDE
	4,4'-DDT
	Aldrin
	alpha-BHC
	beta-BHC
	Chlordane - not otherwise specified
	delta-BHC
	Dieldrin
	Endosulfan I
	Endosulfan II
	Endosulfan sulfate
	Endrin
	Endrin aldehyde
	gamma-BHC (Lindane)
	Heptachlor
	Heptachlor epoxide
	Methoxychlor
	Perchloropentacyclodecane (Mirex)

Method	Organic Acids
	Benzoic Acid
	Chlorendic Acid
	2-Chlorobenzoic Acid
	3-Chlorobenzoic Acid
	4-Chlorobenzoic Acid

APPENDIX D

APL PLUME FLUX MONITORITORING:

AFW/APW COMPOSITE SAMPLING METHODOLOGY

D. APL PLUME FLUX MONITORITORING: AFW/APW COMPOSITE SAMPLING METHODOLOGY

D.1 INTRODUCTION

The *Stipulation on Requisite Remedial Technology (RRT) Program* (the RRT) required that a "composite sample [be prepared] from the flux monitoring wells and the APL Plume Containment System purge wells installed at the Gorge Face." The composite sample was to be prepared using aliquots from each of these wells "based on the proportion of groundwater flow represented by each well." Using the analytical results from this composite sample, a mass flux of select contaminants discharging to the Niagara River gorge was calculated. This sampling program is the APL Plume Flux Monitoring program.

Nine flux monitoring wells were installed for the RRT monitoring program: AFW-1U, AFW-1M, AFW-1L, AFW-2U, AFW-2M, AFW-2L, AFW-3U, AFW-3M, and AFW-3L. There are two APL Plume Containment System purge wells: APW-1 and APW-2. Composite sampling began in August 1999 and continued quarterly through May 2002. The results of this monitoring demonstrated that based on the composite sampling, the mass flux levels were well below the flux allowances defined in the RRT.

The APL Plume Flux Monitoring was temporarily stopped in 2002 for Site investigation activities which were subsequently completed in 2004. During the Site investigations, six of the flux monitoring wells (AFW-1U, AFW-1M, AFW-1L, AFW-2U, AFW-2M, and AFW-2L) were retrofit with small-diameter piezometers designed to discretely monitor bedding-parallel flow zones in the bedrock. Due to the retrofitting, and based on improved understanding of groundwater flow in the bedrock, the apportionment of composite aliquots from each monitoring point to the composite sample was reassessed.

This appendix presents the new sample aliquots for the composite sample and calculations to determine the mass flux discharging to the gorge. Sampling frequency, analytical parameters, and Flux Action Levels are defined in Tables 2.1 and 5.3 of the Performance Monitoring Plan.

D.2 PROPOSED COMPOSITE SAMPLE ALIQUOT DETERMINATION

As part of the hydrogeologic characterization of the Site completed between 2002 and 2004, two of the AFW clusters (AFW-1 and AFW-2) were retrofitted with 1-inch diameter piezometers. As a result, new aliquots have been defined for the APW/AFW composite groundwater sample.

The most appropriate method of assessing the groundwater flow rate, Q , is to use Darcy's Law:

$$Q = K\ i\ A \qquad (1)$$

Where

Q = flow rate

K = hydraulic conductivity

i = hydraulic gradient, and

A = cross-section area; A = Thickness (t) times Width (w)

$$T = Kt$$

Where

T = Transmissivity

Substituting transmissivity into equation 1, yields: $Q = T\ i\ w$ (2)

A transmissivity value has been determined for each well and piezometer. The width of flow represented by a well/piezometer was determined using the midpoint distances between wells/piezometers. The T and w values are presented in the following tables. The hydraulic gradient difficult to determine for the flow zones. For the aliquot calculation, a uniform gradient will be assumed in each flow zone.

Transmissivities were calculated for each of the wells to be used in the composite sample and are tabulated below.

Transmissivity Values

Well I.D.	*Transmissivity (ft^2/day)*	*Notes*
APW-1	20	Pumped well drawdown
APW-2	12	Pumped well drawdown
AFW-1-06	2	Slug test
AFW-1-07	<<1	Slug test
AFW-1-09	<<1	Slug test
AFW-1-11	3	Slug test
AFW-2-04	63	Slug test
AFW-2-05	11	Slug test
AFW-2-06	<<1	Slug test
AFW-2-07	<<1	Slug test
AFW-2-09	<<1	Slug test
AFW-2-11	<<1	Slug test
AFW-3U	760	Slug test
AFW-3M	130	Slug test
AFW-3L	<<1	Slug test

Values of <<1 are so small that these zones do not contribute a significant volume to the composite sample, and representative samples are difficult to collect. Therefore, no sample will be collected from these zones.

A summary of the appropriate aliquot volume was determined and is tabulated below.

Calculated Sample Aliquots

Well I.D.	*Transmissivity (ft2/day)*	*Representative Width (ft)*	*Hydraulic Gradient **	*Relative Percent of Flow*	*Required Volume (L)*
APW-1	20	640	1	0.9	0.080
APW-2	12	830	1	0.7	0.062
AFW-1-06	2	1470	1	0.2	0.018
AFW-1-11	3	1470	1	0.3	0.027
AFW-2-04	63	1550	1	6.8	0.609
AFW-2-05	11	1550	1	1.2	0.106
AFW-3U	760	1460	1	76.8	6.915
AFW-3M	130	1460	1	13.1	1.183
				Total	9.000

* If a uniform gradient is assigned, the actual value of the gradient does not affect the calculated flow percentages.

\- No sample collected from these intervals.

D.3 WELL PURGING AND SAMPLING PROCEDURES

The wells and piezometers will be sampled according to the field procedures presented in the Performance Monitoring Plan for the Site. These procedures include:

FP-04a for the APL Plume Containment System purge wells,
FP-04b for the 4-inch diameter wells AFW-3U and AFW-3M, and
FP-04c for 1-inch diameter piezometers.

D.4 SAMPLE COMPOSITING PROCEDURES

The composite sample will be prepared by measuring the appropriate aliquot volume from the collected samples from each well with a graduated cylinder. Individual volumes will be poured into a large glass container for mixing. When all of the volumes have been collected, the sample will be mixed and poured into sample containers for shipment to the analytical laboratories.

D.5 MASS FLUX CALCUALTIONS

The mass flux discharge to the gorge is calculated as the product of the composite sample concentration and the groundwater discharge to the gorge, as follows:

$$\text{Flux} = Q \times C$$

Where:

Q	=	groundwater discharge to the gorge
C	=	reported concentration of parameter

The groundwater containment system has been demonstrated to effectively contain the groundwater beneath the Hyde Park Landfill and there is limited, if any, continuing Site-related discharge to the gorge. However, previous evaluations of groundwater flux to the gorge (see the description in the Quarterly Bedrock Monitoring Report, Third Quarter 1997) estimated as much as 60 gallons of groundwater per day discharging to the gorge. This flow rate will continue to be used for consistency with previous evaluations.

For 2,3,7,8-Tetrachlorodibenzo-p-dioxin, the mass flux will be calculated as follows:

$$\text{Flux (g/year)} = 60 \text{ gal/day } \times 3.785 \text{ L/gal} \times C_{(pg/L)} \text{ X } 10^{-12} \text{ g/pg} \times 365 \text{ days/year}$$

Where:

$C_{(pg/L)}$ = reported concentration of parameter in pg/L

For perchloropentacyclodecane (Mirex) and polychlorobiphenyls as Aroclor 1248, the mass flux will be calculated as follows:

Flux (lb/day) = 60 gal/day x 3.785 L/gal x $C_{(ug/L)}$ x 10^{-6} g/ug X .0022 lb/g

Where:

$C_{(ug/L)}$ = reported concentration of parameter in ug/L

Non-detect values for parameters will be assigned a value of zero if the detection level is below the RRT defined Detection Level. However, if the RRT defined Detection Level is exceeded, non-detect results will be assigned a concentration equal to ½ of the method detection limit.