Polymer Applications Site

ERIE, NEW YORK

Site Management Plan

NYSDEC Site Number: 915044

Prepared for:
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Revisions to Final Approved Site Management Plan:

Revision #	Submitted Date	Summary of Revision	DEC Approval Date
1	09/12/13	Remove groundwater monitoring component.	

SEPTEMBER 2013

CERTIFICATION

I, Craig W. Pawlewski certify that I am currently a NYS registered professional engineer and that this Site Management Plan was prepared in accordance with all applicable statues and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

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1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM

1.1 INTRODUCTION

This document is required as an element of the remedial program at the Polymer Applications Site (hereinafter referred to as the "Site") under the New York State (NYS) Inactive Hazardous Waste Disposal Site Remedial Program administered by New York State Department of Environmental Conservation (NYSDEC). The site was remediated by the NYSDEC in accordance with the State Superfund Program requirements.

1.1.1 General

A figure showing the site location of this 6.4-acre site located in the Town of Tonawanda, Erie County, New York is provided in Figure 1-1. The boundaries of the site are more fully described in the metes and bounds site description included as Appendix A that will be part of the Environmental Easement currently being pursued by the NYSDEC.

After completion of the remedial work described in the Remedial Design Documents, some contamination was left in the subsurface at this site, which is hereafter referred to as 'remaining contamination." This Site Management Plan (SMP) was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State.

This SMP was prepared by URS Corporation-New York, on behalf of the NYSDEC, in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May, 2010, and the guidelines provided by NYSDEC. This SMP addresses the means for implementing the Institutional Controls (ICs) and Engineering Controls (ECs) that are required by the Environmental Easement currently being pursued by the NYSDEC for the site.

1.1.2 Purpose

The site contains contamination left after completion of the 2011 remedial action. Engineering Controls have been incorporated into the site remedy to control exposure to remaining contamination during the use of the site to ensure protection of public health and the environment. An Environmental Easement is expected to be granted to the NYSDEC, and recorded with the Erie County Clerk, will require compliance with this SMP and all ECs and ICs placed on the site. The ICs place restrictions on site use, and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. This SMP specifies the methods necessary ensure compliance with all ECs and ICs required by the Environmental Easement for contamination that remains at the site. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

This SMP provides a detailed description of all procedures required to manage remaining contamination at the site after completion of the Remedial Action, including: (1) implementation and management of all Engineering and Institutional Controls; (2) media monitoring; and (3) performance of periodic inspections, certification of results, and submittal of Periodic Review Reports.

To address these needs, this SMP includes two plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; and (2) a Monitoring Plan for implementation of Site Monitoring.

This plan also includes a description of Periodic Review Reports for the periodic submittal of data, information, recommendations, and certifications to NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the environmental easement.

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375, and thereby subject to applicable penalties.

1.1.3 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. In accordance with the Environmental Easement for the site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.2 SITE BACKGROUND

1.2.1 Site Location and Description

The site is located in the Town of Tonawanda County of Erie, New York and is identified as Block 2 and Lot 1 on the Town of Tonawanda Tax Map. The site is an approximately 6.4-acre area bounded by National Grid property to the north, Dunlop property to the south and to the east, and River Road to the west (see Figure 1-2). The boundaries of the site are more fully described in Appendix A – Metes and Bounds.

1.2.2 Site History

Polymer Applications, Inc. operated at the site from 1968 through 1988. Its activities included the manufacture of phenolic resins, phenol-formaldehyde resins, plastics, and various rubber products for use in automotive, paint, and coatings industry.

Disposal practices at the site included the discharge of un-reacted phenols, phenolic resins, and light hydrocarbons into an onsite lagoon. Historical aerial photos also showed significant volumes of liquids within the bermed storage tank areas. In addition, there were several reports of spills from approximately 1977-1988. In July 1988, a major fire severely damaged the process and tank farm areas of the site. An estimated 70,000 gallons of a phenol/solvent mixture were released during the fire.

In 1983, the NYSDEC first listed the site as a Class 2a site in the Registry of Inactive Hazardous Waste Disposal Sites in New York (the Registry). Class 2a was a temporary classification assigned to the site that had inadequate and/or insufficient data for inclusion in any of the other classifications. In 1991, the NYSDEC listed the site as a Class 2 site in the Registry. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

In 1995, a State-funded Remedial Investigation and Feasibility Study (RI/FS) was completed. This investigation characterized the nature and extent of onsite and off-site contamination, and resulted in the March 1996 Record of Decision (ROD) for the site. An emergency removal action was also completed by the U.S. Environmental Protection Agency (EPA) in November 1996. This removal action included the following activities: the classification, stabilization, and disposal of a large number of drums of hazardous substances; the cleaning and decontamination of chemical storage tanks; and the removal and proper disposal of all remaining hazardous substances.

A soil treatability study was performed in 1997 which indicated that the bio-treatment remedy in the ROD could effectively treat the site contaminants. The Remedial Design was completed in February 1999. The property owner delayed access to the site until 2002, when a court order was issued allowing the NYSDEC access to complete the remedy. Remedy construction began in 2005 and was completed in 2006. The soil bio-treatment cell operated until January 2007. It was shut down after sampling of the treatment cell soils indicated that there were no appreciable reductions in the contaminants of concern.

Consequently, a ROD Amendment was issued by the NYSDEC in December 2009. The remedy in the ROD Amendment called for the excavation and proper off-site disposal of all contaminated soils remaining on site which were above the 6NYCRR Part 375 Commercial Soil Cleanup Objectives (SCOs). The ROD Amendment also included provisions for imposition of institutional control in the form of an environmental easement, development of a site management plan, and periodic certification of the institutional controls by a professional engineer. The design for the excavation and removal of contaminated soils was completed in January 2011. Implementation of the

excavation and removal of contaminated soils began in February 2011 and was completed in December 2011.

1.2.3 Geologic Conditions

Based on information from the Remedial Investigation (RI) and investigations previous to the RI, five stratigraphic units were identified at the Polymer Applications site. These units included the following: fill (consisting of black, brown, and gray silt, sand, gravel, brick, crushed stone, coal, foundry sand, fly ash, cinders, wood, and slag), red-brown silt, reddish brown silty clay, red clay, gray gravelly silt and bedrock. A pre-remediation cross-section is presented as Figure 1-3. It should be noted that the geology was altered after construction activities in 2005-2006 and 2011 that are discussed in more detail in Section 1.4 below.

Fill ranged from 2 to 13 feet in thickness. The fill was underlain by up to 14 feet of red-brown silt with some clay, sand, and fine gravel. The red-brown silt was underlain by up to 16 feet of reddish brown silty clay with traces of fine, rounded gravel. The silty clay was moist, firm to stiff and moderately plastic. The silty clay was underlain by up to 30 feet of gray to reddish-gray clay with traces of silt and gravel. The clay was moist to wet, soft, highly plastic, and sticky. The clay was underlain by 5 to 12 feet of gravelly silt which overlies the Camillus Shale bedrock. The bedrock was found at depths between 50 and 67 feet below ground surface (bgs) in onsite borings.

Water-bearing zones at the site occurred in the fill unit, the gravelly silt overlying bedrock, and the bedrock. Groundwater in the fill was perched on top of the underlying lower permeability silt unit. The depth to the perched groundwater in fill ranged from about 2 to 10 feet bgs across the site. Groundwater elevation contour maps from 2005 for the shallow, intermediate and deep zones are presented in Figures 1-4, 1-5 and 1-6, respectively. The maps indicate that the shallow and intermediate groundwater at the site flows to the west, and that the deep groundwater flows to the south and east. It should be noted that some of the monitoring wells shown on Figures 1-4 through 1-6 were destroyed or abandoned during construction activities conducted in 2005-2006 and 2011.

1.3 SUMMARY OF REMEDIAL INVESTIGATION FINDINGS

A RI was performed to characterize the nature and extent of contamination at the site. The results of the RI are described in detail in the Remedial Investigation Report prepared by Parsons Engineering Science, Inc., August 1995. Additional soil sampling was performed after bio-treatment cell construction and reported in the Focused Feasibility Study prepared by URS Corporation, December 2008. Additional groundwater sampling was performed prior to remedial construction in 2005 and reported in the Groundwater sampling Event Letter Report, December 2005. The results of these investigations are summarized below.

Soil

Soil samples were collected from the surface, the shallow and deep soil and monitoring well borings, test pits, and the soil and debris piles for the RI. The majority of the samples were collected from the surface or within the fill unit. Sediment samples were collected from drainage ditches surrounding the site. Volatile organic compounds (VOCs), semi-volatile compounds (SVOCs) and polychlorinated biphenyls (PCBs) were detected in the on-site surface and shallow subsurface soil and sediment samples.

The RI characterized the widespread soil contamination found in on-site and off-site soils. The area of highest soil contamination was the northeast portion of the site that was the location of the chemical storage tanks. Concentrations of total phenols in this area of the site was reported as high as 3,800 ppm, with total VOC concentrations as high as 713 ppm. PCBs were also detected in on-site surface soils in concentrations as high as 20 ppm. Due to the nature of the native silt and clay overburden, contamination was generally limited to soils within 4 feet of the surface. In addition, off-site soil concentrations were significantly lower with concentrations rapidly declining with increased distance from the site. On-site soil boring results for contaminants of concern detected above SCOs in subsurface soils are summarized in Table 1-1 below.

TABLE 1-1

SOIL BORING SAMPLE RESULTS SUMMARY FROM 1995 RI

Compound	Soil Cleanup Objective (SCO) in ppb*	No. of Detections**	No. of Detections above SCO	Range of Detected Concentrations (ppb)
Ethylbenzene	15,400	8	6	2-42,000
Toluene	4,200	9	5	1-41,000
Xylenes (Total)	3,400	9	7	3-250,000
Phenol	84	8	8	560-78,000

* Recommended Site Cleanup Objective, NYSDEC TAGM HWR-94-4046 adjusted based 2.8% average soil organic carbon content. (These SCOs pre-date DER-10 and 6NYCRR Part 375.)

** A total of 13 onsite boring samples were collected.

In 2005 and 2006, as part of remedial construction, soil contaminated by PCBs and soil present in areas where free product was suspected were removed and disposed off-site. In general, on site soil contaminated by VOCs and phenol remained on site and soil excavated from offsite locations contaminated by VOCs and phenol were brought onsite. The VOC and phenol contaminated soils from onsite and offsite locations were consolidated within an on-site bio-treatment cell located in the northeastern portion of the site. The intent of the bio-treatment cell was to reduce contaminants concentrations to acceptable levels. After reviewing monitoring data, it was determined that the bio-treatment cell would not meet soil cleanup objectives, and therefore, a Focused Feasibility Study (FFS) was conducted in 2008. As part of the FFS, soil samples were collected from the bio-treatment cell at 42 locations and depth intervals ranging from 1-2 feet to 7-8 feet bgs. The results from the sampling program are summarized in Table 1-2 below. As shown, the principal compounds detected above SCOs were ethylbenzene, toluene, xylene, and phenols.

TABLE 1-2 2008 SOIL SAMPLING OF BIO-TREATMENT CELL				
	COMPOUND			
Soil Depth in Feet	**Ethylbenzene (ppm)**	**Toluene (ppm)**	**Total Xylenes (ppm)**	**Phenol (ppm)**
1-2	ND-17	ND-1.8	ND-22	ND-490
2-3	ND-760	ND-540	ND-2,100	ND-1,500
3-4	ND-1,200	ND-220	ND-7,900	ND-140
4-5	ND-3,100	ND-200	ND-7,900	ND-140
5-6	ND-3,000	ND-340	ND-1,400	ND-240
6-7	ND-2,300	ND-160	ND-3,400	ND-1,800
7-8	ND-690	ND-7.4	ND-4,400	ND-370
6NYCRR Part 375 Commercial Use SCO	390 ppm	500 ppm	500 ppm	500 ppm
Number of Samples Above SCO	15 of 42	1 of 42	15 of 42	2 of 42
ND = Not Detected				

Site-Related Groundwater

During the RI, groundwater samples were collected from wells screened within the fill unit (shallow), the silty clay unit (intermediate), and the basal silt and sand unit (deep). Several VOCs and SVOCs were detected in the shallow groundwater samples at concentrations exceeding groundwater standards. VOCs of concern in groundwater that exceeded groundwater standards included toluene, ethylbenzene, and xylene. SVOCs of concern in groundwater included phenol, 2-methylphenol, 4-methylphenol, and 2,4-dimethylphenol. These compounds were the same compounds detected in on-site soil samples. RI sampling results for contaminants of concern exceeding groundwater standards are summarized on Table 1-3 below.

TABLE 1-3

RI GROUNDWATER SAMPLE RESULTS SUMMARY

Compound	Groundwater Standard (ppb)*	No. of Detections**	No. of Detections above Standard	Range of Detected Concentrations (ppb)
Ethylbenzene	5	8	7	2-4,500
Toluene	5	10	4	0.6-1,800
Xylenes (Total)	5	14	11	3-31,000
Phenol	1	18	18	2-91,000
2-Methylphenol	1	14	12	0.6-1,000
4-Methylphenol	1	12	11	0.6-1,300
2,4-Dimethylphenol	1	7	7	6-630

* NYSDEC Ambient Water Quality Standards and Guidance Values (TOGS 1.1.1) June 1998, Class GA

** A total of 38 groundwater samples were collected.

VOCs and SVOCs were either not detected or detected at very low concentrations in the intermediate wells screened in the underlying silty clay unit. These data in combination with the low permeability of the silty clay suggested that the silty clay acted as a barrier to vertical migration of contaminants in groundwater.

Many of the wells samples for the RI were re-sampled in October 2005, immediately prior construction of the bio-treatment cell. There were no detections of contaminants of concern above standards, criteria, and guidance (SCGs) in any of the off-site wells. Of the 16 deep and shallow wells that were sampled, only two on-site wells, GW-3S and B-4S, showed contaminants of concern above SCGs. Both of these wells monitor the shallow aquifer, and both are located on the northeast portion of the site (see Figure 1-7). Well GW-3S, located at the center of the contaminant source area, had the most significant groundwater contamination with ethylbenzene at 3,800 ppb (vs. SCG of

5 ppb), toluene at 1,300 ppb (vs. SCG of 5 ppb), total xylenes at 19,000 ppb (vs. SCG of 5 ppb) and phenol at 5,400 ppb (vs. SCG of 1 ppb). At well B-4S, groundwater concentrations of contaminants of concern were ethylbenzene at 180 ppb (vs. SCG of 5 ppb), total xylenes at 140 ppb (vs. SCG of 5 ppb) and phenol at 36 ppb (vs. SCG of 1 ppb).

Underground Storage Tanks

A 30,000 gallon underground storage tank (UST) was cleaned and removed from the site during remedial construction in 2005. The location is shown on Figure 1-7. The tank was originally believed to contain #6 fuel oil.

1.4 SUMMARY OF REMEDIAL ACTIONS

The site was remediated in accordance with the NYSDEC-approved Remedial Design dated January 1999 and Request for Proposal (containing Remedial Design) dated January 2011.

The following is a summary of the Remedial Actions performed at the site:

1. Demolition of selected site structures, some of which contained asbestos-containing material (ACM);
2. Excavation of soil/fill exceeding 6NYCRR Part 375 Commercial SCOs;
3. Execution and recording of an Environmental Easement to restrict land use and prevent future exposure to any contamination remaining at the site;
4. Implementation of Institutional Controls listed in Section 2.3; and
5. Development and implementation of a Site Management Plan for long term management of remaining contamination as required by the Environmental Easement, which includes plans for: (1) Institutional and Engineering Controls, (2) monitoring, and (3) reporting.

Remedial activities were completed at the site in November, 2011.

1.4.1 Removal of Contaminated Materials from the Site

During the 2005-2006 remedial construction, removal activities included the following:

- Removal and off-site disposal (as hazardous waste) of 3,537 tons of contaminated concrete;
- Removal and off-site disposal (as hazardous waste) of approximately 4,250 tons of contaminated soils;
- Removal and off-site disposal (as non-hazardous waste) of approximately 4,270 tons of contaminated soils;
- Removal and off-site disposal of approximately 16 tons of non-friable asbestos;
- Removal and off-site disposal of approximately 2 tons of friable asbestos;
- Removal and off-site disposal of 4 drums of hazardous transformer oil;
- Removal and off-site disposal of 22 drums of non-hazardous transformer oil;
- Removal and off-site disposal of numerous drums of hazardous and nonhazardous chemicals remaining in the site warehouse; and,
- Removal of 5,257 cubic yards of contaminated soils from off-site areas, and consolidation into the on-site bio-treatment cell.

The SCOs for the contaminants of concern (COCs) for the 2005-2006 construction were based on the Technical and Administrative Guidance Memorandum (TAGM) 4046: Determination of Soil Cleanup Objectives and Cleanup Levels (January 24, 1994). The SCOs for some of the primary contaminants of concern were as follows:

- 5,500 ppb ethylbenzene
- 1,500 ppb toluene
- 1,200 ppb xylene
- 30 ppb phenol
- 10,000 ppb PCBs subsurface soil
- 1,000 ppb PCBs surface soil

Figure 1-8 shows areas of soil excavation for construction in 2005 and 2006. During the 2011 remedial construction, removal activities included the following:

- Removal and off-site disposal (as hazardous waste) of approximately 16,000 tons of contaminated soils;
- Removal and off-site disposal (as hazardous waste) of 9 buried drums; and
- Removal and off-site disposal of about 177 tons of asbestos material.

The SCOs for the primary contaminants of concern (COCs) for the 2011 remedial construction were based on 6NYCRR Part 376 Land Disposal Restrictions as follows:

- 300 ppm xylene
- 62 ppm phenol

A figure showing the area of soil excavation in 2011 is shown in Figure 1-9.

1.4.2 Site-Related Treatment Systems

An air and groundwater treatment system was installed during the 2005-2006 remedial construction. This system was dismantled and removed during the 2011 remedial construction. A temporary groundwater treatment system for dewatering was constructed in 2011 and removed at the completion of construction.

No long-term treatment systems remain at the site.

1.4.3 Remaining Contamination

Soils were excavated down to the clay layer which was not contaminated. Some contaminated soils (fill and silty clay) above the clay layer remain on site. Documentation soil sampling was completed at the bottom of the excavation and around the perimeter wall of the excavation to determine the nature and extent of contamination remaining on site. The results of documentation sampling are included in Appendix B.

Table 1-4 below summarizes the results of documentation soil sampling at the site. The locations of those samples that exceeded the site SCOs are shown on Figure 1-10. Figure 1-10 also shows the elevation of samples exceeding the SCOs. Based on the conditions at the site at the end of construction in 2012, the approximate depths of the 5

samples exceeding the SCOs area as follows: B-A6-7.6 feet bgs; B-A5-7.6 feet bgs; B-C1-10.5 feet bgs; B-D2—6.7 feet bgs; and W-D-6.9 feet bgs.

TABLE 1-4

DOCUMENTATION SAMPLE RESULTS SUMMARY

Sample Type	Total Number of Samples[1]	Total Number of Sample Locations[1]	Number of Sample Locations Exceeding the SCO for Xylene	Number of Sample Locations Exceeding the SCO for Phenol	Total Number of Sample Locations Exceeding the SCOs
Bottom	112	107	0	4	4
Wall	46	42	1	0	1
Total	158	149	1	4	5

Note 1: A total of 7 duplicate samples were collected-5 on the excavation bottom and 2 on the excavation walls. Samples from 2 wall locations were resampled after additional excavation; thereby reducing the number of locations where SCOs were exceeded. The 5 locations where SCOs were exceeded are shown on Figure 1-10.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 INTRODUCTION

2.1.1 General

Since remaining contaminated soil exists beneath the site, Engineering Controls and Institutional Controls (EC/ICs) are required to protect human health and the environment. This Engineering and Institutional Control Plan describes the procedures for the implementation and management of all EC/ICs at the site. The EC/IC Plan is one component of the SMP and is subject to revision by NYSDEC.

2.1.2 Purpose

This plan provides:

- A description of all EC/ICs on the site;
- The basic implementation and intended role of each EC/IC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the features to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of EC/ICs, such as the implementation of the Excavation Work Plan for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the site remedy, as determined by the NYSDEC.

2.2 ENGINEERING CONTROLS

The site remedy includes the following engineering controls:

- A drainage swale to promote effective site surface water run-off control; and
- Fencing to restrict site access.

2.3 INSTITUTIONAL CONTROLS

A series of Institutional Controls is required by the ROD to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination; and, (3) limit the use and development of the site to commercial and industrial uses only. Adherence to these Institutional Controls on the site is required by the Environmental Easement and will be implemented under this Site Management Plan. These Institutional Controls are:

- Compliance with the Environmental Easement and this SMP by the Grantor and the Grantor's successors and assigns;
- All Institutional Controls must be maintained as specified in this SMP;
- The Controlled Property must be inspected at a frequency and in a manner defined in the SMP.
- Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in this SMP;

Institutional Controls identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement.

The site has a series of Institutional Controls in the form of site restrictions. Adherence to these Institutional Controls is required by the Environmental Easement. Site restrictions that apply to the Controlled Property are:

- The property may only be used for commercial or industrial use provided that the long-term Institutional Controls included in this SMP are employed.

- The property may not be used for a higher level of use, such as unrestricted, residential, or restricted residential use without additional remediation and amendment of the Environmental Easement, as approved by the NYSDEC;
- All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- The use of the groundwater underlying the property is prohibited without treatment rendering it safe for intended use as determined by the New York State Department of Health (NYSDOH);
- The site owner or remedial party will submit to NYSDEC a certification of institutional controls, prepared by a professional engineer or such other expert acceptable to the NYSDEC, until the NYSDEC notifies the owner or remedial party that this certification is no longer needed. This submittal will: (1) contain certification that the institutional controls put in place are still in place and are either unchanged from the previous certification or are compliant with NYSDEC-approved modifications; and (2) state that nothing has occurred that will impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the NYSDEC. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow.

2.3.1 Excavation Work Plan

The site has been remediated for commercial and industrial uses in accordance with the amended ROD. Any future intrusive work will be performed in compliance with the Excavation Work Plan (EWP) that is attached as Appendix C to this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) prepared for the site. A sample HASP and CAMP are attached as Appendix D to this SMP that are in current compliance with DER-10, and 29 CFR 1910,

29 CFR 1926, and all other applicable Federal, State and local regulations. Based on future changes to State and federal health and safety requirements, and specific methods employed by future contractors, the HASP and CAMP will be updated and re-submitted with the notification provided in Section D-1 of the EWP. Any intrusive construction work will be performed in compliance with the EWP, HASP and CAMP, and will be included in the periodic inspection and certification reports submitted under the Site Management Reporting Plan (See Section 5).

The site owner and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all intrusive work, the structural integrity of excavations, proper disposal of excavation de-water, control of runoff from open excavations into remaining contamination, and for structures that may be affected by excavations (such as building foundations and bridge footings). The site owner will ensure that site development activities will not interfere with, or otherwise impair or compromise, the controls described in this SMP.

2.3.2 Soil Vapor Intrusion Evaluation

Prior to the construction of any enclosed structures located over areas that contain remaining contamination where the potential for soil vapor intrusion (SVI) has been identified, an SVI evaluation will be performed to determine whether any mitigation measures are necessary to eliminate potential exposure to vapors in the proposed structure. Alternatively, an SVI mitigation system may be installed as an element of the building foundation without first conducting an investigation. This mitigation system will include a vapor barrier and passive sub-slab depressurization system that is capable of being converted to an active system.

Prior to conducting an SVI investigation or installing a mitigation system, a work plan will be developed and submitted to the NYSDEC and the New York State Department of Health (NYSDOH) for approval. This work plan will be developed in accordance with the most recent NYSDOH “Guidance for Evaluating Vapor Intrusion in the State of New York”. Measures to be employed to mitigate potential vapor intrusion

will be evaluated, selected, designed, installed, and maintained based on the SVI evaluation, the NYSDOH guidance, and construction details of the proposed structure.

Preliminary (unvalidated) SVI sampling data will be forwarded to the NYSDEC and NYSDOH for initial review and interpretation. Upon validation, the final data will be transmitted to the agencies, along with a recommendation for follow-up action, such as mitigation. SVI sampling results, evaluations, and follow-up actions will also be summarized in the next Periodic Review Report.

2.4 INSPECTIONS AND NOTIFICATIONS

2.4.1 Inspections

Inspections of all remedial components installed at the site will be conducted at the frequency specified in the SMP Monitoring Plan schedule. A comprehensive site-wide inspection will be conducted annually, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Compliance with requirements of this SMP and the Environmental Easement;
- If site records are complete and up to date; and
- Changes, or needed changes, to the remedial or monitoring system;

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3). The reporting requirements are outlined in the Periodic Review Reporting section of this plan (Section 5).

If an emergency, such as a natural disaster occurs, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the EC/ICs implemented at the site by a qualified environmental professional as determined by NYSDEC.

2.4.2 Notifications

Notifications will be submitted by the property owner to the NYSDEC as needed for the following reasons:

- 60-day advance notice of any proposed changes in site use. Seven-day advance notice of any proposed ground-intrusive activities pursuant to the Excavation Work Plan.
- Notice within 48-hours of any damage or defect to the fence that reduces or has the potential to reduce its effectiveness. Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of Controls in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action shall be submitted to the NYSDEC within 45 days and shall describe and document actions taken to restore the effectiveness of the Controls.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser has been provided with a copy of all approved work plans and reports, including this SMP
- Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing.

2.5 CONTINGENCY PLAN

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions. The objectives during any emergency will be to protect human health and safety and the environment. A qualified environmental professional or Site Safety Officer will determine the best course of action for dealing with the emergency and follow-up requirements and actions.

2.5.1 Emergency Telephone Numbers

In the event of any environmentally-related situation or unplanned occurrence requiring assistance, the Owner or Owner's representative(s) should contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. Prompt contact should also be made to the NYSDEC Project Manager. These emergency contact lists must be maintained in an easily accessible location at the site.

Table 2-1: Emergency Contact Numbers

Medical, Fire, and Police:	911
Dig Safely New York:	(800) 962-7962 or 811 (3 day notice required for utility markout)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline:	(800) 457-7362

Table 2-2: Other Contact Numbers

NYSDEC-Division of Environmental Remediation (DER)-Albany, NY	(518) 402-9814
NYSDEC-DER (Region 9)	(716) 851-7220

* Note: Contact numbers subject to change and should be updated as necessary

2.5.2 Map and Directions to Nearest Health Facility

Site Location: 3445 River Road, Town of Tonawanda, New York

Nearest Hospital Name: Kenmore Mercy Hospital

Hospital Location: 2959 Elmwood Avenue, Kenmore, New York

Hospital Telephone: (716) 447-6100

Directions to the Hospital:

1. Head southwest on River Road
2. Take first left on RT 325/Sheridan Drive
3. Turn slight right onto RT 324/Sheridan Drive
4. Turn right onto Elmwood Avenue-Hospital is on right

Total Distance: 3.2 miles

Total Estimated Time: 5 minutes

A map showing the route from the site to the nearest hospital is provided on Figure 2-1.

2.5.3 Response Procedures

As appropriate, the fire department and other emergency response group will be notified immediately by telephone of the emergency. The emergency telephone number list is found at the beginning of this Contingency Plan (Table 2-1). The list will also be posted prominently at the site and made readily available to all personnel at all times.

Contingency Procedures for Fire/Explosion

When fire or explosion appear imminent or have occurred, all normal activity in affected areas will cease. Firefighting will not be done at the risk to site workers. Local fire departments will be contacted in all situations in which fires and/or explosions have occurred. The following steps will be taken for localized fire:

- contact local fire departments;
- move all personnel to a safe upwind location;
- if the emergency is within onsite personnel capabilities, utilize most appropriate means of extinguishing fire (e.g., fire extinguishers, water, covering with soil); and
- once fire is extinguished, containerize and properly dispose of any spilled material, runoff, or soil.

If the situation appears uncontrollable or poses a direct threat to human life, fire departments will be contacted and the Emergency Evacuation Procedures will be implemented.

Contingency Procedures for Spills or Material Releases

If a hazardous waste spill or material release or process upset resulting in probable vapor release is identified, the onsite coordinator will immediately assess the magnitude and potential seriousness of the spill or release based upon:

- Material Safety Data Sheet (MSDS) for the material spilled or released;
- source of the release or spillage of hazardous material;
- an estimate of the quantity released and the rate at which it is being released;
- the direction in which the spill or air release is moving;
- personnel who may be or may have been in contact with the material, or air release, and possible injury or sickness as a result;
- potential for fire and/or explosion resulting from the situation; and
- estimates of area under influence of the release.

If the spill or release is determined to be within the onsite emergency response capabilities, the remedial action will be implemented. If the accident is beyond the capabilities of the onsite personnel, all personnel not involved with the emergency response activity will be evacuated from the immediate area and the appropriate emergency response group(s) will be contacted.

Contingency Procedures for Severe Weather

If severe weather (e.g., high winds, flooding, etc.) is predicted or is observed, the onsite coordinator will institute emergency shutdown procedures, and all personnel will be directed to proceed indoors after completing appropriate shutdown procedures. When the severe weather has passed, the onsite coordinator will direct personnel to inspect onsite equipment to ensure its readiness for operation prior to restarting operations.

If an inspection indicates a fire, explosion, or release has occurred as the result of a severe weather condition, the procedures for those events will be followed.

Contingency Procedures for Physical Injury to Workers

Upon notification that a worker has been injured, the onsite coordinator will immediately determine the severity of the accident, and whether the victim can be safely moved from the incident site. Appropriate medical assistance will be summoned immediately. A report of the injury or incident will be completed as required by the Site Health and Safety Plan.

Minor injuries sustained by workers will be treated onsite using materials from the first aid kits. Whenever possible such treatment will be administered by trained personnel in a "clean zone". Examples of minor injuries include small scrapes and blisters.

Major injuries sustained by workers will require professional medical attention at a hospital. The onsite coordinator will immediately summon an ambulance and contact the hospital to which the injured worker will be transported. The onsite coordinator will notify the NYSDEC manager as soon as practical. The hospital and ambulance should be advised of:

- the nature of the injury;
- whether the injured worker will be decontaminated prior to transport;
- when and where the injury was sustained; and
- the present condition of the injured worker (e.g., conscious, breathing).

Contingency Procedures for Chemical Injury to Workers

Upon notification that a chemical injury has been sustained or severe symptoms of chemical exposure are being experienced, the onsite coordinator will notify the hospital and ambulance of the occurrence. The onsite coordinator will provide, to the extent possible, the following information:

- the nature of the injury (e.g., eyes contaminated);

- the chemical(s) involved;
- the present condition of the injured worker (e.g., conscious, breathing);
- whether the injured worker will be decontaminated prior to transport; and
- when and where the injury was sustained.

Steps will immediately be taken to remove the victim from the incident site using whatever personal protective equipment (PPE) and safety equipment is necessary. Rescuers will check for vital signs and, if possible, remove contaminated outer clothing. If the victim's eyes have been contaminated, personnel trained in administering first aid will flush the victim's eyes with eyewash solution until the emergency response team arrives.

Details on the nature of the contaminant and methods for treating exposure or injury can be obtained from the MSDSs or Occupational Health Guidelines as provided in the Site Health and Safety Plan.

3.0 SITE MONITORING PLAN

3.1 INTRODUCTION

3.1.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the site, and all affected site media identified below. This Monitoring Plan may only be revised with the approval of NYSDEC.

3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

- Reporting requirements;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

The first periodic certification was completed in July 2013. The next periodic certification is required to be completed within 5 years. The frequency thereafter will be determined by NYSDEC.

3.2 MEDIA MONITORING PROGRAM

3.2.1 Groundwater Monitoring

Groundwater monitoring was performed in December 2012 to assess the performance of the remedy. The NYSDEC has determined that subsequent groundwater monitoring is not required. All existing monitoring wells shown on Figure 3-1 are to be properly decommissioned.

3.2.2 Monitoring Well Decommissioning

All monitoring wells shown on Figure 3-1 will be properly decommissioned. Copies of the well construction logs and/or well developments logs are provided in

Appendix E. All waste materials resulting from well decommissioning shall be removed from the site. The materials shall be handled, transported and disposed of in accordance with applicable local, State and Federal regulations.

The NYSDEC will be notified prior to any decommissioning of monitoring wells, and the decommissioning process will be documented in the subsequent periodic report. Well decommissioning without replacement has been approved by the NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "CP-43: Groundwater Monitoring Well Decommissioning Policy".

3.3 SITE-WIDE INSPECTION

Site-wide inspections will be performed on a regular schedule at a minimum of once a year. Site-wide inspections will also be performed after all severe weather conditions that may affect monitoring devices. During these inspections, an inspection form will be completed (Appendix G). The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- General site conditions at the time of the inspection;
- Confirm that site records are up to date.

3.4 MONITORING REPORTING REQUIREMENTS

Forms and any other information generated during regular monitoring events and inspections will be kept on file on-site. All forms, and other relevant reporting formats used during the monitoring/inspection events, will be (1) subject to approval by NYSDEC and (2) submitted at the time of the Periodic Review Report, as specified in the Reporting Plan of this SMP.

All monitoring results will be reported to NYSDEC on a periodic basis in the Periodic Review Report. The report will include, at a minimum:

- Date of event;

- Personnel conducting inspections;
- Description of the activities performed;
- Copies of all field forms completed (e.g., site inspection logs, etc.);
- Results of fence and site-wide inspection; and
- Any observations, conclusions, or recommendations.

Data will be reported in hard copy or digital format as determined by NYSDEC.

4.0 OPERATION AND MAINTENANCE PLAN

4.1 INTRODUCTION

The site remedy does not rely on any mechanical systems, such as sub-slab depressurization systems or air sparge/ soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP.

5.0 INSPECTIONS, REPORTING AND CERTIFICATIONS

5.1 SITE INSPECTIONS

5.1.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in Section 3 Monitoring Plan of this SMP. At a minimum, a site-wide inspection will be conducted annually. Inspections will also be conducted whenever a severe condition has taken place, such as an erosion or flooding event.

5.1.2 Inspection Forms, Sampling Data, and Maintenance Reports

A general site-wide inspection form will be completed during the site-wide inspection (see Appendix G). These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including all system maintenance reports, generated for the site during the reporting period will be provided in electronic format in the Periodic Review Report.

5.1.3 Evaluation of Records and Reporting

The results of the inspection and site monitoring data will be evaluated as part of the IC certification to confirm that the:

- ICs are in place, are performing properly, and remain effective;
- The Monitoring Plan is being implemented; and
- The site remedy continues to be protective of public health and the environment and is performing as designed in the FER.

5.2 CERTIFICATION OF ENGINEERING AND INSTITUTIONAL CONTROLS

After the last inspection of the reporting period, a qualified environmental professional will prepare the following certification:

For each institutional control identified for the site, I certify that all of the following statements are true:

- The institutional control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;
- Access to the site will continue to be provided to the NYSDEC to evaluate the remedy, including access to evaluate the continued maintenance of this control;
- If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;
- Use of the site is compliant with the environmental easement;
- The information presented in this report is accurate and complete;
- I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as Owner's Designated Site Representative for the site.

The signed certification will be included in the Periodic Review Report described below.

5.3 PERIODIC REVIEW REPORT

A Periodic Review Report will be submitted to the NYSDEC periodically. The first report was submitted in July 2013, (i.e., within eighteen months after the approval of the Final Engineering Report). The next Periodic Review Report will be submitted within five years of the first report (i.e., by July 2018). In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review

Report will be prepared that addresses the site described in Appendix A (Metes and Bounds). The report will be prepared in accordance with NYSDEC DER-10 and submitted within 45 days of the end of each certification period. Media sampling results (e.g., SVI evaluation if new structures are proposed) will also be incorporated into the Periodic Review Report. The report will include:

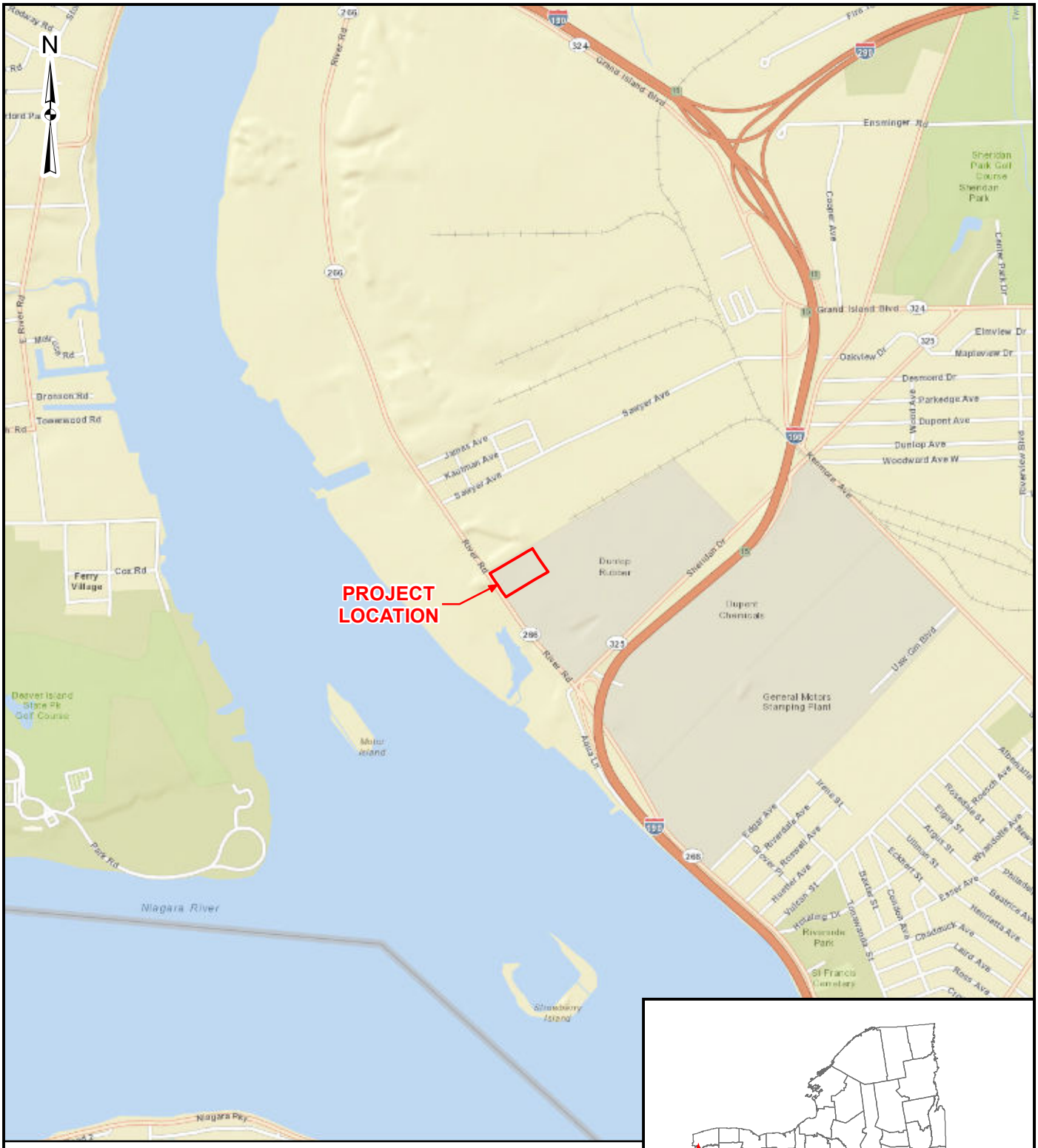
- Identification, assessment and certification of all ICs required by the remedy for the site;
- Results of the required annual site inspections and severe condition inspections, if applicable;
- All applicable inspection forms and other records generated for the site during the reporting period in electronic format;
- Data summary tables and graphical representations of contaminants of concern by media (soil vapor), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format;
- A site evaluation, which includes the following:
    - The compliance of the remedy with the requirements of the site-specific ROD;
    - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring Plan for the media being monitored;
    - Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and
    - The overall performance and effectiveness of the remedy.

The Periodic Review Report will be submitted, in hard-copy format, to the NYSDEC Central Office and Regional Office in which the site is located, and in

electronic format to NYSDEC Central Office, Regional Office and the NYSDOH Bureau of Environmental Exposure Investigation.

5.4 CORRECTIVE MEASURES PLAN

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a corrective measures plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the corrective measures plan until it is approved by the NYSDEC.



Source: ESRI World Street Map

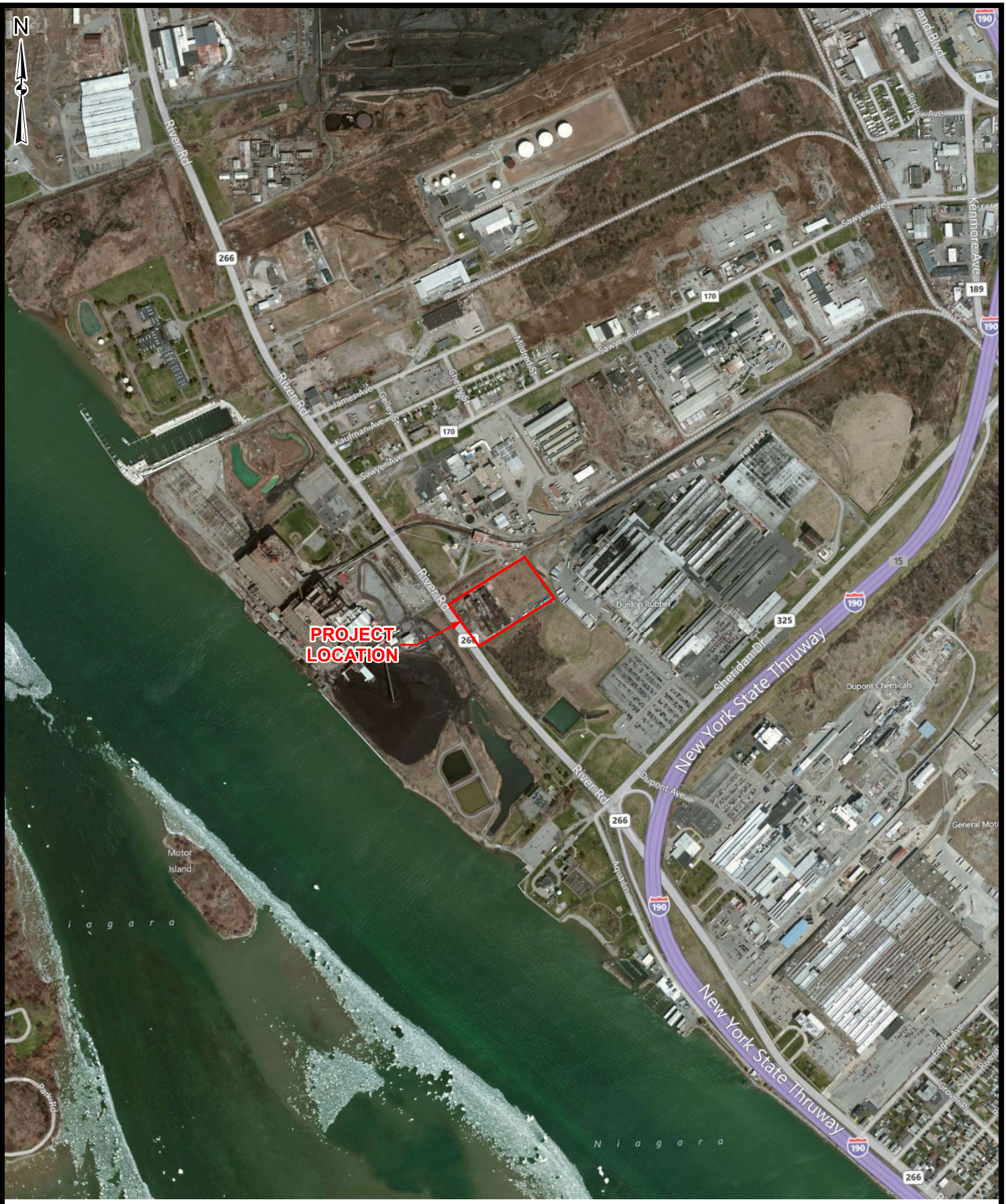
2,000 0 2,000 Feet

N:\11173425.0000\DB\Gis\REPORT (FEB 2013)\SITE LOCATION.mxd 6/28/2013

URS

POLYMER APPLICATIONS SITE
SITE LOCATION MAP
3445 RIVER ROAD, TOWN OF TONAWANDA, NY

FIGURE 1-1



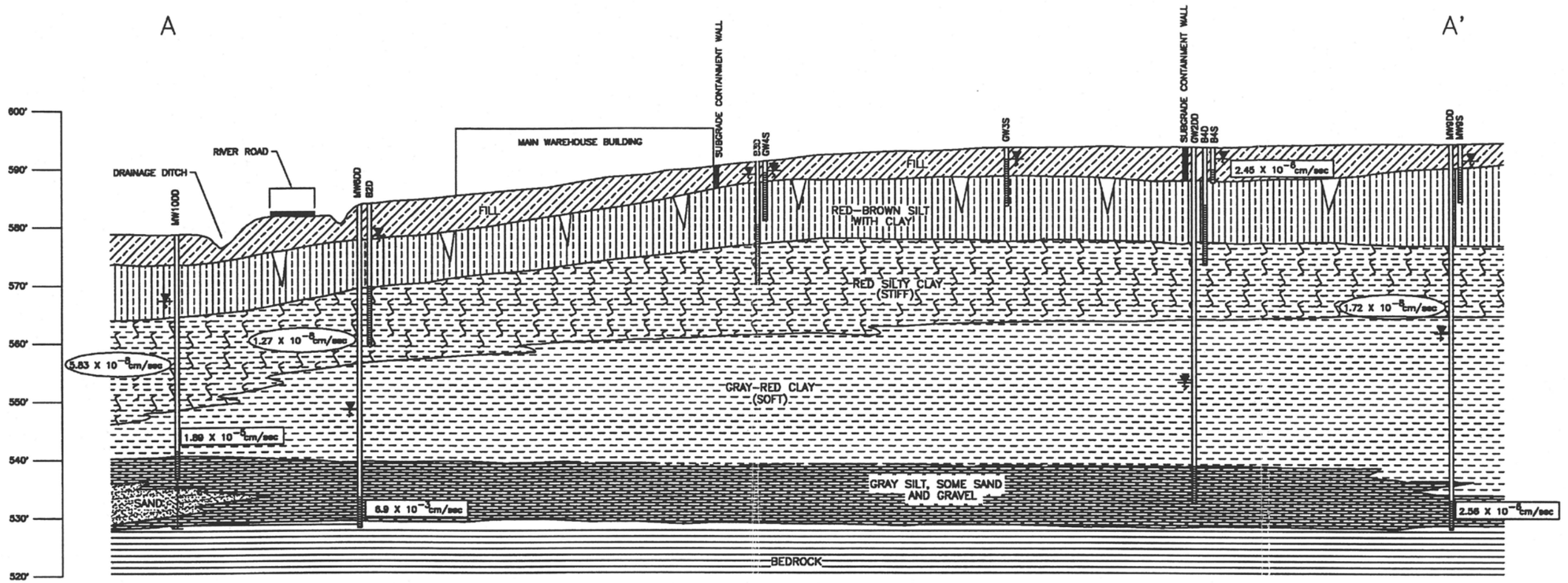
Source: Bing Maps Hybrid © 2010 Microsoft Corporation

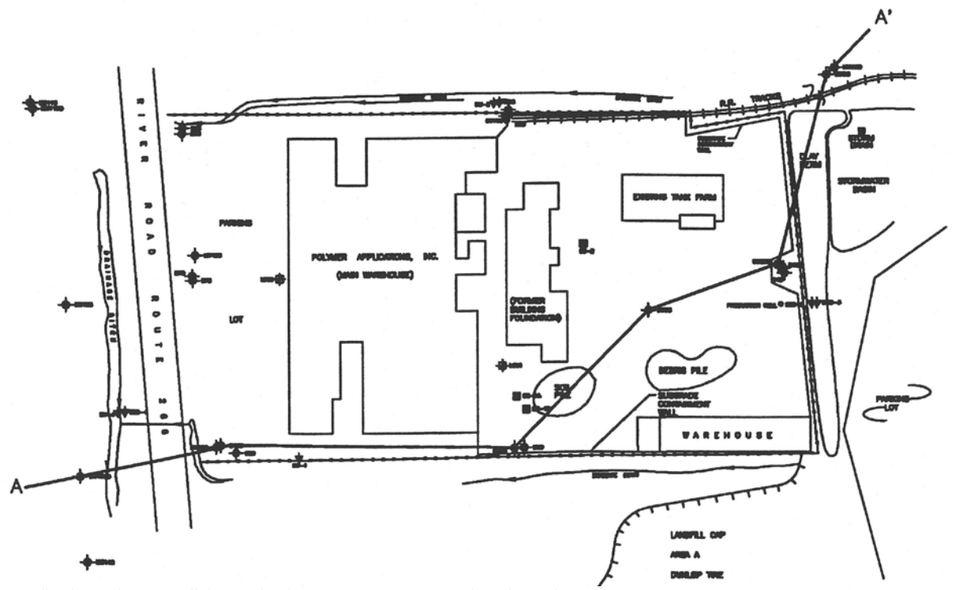
URS

POLYMER APPLICATIONS SITE
SITE AERIAL VIEW

FIGURE 1-2

N:\11173425.0000\DB\Gis\REPORT (JAN 2012)\SITE AERIAL VIEW.mxd 1/5/2012





100' 50' 0 100'
Approximate Scale in Feet
HORIZONTAL SCALE

20' 10' 0 20'
Approximate Scale in Feet
VERTICAL SCALE

5.83 X 10⁻⁸cm/sec — HYDRAULIC CONDUCTIVITY FROM SHELBY TUBE SAMPLES

1.89 X 10⁻⁵cm/sec — HYDRAULIC CONDUCTIVITY FROM SLUG TESTS

WELL SCREEN

GROUNDWATER ELEVATION ON 7/13/94 (IN FEET ABOVE MEAN SEA LEVEL)

LEGEND

- FILL
- SILT WITH DESICCATION CRACKS
- SILTY CLAY
- CLAY
- SILT, WITH SAND AND GRAVEL
- CAMILLUS SHALE BEDROCK

Source: Polymer Applications Site Remedial Investigation Report, Parsons Engineering Science Inc., August 1995

Note: Features shown on this figure represent conditions in 1995 prior to construction activities in 2005-2006 and 2011.

POLYMER APPLICATIONS SITE GEOLOGIC CROSS-SECTION A - A'

URS

FIGURE 1-3

N:\11173425.00000\DB\GIS\REPORT (JAN 2012)\GEOLOGIC CROSS-SECTION.mxd 2/14/2012

N

MW-11S, 576.32

MW-13S, 575.04

MW-14S, 574.11

B-06S, 580.33

DRAINAGE DITCH

RIVER ROAD

PARKING

MW-12S, 580.58

POLYMER APPLICATIONS, INC.
(MAIN WAREHOUSE)

B-05S, 590.95

RAIL ROAD TRACKS

GW-03S, 592.63

MW-09S, 593.15

STORMWATER
BASIN

FENCE

CLAY
BERM

B-04S, 594.92

PARKING LOT

LANDFILL CAP
AREA A
DUNLOP TIRE

576 578 580 582 584 586 588 590 592 594

80 0 80 Feet

Legend

- Monitoring Well
- 580 — Groundwater Elevation Contour
- Groundwater Flow Direction

MW-12S, 580.58
Location ID
Groundwater Elevation (ft amsl)

POLYMER APPLICATIONS SITE
GROUNDWATER ELEVATION CONTOUR MAP
(DECEMBER 7, 2005 - SHALLOW GROUNDWATER)

URS

FIGURE 1-4

N:\11173425.00000\DB\GisIREPORT (JAN 2012)\GW ELEV 120705 SHALLOW.mxd 1/4/2012

N

DRAINAGE DITCH

B-06D, 575.11

B-05D, 587.16

RAIL ROAD TRACKS

576

578

580

582

584

586

588

590

592

PARKING

RIVER ROAD

DRAINAGE DITCH

POLYMER APPLICATIONS, INC.
(MAIN WAREHOUSE)

FENCE

STORMWATER
BASIN

CLAY
BERM

B-04D, 593.97

PARKING LOT

B-02D, 580.49

B-03D, 591.06

LANDFILL CAP
AREA A
DUNLOP TIRE

Legend

- Monitoring Well
- Groundwater Elevation Contour (580)
- Groundwater Flow Direction

B-02D, 580.49
Location ID
Groundwater Elevation (ft amsl)

80 0 80 Feet

POLYMER APPLICATIONS SITE
GROUNDWATER ELEVATION CONTOUR MAP
(DECEMBER 7, 2005 - INTERMEDIATE GROUNDWATER)

URS

FIGURE 1-5

N:\111173425.00000\DB\Gis\REPORT (JAN 2012)\GW ELEV 120705 INTERMEDIATE.mxd 1/4/2012

N

MW-11DD, 568.86

MW-09DD, 567.80

DRAINAGE DITCH

RAIL ROAD TRACKS

568.8

568.6

568.4

568.2

568

PARKING

RIVER ROAD

DRAINAGE DITCH

POLYMER APPLICATIONS, INC.
(MAIN WAREHOUSE)

FENCE

STORMWATER
BASIN

CLAY
BERM

PARKING LOT

MW-08DD, 568.83

B-01DD, 568.81

MW-10DD, 568.29

LANDFILL CAP
AREA A
DUNLOP TIRE

Legend

- Monitoring Well
- 568 — Groundwater Elevation Contour
- Groundwater Flow Direction

B-01DD, 568.81
Location ID
Groundwater Elevation (ft amsl)

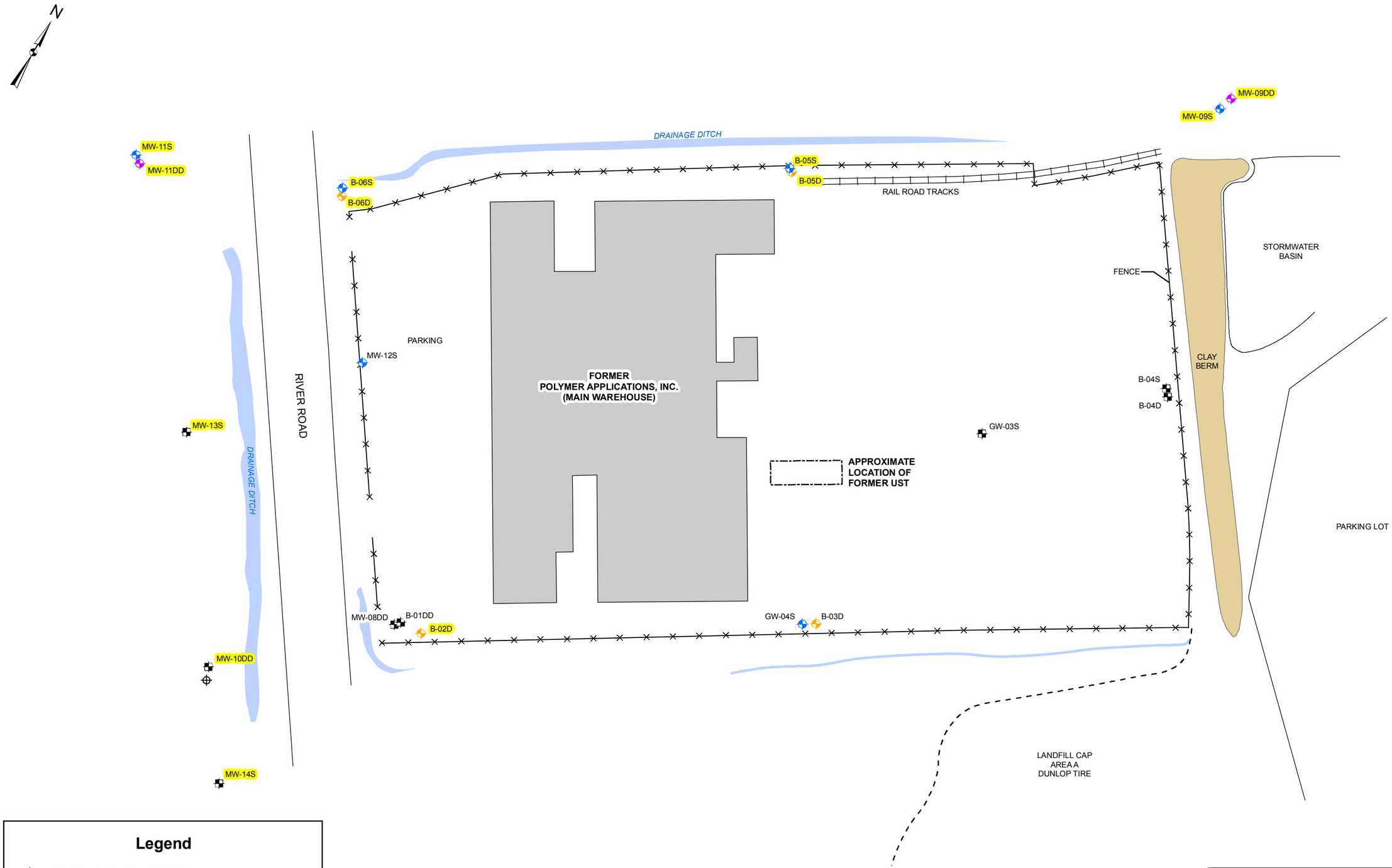
80 0 80 Feet

POLYMER APPLICATIONS SITE
GROUNDWATER ELEVATION CONTOUR MAP
(DECEMBER 7, 2005 - DEEP GROUNDWATER)

URS

FIGURE 1-6

N:\11173425.00000\DB\Gis\REPORT (JAN 2012)\GW ELEV 120705 DEEP.mxd 1/4/2012



Legend

- Well Installed by NRG Energy
- Monitoring Well (Destroyed/Missing)
- Monitoring Well (Deep Groundwater)
- Monitoring Well (Intermediate Groundwater)
- Monitoring Well (Shallow Groundwater)

NOTES:
Monitoring wells, highlighted in yellow, were to be sampled as listed in the Polymer Applications Site Management Plan (URS, March 2012). Monitoring well, GW-04S, was listed as destroyed in the Site Management Plan, but was located during the November 2012 site inspection.

80 0 80 Feet

POLYMER APPLICATIONS SITE
MONITORING WELL AND UST LOCATIONS

URS

FIGURE 1-7

N:\11173425.00000\DB\Gis\MW AND UST LOCATIONS.mxd 8/26/2013

N

DRAINAGE DITCH

RAIL ROAD TRACKS

STORMWATER BASIN

FENCE

PARKING

POLYMER APPLICATIONS, INC.
(MAIN WAREHOUSE)

CLAY BERM

RIVER ROAD

DRAINAGE DITCH

PARKING LOT

LANDFILL CAP
AREA A
DUNLOP TIRE

Legend

Approximate Area of Soil Excavation

80 0 80 Feet

POLYMER APPLICATIONS SITE
2005-2006 SOIL EXCAVATION AREAS

URS

FIGURE 1-8

N:\11173425.00000\DB\Gis\REPORT (JAN 2012)\SOIL EXCAVATION (2005-2006).mxd 1/4/2012

N

DRAINAGE DITCH

RAIL ROAD TRACKS

590

591

RIVER ROAD

PARKING

POLYMER APPLICATIONS, INC.
(MAIN WAREHOUSE)

BUILDING

593

592

593.5

592

593.5

593

FENCE

STORMWATER
BASIN

CLAY
BERM

592.5

592

590

592.5

594

594

591

PARKING LOT

NEW CATALYTIC
OXIDIZER

NEW TREATMENT
BUILDING

CONCRETE BLOCK
BUILDING

Legend

- Existing Subgrade Containment Wall
- Fence
- 592 Contours
- Approximate Limits of Excavation

65 0 65 Feet

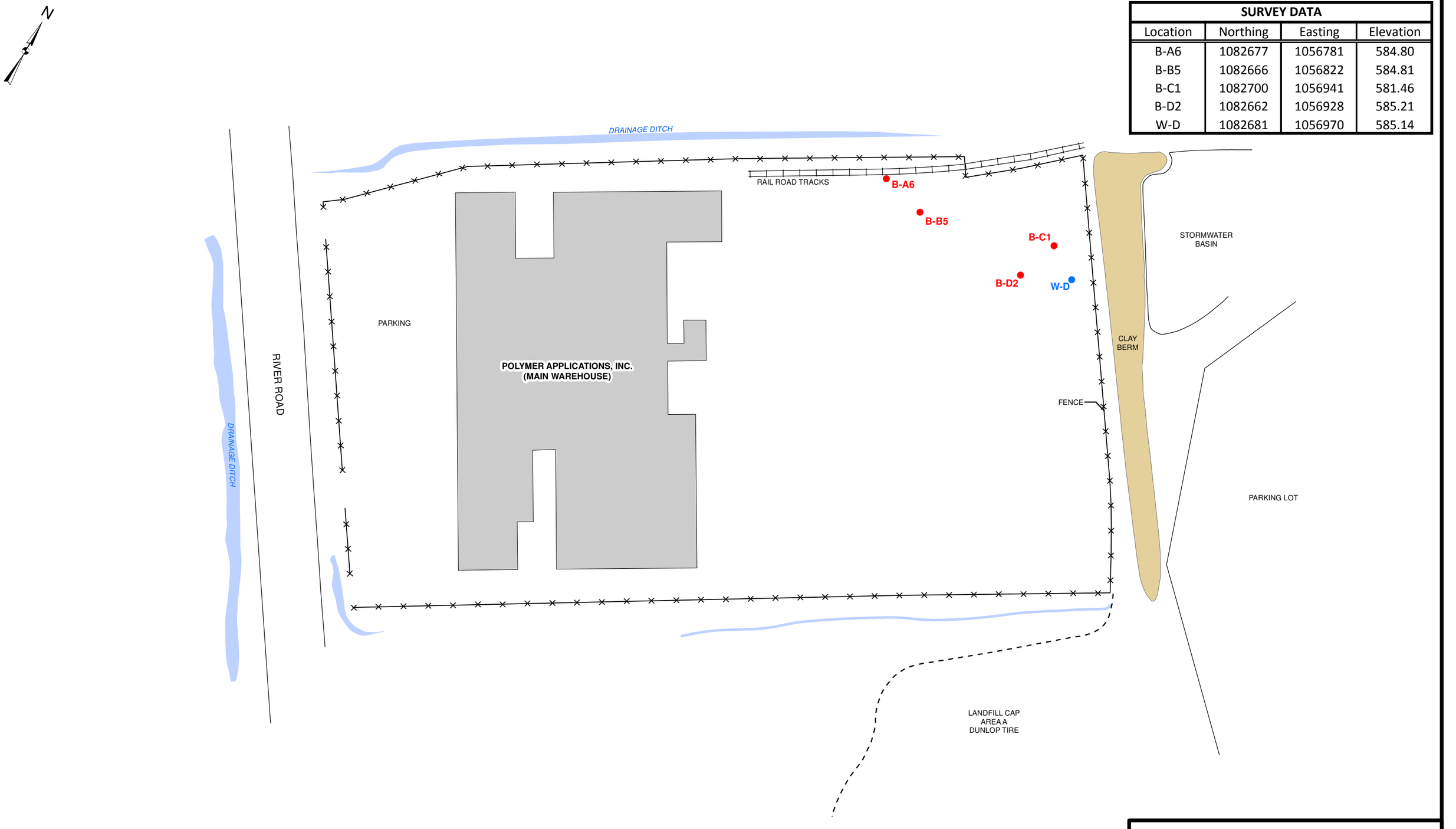
POLYMER APPLICATIONS SITE
2011 SOIL EXCAVATION AREA

URS

FIGURE 1-9

N:\11173425.00000\DB\Gis\REPORT (JAN 2012)\SOIL EXCAVATION (2011).mxd 1/4/2012

SURVEY DATA			
Location	Northing	Easting	Elevation
B-A6	1082677	1056781	584.80
B-B5	1082666	1056822	584.81
B-C1	1082700	1056941	581.46
B-D2	1082662	1056928	585.21
W-D	1082681	1056970	585.14



Legend

- Bottom Sample Location
- Wall Sample Location

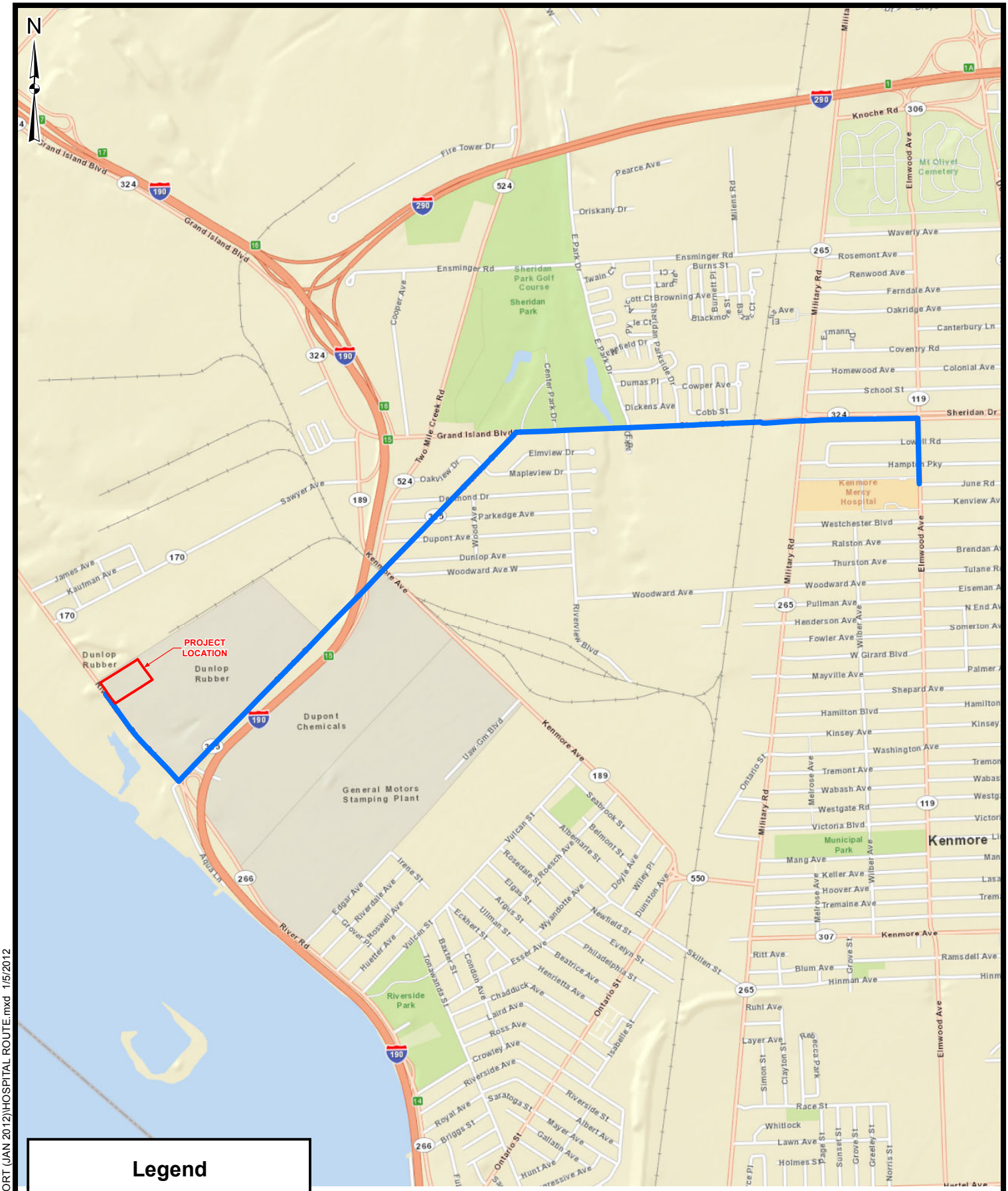
80 0 80 Feet

POLYMER APPLICATIONS SITE
SAMPLE LOCATIONS WITH
CONTAMINANTS ABOVE SCOS

URS

FIGURE 1-10

N:\11173425.00000\DB\Gis\REPORT (JAN 2012)\SAMPLE LOCATIONS.mxd 2/15/2012



N:\11173425.0000\DB\Gis\REPORT (JAN 2012)\HOSPITAL ROUTE.mxd 1/5/2012

URS

POLYMER APPLICATIONS SITE
MAP OF ROUTE TO NEAREST HOSPITAL

FIGURE 2-1

N

MW-11S
MW-11DD
MW-09DD
MW-09S
DRAINAGE DITCH
B-06S
B-06D
B-05S
B-05D
RAIL ROAD TRACKS
STORMWATER BASIN
FENCE
MW-12S
RIVER ROAD
DRAINAGE DITCH
CLAY BERM
PARKING LOT
B-02D
GW-04S
B-03D
LANDFILL CAP
AREA A
DUNLOP TIRE

Legend

- Monitoring Well (Deep Groundwater)
- Monitoring Well (Intermediate Groundwater)
- Monitoring Well (Shallow Groundwater)

80 0 80 Feet

POLYMER APPLICATIONS SITE MONITORING WELL LOCATIONS TO BE DECOMMISSIONED

URS

FIGURE 3-1

N:\11173425.00000\DB\Gis\DECOMMISSIONED MW (REV).mxd 9/11/2013

APPENDIX A

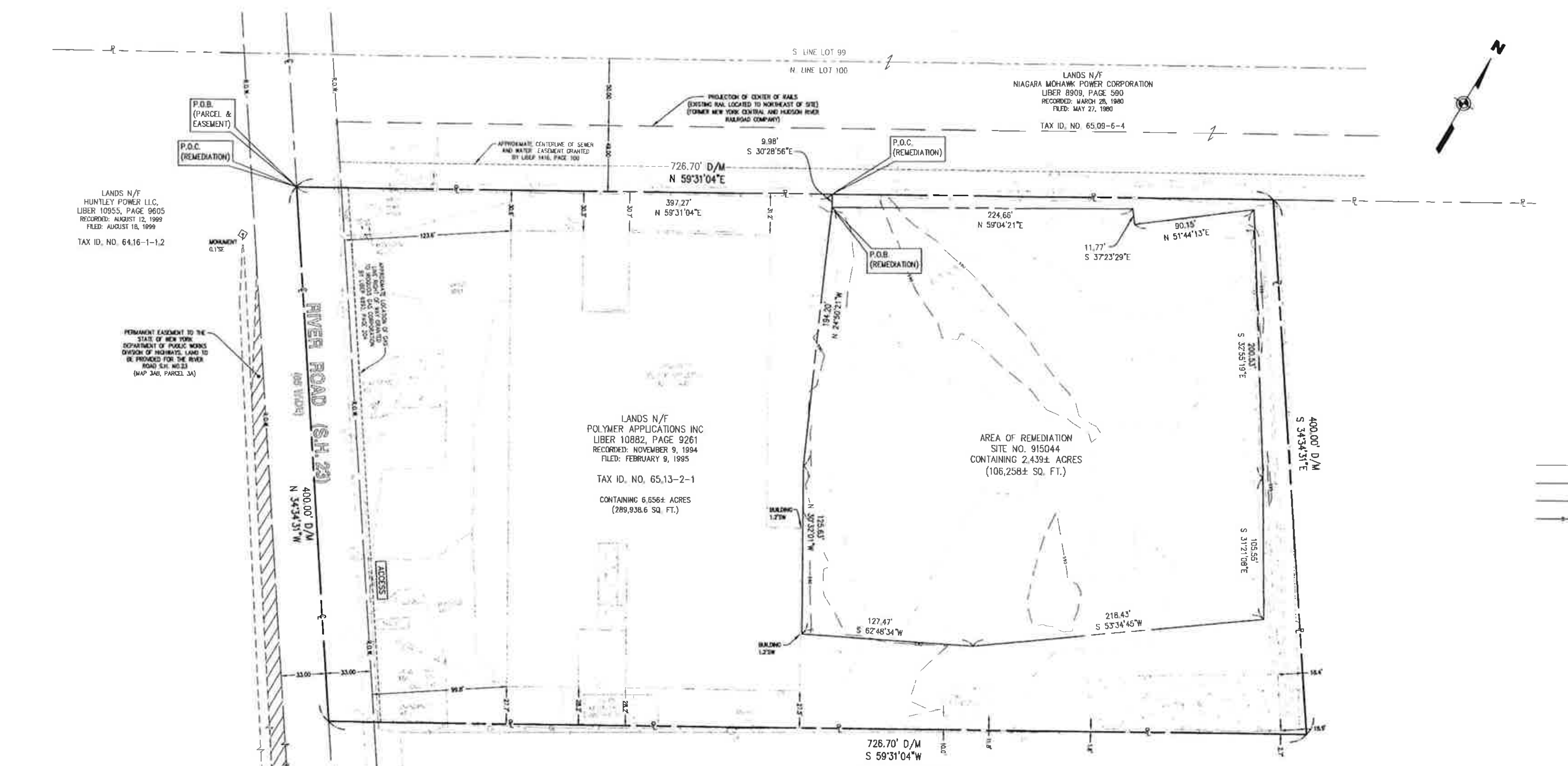
METES AND BOUNDS

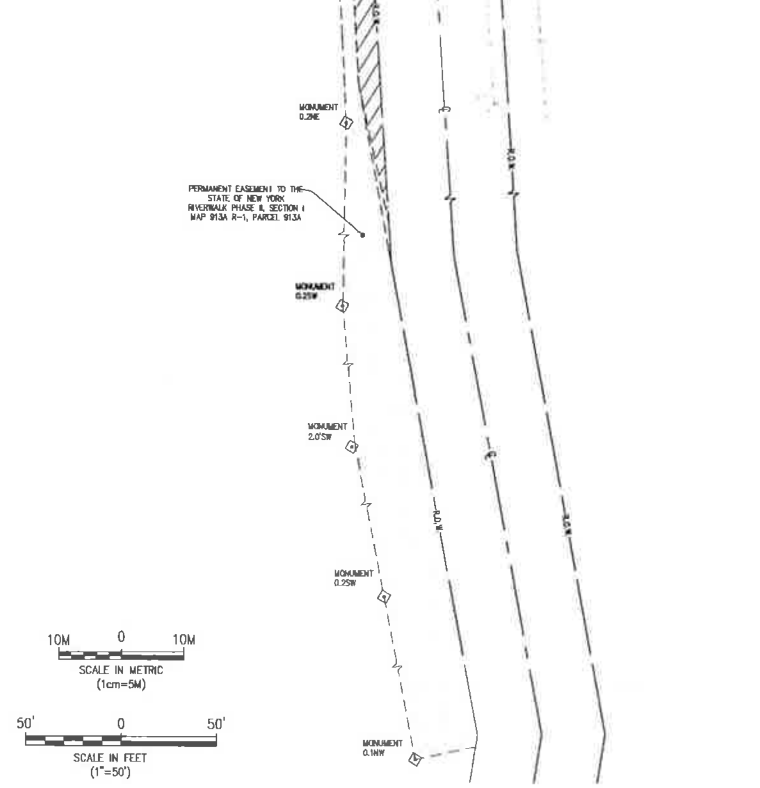
for the

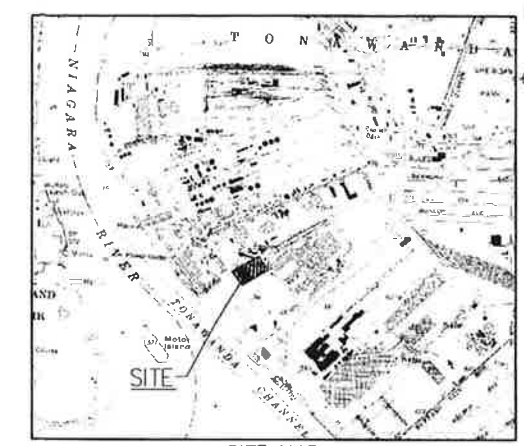
POLYMER APPLICATIONS SITE

NYSDEC SITE NO. 915044

TOWN OF TONAWANDA, ERIE COUNTY, NEW YORK







SITE MAP
(NOT TO SCALE)

ENGINEERING AND/OR INSTITUTIONAL CONTROLS

THE ENGINEERING AND INSTITUTIONAL CONTROLS FOR THIS EASEMENT ARE SET FORTH IN THE SITE MANAGEMENT PLAN (SMP). A COPY OF THE SMP MUST BE OBTAINED BY ANY PARTY WITH AN INTEREST IN THE PROPERTY. THE SMP CAN BE OBTAINED FROM NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION, DIVISION OF ENVIRONMENTAL REMEDIATION, SITE CONTROL SECTION, 625 BROADWAY, ALBANY, NEW YORK, 12233 OR AT derweb@gw.dec.state.ny.us

PARCEL LEGAL DESCRIPTION
(PER LIBER 10882, PAGE 9261)

ALL THAT TRACT OR PARCEL OF LAND, SITUATE IN THE TOWN OF TONAWANDA, COUNTY OF ERIE AND STATE OF NEW YORK, BEING PART OF LOT NO. 100 OF THE NIAGARA RIVER MILE STRIP, SO CALLED, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE CENTER OF RIVER ROAD, SO-CALLED, IN LINE OF LAND OF THE NEW YORK CENTRAL AND HUDSON RIVER RAILROAD COMPANY; THENCE FOLLOWING LINE OF LAND OF SAID RAILROAD COMPANY N 64 DEGREES 50 MINUTES E, A DISTANCE OF 726.7 FEET TO A POINT; THENCE S 27 DEGREES 45 MINUTES E, A DISTANCE OF 400 FEET TO A POINT; THENCE S 64 DEGREES 50 MINUTES W, 726.7 FEET TO A POINT IN THE CENTER OF SAID ROAD; THENCE ALONG THE CENTER OF SAID ROAD N 27 DEGREES 45 MINUTES W, 400 FEET TO THE POINT OF BEGINNING.

SURVEYOR'S PARCEL/ENVIRONMENTAL EASEMENT DESCRIPTION

ALL THAT TRACT OR PARCEL OF LAND, SITUATE IN THE TOWN OF TONAWANDA, COUNTY OF ERIE AND STATE OF NEW YORK, BEING PART OF LOT NO. 100 OF THE NIAGARA RIVER MILE STRIP, SO-CALLED, BEING BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE CENTER OF RIVER ROAD AT THE DIVISION LINE BETWEEN THE PROPERTY OF NIAGARA MOHAWK POWER CORPORATION (REPUTED OWNER) ON THE NORTH, SAID PROPERTY BEING DESIGNATED BY TAX ID. NO. 65.09-6-4, AND THE PROPERTY OF POLYMER APPLICATIONS INC. (REPUTED OWNER) ON THE SOUTH, SAID PROPERTY BEING DESIGNATED BY TAX ID. NO. 65.13-2-1;

THENCE NORTH 59°31'04" EAST, ALONG SAID DIVISION LINE, A DISTANCE OF SEVEN HUNDRED TWENTY SIX AND SEVENTY HUNDREDTHS FEET (726.70') TO A POINT;

THENCE SOUTH 34°34'31' EAST, A DISTANCE OF FOUR HUNDRED AND ZERO HUNDREDTHS FEET (400.00') TO A POINT;

THENCE SOUTH 59°31'04" WEST, A DISTANCE OF SEVEN HUNDRED TWENTY SIX AND SEVENTY HUNDREDTHS FEET (726.70') TO A POINT IN THE CENTER OF SAID RIVER ROAD;

THENCE NORTH 34°34'31" WEST, ALONG SAID CENTER OF RIVER ROAD, A DISTANCE OF FOUR HUNDRED AND ZERO HUNDREDTHS FEET (400.00') TO THE POINT OR PLACE OF BEGINNING, CONTAINING 6.656 ACRES OF LAND, MORE OF LESS.

AREA OF REMEDIATION DESCRIPTION (SITE NO. 915044)

ALL THAT TRACT OR PARCEL OF LAND, SITUATE IN THE TOWN OF TONAWANDA, COUNTY OF ERIE AND STATE OF NEW YORK, BEING PART OF LOT NO. 100 OF THE NIAGARA RIVER MILE STRIP, SO-CALLED, BOUNDED AND DESCRIBED AS FOLLOWS:

COMMENCING AT A POINT IN THE CENTER OF RIVER ROAD AT THE DIVISION LINE BETWEEN THE PROPERTY OF NIAGARA MOHAWK POWER CORPORATION (REPUTED OWNER) ON THE NORTH, SAID PROPERTY BEING DESIGNATED BY TAX ID. NO. 65.09-6-4, AND THE PROPERTY OF POLYMER APPLICATIONS INC. (REPUTED OWNER) ON THE SOUTH, SAID PROPERTY BEING DESIGNATED BY TAX ID. NO. 65.13-2-1;

THENCE NORTH 59°31'04" EAST, ALONG SAID DIVISION LINE, A DISTANCE OF THREE HUNDRED NINETY SEVEN AND TWENTY-SEVEN HUNDREDTHS FEET (397.27') TO A POINT;

THENCE SOUTH 30°28'56" EAST, ON A LINE PERPENDICULAR TO SAID DIVISION LINE, A DISTANCE OF NINE AND NINTY-EIGHT HUNDREDTHS FEET (9.98') TO THE TRUE POINT OR PLACE OF BEGINNING;

THENCE NORTH 59°04'21" EAST, A DISTANCE OF TWO HUNDRED TWENTY FOUR AND SIXTY-SIX HUNDREDTHS FEET (224.66') TO A POINT;

THENCE SOUTH 37°23'29" EAST, A DISTANCE OF ELEVEN AND SEVENTY-SEVEN HUNDREDTHS FEET (11.77') TO A POINT;

THENCE NORTH 51°44'13" EAST, A DISTANCE OF NINETY AND FIFTEEN HUNDREDTHS FEET (90.15') TO A POINT;

THENCE SOUTH 32°55'19" EAST, A DISTANCE OF TWO HUNDRED AND FIFTY-THREE HUNDREDTHS FEET (200.53') TO A POINT:

THENCE SOUTH 31°21'08" EAST, A DISTANCE OF ONE HUNDRED FIVE AND FIFTY-FIVE HUNDREDTHS FEET (105.55') TO A POINT;

THENCE SOUTH 53°34'45" WEST, A DISTANCE OF TWO HUNDRED EIGHTEEN AND FORTY-THREE HUNDREDTHS FEET (218.43') TO A POINT;

THENCE SOUTH 62°48'34" WEST, A DISTANCE OF ONE HUNDRED TWENTY SEVEN AND FORTY-SEVEN HUNDREDTHS FEET (127.47') TO A POINT;

THENCE NORTH 30°32'01" WEST, A DISTANCE OF ONE HUNDRED TWENTY FIVE AND SIXTY-THREE HUNDREDTHS FEET (125.63') TO A POINT;

THENCE NORTH 24°50'21" WEST, A DISTANCE OF ONE HUNDRED NINETY FOUR AND TWENTY HUNDREDTHS FEET (194.20') TO THE POINT OR PLACE OF BEGINNING, CONTAINING 2.439 ACRES OF LAND, MORE OR LESS.

LEGEND

- MONITORING WELL
- HYDRANT
- UTILITY POLE
- CONCRETE MONUMENT
- CENTERLINE
- OVERHEAD WIRES
- PROPERTY LINE
- CHAIN LINK FENCE

ABBREVIATIONS

N	NORTH
E	EAST
S	SOUTH
W	WEST
L	LIBER
P	PAGE
UP	UTILITY POLE
NO.	NUMBER
℄	CENTERLINE
℔	PROPERTY LINE
R.O.W.	RIGHT OF WAY
P.O.B.	POINT OF BEGINNING
P.O.C.	POINT OF COMMENCEMENT

NOTES

1. SITE ACCESS IS FROM RIVER ROAD.
2. BEARINGS SHOWN ARE BASED UPON THE NEW YORK STATE PLANE COORDINATE SYSTEM, WEST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83/92) AND WERE ESTABLISHED THROUGH GPS MEASUREMENTS.
3. ONLY LOCATIONS OF VISIBLE UTILITIES AND IMPROVEMENTS ARE SHOWN HEREON.
4. GREY SCALE INFORMATION SHOWN REPRESENTS AS-BUILT CONDITIONS AT THE TIME OF THIS SURVEY.
5. CONTOURS SHOWN REPRESENT THE FINAL GRADING PLAN
6. ANY ALTERATION OR ADDITION TO THIS SURVEY IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW, EXCEPT AS PER SECTION 7209-SUBDIVISION 2.

EASEMENTS AND RIGHTS OF WAY AFFECTING PARCEL

1. RIGHT OF WAY GRANTED TO FRONTIER TELEPHONE COMPANY IN AND ALONG THE HIGHWAY KNOWN AS THE TWO MILE CREEK ROAD AND THE RIVER ROAD IN FRONT OF THE ABOVE DESCRIBED PREMISES ON SAID HIGHWAY RIGHT OF WAY IN DEED DATED NOVEMBER 3, 1906. (AS FOUND IN LIBER 1125, PAGE 361) GIVEN TO E.I. DU PONT DE NEMOURS POWER COMPANY BY LIBER 1125 AT PAGE 361 AS RECORDED IN THE ERIE COUNTY CLERK'S OFFICE ON JULY 30, 1909. (UNABLE TO PLOT)
2. EASEMENT FOR SEWER AND WATER LINE GRANTED TO THE PIERCE ARROW MOTOR CAR COMPANY DATED SEPTEMBER 6, 1918 AND RECORDED ON SEPTEMBER 20, 1918 IN THE ERIE COUNTY CLERK'S OFFICE IN LIBER 1416 AT PAGE 100.
3. RIGHT OF WAY FOR GAS LINE GRANTED TO IROQUOIS GAS CORPORATION DATED MAY 15, 1963 AND RECORDED IN THE ERIE COUNTY CLERK'S OFFICE ON JUNE 11, 1963 IN LIBER 6893 AT PAGE 204.
4. EASEMENT FOR ELECTRIC GRANTED TO NIAGARA MOHAWK POWER CORPORATION DATED OCTOBER 8, 1963 AND RECORDED IN THE ERIE COUNTY CLERK'S OFFICE ON OCTOBER 17, 1963 IN LIBER 6941 AT PAGE 418. (UNABLE TO PLOT)

REFERENCES

1. LIBER 10882, PAGE 9261 (DEED FOR TAX ID. NO. 65.13-2-1)
2. TAX MAP 65.13, OF TONAWANDA, NEW YORK, COUNTY OF ERIE.
3. TITLE REPORT NO. 2010-13196, PREPARED BY HOLLAND LAND TITLE & ABSTRACT COMPANY, INC., EFFECTIVE DATE OF JANUARY 19, 2012
4. ERIE COUNTY PERMANENT EASEMENT FOR A RIVERWALK AND BICYCLE PATH, MAP NO. 913 A R-1, PARCEL NO'S. 913A, 913B, & 913D
5. RIGHT OF WAY PLANS TITLED: STATE OF NEW YORK DEPARTMENT OF TRANSPORTATION RIGHT OF WAY PLAN RIVERWALK PHASE II, SECTION I, ERIE COUNTY, P.I.N.: 5050.61.121, DATED: FEBRUARY 26, 1990.
6. PLANS TITLED: STATE OF NEW YORK DEPARTMENT OF PUBLIC WORKS DIVISION OF HIGHWAYS, PLANS FOR RECONSTRUCTING, WITH FEDERAL AID, ALL OF THE RIVER ROAD, STATE HIGHWAY NO. 23, AND A PORTION OF THE RIVER ROA, PARTS 2 AND 3, STATE HIGHWAY NO. 129, DATED: MARCH 3, 1937, FED ROAD DIST. NO. 9, FED. AID PROJ. NO. 865A

CERTIFICATION

WE: FISHER ASSOCIATES, P.E., L.S., P.C., CERTIFY TO: THE PEOPLE OF THE STATE OF NEW YORK ACTING THROUGH ITS COMMISSIONER OF THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION AND HOLLAND LAND TITLE & ABSTRACT CO., INC.; THAT THIS MAP WAS PREPARED 11-22-11 FROM THE NOTES OF AN INSTRUMENT SURVEY COMPLETED BY US ON 01-17-12 USING REFERENCES AND EVIDENCE SHOWN HEREON.

BY: [signature]
SCOTT V. SMITH, N.Y.S.P.L.S. NO. 050561

DATE: MARCH 27, 2012

STATE OF NEW YORK · SCOTT V. SMITH · 050561 · LICENSED LAND SURVEYOR

REVISIONS | DATE | BY
7
6
5
4
3
2
1

FA PROJECT NO. 112010
PROJECT MANAGER RI
DRAWN BY KPL
SCALE 1"=50'
ISSUE DATE 11/30/11

811 Know what's below. Call before you dig.

FISHER ASSOCIATES
325 Delaware Ave., Suite 200, Buffalo, NY 14202
Phone: 716-856-1234

PROJECT
NYSDEC POLYMER APPLICATION SITE
3445 RIVER ROAD, SITE NO. 915044
TOWN OF TONAWANDA, ERIE COUNTY, NEW YORK
LOT 100 OF THE NIAGARA RIVER MILE STRIP

TITLE OF DRAWING
NYSDEC ENVIRONMENTAL EASEMENT MAP

PROJECT NO. 112010
DRAWING NO. NO. 1
SHEET 1 OF 1

APPENDIX B

DOCUMENTATION SAMPLING RESULTS

for the

POLYMER APPLICATIONS SITE

NYSDEC SITE NO. 915044

TOWN OF TONAWANDA, ERIE COUNTY, NEW YORK

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-1B	BOTTOM-1C	BOTTOM-1E	BOTTOM-1F	BOTTOM-1G
Sample ID			B-1B	B-1C	BTM-1E	BTM-1F	BOTTOM-1G
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/29/11	08/29/11	09/19/11	09/19/11	09/21/11
Parameter	**Units**	**Criteria***					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	1,300	1,900	610 DB	140	23
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	3,200	100,000 D	190 U	190 U	33 J

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit. ; J - The reported concentration is an estimated value.
B - Compound was detected in the associated method blank.
D - Result reported from a secondary dilution analysis.
Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-2C	BOTTOM-2E	BOTTOM-2E	BOTTOM-2F	BOTTOM-2G
Sample ID			B-2C	BTM-2E	BTM-2E DUPE	BTM-2F	BOTTOM-2G
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/29/11	09/19/11	09/19/11	09/19/11	09/21/11
Parameter	Units	Criteria*			Field Duplicate (1-1)		
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	850	37 B	43	450	280
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	1,800	210 U	210 U	190 U	320

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit. ; J - The reported concentration is an estimated value.

B - Compound was detected in the associated method blank.

D - Result reported from a secondary dilution analysis.

Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-3C	BOTTOM-3F	BOTTOM-4C	BOTTOM-4F	BOTTOM-4G
Sample ID			B-3C	BTM-3F	B-4C	BTM-4F	BOTTOM-4G
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/26/11	09/19/11	08/26/11	09/19/11	09/21/11
Parameter	**Units**	**Criteria***					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	4,300	24,000	1,400	21,000 D	17,000
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	15,000 D	7,200 D	14,000 D	8,800 D	3,800

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit. ; J - The reported concentration is an estimated value.
B - Compound was detected in the associated method blank.
D - Result reported from a secondary dilution analysis.
Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-4H	BOTTOM-5C	BOTTOM-5F	BOTTOM-5G	BOTTOM-5H
Sample ID			BOTTOM-4H	B-5C	BTM-5F	BOTTOM-5G	BOTTOM-5H
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			09/21/11	08/26/11	09/19/11	09/21/11	09/21/11
Parameter	**Units**	**Criteria***					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	290	2,000	4,000	5,800 D	160
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	200 U	11,000 D	920	490	200 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

(oval) Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit. ; J - The reported concentration is an estimated value.

B - Compound was detected in the associated method blank.

D - Result reported from a secondary dilution analysis.

Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-6F	BOTTOM-6G	BOTTOM-7F	BOTTOM-7G	BOTTOM-B-1A
Sample ID			BTM-6F	BOTTOM-6G	BOTTOM-7F	BOTTOM-7G	B-1A
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			09/19/11	09/21/11	09/21/11	09/21/11	08/22/11
Parameter	**Units**	**Criteria***					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	6,300	2,800	3,600 D	7,400 D	9,600
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	38,000 D	690	130 J	22,000 D	190 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit. ; J - The reported concentration is an estimated value.

B - Compound was detected in the associated method blank.

D - Result reported from a secondary dilution analysis.

Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-2A	BOTTOM-B-2B	BOTTOM-B-3B	BOTTOM-B-4B	BOTTOM-B-6C
Sample ID			B-2A	B-2B	B-3B	B-4B	B-6C
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/22/11	08/22/11	08/22/11	08/22/11	08/24/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	32	14,000	18,000	300	4,200 D
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	190 U	200 U	5,600	6,500	850

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit. ; J - The reported concentration is an estimated value.

B - Compound was detected in the associated method blank.

D - Result reported from a secondary dilution analysis.

Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-7C	BOTTOM-B-A10	BOTTOM-B-A3	BOTTOM-B-A4	BOTTOM-B-A5
Sample ID			B-7C	Bottom-B-A10	BOTTOM B-A3	BOTTOM B-A4	BOTTOM B-A5
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/24/11	07/11/11	08/16/11	08/16/11	08/16/11
Parameter	**Units**	**Criteria***					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	1,700 D	150,000 D	5,100 D	20,000 D	1,200
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	200 U	20,000	200 U	200 U	200 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit. ; J - The reported concentration is an estimated value.

B - Compound was detected in the associated method blank.

D - Result reported from a secondary dilution analysis.

Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-A6	BOTTOM-B-A7	BOTTOM-B-A8	BOTTOM-B-A9	BOTTOM-B-B10
Sample ID			BOTTOM B-A6	BOTTOM B-A7	BOTTOM B-A-8	Bottom-B-A9	Bottom-B-B10
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/16/11	08/16/11	07/25/11	07/11/11	07/11/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	430	8,100 D	520	9,000 D	92,000 D
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	130,000 D	37,000 D	210 U	460 J	1,500

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

(oval) Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit. ; J - The reported concentration is an estimated value.

B - Compound was detected in the associated method blank.

D - Result reported from a secondary dilution analysis.

Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-B5	BOTTOM-B-B6	BOTTOM-B-B7	BOTTOM-B-B7	BOTTOM-B-B8
Sample ID			BOTTOM B-B5	BOTTOM B-B6	BOTTOM B-B7	BOTTOM B-B7 DUPE	BOTTOM B-B-8
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/16/11	08/16/11	08/16/11	08/16/11	07/25/11
Parameter	Units	Criteria*				Field Duplicate (1-1)	
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	1,300 D	1,700	7,000	13,000	690 D
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	110,000 D	200 U	4,200	3,500	150 J

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

(110,000 D) Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit. ; J - The reported concentration is an estimated value.

B - Compound was detected in the associated method blank.

D - Result reported from a secondary dilution analysis.

Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-B9	BOTTOM-B-C10	BOTTOM-B-C9	BOTTOM-B-D1	BOTTOM-B-D10
Sample ID			Bottom-B-B9	Bottom-B-C10	Bottom-B-C9	BOTTOM B-D1	BOTTOM B-D10
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			07/11/11	07/11/11	07/11/11	09/02/11	07/18/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	60,000 D	33,000 D	160,000 D	14,000 D	8,100 D
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	1,400	410	4,400	11,000 D	170 J

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit. ; J - The reported concentration is an estimated value.

B - Compound was detected in the associated method blank.

D - Result reported from a secondary dilution analysis.

Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-D11	BOTTOM-B-D2	BOTTOM-B-D3	BOTTOM-B-D4	BOTTOM-B-D5
Sample ID			Bottom-B-D11	BOTTOM B-D2	BOTTOM B-D3	BOTTOM B-D4	BOTTOM B-D5
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			07/11/11	09/07/11	09/02/11	09/07/11	09/02/11
Parameter	**Units**	**Criteria***					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	7,000 D	58,000 D	1,200 D	490	1,300 DB
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	74 J	68,000 D	6,300	2,900	2,600

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

(oval) Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit. ; J - The reported concentration is an estimated value.

B - Compound was detected in the associated method blank.

D - Result reported from a secondary dilution analysis.

Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-D6	BOTTOM-B-D7	BOTTOM-B-D9	BOTTOM-B-E10	BOTTOM-B-E3
Sample ID			BOTTOM B-D6	BOTTOM B-D7	BOTTOM B-D9	BOTTOM B-E10	BOTTOM B-E3
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			09/02/11	09/02/11	07/18/11	07/18/11	09/07/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	530	1,600 DB	9,700 D	7,400 D	440 B
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	1,400	210 J	1,300	210 U	17,000 D

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit ; J - The reported concentration is an estimated value.
B - Compound was detected in the associated method blank.
D - Result reported from a secondary dilution analysis.
Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-E4	BOTTOM-B-E5	BOTTOM-B-E6	BOTTOM-B-E7	BOTTOM-B-E9
Sample ID			BOTTOM B-E4	BOTTOM B-E5	BOTTOM B-E6	BOTTOM B-E7	BOTTOM B-E-9
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			09/07/11	09/02/11	09/02/11	09/02/11	07/25/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	1,400	5,600 B	200 B	2,300	1,100
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	6,400	4,600	6,000	210 U	1,600

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

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B - Compound was detected in the associated method blank.
D - Result reported from a secondary dilution analysis.
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Detection Limits shown are PQL

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[LOGDATE] BETWEEN #07/11/11# AND #10/14/11# AND [LOCID] NOT LIKE 'STOCKPILE*' AND ([PARNAME] = 'Phenol' OR [PARNAME] = 'Xylene (tota

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-E9	BOTTOM-B-F10	BOTTOM-B-F9	BOTTOM-B-G3	BOTTOM-B-G8
Sample ID			BOTTOM B-E-9 DUPE	BOTTOM B-F-10	BOTTOM B-F-9	BOTTOM B-G3	BOTTOM B-G8
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			07/25/11	07/25/11	07/25/11	09/26/11	08/10/11
Parameter	Units	Criteria*	Field Duplicate (1-1)				
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	510	91,000 D	5,800	9,900 D	7,200 D
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	5,500	43,000 D	210 U	3,800	1,800

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

( ) Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit ; J - The reported concentration is an estimated value.

B - Compound was detected in the associated method blank.

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TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-G9	BOTTOM-B-H1	BOTTOM-B-H2	BOTTOM-B-H3	BOTTOM-B-H3
Sample ID			BOTTOM B-G9	BOTTOM B-H1	BOTTOM B-H2	BOTTOM B-H3	BOTTOM B-H3 DUPE
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/05/11	09/26/11	09/26/11	09/26/11	09/26/11
Parameter	Units	Criteria*					Field Duplicate (1-1)
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	2,100 D	4.2 J	31	110	280
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	200 U	200 U	200 U	200 U	200 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

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Concentration Exceeds Criteria

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TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-H6	BOTTOM-B-H7	BOTTOM-B-H8	BOTTOM-B-H9	BOTTOM-B-I1
Sample ID			BOTTOM B-H6	BOTTOM B-H7	BOTTOM B-H8	BOTTOM B-H9	BOTTOM B-I1
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			10/07/11	10/07/11	08/10/11	08/05/11	10/07/11
Parameter	**Units**	**Criteria***					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	8,300 D	28,000 D	6,400 D	370	1.2 JB
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	1,200	920	210 U	190 U	200 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

(oval) Concentration Exceeds Criteria

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[LOGDATE] BETWEEN #07/11/11# AND #10/14/11# AND [LOCID] NOT LIKE "STOCKPILE" AND ([PARNAME] = "Phenol" OR [PARNAME] = "Xylene (tota

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-I1	BOTTOM-B-I2	BOTTOM-B-I3	BOTTOM-B-I4	BOTTOM-B-I5
Sample ID			BOTTOM B-I1 DUPE	BOTTOM B-I2	BOTTOM B-I3	BOTTOM B-I4	BOTTOM B-I5
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			10/07/11	10/07/11	10/07/11	10/07/11	10/07/11
Parameter	Units	Criteria*	Field Duplicate (1-1)				
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	11 U	1.3 JB	1.9 JB	3.1 JB	11 U
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	170 J	190 U	210 U	220 U	200 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

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EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-I6	BOTTOM-B-I7	BOTTOM-B-I8	BOTTOM-B-I9	BOTTOM-B-J1
Sample ID			BOTTOM B-I6	BOTTOM B-I7	BOTTOM BI8	BOTTOM B-I9	BOTTOM B-J1
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			10/07/11	10/12/11	10/12/11	08/10/11	10/12/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	250 B	2.0 J	25	2,700 D	12 U
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	230 U	210 U	1,100	1,700	240

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

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EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-J10	BOTTOM-B-J11	BOTTOM-B-J2	BOTTOM-B-J3	BOTTOM-B-J4
Sample ID			BOTTOM B-J10	BOTTOM B-J11	BOTTOM B-J2	BOTTOM B-J3	BOTTOM B-J4
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/05/11	08/05/11	10/12/11	10/12/11	10/12/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	12 U	120	13 U	11 U	13 U
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	210 U	210 U	210 U	1,900 U	230 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

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TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-B-J5	BOTTOM-B-J6	BOTTOM-B-J7	BOTTOM-B-J8	BOTTOM-B-J9
Sample ID			BOTTOM B-J5	BOTTOM B-J6	BOTTOM B-J7	BOTTOM B-J8	BOTTOM B-J9
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			10/12/11	10/12/11	10/12/11	10/12/11	08/10/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	12 U	12 U	13 U	1,100 D	12 U
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	200 U	210 U	210 U	210 U	200 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

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TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-C8	BOTTOM-D8	BOTTOM-E11	BOTTOM-E8	BOTTOM-F11
Sample ID			BOTTOM C8	BOTTOM D8	BOTTOM E-11	BOTTOM E8	BOTTOM F-11
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/03/11	08/03/11	07/18/11	08/03/11	07/18/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	300	72	270	38	370
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	190 U	220 U	210 U	210 U	210 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

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TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-F8	BOTTOM-G10	BOTTOM-G11	BOTTOM-H10	BOTTOM-H11
Sample ID			BOTTOM F8	BOTTOM G10	BOTTOM G11	BOTTOM H10	BOTTOM H11
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/03/11	08/03/11	08/03/11	08/03/11	08/03/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	650 D	12,000 D	3,100 D	5,100 D	3,100 D
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	200 U	2,100	200 U	2,800	200 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

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TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			BOTTOM-I10	BOTTOM-I11	W-2	W-4	WALL-B
Sample ID			BOTTOM I10	BOTTOM I11	W-2	W-4	W-B
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/03/11	08/03/11	10/14/11	10/14/11	08/29/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	52,000 D	64	6.1 J	16	14,000 D
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	1,600 J	210 U	390	2,800	230 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

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TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			WALL-C	WALL-E	WALL-F	WALL-W1	WALL-W-1.1
Sample ID			W-C	WALL-E	WALL-F	W-1	WALL W-1.1
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/29/11	09/19/11	09/21/11	08/22/11	10/12/11
Parameter	**Units**	**Criteria***					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	230,000 DH	100,000	16,000	5,900	12 U
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	7,400	670	880	190 U	1,100 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

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TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			WALL-W10	WALL-W-10.1	WALL-W11	WALL-W-11.1	WALL-W2
Sample ID			Wall-W 10	WALL W-10.1	Wall-W 11	WALL W-11.1	W-2
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			07/11/11	08/05/11	07/11/11	08/05/11	08/22/11
Parameter	**Units**	**Criteria***					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	11 U	14	11 U	3,900 D	2,600,000 D
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	990 J	730	400 J	220	2,000 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

(oval) Concentration Exceeds Criteria

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TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			WALL-W-2.1	WALL-W3	WALL-W-3.1	WALL-W4	WALL-W4
Sample ID			WALL W-2.1	WALL W-3	WALL W-3.1	WALL W-4	WALL W-4 DUPE
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			10/12/11	08/16/11	10/12/11	08/16/11	08/16/11
Parameter	Units	Criteria*					Field Duplicate (1-1)
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	12 U	32,000 D	12 U	1,400,000 D	1,300,000 D
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	210 U	430 J	590 J	1,200 J	2,300

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

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Made By: PRF 01/20/12: Checked By: _____

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TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			WALL-W-4.1	WALL-W5	WALL-W-5.1	WALL-W6	WALL-W-6.1
Sample ID			WALL W-4.1	WALL W-5	WALL W-5.1	WALL W-6	WALL W-6.1
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			10/12/11	08/16/11	10/12/11	08/16/11	10/12/11
Parameter	**Units**	**Criteria***					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	10 U	47,000	11 U	11 U	11 U
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	1,700 J	2,000	920 U	2,900	9,400 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

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[LOGDATE] BETWEEN #07/11/11# AND #10/14/11# AND [LOCID] NOT LIKE 'STOCKPILE*' AND ([PARNAME] = 'Phenol' OR [PARNAME] = 'Xylene (tota

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			WALL-W7	WALL-W-7.1	WALL-W8	WALL-W8	WALL-W-8.1
Sample ID			WALL W-7	WALL W-7.1	WALL W-8	WALL W-8 DUPE	WALL W-8.1
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			08/16/11	10/12/11	07/25/11	07/25/11	10/12/11
Parameter	Units	Criteria*				Field Duplicate (1-1)	
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	7,200 D	11 U	110,000 D	170,000 D	11 U
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	2,100	1,900 U	9,300	11,000	1,900 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

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B - Compound was detected in the associated method blank.
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[LOGDATE] BETWEEN #07/11/11# AND #10/14/11# AND [LOCID] NOT LIKE 'STOCKPILE*' AND ([PARNAME] = 'Phenol' OR [PARNAME] = 'Xylene (tota

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			WALL-W9	WALL-W-9.1	WALL-WA	WALL-WA1	WALL-WB1
Sample ID			Wall-W 9	WALL W-9.1	W-A	Wall-WA.1	Wall-WB.1
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			07/11/11	08/05/11	08/22/11	07/11/11	07/11/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	1.8 J	1.4 J	13,000	89	51
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	7,700	210 U	150 J	860	81 J

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

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B - Compound was detected in the associated method blank.

D - Result reported from a secondary dilution analysis.

Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			WALL-WC1	WALL-WD	WALL-WD1	WALL-WE1	WALL-WF1
Sample ID			Wall-WC.1	WALL W-D	Wall-WD.1	WALL W-E1	WALL W-F1
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			07/11/11	09/02/11	07/11/11	07/18/11	07/18/11
Parameter	Units	Criteria*					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	370	1,600,000 D	15,000 D	550 D	3,600 D
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	210 U	1,100 J	210	840	4,100

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

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TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			WALL-WG	WALL-WG1	WALL-WH	WALL-WH1	WALL-WI
Sample ID			WALL W-G	WALL W-G.1	WALL W-H	WALL W-H.1	WALL W-I
Matrix			Soil	Soil	Soil	Soil	Soil
Depth Interval (ft)			-	-	-	-	-
Date Sampled			09/26/11	08/03/11	09/26/11	08/03/11	10/07/11
Parameter	**Units**	**Criteria***					
Volatile Organic Compounds							
Xylene (total)	UG/KG	3.00E+05	100	210,000 D	13 U	1.1 J	84 B
Semivolatile Organic Compounds							
Phenol	UG/KG	62000	2,300 U	770 J	210 U	1,500 J	210 U

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit. ; J - The reported concentration is an estimated value.

B - Compound was detected in the associated method blank.

D - Result reported from a secondary dilution analysis.

Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

TABLE 1
EXCAVATION LIMIT DOCUMENTATION SOIL ANALYTICAL RESULTS
JULY to OCTOBER 2011
POLYMER APPLICATIONS SITE

Location ID			WALL-WI1	WALL-WJ	WALL-W-J.1
Sample ID			WALL W-I.1	WALL W-J	WALL W-J.1
Matrix			Soil	Soil	Soil
Depth Interval (ft)			-	-	-
Date Sampled			08/03/11	10/12/11	08/05/11
Parameter	**Units**	**Criteria***			
Volatile Organic Compounds					
Xylene (total)	UG/KG	3.00E+05	150	13 U	170
Semivolatile Organic Compounds					
Phenol	UG/KG	62000	2,100 U	1,100 U	1,100

*Criteria- Soil Cleanup Objectives (SCOs), Contract Specification Section 02220, paragraph 3.08.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria

U - Not detected above the reported quantitation limit. ; J - The reported concentration is an estimated value.
B - Compound was detected in the associated method blank.
D - Result reported from a secondary dilution analysis.
Made By: PRF 01/20/12: Checked By: _____

Detection Limits shown are PQL

APPENDIX C
EXCAVATION WORK PLAN

for the

POLYMER APPLICATIONS SITE
NYSDEC SITE NO. 915044
TOWN OF TONAWANDA, ERIE COUNTY, NEW YORK

C-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the Department. Currently, this notification will be made to:

Greg Sutton

Regional Hazardous Waste Remediation Engineer

270 Michigan Avenue

Buffalo, New York 14203-2915

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control,
- A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work,
- A summary of the applicable components of this Excavation Work Plan (EWP),
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120,
- A copy of the contractor's health and safety plan, in electronic format, if it differs from the HASP provided in Appendix D of this document,
- Identification of disposal facilities for potential waste streams,
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

C-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based soil screening will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal, material that requires testing, material that can be returned to the subsurface, and material that can be used as cover soil.

C-3 STOCKPILE METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by NYSDEC.

C-4 MATERIALS EXCAVATION AND LOAD OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-site. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

C-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

All trucks will be washed prior to leaving the site. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Truck transport routes shall be approved by the Department. All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to

major highways; (e) promoting safety in access to highways; and (f) overall safety in transport; (g) community input [where necessary].

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

C-6 MATERIALS DISPOSAL OFF-SITE

All soil/fill/solid waste excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

C-7 MATERIALS REUSE ON-SITE

Materials reuse on the site must be approved by the NYSDEC. Chemical criteria for on-site reuse of material must be obtained from the NYSDEC. Sampling and analytical methods, and stockpile segregation methods proposed for materials reuse must be submitted to and approved by the NYSDEC. A qualified environmental professional must ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for re-use on-site will be placed in areas and at depths approved by the NYSDEC, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

C-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including excavation dewatering and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, but will be managed off-site.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

C-9 BACKFILL FROM OFF-SITE SOURCES

All backfill from off-site borrow sources, unless otherwise approved by the NYSDEC, shall be free from organic or other perishable material, roots, frozen material, stones or any other objectionable materials. Materials shall be classified in ASTM D2487 as GW, GP, GM, GC, SW, SP, SM, SC or an approved combination of these classifications. The sieve analysis shall be in accordance with the following: 1-1/2 inch-

100% passing by weight; ¼ inch-30-65% passing by weight; and 200-0-10 % passing by weight. A full TCL analysis shall be performed on a sample collected from each off-site borrow source. The backfill material must meet the cleanup objectives specified in 6NYCRR Subpart 375 for commercial use.

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Materials brought on site must not exceed the soil cleanup objectives for commercial use specified in Table 375-6.8(b) of 6NYCRR 375. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

C-10 STORMWATER POLLUTION PREVENTION

For construction projects exceeding 1 acre, a Stormwater Pollution Prevention Plan that conforms to the requirements of NYSDEC Division of Water guidelines and NYS regulations shall be submitted to the NYSDEC for approval.

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

C-11 CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for full a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the periodic reports prepared pursuant to Section 5 of the SMP.

C-12 COMMUNITY AIR MONITORING PLAN

Community Air Monitoring will be consistent with the guidance provided in the NYSDOH Generic Community Monitoring Plan included as Appendix 1A of DER-10, Generic Community Air Monitoring Plan. The Community Air Monitoring Plan for the site is presented in Appendix D.

Air sampling stations shall be located upwind and downwind of the work area based on prevailing wind conditions. . These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

C-13 ODOR CONTROL PLAN

If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by

sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

C-14 DUST CONTROL PLAN

A dust suppression plan will be developed that addresses dust management during invasive on-site work that will include, at a minimum, the items listed below:

- Dust suppression will be achieved though the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

C-15 OTHER NUISANCES

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX D

HEALTH AND SAFETY PLAN AND COMMUNITY AIR MONITORING PLAN

for the

POLYMER APPLICATIONS SITE

NYSDEC SITE NO. 915044

TOWN OF TONAWANDA, ERIE COUNTY, NEW YORK

HEALTH AND SAFETY PLAN AND COMMUNITY AIR MONITORING PLAN POLYMER APPLICATIONS SITE TOWN OF TONAWANDA, NEW YORK

HEALTH AND SAFETY PLAN

1.0 Site Description

1.1 Site Location and Description

The site is located in the Town of Tonawanda County of Erie, New York. The site is an approximately 6.7-acre area bounded by National Grid property to the north, Dunlop property to the south and to the east, and River Road to the west. The site was remediated in 2005 and 2006 during which time much of the contaminated soil from onsite and offsite sources was removed and disposed of offsite. In addition, some of the contaminated soil was consolidated in an onsite bio-treatment cell. After it was determined that the bio-treatment cell would not meet the site cleanup objectives, contaminated soil above the cleanup objectives in the cell was excavated and disposed of offsite in 2011. However, some contaminated soil above the cleanup objectives located around the perimeter of the excavation was left in place.

1.2 Residual Contamination

Documentation sampling was performed after soil excavation in 2011. Remaining contamination identified from the documentation sampling is discussed in Section 1.4.3 of the Site Management Plan (SMP).

2.0 OVERVIEW OF PRECAUTIONS TO ENSURE THE SAFETY OF HUMAN HEALTH AND THE ENVIRONMENT

The following precautions must be considered for any excavation work on this site. The applicability and extent of each precaution will need to be determined based upon the actual work location and depth of excavation.

Workers should proceed with caution at all depths and evaluate soil handling, personal protective equipment, equipment decontamination and backfilling requirements based on the guidance provided below. In all circumstances, workers should err on the side of caution and treat any suspected contamination as possible hazardous waste.

- **Notification** to the New York State Department of Environmental Conservation (NYSDEC) as soon as practical, preferably prior to excavation (see Contact List).
- **Personal Hygiene**, at a minimum, should consist of workers washing hands prior to leaving area of excavation, smoking, eating, drinking and/or using toilets. Eating and/or drinking are not permitted in the vicinity of the excavation. Smoking is not permitted anywhere on the property.

• **Personal Protective Equipment (PPE)**, at minimum, workers should don long sleeve shirt, long pants, work boots and work gloves. If soil is stained, then workers should don rubber boots, tyvek suits or rain suits and nitrile or other chemical resistant inner gloves.

• **OSHA 40-Hour Hazardous Waste Operator (HAZWOPER)** trained workers will be required to perform excavation in highly contaminated areas unless otherwise directed by the NYSDEC.

• **Air Monitoring** is required for worker and community safety for volatile organic compounds (VOCs) and dust if excavations encounter heavily contaminated soils. The Community Air Monitoring Plan shall be followed. This plan is included in this document.

•**Soil Handling**. Contaminated or stained soil should be handled to minimize contaminating adjacent areas. Contaminated or stained soil should be placed on polyethylene sheeting (poly) or in either 55-gallon drums or waste wranglers. If sidewall and bottom of excavation is heavily stained, then the excavation should be lined with poly prior to workers entering excavation.

• **Dewatering Excavation**. Water that contains sheen should not be discharged to storm sewers. Contaminated or stained water should be placed in storage containers (i.e. 55-gallon drums or larger containers).

• **Dust Control** should be accomplished by wetting soil with water.

• **Equipment Decontamination**, prior to leaving the work area, soil that has accumulated on equipment should be removed. Contaminated equipment will require washing prior to leaving the area of excavation. At no time shall rinse water or contaminated soil removed from equipment be allowed to contact surface soils or clean backfill material. Decontamination residuals should be handled and disposed of in accordance with all applicable regulations.

• **Personnel Decontamination**, at a minimum, should consist of removing soil from footwear and clothing prior to leaving the area of excavation. Workers should wash hands prior to leaving area of excavation, smoking, eating, drinking and/or using toilets.

• **Material Storage**. Bulk soil and containerized waste materials (i.e., soil, water, PPE and poly) should be placed in a designated area at the site.

CONTACT LIST

NYSDEC: Mr. David Chiusano
NYSDEC-Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7017
Office Phone: (518) 402-9814
E-mail: djchiusa@gw.dec.state.ny.us

NYSDOH: Mr. Matthew Forucci
Western Regional Office
584 Delaware Avenue
Buffalo, New York 14202
Office Phone: (716) 847-4501
E-mail: bcci@health.state.ny.us

COMMUNITY AIR MONITORING PLAN

Real-time air monitoring for volatile organic compounds will be conducted at the perimeter of the Exclusion Zone during the intrusive activities as follows:

- Volatile organic compounds and dust particulates will be monitored at the downwind perimeter of the exclusion zone on a continuous basis. If total organic vapor levels exceed 5 parts per million (ppm) above background, work activities will be halted and monitoring continued under the provisions of a Vapor Emission Response Plan. All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review if requested.

- If particulate levels at the downwind station exceed particulate levels at the upwind station by more than 100 micrograms per cubic meter (mcg/m^3), work activities will be halted and appropriate dust suppression measures will be employed. All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review if requested.

Vapor Emission Response Plan

If the ambient air concentration of total organic vapors at the downwind perimeter of the Work Area or Exclusion Zone exceed 5 ppm above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the Exclusion Zone, activities can resume provided the organic vapor level 200 feet downwind of the Exclusion Zone or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If the organic vapor level is above 10 ppm at the perimeter of the Exclusion Zone, activities must be shut down. When work shutdown occurs, downwind air monitoring as directed by the Site HSO will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Response Plan.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

Major Vapor Emission Response Plan

If any organic vapor levels greater than 5 ppm over background are identified 200 feet downwind from the Exclusion Zone or half the distance to the nearest residential or commercial property, whichever is less, all work activities will be halted.

If, following the cessation of work activities, or as the result of an emergency, organic vapor levels persist above 5 ppm above background 200 feet downwind from the Exclusion Zone or half the distance to the nearest residential or commercial property, then the air quality will be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20-foot zone).

If efforts to abate the emission source are unsuccessful and organic vapor levels approaching 5 ppm persist for more than 30 minutes in the 20-foot zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect. Also, the Major Vapor Emission Response Plan shall be immediately placed into effect if 20-foot zone organic vapor levels are greater than 10 ppm above background.

Upon activation of the Major Vapor Emission Response Plan, the following activities will be undertaken:

- All Emergency Response authorities will immediately be contacted by the Site HSO and advised of the situation.

- Air monitoring will be conducted at 30 minute intervals within the 20-foot zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site HSO.

Particulate Monitoring, Response Levels and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedances of the action level. In addition, fugitive dust migration will be visually assessed during all work activities.

If the downwind PM-10 particulate is 100 mcg/m^3 greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work may continue with dust suppression techniques provided that either of the downwind stations report PM-10 particulate levels do not exceed 150 mcg/m^3 above the up wind level and provided that no visible dust is migrating from the work area.

If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the up wind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 above the upwind level and preventing visible dust migration.

All readings will be recorded and available for NYSDEC and NYSDOH personnel to review.

APPENDIX E
WELL CONSTRUCTION AND DEVELOPMENT LOGS

for the

POLYMER APPLICATIONS SITE
NYSDEC SITE NO. 915044
TOWN OF TONAWANDA, ERIE COUNTY, NEW YORK

WELL DEVELOPMENT LOG

URS Corporation

PROJECT TITLE: Polymer Apps. Site WELL NO.: B-02D

PROJECT NO.: 11176720.00004

STAFF: Tim Ifkovich

DATE(S): 11/15/2012, 11/16/2012

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=	22.57	1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=	6.05	2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	16.52	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	2.81	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 5)	=	14.04	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=	8.00	8"	2.60

OR

$V = 0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)											
	11/15/2012				11/16/2012							
PARAMETERS	Initial	2	4	5	6	7	8					
pH	7.20	7.27	7.35	7.44	7.29	7.16	7.17					
SPEC. COND. (ms/cm)	5.01	4.34	3.73	4.06	4.10	4.78	4.80					
APPEARANCE	Gray Cloudy	Brown Cloudy	Brown Cloudy	Brown Cloudy	Brown Cloudy	Brown Cloudy	Brown Cloudy					
TEMPERATURE (°C)	12.1	12.3	12.7	11.3	14.6	12.8	14.0					
TURBIDITY	>1,000	>1,000	>1,000	>1,000	>1,000	>1,000	>1,000					
TIME	1533	1541	1553	1602	1227	1236	1241					

COMMENTS: Well dry after initial 5.0 gallons removed.
Water Level on 11/16/2012 - 18.52'

WELL DEVELOPMENT LOG

URS Corporation

PROJECT TITLE: Polymer Apps. Site WELL NO.: B-03D

PROJECT NO.: 11176720.00004

STAFF: Tim Ifkovich

DATE(S): 12/5/2012

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=	21.80	1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=	5.60	2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	16.20	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	2.75	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 5)	=	13.77	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=	7.00	8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)											
PARAMETERS	Initial	2	4	6	7							
pH	6.63	7.51	7.68	7.69	7.73							
SPEC. COND. (ms/cm)	1.84	1.01	1.79	1.80	1.80							
APPEARANCE	Clear	Clear	Brown Cloudy	Brown Cloudy	Brown Cloudy							
TEMPERATURE (°C)	11.2	12.7	12.4	12.7	12.4							
TURBIDITY	0	81.9	>1,000	>1,000	>1,000							
TIME	0847	0852	0858	0905	0909							

COMMENTS:

DRILLING SUMMARY

Engineer: Kyle Jackson

Drilling Company: Parratt-Wolff

Reviewed By:

Driller: Glen Lansing

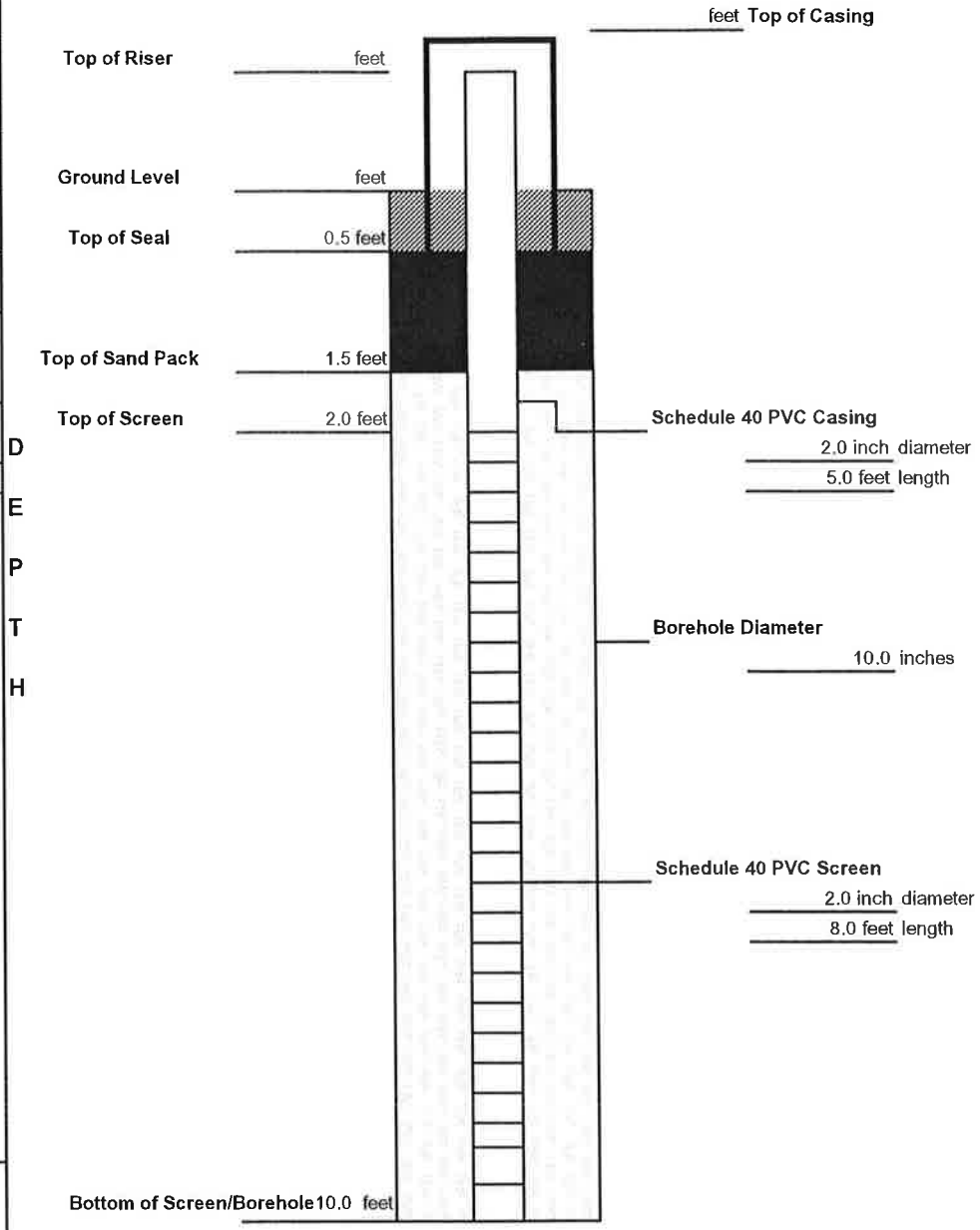
Rig Make/Model: CME-75 ATV

3/20/2006

GEOLOGIC LOG

Depth(ft.)	Description
0.0' - 3.0'	Brown/black sand, silt, gravel (fill material)
3.0'-10.0'	Red/brown silt, sand, gravel, little clay

WELL DESIGN



CASING MATERIAL

Surface: 4" Steel protective cover (Stick Up)

Monitor: 2" Schedule 40 PVC

SCREEN MATERIAL

Type: 2" Schedule 40 PVC

Slot Size: 0.010"

FILTER MATERIAL

Type: Morie Equivalent #1 N well sand
Setting: 1.5' - 10.0'

SEAL MATERIAL

Type: Bentonite chips
Setting: 0.5' - 1.5'
Type: Concrete/Bentonite Grout
Setting: 0.0' - 0.5'

COMMENTS:

The thickness of the filter and seal materials varies from the orginal detail.
K. Jackson verbally received the illustrated thicknesses from G. Lansing.

LEGEND

Cement Grout

Bentonite Seal

Sand Pack

Client: NYSDEC

Location: Polymer Applications

Project No.: 11173425

URS Corporation

MONITORING WELL CONSTRUCTION DETAILS

Well Number: GW-4S

WELL DEVELOPMENT LOG

URS Corporation

PROJECT TITLE: Polymer Apps. Site WELL NO.: B-03S GW-4S

PROJECT NO.: 11176720.00004

STAFF: Tim Ifkovich

DATE(S): 12/5/2012

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=	12.52	1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=	3.70	2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	8.82	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	1.50	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 5)	=	7.50	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=	8.00	8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)											
PARAMETERS	Initial	2	4	6	7	8						
pH	7.37	7.40	7.38	7.40	7.31	7.39						
SPEC. COND. (ms/cm)	2.01	1.91	1.98	2.03	2.22	2.24						
APPEARANCE	Brown Cloudy	Brown Cloudy	Cloudy	Cloudy	Cloudy	Clear						
TEMPERATURE (°C)	10.8	9.3	10.2	10.0	10.6	11.1						
TURBIDITY	208	200	174	254	105	51.8						
TIME	0919	0922	0926	0930	0935	0939						

COMMENTS:

WELL DEVELOPMENT LOG

URS Corporation

PROJECT TITLE: Polymer Apps. Site WELL NO.: B-05D

PROJECT NO.: 11176720.00004

STAFF: Tim Ifkovich

DATE(S): 11/16/2012

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=	26.42	1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=	7.70	2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	18.72	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	3.18	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 5)	=	15.91	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=	11.00	8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)											
PARAMETERS	Initial	2	4	6	8	10	11					
pH	7.06	7.24	7.32	7.21	7.25	7.08	7.19					
SPEC. COND. (ms/cm)	6.01	4.48	3.71	4.32	5.12	5.62	5.87					
APPEARANCE	Black Cloudy	Gray Cloudy	Gray Cloudy	Brown Cloudy	Brown Cloudy	Brown Cloudy	Brown Cloudy					
TEMPERATURE (°C)	10.6	12.0	11.3	13.1	13.3	13.8	12.4					
TURBIDITY	>1,000	>1,000	767	>1,000	273	195	165					
TIME	0844	0848	0855	0903	0911	1053	1057					

COMMENTS:

WELL DEVELOPMENT LOG

URS Corporation

PROJECT TITLE: Polymer Apps. Site WELL NO.: B-05S

PROJECT NO.: 11176720.00004

STAFF: Tim Ifkovich

DATE(S): 11/15/2012, 11/16/2012

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=	11.65	1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=	7.28	2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	4.37	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	0.74	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 5)	=	3.71	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=	16.00	8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)											
	11/15/2012				11/16/2012							
PARAMETERS	Initial	2	3	4	6	8	10	12	14	16		
pH	7.80	7.34	7.33	7.31	7.24	7.22	7.26	7.16	7.19	7.16		
SPEC. COND. (ms/cm)	1.63	1.38	1.31	1.33	1.33	1.25	1.23	1.24	1.25	1.21		
APPEARANCE	Black Cloudy	Black Cloudy	Black Cloudy	Black Cloudy	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy		
TEMPERATURE (°C)	10.6	11.0	10.4	10.1	12.0	11.3	11.1	12.2	11.9	12.4		
TURBIDITY	>1,000	>1,000	>1,000	>1,000	77.6	31.2	21.3	26	22.4	25.7		
TIME	1449	1457	1502	1509	1024	1028	1032	1037	1042	1046		

COMMENTS:

Water Level on 11/16/2012 - 7.32'

WELL DEVELOPMENT LOG

URS Corporation

PROJECT TITLE: Polymer Apps. Site WELL NO.: B-06D

PROJECT NO.: 11176720.00004

STAFF: Tim Ifkovich

DATE(S): 11/15/2015, 11/16/2012

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=	22.10	1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=	5.50	2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	16.60	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	2.82	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 5)	=	14.11	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=	10.50	8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)											
	11/15/2012							11/16/2012				
PARAMETERS	Initial	2	4	5	6	7	8	9	10	10.5		
pH	7.27	7.31	7.46	7.42	7.36	7.34	7.33	7.33	7.20	7.29		
SPEC. COND. (ms/cm)	5.03	5.23	4.77	4.62	4.34	4.61	4.61	4.65	4.92	5.67		
APPEARANCE	Gray Cloudy	Gray Cloudy	Brown Cloudy	Brown Cloudy	Brown Cloudy	Brown Cloudy	Brown Cloudy	Brown Cloudy	Brown Cloudy	Brown Cloudy		
TEMPERATURE (°C)	14.4	14.1	14.0	14.4	13.7	13.9	12.9	13.0	13.0	12.8		
TURBIDITY	>1,000	>1,000	>1,000	>1,000	>1,000	>1,000	>1,000	>1,000	>1,000	>1,000		
TIME	1306	1312	1318	1323	1330	1337	1347	1146	1150	1159		

COMMENTS: Well dry after initial 8.0 gallons removed.
Water Level on 11/16/2012 - 18.92'

WELL DEVELOPMENT LOG

URS Corporation

PROJECT TITLE: Polymer Apps. Site WELL NO.: B-06S

PROJECT NO.: 11176720.00004

STAFF: Tim Ifkovich

DATE(S): 11/15/2015, 11/16/2012

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=	7.11	1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=	4.56	2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	2.55	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	0.43	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 5)	=	2.17	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=	1.50	8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)											
	11/15/2012		11/16/2012									
PARAMETERS	Initial	1	1.25	1.5								
pH	7.30	7.28	7.27	7.27								
SPEC. COND. (ms/cm)	1.75	1.79	1.78	1.71								
APPEARANCE	Black Cloudy	Brown Cloudy	Brown Cloudy	Brown Cloudy								
TEMPERATURE (°C)	11.3	11.3	12.6	12.0								
TURBIDITY	>1,000	>1,000	>1,000	>1,000								
TIME	1357	1404	1130	1137								

COMMENTS: Well dry after initial 1.0 gallons removed.
Water Level on 11/16/2012 - 5.89'

WELL DEVELOPMENT LOG

URS Corporation

PROJECT TITLE: Polymer Applications

WELL NO.: MW-9DD

PROJECT NO.: 11173759

Start purge time: 12:07

STAFF: John Doerr

Stop purge time: 12:21

DATE(S): 9/30/2005

			WELL ID.	L. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=	67.81	1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=	42.39	2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	25.42	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	4.32	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 3)	=	12.96	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=	7	8"	2.60

OR

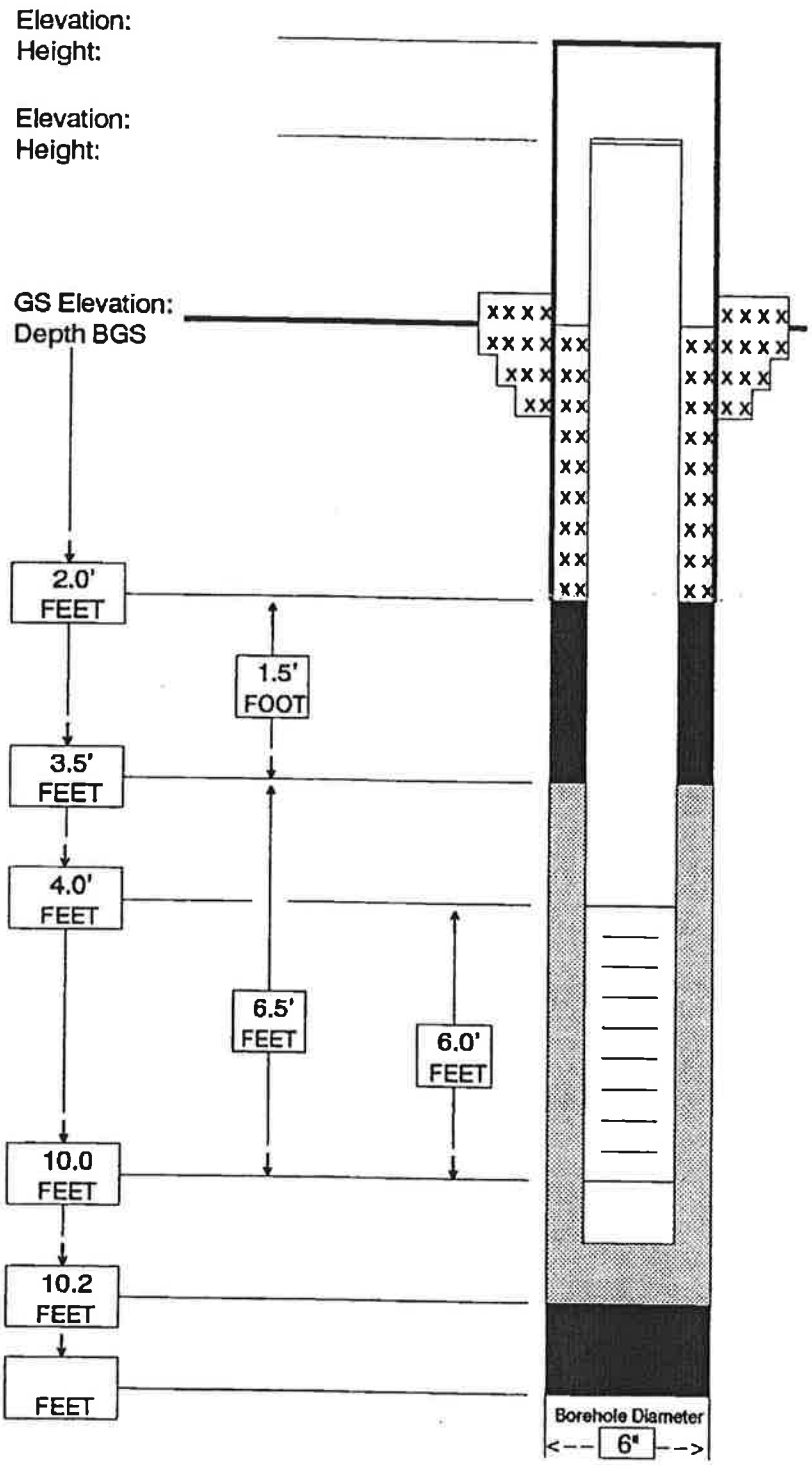
$V=0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)										
PARAMETERS	INITIAL	3	4	5	6	7					
pH	7.83	7.78	7.73	7.75	7.78	7.74					
SPEC. COND. (umhos)	2600	2600	2600	2700	2700	2700					
TEMPERATURE (°C)	13.3	13.1	13.0	13.1	12.8	12.9					
TURBIDITY (NTU)	<50	100	100	200	300	600					

COMMENTS: Well was pumped dry after removing 7.2 gallons.

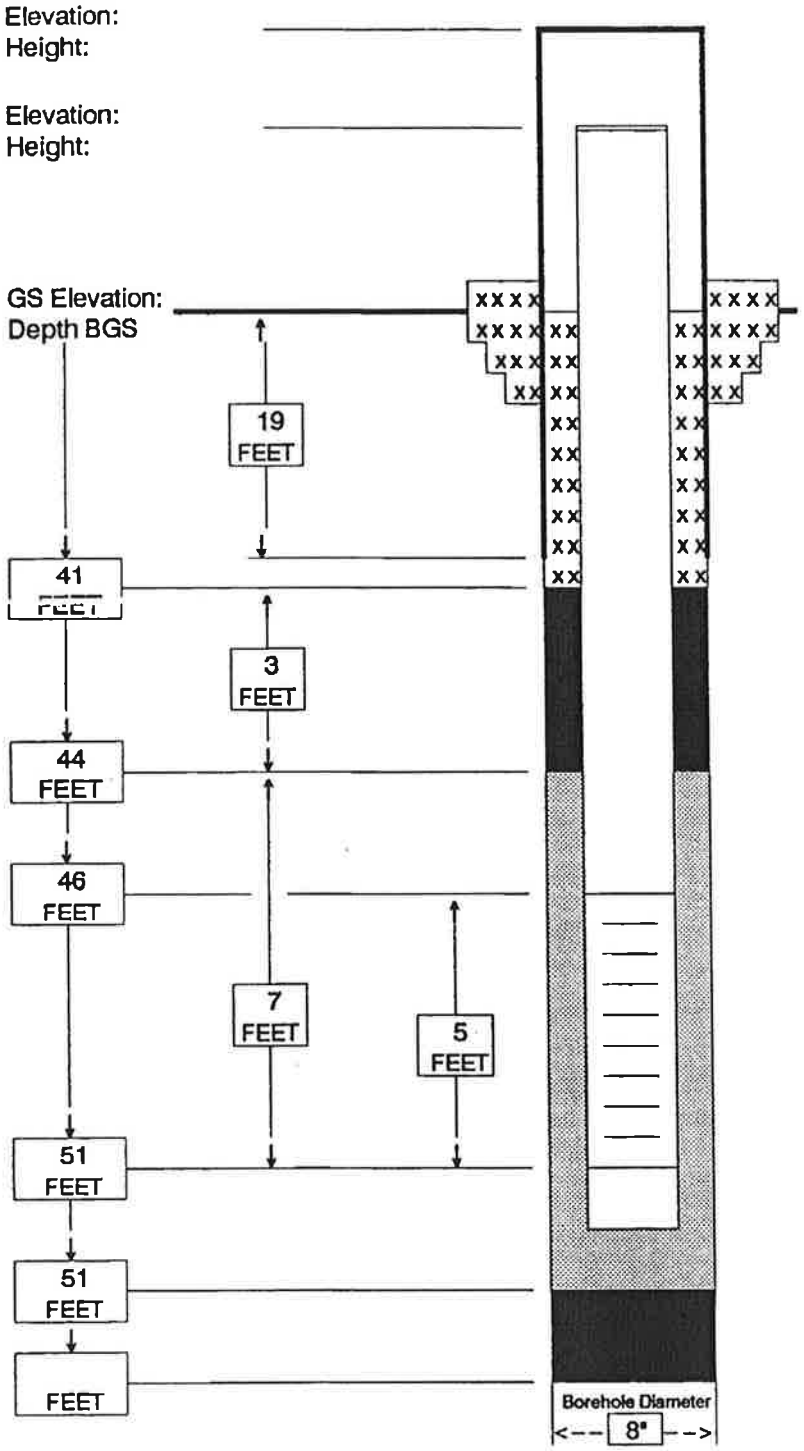
MONITORING WELL CONSTRUCTION LOG

WELL NO.:	MW09S	INSTALLATION:	
PROJECT NO.:	723856 02010	CLIENT/PROJECT:	NYSDEC/ Polymer Applications
INSPECTOR:	A. George (ES)	DRILLING CONTACTOR:	American Auger
COMP. START:	2/24/94 @1000	COMP. END:	2/24/94 @1315
BUILT BY:	Lee Penrod	WELL COORD.:	



DOUBLE CASED MONITORING WELL CONSTRUCTION LOG

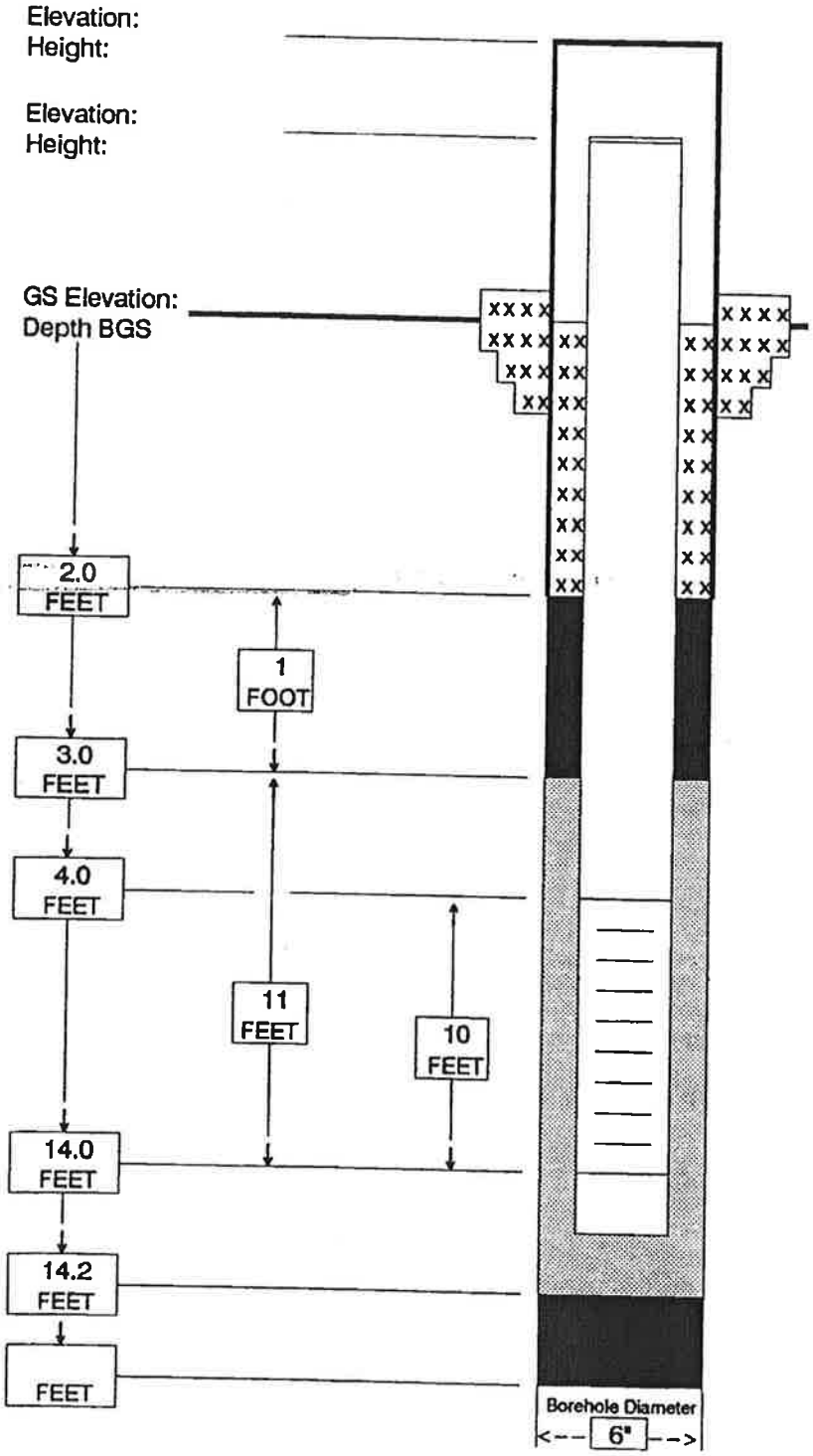
WELL NO.:	MW11DD	INSTALLATION:	
PROJECT NO.:	723856 02010	CLIENT/PROJECT:	NYSDEC/ Polymer Applications
INSPECTOR:	A. George (ES)	DRILLING CONTACTOR:	American Auger and Ditching
COMP. START:	2/21/94 @1345	COMP. END:	3/4/94 @1432
BUILT BY:	Lee Penrod/ John Pietruck	WELL COORD.:	



PROTECTIVE/ OUTER CASING	
Material Type:	STEEL
Diameter:	5 INCHES
Depth BGS:	19 Feet
Water Tight Seal:	YES
Weep Hole:	NO
GUARD POSTS	
Type:	STEEL
No. & Size:	3 @ 5 FEET EACH
SURFACE PAD	
Composition:	CEMENT
Size:	Borehole Diameter
RISER PIPE	
Type:	PVC SCH 40
Diameter:	2 INCH
GROUT	
Composition & Proportions:	3:1 Grout/Bent
Interval:	41 ft to surface
Tremied:	Yes
CENTRALIZERS	
Depth(s):	0 FEET
SEAL	
Type:	3/8" Bentonite Chips
Source:	
Setup/Hydration Time:	1 HOUR (MIN.)
Vol. Fluid Added:	
Tremied:	NO
FILTER PACK	
Type:	Morey 0 Sand
Source:	
Amount Used:	100 lbs
Grain Size Dist.:	
Tremied:	No
SCREEN	
Type:	PVC SCH 40
Diameter:	2 INCH
Slot Size & Type:	0.010 INCH
Interval BGS:	51ft–46ft
SUMP	
Interval BGS:	N/A
Bottom Cap:	YES
BACKFILL PLUG	
Material:	N/A
Setup/Hydration Time:	
WATER ADDED	
Interval: N/A	Amount: N/A
Interval: N/A	Amount: N/A

MONITORING WELL CONSTRUCTION LOG

WELL NO.:	MW11S	INSTALLATION:	
PROJECT NO.:	723856 02010	CLIENT/PROJECT:	NYSDEC/ Polymer Applications
INSPECTOR:	A. George (ES)	DRILLING CONTACTOR:	American Auger and Ditching
COMP. START:	2/25/94 @1300	COMP. END:	2/25/94 @1540
BUILT BY:	Lee Penrod	WELL COORD.:	



WELL DEVELOPMENT LOG

URS Corporation

PROJECT TITLE: Polymer Apps. Site WELL NO.: MW-12S

PROJECT NO.: 11176720.00004

STAFF: Tim Ifkovich

DATE(S): 12/5/2012

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=	14.00	1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=	3.82	2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	10.18	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	1.73	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 5)	=	8.65	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=	7.00	8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)											
PARAMETERS	Initial	2	4	5	6	7						
pH	7.89	7.90	7.87	7.98	7.92	7.98						
SPEC. COND. (ms/cm)	2.06	2.02	2.05	2.02	2.03	2.12						
APPEARANCE	Brown Cloudy	Brown Cloudy	Cloudy	Cloudy	Cloudy	Cloudy						
TEMPERATURE (°C)	10.5	9.6	10.2	10.4	11.1	11.5						
TURBIDITY	>1,000	715	625	844	541	>1,000						
TIME	0953	0958	1003	1007	1011	1014						

COMMENTS:

APPENDIX F
FIELD SAMPLING PLAN

for the

POLYMER APPLICATIONS SITE
NYSDEC SITE NO. 915044
TOWN OF TONAWANDA, ERIE COUNTY, NEW YORK

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FIELD SAMPLING PLAN

ATTACHMENTS

1.0 INTRODUCTION

This Field Sampling Plan (FSP) is designed to provide detailed step-by-step procedures for the field activities outlined in the Site Management Plan (SMP) for the Polymer Applications site. Adherence to these procedures will ensure the quality and defensibility of the field data collected. In addition to the field procedures outlined in this document, all personnel performing field activities must do so in compliance with the Quality Assurance/Quality Control measures outlined in the Quality Assurance Project Plan (QAPP), which also is attached to the SMP.

The NYSDEC has determined that the groundwater monitoring component of the Polymer Applications SMP is no longer required, therefore this FSP has been revised and includes only NYSDEC well decommissioning procedures.

2.0 GROUNDWATER MONITORING

2.1 GENERAL PROGRAM

The groundwater monitoring program has been discontinued as per the NYSDEC's determination. All site-related monitoring well are to be decommissioned.

2.2 GROUNDWATER MONITORING WELL DECOMMISSIONING PROCEDURES

All site-related wells will be decommissioned in accordance with the NYSDEC's CP-43: Groundwater Monitoring Well Decommissioning Policy (November 3, 2009). The policy is provided in its entirety in Attachment A.

3.0 FIELD DOCUMENTATION

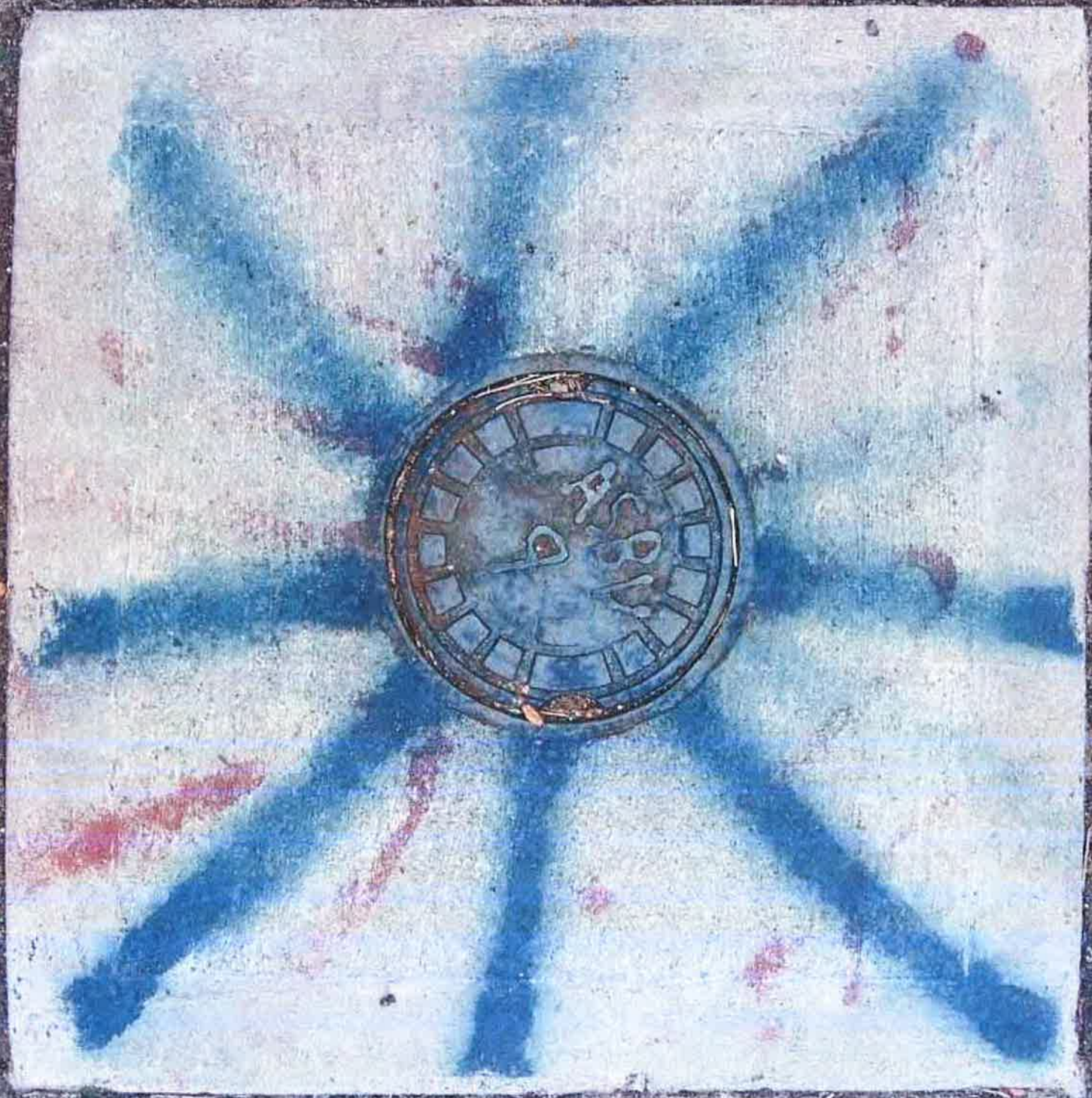
Field notebooks will be used during all on-site work. A dedicated field notebook will be maintained by the field technician overseeing the site activities. In addition to the notebook, any and all original forms, and notebooks used during field activities will be submitted as part of the final report.

ATTACHMENT A

CP-43: GROUNDWATER MONITORING WELL DECOMMISSIONING POLICY

Final - August 2009

GROUNDWATER MONITORING WELL DECOMMISSIONING PROCEDURES



New York State Department of Environmental Conservation
Division of Environmental Remediation

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FIGURES

APPENDICES

INTRODUCTION

This document, *Groundwater Monitoring Well Decommissioning Procedures*, is the addendum to CP-43, Groundwater Monitoring Well Decommissioning Policy, which provides acceptable procedures to be used as guidance when decommissioning monitoring wells in New York State. Please note that this document does not address some site-specific special situations that may be encountered in the field. Compliance with the procedures set forth in this document does not relieve any party of the obligation to properly decommission a monitoring well.

Unprotected, neglected and improperly abandoned monitoring wells are a serious environmental liability. They can function as a pollution conduit for surface contaminants to reach the subsurface and pollute our groundwater. They also can cause unwanted mixing of groundwater, which degrades the overall water quality within an aquifer. Improperly constructed, poorly maintained or damaged monitoring wells can yield anomalous poor data that can compromise the findings of an environmental investigation or remediation project. Unneeded or compromised monitoring wells should be properly decommissioned in order to prevent harm to our groundwater.

Previous versions of this guidance have been issued since 1995. Originally developed as a specification for well decommissioning at Love Canal, the procedures were rewritten to make them applicable across the state. From an engineering standpoint, the guidance has changed very little. Most situations do not require a complex procedure.

If you have any questions, please contact Will Welling at (518) 402-9814.

Sincerely,

Gerald J. Rider, Jr., P.E.
Chief, Remedial Section D
Remedial Bureau E
Division of Environmental Remediation

1.0 PREPARATION

If an unneeded monitoring well remains in good usable condition, an alternative to decommissioning might be the reuse by another agency program. DEC encourages reuse in situations where a well will continue to be used and cared for responsibly.

When reuse is not an option, the first step in the well decommissioning process is to review all pertinent well construction information. One must know the well depth and construction details. GPS coordinates and permanent labeling (if available) will be useful in confirming the well to be decommissioned. An inspection must be performed prior to decommissioning in order to verify the construction and condition of each well. Specific details and subsurface conditions form the basis for decisions throughout the decommissioning process.

Well Details

1. Is the well a single stem riser (all one diameter)?
2. Is the well a simple overburden well (no penetration into bedrock)?
3. Does the well riser consist of telescoping diameters of pipe which decrease with depth?
4. Is the well seal compromised (leaking, inadequate or damaged)?
5. If the well is PVC, is it 25 feet or shallower and not grouted into rock?
6. Can the riser be pulled and is removal of the well desired?
7. Is the well a bedrock well?
8. If the monitoring well is a bedrock well, does it have an open hole?
9. Is there a well assembly (riser and screen) installed within the bedrock hole?

Subsurface Conditions

10. Is the soil contaminated?
11. Does the well penetrate a confining layer?
12. If the well penetrates a confining layer, might overdrilling or casing pulling cause contamination to travel up or down through a break in the confining layer?
13. Does the screened interval cross multiple water-bearing zones?

For additional collection and verification of information, the "Monitoring Well Field Inspection Log" (Figure 1) can be used during a field inspection. After the well has been located and the information gathered, one is ready to select the decommissioning procedure in accordance with Section 2.

Special conditions, such as access problems, well extensions through capped and covered non-Part 360 landfills and seasonal weather patterns affecting construction, should be assessed in the planning stage. Decommissioning work requiring the use of heavy vehicular equipment on landfill caps should be scheduled during dry weather (if possible) so as to minimize damage to the cover. If work must be performed during the spring, winter or inclement weather, special measures to reduce ruts should be employed to maintain the integrity of a completed landfill cover system. As an example, placement of plywood under vehicular equipment can eliminate deep ruts that would require repair.

2.0 DECOMMISSIONING METHODS

The primary rationale for well decommissioning is to remove any potential groundwater pathway. A secondary rationale, often important to the property owner or owner of the well, is to physically remove the well. Removed well materials may be recycled and will not interfere with future construction excavation. The previous versions of these decommissioning procedures have stressed that physical removal of the well by pulling is preferable to leaving casing in the ground. Due to the added effort, expense and risk involved with pulling, the decision of whether to pull or not should be a separate consideration aside from selecting the sealing procedure.

One should select a decommissioning procedure that takes into account the geologic and hydrogeologic conditions at the well site; the presence or absence of contamination in the groundwater; and original well construction details. The selection process for well decommissioning procedures is provided by the flow chart, Figure 2. Answers to the questions

in the preceding section are the input for this flow chart. The four primary well decommissioning methods are:

1. Grouting in-place;
2. Perforating the casing followed by grouting in-place;
3. Grouting in-place followed by casing pulling;
4. Over-drilling and grouting with or without a temporary casing.

In a complex situation, one or more decommissioning procedures may be used for different intervals of the same well.

The remainder of Section 2 discusses the well decommissioning methods and the selection process. Refer to Figure 2 for a flow chart diagram of the complete procedure selection process. The DEC Project Manager has the discretion to deviate from the flow chart, (Figure 2), based on site conditions and professional judgment.

2.1 Grouting In-Place

Grouting in-place is the simplest and most frequently used well decommissioning method and grouting itself is the essential component of all the decommissioning methods. The grout seals the borehole and any portion of the monitoring well that may be left in the ground. Because dirt and foreign objects can fall into an open well, whenever possible a well should be sealed first with grout before attempting subsequent decommissioning steps.

For the purpose of these decommissioning procedures, the well seal is defined as the bentonite seal above the sand pack. Aside from obvious channeling by in-flowing surface water around the well, an indication of the well seal integrity may be obtained through review of the boring logs and/or a comparison of groundwater elevations if the well is part of a cluster. Any problems noted on the boring logs pertaining to the well seal, such as bridging of bentonite pellets or running sands, or disparities between field notes (if available) and the well log would indicate the potential for a poor (compromised) well seal.

If the well seal is not compromised and there is no confining layer present, a single-stem, 2-inch PVC, monitoring well can be satisfactorily decommissioned by grouting it in-place. If the seal is compromised, casing perforation may be called for as discussed in Section 2.2.

As discussed in Section 2.4 and its sub-sections, this method is specified for the bedrock portion of a well, and is used for decommissioning small diameter cased wells. Grouting in-place involves filling the casing with grout to a level of five feet below the land surface, cutting the well casing at the five-foot depth, and removing the top portion of the casing and associated well materials from the ground. The casing must be grouted according to the procedures in Section 6. In addition, the upper five feet of the borehole is filled to land surface and restored according to the procedures described in Section 7.

For open-hole bedrock wells, the procedure involves filling the opening with grout to the top of rock according to the procedures in Section 5. A thicker grout may be required to fill any bedrock voids. If excessive grout is being lost down-hole, consider grouting in stages to reduce the pressure caused by the height of the grout column.

The standard mix with the maximum amount of allowable water will be required to penetrate the well screen and sand pack when a well assembly has been installed within a bedrock hole. For an assembly such as this, the grout should be mixed thinly enough to penetrate the slots and sand pack. The grout mixes are discussed in Sections 6.1 and 6.2.

2.2 Casing Perforating/Grouting In-Place

Casing perforation followed by grouting in-place is the preferred method to use if there is poor documentation of the grouting of the well annulus, or the annulus was allowed to be back-filled with cuttings. The grout will squeeze through the perforations to seal any porous zones along the outside of the casing. The procedure involves puncturing, cutting or splitting the well casing and screen followed by grouting the well. A variety of commercial equipment is available for perforating casings and screens in wells with four-inch or larger inside diameters. Due to the diversity of applications, experienced contractors must recommend a specific technique based on site-specific conditions. A minimum of four rows of perforations several inches long around the circumference of the pipe and a minimum of five perforations per linear foot of casing or screen is recommended (American Society for Testing and Materials, Standard D 5299-99, 1999). After the perforating is complete, the borehole must be grouted according to the procedures in Section 6 and the upper five feet of borehole restored according to the procedures in Section 7.

2.3 Casing Pulling

Casing pulling should be used in cases where the materials of the well assembly are to be recycled, or the well assembly must be removed to clear the site for future excavation or re-development. Casing pulling is an acceptable method to use when no contamination is present; contamination is present but the well does not penetrate a confining layer; and when both contamination and a confining layer are present but the contamination cannot cross the confining layer. Additionally, the well construction materials and well depth must be such that pulling will not break the riser. When contamination is likely to cross the confining layer during pulling, a temporary casing can be used. See Section 2.4.

Casing pulling involves removing the well casing by lifting. Grout is to be added during pulling; the grout will fill the space once occupied by the material being withdrawn. An acceptable procedure to remove casing involves puncturing the bottom of the well or using a casing cutter to cut away the screen, grouting, using jacks to free casing from the hole, and lifting the casing out by using a drill rig, backhoe, crane, or other suitable equipment. Additional grout must be added to the casing as it is withdrawn. Grout mixing and placement procedures are provided in Section 6. In wells or well points in which the bottom cannot be punctured, the casing or screened interval will be perforated or cut away prior to being filled with grout. This procedure should be followed for wells installed in collapsible formations or for highly contaminated wells.

At sites in which well casings have been grouted into the top of bedrock, the casing pulling procedure should not be attempted unless the casing can be first cut or freed from the rock.

2.4 Over-Drilling

Over-drilling is the technique used to physically remove an entire monitoring well, its sand pack and the old grout column and fill. In situations where PVC screens and risers are expected to sever and removal of all well materials is required, over-drilling will be required. Over-drilling is called for when a riser can't be pulled and it penetrates a confining layer. Compared to the other procedures, over-drilling is the least common method of well decommissioning.

A "temporary casing" may be necessary when extraordinary conditions are present, such as a high concentration of mobile contaminants in the overburden, depth to water is shallow, there is poor construction documentation or shoddy construction practices. The approach involves installing a large diameter steel casing around the outside of the well followed by drilling / pulling /grouting within this casing. The casing is withdrawn at the end of pulling, grouting and (perhaps) drilling. If the confining layer is less than 5 feet thick, the casing should be installed to the top of the confining layer. Otherwise, it is installed to a depth of 2 feet below the top of the confining layer. After the outer casing has been set, the well can be removed and grouted through pulling if possible or removed and grouted by drilling inside the casing.

Over-drilling is used where casing pulling is determined to be unfeasible, or where installation of a temporary casing is necessary to prevent cross-contamination, such as when a confining layer is present and contamination in the deeper aquifer could migrate to the upper aquifer as the well is pulled. The over-drilling method should:

- Follow the original well bore;
- Create a borehole of the same or greater diameter than the original boring; and
- Remove all of the well construction materials.

In over-drilling the difficulty lies in keeping the augers centered on the old well as the bit is lowered; it will tend to wander off. As a precaution, the well column should be filled with grout before over-drilling. Then without allowing the grout to dry, the driller proceeds with over-drilling the well. Grouting first guarantees that if the drill wanders off the old well and the effort is less than 100% successful, the remaining well portion will at least have been grouted. There are many methods for over-drilling. Please note that the following methods are not suitable for all types of casing, and the advice of an experienced driller should be sought.

- Conventional augering (i.e., a hollow stem auger fitted with a pilot bit). The pilot bit will grind the well construction materials, which will be brought to the well surface by the auger.
- A conventional cable tool rig to advance "temporary" casing having a larger diameter than the original boring. The cable tool kit is advanced within the casing to grind the well construction materials and soils, which are periodically removed with large diameter bailer. This method is not applicable to bedrock wells.

- An over-reaming tool with a pilot bit nearly the same size as the inside diameter of the casing and a reaming bit slightly larger than the original borehole diameter. This method can be used for wells with steel casings.

- A hollow-stem auger with outward facing carbide cutting teeth having a diameter two to four inches larger than the casing.

Prior to over-drilling, the bottom of the well should be perforated or cut away, and the casing filled with grout as with casing removal by pulling.

In all cases above, over-drilling should advance beyond the original bore depth by a distance of half a foot to ensure complete removal of the construction materials. Oversight attention should be focused on the drill cuttings, looking for fragments of well materials. Absence of these indicators is a sign that the drill has wandered off the well. If wandering is suspected, having previously filled the well with grout, the remaining portion which cannot be over-drilled can be considered grouted in-place. When the over-drilling is complete, grout should be tremied within the annular space between the augers and well casings. The grout level in the borehole should be maintained as the drilling equipment and well materials are sequentially removed. As with all the other methods, the upper five feet of borehole should be restored according to the procedures in Section 7.

3.0 SELECTION PROCESS AND IMPLEMENTATION

The decommissioning procedure selection flow chart, Figure 2, is to be used to select decommissioning methods. The selection process first identifies the basic monitoring well type. There are only two types of monitoring wells described in this guidance, overburden wells and bedrock wells. Bedrock wells typically have an overburden portion which in the selection process is to be treated as an overburden well. Techniques are specified for wells based upon their type and the other physical conditions present. Decommissioning techniques called for by the selection process have their practical limits; construction details dictate when a well stem can be pulled without breaking and when it cannot be pulled. The DEC project manager has the discretion to deviate from the flow chart, (Figure 2), based on site conditions, budgetary concerns and professional judgment. The remainder of this section will discuss types of monitoring wells in various settings along with recommended decommissioning techniques.

3.1 Bedrock Wells

Referring to Figure 2 and Section 2.1, if the well extends into bedrock, the rock hole portion of the well is to be grouted in-place to the top of the rock. The grout mix, however, may vary according to the conditions. A thicker grout may be required to fill voids and a thinner grout may be necessary to penetrate well screen and sand pack. Refer to the grout mixture specifications given in Section 6.1 and 6.2.

Prior to grouting, the depth of the well will be measured to determine if any silt or debris has plugged the well. If plugging has occurred, all reasonable attempts to clear it should be made before grouting. The borehole will then be tremie grouted according to Section 6.4 from the bottom of the well to the top of bedrock to ensure a continuous grout column.

After the rock hole is grouted, the overburden portion of the well is decommissioned using appropriate techniques described below. If the bedrock extends to the ground surface, grouting can extend to the ground surface or to slightly below so that the site can be restored as appropriate in accordance with Section 7.

3.2 Uncontaminated Overburden Wells

For overburden wells and the overburden portion of bedrock wells, the first factor in determining the decommissioning method is whether the overburden portion of the well exhibits contamination, as determined through historical groundwater and/or soil sampling results. If the overburden is uncontaminated, the next criteria considers whether the well penetrates a confining layer. In the case that the overburden portion of the well does not penetrate a confining layer, the casing can either be tremie-grouted and pulled or tremie grouted and left in place. As a general rule, PVC wells greater than 25-feet deep should not be pulled unless site-specific conditions or other factors indicate that the well can be pulled without breaking. If the well cannot be pulled, the well should be grouted in-place as accordance with Sections 2.1 and 2.2.

If a non-telescoped overburden well penetrates a confining layer, the casing should be removed by pulling (if possible) in accordance with Section 2.3. If the casing cannot be removed by pulling, the well should be grouted in-place or where complete removal is required, removed by over-drilling. Over-drilling will be based upon the site-specific conditions and requirements. If pulling is attempted and fails (i.e., a portion of the riser breaks) the remaining portion of the well should be removed by using the conventional augering procedure identified in Section 2.4. Note that if the riser is broken during pulling, it is highly unlikely that the driller will be able to target it to over-drill it. This is the reason why all wells should be grouted first. In all cases, after the well construction materials have been removed to the extent possible, the borehole will be grouted in accordance with Section 6 and the upper five feet will be restored in accordance with Section 7.

3.3 Contaminated Overburden Monitoring Wells/Piezometers

Contamination in the overburden plays a role in the selection process. Any contamination present in the overburden must not be allowed to spread as a result of the decommissioning construction. For wells and piezometers suspected or known to be contaminated with light non-aqueous phase liquid (LNAPL) and/or dense non-aqueous phase liquid (DNAPL), often referred to as "product," the decision to decommission the well should be reviewed. Such gross contamination is a special condition and requires design of the decommissioning procedure. If decommissioning is determined to be the proper course of action, measurement of the non-aqueous phase liquid volume will be determined and this liquid will be removed.

If an overburden well (or the overburden portion of a bedrock well) is contaminated with LNAPL, DNAPL and /or dissolved fractions as indicated by historical sampling results, one must evaluate the potential for contamination to cross an overburden confining layer (if one exists) during decommissioning. A rock or soil horizon of very low permeability is known as a confining layer. Contamination in the overburden lying above a confining layer is a significant condition to recognize. To prevent mobile contaminants from crossing a confining layer during pulling or over-drilling, a temporary casing should be installed to isolate the work zone. One should follow the procedure selection flow chart. Some contaminated conditions call for over-

drilling or a specially designed procedure.

A well in contaminated overburden may be grouted in-place as long as the grout fully seals the well and boring zone. If a well in contaminated overburden was constructed allowing formation collapse as annular backfill or if the well has a compromised well seal, one must either physically remove the well or thoroughly perforate the riser and grout it in-place.

If physical removal of the well is required and the overburden contaminants are likely to be dragged upward or downward during decommissioning, a temporary casing should be used to seal off the construction work zone. Casing pulling and overdrilling can be safely accomplished within the temporary casing. Section 2.4 discusses the temporary casing technique.

3.4 Telescoped Riser

If the riser is telescoped in one or more outer casings, the decommissioning approach depends upon the integrity of the well seal. If there is no evidence that the well seal integrity is compromised, the riser should be grouted in-place in accordance with Sections 2.1 or 2.2 and the upper 5 feet of the well surface should be restored in accordance with Section 7. If indications are that the well seal is not competent, it will be necessary to design and implement a special procedure to perforate and grout or remove the well construction materials. The presence and configuration of the outer casing(s) will be specific in the individual wells and will be a key factor in the decommissioning approach. The special procedure must mitigate the potential for cross-contamination during removal of the well construction materials.

4.0 LOCATING AND SETTING-UP ON THE WELL

Prior to mobilizing to decommission a monitoring well, one should notify the property owner and/or other interested parties including the governing regulatory agency. It is advisable that when at the well location, one should review the proposed well decommissioning procedure. Verify well locations and identification by their identifying markers and GPS coordinates. Lastly, verify the depth of each well with respect to depth recorded on the well construction log.

5.0 REMOVING THE PROTECTIVE CASING

Most monitoring wells installed in non-traffic locations are finished with an elevated, protective casing (guard pipe) and a concrete rain pad. Wells at gasoline stations, usually being in high-traffic areas, are typically finished with a flush-mount, curb box and protective 8" dia steel inspection plate rather than a stick-up riser. The curb box is usually easily removed from around the flush-mount well before pulling or over-drilling. In the case of stick-up wells, the riser pipe may be bonded to the guard pipe and rain pad. When the protective casing and concrete pad of a stick-up monitoring well are "yanked out," a PVC riser will typically break off at the bottom of the guard pipe several feet below grade. Once this happens, it may become impossible to center a drill rig upon the well. The riser may become splintered and structurally unstable for pulling. Unless grouted first, the well may fill with dirt. Before pulling a casing or over-drilling a well, a method must be devised for removing these protective surface pieces without jeopardizing the remaining decommissioning effort.

Generally, unless the protective casing is loose and can be safely lifted off by hand, *one*

should fill the monitoring well with grout before removing the outer protective casing. This will ensure that the well is properly sealed regardless of any problems later when removing the protective casing. Remove the protective casing or road box vault initially only if the stick-up or vault will interfere with subsequent down-hole work which must be done before grouting. This down-hole work may include puncturing, perforating or cutting the screen or riser. But as a general procedure don't remove the protective casing or road box until after initial grouting is complete.

The procedure for removing the protective casing of a well depends upon the decommissioning method specified for the monitoring well. The variety of protective casings available preclude developing a specific removal procedure but often one can simply break up the concrete seal surrounding the casing and jack or hoist the protective casing out of the ground. A check should be made during pulling to ensure that the inner well casing is not being hoisted with the protective casing. If this occurs, the well casing should be cut off after the base of the protective casing is lifted above the land surface. At well locations where the riser has been extended, the burial of a previous concrete pad may require the excavation of soil to the top of the concrete pad to remove the well.

Steel well casing should be removed approximately five feet below the land surface so as to be below the frost line and out of the way of any subsequent shallow digging. The upper five feet of casing and the protective casing can be removed in one operation if a casing cutter is used.

Waste handling and disposal must be consistent with the methods used for the other well materials unless an alternate disposal method can be employed (i.e., steam cleaning followed by disposal as non-hazardous waste).

6.0 SELECTING, MIXING, AND PLACING GROUT

This section gives recipes for the "standard grout mixture" and the thicker "special grout mixture." Mixing and placing grout is also discussed in this section. The goal of well decommissioning is to eliminate the capability of water to travel up or down within the volume of the former well and its boring. Success depends upon the correct grout mixture and placement where it is needed. There are two types of grout mixes that may be used to seal monitoring wells: a standard mix and a special mix. Both mixes use Type 1 Portland cement and four percent bentonite by weight. However, the special mix uses a smaller volume of water and is used in situations where excessive loss of the standard grout mix is possible (e.g., highly-fractured bedrock or coarse gravels).

6.1 Standard Grout Mixture

For most boreholes, the following standard mixture will be used:

- One 94-pound bag Type I Portland cement;
- 3.9 pounds powdered bentonite; and
- 7.8 gallons potable water.

Slightly more water may be used in order to penetrate a sand pack when a well screen transects multiple flow zones. This mixture results in a grout with a bentonite content of four percent by weight and will be used in all cases except in boreholes where excessive use of grout is anticipated. In these cases a special thicker mixture will be used.

6.2 Special Mixture

In cases where excessive use of grout is anticipated, such as high permeability formations and highly fractured or cavernous bedrock formations, the following special mixture will be used:

- one 94-pound bag type I Portland cement;
- 3.9 pounds powdered bentonite;
- 1 pound calcium chloride; and
- 6.0-7.8 gallons potable water (depending on desired thickness).

The special mixture results in a grout with a bentonite content of four percent by dry weight. It is thicker than the standard mixture because it contains less water. This grout is expected to set faster than the Standard Grout Mixture due to the added calcium chloride. The least amount of water that can be added for the mixture to be readily pumpable is 6 gallons per 94-pound bag of cement.

6.3 Grout Mixing Procedure

To begin the grout-mixing procedure, calculate the volume of grout required to fill the borehole. If possible, the mixing basin should be large enough to hold all of the grout necessary for the borehole.

Mix grout until a smooth, homogeneous mixture is achieved. Grout can be mixed manually or with a mechanized mixer. Colloidal mixers should not be used as they tend to excessively decrease the thickness of the grout for the above recipes.

6.4 Grout Placement

This guidance requires that grout be placed in the well from the bottom to the top by means of a "tremie." A tremie is a pipe, a hose or a tube extending from the grout supply to the bottom of the well. The tremie delivers the grout all the way down through the water column without its being diluted and mixed with the water that may be present in the well. The tremie pipe or tube is withdrawn as (or after) the well is filled with grout.

Using the tremie, grout is placed in the borehole filling from the bottom to the top. Two-inch and larger wells should use tremie tubing of not less than 1-inch diameter. Smaller diameter wells will call for a smaller tremie pipe. Grout will then be pumped in until the grout appears at the land surface (when grouting open holes in bedrock, the grout level only needs to reach above the bedrock surface). Any groundwater displaced during grout placement, if known to be contaminated, will be contained for proper disposal.

At this time the rate of settling should be observed. If grouting the well in place, the well

casing remains in the hole. But if the decommissioning method has involved down-hole tools such as hollow-stem augers or temporary casing for overdrilling, these will be removed from the hole. As each section is removed, grout will be added to keep the level between 0 and 5 feet below grade. If the grout level drops below the land surface to an excessive degree, an alternate grouting method must be used. One possibility is to grout in stages; i.e., the first batch of grout is allowed to partially cure before a second batch of grout is added.

As previously described in Section 5.0, the outer protective casing "stick-up" should be removed only after a well has been properly filled with grout. This will ensure that the well is properly sealed regardless of any breakage which may occur when removing the stick-up. It is important to reiterate that when either casing pulling or over-drilling are required, due to the uncertainty of successfully pulling a well or over-boring a well, we insist that the driller tremie grout the well first. Then without allowing the grout to dry, the driller proceeds with pulling the casing or over-drilling the well.

Upon completion of grouting, ensure that the final grout level is approximately five feet below land surface. A ferrous metal marker will be embedded in the top of the grout to indicate the location of the former monitoring well. Lastly, a fabric "utility" marking should be placed one foot above the grout so an excavator can see it clearly.

7.0 BACKFILLING AND SITE RESTORATION

The uppermost five feet of the borehole at the land surface should be filled with material physically similar to the natural soils. The surface of the borehole should be restored to the condition of the area surrounding the borehole. 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 will be used in other areas. All solid waste materials generated during the decommissioning process must be disposed of properly.

8.0 DOCUMENTATION

A form which may be used in the field to record the decommissioning construction is included as Figure 3. Additional documentation may be required by a DEC project manager and samples are included in Appendix A. Programs within the DEC that maintain geographic data on monitoring wells strive to keep that data up to date. Owners of these data sets must be notified when a well is decommissioned. Historical groundwater quality data is linked to monitoring well locations so when a well is decommissioned, existing GIS data must be updated to reflect that fact but the coordinate location in the GIS database should not be eliminated. A metal detector may not be able to detect a deeply buried marker so if this locator is important for future utility runs or foundations, a map should be submitted to the property owner and the town engineer showing the decommissioned well locations. Global Positioning System (GPS) coordinates should be indicated on this map. Lastly, whatever documentation is produced should be provided to the property owner, the DEC, and all other parties involved.

9.0 FIELD OVERSIGHT

Over-drilling requires careful observation to detect whether the drill has wandered off the well. Grout preparation and tremie work should be carefully observed. The successful implementation of a decommissioning work plan depends upon proper direction, observation and oversight. Methods to be employed must be clearly worked through and all parties must understand what they have to do before going into the field. Flexibility is allowed where necessary but the work effort must be thorough and effective to protect our groundwater.

10.0 RELATED REFERENCES

- *Groundwater Monitoring Well Decommissioning Procedures*, October 1986. Prepared by Malcolm Pirnie, Inc., for the New York State Department of Environmental Conservation, Division of Environmental Remediation.

- American Society for Testing and Materials, A.S.T.M. D 5299-99, Standard Guide for the Decommissioning of Ground Water Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities. A.S.T.M.. Philadelphia. 2005.

- New York State Department of Environmental Conservation, Division of Solid and Hazardous Materials, 6 NYCRR Part 360, Solid Waste Management Facilities.

- New York State Department of Environmental Conservation, Region I - Water Unit, Specifications for Abandoning Wells and Boreholes in Unconsolidated Materials, undated.

- United States Environmental Protection Agency, The Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells, EPA 600/4-89/034.

FIGURES

APPENDICES

FIGURE 1

MONITORING WELL FIELD INSPECTION LOG

FIGURE 1

SITE NAME:

SITE ID.: _____
INSPECTOR: _____
DATE/TIME: _____
Well ID.: _____

MONITORING WELL FIELD INSPECTION LOG
NYSDEC WELL DECOMMISSIONING PROGRAM

	YES	NO
WELL VISIBLE? (If not, provide directions below)		
WELL I.D. VISIBLE?		
WELL LOCATION MATCH SITE MAP? (if not, sketch actual location on back).....		

WELL I.D. AS IT APPEARS ON PROTECTIVE CASING OR WELL: .....

	YES	NO
SURFACE SEAL PRESENT?		
SURFACE SEAL COMPETENT? (If cracked, heaved etc., describe below)		
PROTECTIVE CASING IN GOOD CONDITION? (If damaged, describe below)		

HEADSPACE READING (ppm) AND INSTRUMENT USED..... _____
TYPE OF PROTECTIVE CASING AND HEIGHT OF STICKUP IN FEET (If applicable) _____
PROTECTIVE CASING MATERIAL TYPE: ..... _____
MEASURE PROTECTIVE CASING INSIDE DIAMETER (Inches): ..... _____

	YES	NO
LOCK PRESENT?		
LOCK FUNCTIONAL?		
DID YOU REPLACE THE LOCK?		
IS THERE EVIDENCE THAT THE WELL IS DOUBLE CASED? (If yes,describe below)		
WELL MEASURING POINT VISIBLE?		

MEASURE WELL DEPTH FROM MEASURING POINT (Feet): ..... _____
MEASURE DEPTH TO WATER FROM MEASURING POINT (Feet): ..... _____
MEASURE WELL DIAMETER (Inches): ..... _____
WELL CASING MATERIAL: ..... _____
PHYSICAL CONDITION OF VISIBLE WELL CASING: ..... _____
ATTACH ID MARKER (if well ID is confirmed) and IDENTIFY MARKER TYPE ..... _____
PROXIMITY TO UNDERGROUND OR OVERHEAD UTILITIES..... _____

DESCRIBE ACCESS TO WELL: (Include accessibility to truck mounted rig, natural obstructions, overhead power lines, proximity to permanent structures, etc.); ADD SKETCH OF LOCATION ON BACK, IF NECESSARY.

_____

_____

_____

DESCRIBE WELL SETTING (For example, located in a field, in a playground, on pavement, in a garden, etc.) AND ASSESS THE TYPE OF RESTORATION REQUIRED.

_____

_____

IDENTIFY ANY NEARBY POTENTIAL SOURCES OF CONTAMINATION, IF PRESENT (e.g. Gas station, salt pile, etc.):

_____

_____

_____

REMARKS:

_____

_____

FIGURE 2

DECOMMISSIONING PROCEDURE SELECTION

NYSDEC Monitoring Well Decommissioning Procedure Selection

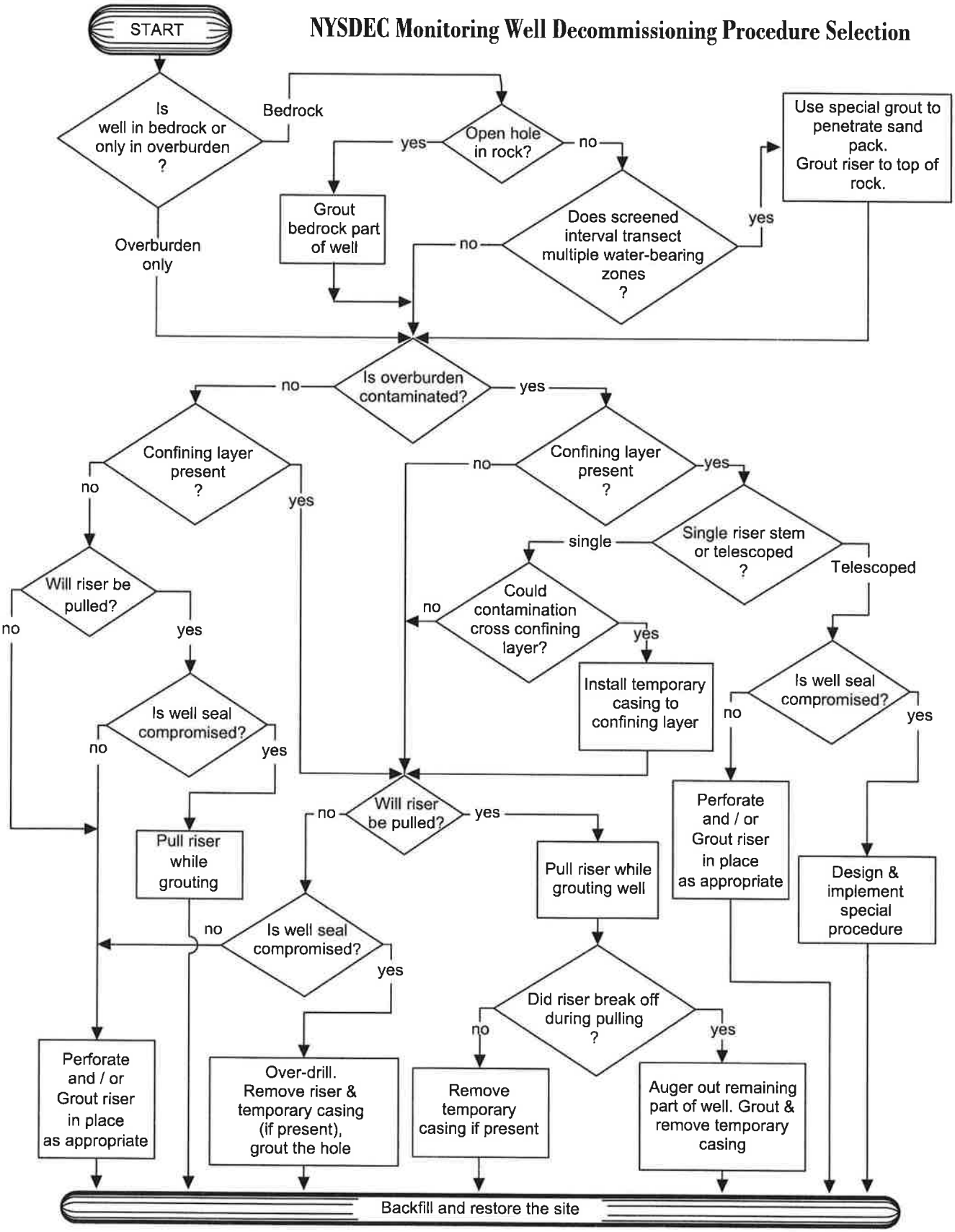


FIGURE 2

FIGURE 3

WELL DECOMMISSIONING RECORD

FIGURE 3

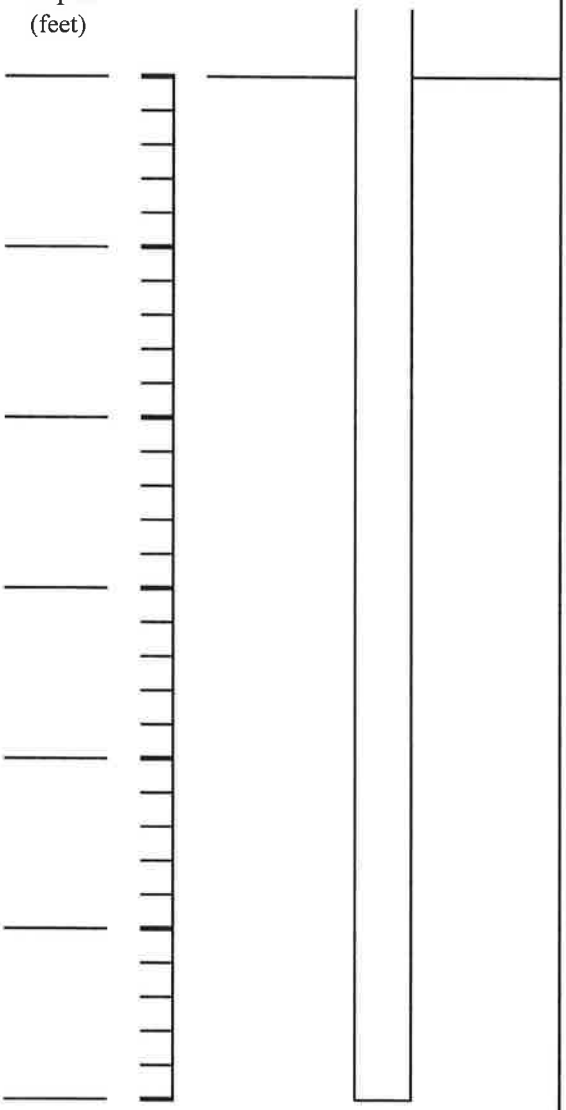
WELL DECOMMISSIONING RECORD

Site Name:	Well I.D.:
Site Location:	Driller:
Drilling Co.:	Inspector:
	Date:

DECOMMISSIONING DATA
(Fill in all that apply)

OVERDRILLING	
Interval Drilled	
Drilling Method(s)	
Borehole Dia. (in.)	
Temporary Casing Installed? (y/n)	
Depth temporary casing installed	
Casing type/dia. (in.)	
Method of installing	
CASING PULLING	
Method employed	
Casing retrieved (feet)	
Casing type/dia. (in)	
CASING PERFORATING	
Equipment used	
Number of perforations/foot	
Size of perforations	
Interval perforated	
GROUTING	
Interval grouted (FBLS)	
# of batches prepared	
For each batch record:	
Quantity of water used (gal.)	
Quantity of cement used (lbs.)	
Cement type	
Quantity of bentonite used (lbs.)	
Quantity of calcium chloride used (lbs.)	
Volume of grout prepared (gal.)	
Volume of grout used (gal.)	

WELL SCHEMATIC*



COMMENTS:

* Sketch in all relevant decommissioning data, including: interval overdrilled, interval grouted, casing left in hole, well stickup, etc.

Drilling Contractor

Department Representative

APPENDIX A - REPORTS

APPENDIX A1 - INSPECTOR'S DAILY REPORT

APPENDIX A2 - PROBLEM IDENTIFICATION REPORT

APPENDIX A3 - CORRECTIVE MEASURES REPORT

Appendix A1

Inspector's Daily Report

CONTRACTOR:
ADDRESS:

TELEPHONE:
LOCATION _____ FROM _____ TO _____
WEATHER _____ TEMP _____ A.M. _____ P.M. _____ DATE _____

CONTRACTOR'S WORK FORCE AND EQUIPMENT

DESCRIPTION	*H*	*#*	*DESCRIPTION*	*H*	*#*	*DESCRIPTION*	*H*	*#*	*DESCRIPTION*	*H*	*#*
Field Engineer						Equipment			Front Loader Ton		
Superintendent			Ironworker			Generators			Bulldozer		
						Welding Equip.					
Laborer Foreman			Carpenter								
Laborer									Backhoe		
Operating Engineer			Concrete Finisher								
Carpenter						Paving Equip. & Roller					
						Air compressor					

SEE REVERSE SIDE FOR SKETCH YES ☐ NO ☐
WORK PERFORMED:

PAY ITEMS

CONTRACT		STA		DESCRIPTION	QUANTITY	REMARKS
Number	ITEM	FROM	TO			

TEST PERFORMED:
PICTURES TAKEN:

VISITORS:

QA PERSONNEL
SIGNATURE

REPORT NUMBER
SHEET _____ Of _____

PROBLEM IDENTIFICATION REPORT

Date _____

Project _____ Job Number _____

Contractor _____

Subject _____

Day | Su | M | T | W | Th | F | Sa

Sky/Precip.	Clear	Partly Cloudy	Cloudy	Rainy	Snow
TEMP.	<32F	32-40F	40-70F	70-80F	80-90F
WIND	No	Light	Strong		
HUMIDITY	Dry	Mod.	Humid		

PROBLEM DESCRIPTION Reference Daily Report Number 1: _____

PROBLEM LOCATION - REFERENCE TEST RESULTS AND LOCATION (Note: Use sketches on back of form as appropriate):

PROBABLE CAUSES: _____

SUGGESTED CORRECTIVE MEASURES: _____

APPROVALS:

QA ENGINEER: _____

PROJECT MANAGER: _____

Distribution:
1. Project Manager
2. Field Office
3. File
4. Owner

QA Personnel
Signature: _____

MEETINGS HELD AND RESULTS

REMARKS

REFERENCES TO OTHER FORMS

SKETCHES

SAMPLE LOG

SAMPLE NUMBER

APPROXIMATE LOCATION OF STOCKPILE

NUMBER OF STOCKPILE

DATE OF COLLECTION

CLIMATIC CONDITIONS

FIELD OBSERVATION

SHEETS OF

CORRECTIVE MEASURES REPORT

Date _____

Day | Su | M | T | W | Th | F | Sa |

Project _____ Job Number _____

Contractor _____

Subject _____

Sky/Precip.	Clear	Partly Cloudy	Cloudy	Rainy	Snow
TEMP.	<32F	32-40F	40-70F	70-80F	80-90F
WIND	No	Light	Strong		
HUMIDITY	Dry	Mod.	Humid		

CORRECTIVE MEASURES TAKEN (Reference Problem Identification Report No.): _____

RETESTING LOCATION: _____

SUGGESTED METHOD OF MINIMIZING RE-OCCURRENCE: _____

SUGGESTED CORRECTIVE MEASURES: _____

APPROVALS:

QA ENGINEER: _____

PROJECT MANAGER: _____

Distribution:

1. Project Manager
2. Field Office
3. File
4. Owner

QA Personnel
Signature: _____

APPENDIX G
INSPECTION FORMS

for the

POLYMER APPLICATIONS SITE
NYSDEC SITE NO. 915044
TOWN OF TONAWANDA, ERIE COUNTY, NEW YORK

POLYMER APPLICATIONS SITE
NYSDEC SITE NO. 915044
SITE-WIDE INSPECTION FORM
(PAGE 1 of 1)

GENERAL INFORMATION

Date:		**Inspector:**	
Weather:		**Signature:**	
Temperature:		**Company:**	
Season (circle one): Winter Spring Summer Fall			

SITE INSPECTION LOG SHEET

Evidence of Disturbance(s) (Y/N):		**Description of Disturbance(s):***	
Evidence of Demolition (Y/N):		**Description of Demolition:***	
Evidence of Building Construction (Y/N):		**Description of Building Construction:***	
Evidence of site use change (Y/N):		**Description of New/Additional Site Use:***	
Site Fence Present (Y/N)		**Description of Condition**	
Drainage Swale Present (Y/N)		**Description of Condition**	
Comments:			

* Attach map showing locations and any other information as required.

APPENDIX H
QUALITY ASSURANCE PROJECT PLAN

for the

POLYMER APPLICATIONS SITE
NYSDEC SITE NO. 915044
TOWN OF TONAWANDA, ERIE COUNTY, NEW YORK

TABLE OF CONTENTS

QUALITY ASSURANCE PROJECT PLAN

ACRONYMS AND ABBREVIATIONS

ASP	Analytical Services Protocol
°C	degree centigrade
CLP	Contract Laboratory Program
COC	chain of custody
DUSR	Data Usability Summary Report
ELAP	Environmental Laboratory Approval Program
FD	field duplicate
FSP	Field Sampling Plan
IDL	instrument detection limit
LCS	laboratory control sample (equivalent to MSB)
LCSD	laboratory control sample duplicate
MD	matrix duplicate
MDL	method detection limit
mg/L	milligrams per liter
MS	matrix spike
MSB	matrix spike blank (equivalent to LCS)
MSD	matrix spike duplicate
NEIC	National Enforcement Investigations Center
NIST	National Institute of Standards and Technology
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCB	polychlorinated biphenyl
PQO	Project Quality Objective
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RPD	relative percent difference
SMP	Site Management Plan
µg/L	micrograms per liter
USEPA	United States Environmental Protection Agency
VTSR	validated time of sample receipt chain-of-custody

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) provides an overview of quality assurance/quality control (QA/QC) procedures that are required for work at the Polymer Applications Site under the direction of the New York State Department of Environmental Conservation (NYSDEC).

2.0 PROJECT/SITE DESCRIPTION

The scope of the project and a description of the site are provided in the Site Management Plan (SMP).

3.0 PROJECT RESPONSIBILITIES

The Owner or Owner's representative is responsible for verifying that the analytical laboratories adhere to the QA/QC requirements specified in this QAPP. All laboratories to be used for the work assignment shall hold applicable New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certifications for the analyses to be performed. Copies of the applicable ELAP certifications for each laboratory to be used during the work assignment shall be made available upon request. Each laboratory maintains its own QA/QC program and employs the required staff to implement this program. The QA Officer for each laboratory is responsible for verifying that all sample analyses are performed in accordance the analytical methods, laboratory QA/QC procedures, and this QAPP.

All work of a substantive nature or identified as a deliverable will undergo an independent technical review (ITR) by experienced and qualified personnel. A written record of the review and resolution of the review findings will be maintained in the project files.

The ITR is used as a management tool to assess:

- Compliance with referenced standards;
- The potential for erroneous assumptions, data, calculations, methods, or conclusions;
- Compliance with the standard of professional practice;
- The basis of and compliance with input and design requirements, design criteria, and design calculations;
- That the appropriate detail/or and calculation checks (i.e., QC) and internal project team reviews have been performed; and
- The soundness of the technical approach and results.

4.0 PROJECT QUALITY OBJECTIVES

4.1 Background

Project quality objectives (PQOs), such as those described in the *Uniform Federal Policy for Quality Assurance Project Plans* (USEPA, 2005), define the type, quantity, and quality of data that are needed to answer specific environmental questions and support proper environmental decisions. More specifically, the PQOs:

- Define the environmental problem;
- Identify target analytes/contaminants of concern and concentration levels;
- Establish the analytical techniques to be used (field-screening, on-site, and/or off-site);
- Establish the appropriate sampling techniques to be used;
- Establish project sampling/analytical measurement performance criteria (where applicable) for precision, accuracy/bias, representativeness, comparability, completeness, and sensitivity; and
- Determine the number of samples needed for each analytical group/matrix/concentration level.

PQOs are provided in the SMP.

4.2 Project Quality Objectives For Chemical Data Measurement

The data quality indicators of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS) will be measured (when applicable) from data collected from chemical analyses of samples collected during the work assignment.

4.2.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix, as well as by errors made in the field and/or laboratory handling

procedures. Precision is evaluated using analyses of matrix spike/matrix spike duplicate/matrix duplicate (MS/MSD/MD) and field duplicate (FD) samples. These provide a measure not only of sampling and analytical precision, but also of analytical precision based on the reproducibility of the analytical results. Relative percent difference (RPD) is used to evaluate precision. RPD criteria for all analyses being performed as part of the work assignment are provided in the analytical procedures identified in this QAPP, where applicable.

4.2.2 Accuracy

Accuracy measures the analytical bias of a measurement system. Sources of measurement error may include the sampling process, field contamination, sample preservation and handling, sample matrix, and sample preparation and analysis techniques. Sampling accuracy may be assessed by evaluating the results of equipment rinsate blanks, field blanks and trip blanks. These data help to assess the potential contamination contribution from various outside sources.

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on samples of the same matrix. Accuracy can be estimated based on the recovery of spiked analytes in the MS/MSD and laboratory control samples (LCS) or matrix spike blanks (MSB). MS/MSD analyses, which will give an indication of matrix effects that may be affecting target compound identification and quantitation, are also a good gauge of method efficiency. Accuracy criteria for all analyses being performed as part of the work assignment are provided in the analytical methods identified in this QAPP, where applicable.

4.2.3 Representativeness

Representativeness expresses the degree to which the sample data accurately and precisely represent the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter that is most concerned with the proper design of the sampling program or subsampling of a given sample. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigation objectives. The sampling procedures, as described in the project Field Sampling Plan, have been selected with the goal of obtaining representative samples for the media of concern.

4.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. An objective for this program is to produce data with the greatest possible degree of comparability. This goal is achieved through using standard techniques to collect and analyze representative samples, and reporting analytical results in appropriate units. Complete field documentation using standardized data collection forms will support the assessment of comparability. Comparability is limited by the other parameters (e.g., precision, accuracy, representativeness, completeness, and sensitivity) because only when precision and accuracy are known can data sets be compared with confidence. For data sets to be comparable, it is imperative that the analytical methods and procedures be explicitly followed.

4.2.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that were expected to be obtained under normal conditions. To meet project needs, it is important that appropriate QC procedures be maintained to verify that valid data are obtained. The completeness goal for data collected as part of the work assignment is 90%, unless otherwise specified. If this goal is not met, then NYSDEC will determine what, if any, further actions need to be taken.

4.2.6 Sensitivity

Sensitivity, as it pertains to analytical methods/instrumentation, is defined as the lowest concentration that can be distinguished from background noise. Sensitivity is measured by method detection limit (MDL) determinations, which are performed by laboratories for each analyte and matrix following procedures specified in 40 CFR Part 136, Appendix B. The MDL is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. Instrument detection limits (IDLs) are similar to MDLs although the analytical procedures used for IDL determinations do not include the preparation/extraction procedures that are used for MDL determinations and environmental sample analyses. Therefore, IDLs provide a measure of sensitivity under ideal conditions, and do not take into account effects of sample matrix and/or other factors that may affect sensitivity. MDLs (and/or IDLs) for the parameters to be analyzed will be provided by the laboratory.

5.0 SAMPLING LOCATIONS AND PROCEDURES

There are currently no proposed sampling locations or sampling procedures provided in the SMP or FSP since groundwater monitoring is not required for the Polymer Applications Site. In the event a soil vapor intrusion evaluation is necessary, a sampling plan should be submitted to the NYSDEC for approval.

6.0 SAMPLE CUSTODY AND HOLDING TIMES

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody (COC) procedures. Chain-of-custody procedures are essential for presenting sample analytical results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in this work assignment will follow the COC guidelines of National Enforcement Investigations Center (NEIC) Policies and Procedures, prepared by the NEIC of the USEPA Office of Enforcement.

6.1 Custody Definitions

- Chain-of-Custody Officer - The employee responsible for oversight of all COC activities is the Site Manager (or his/her designee).
- Under Custody - A sample is "Under Custody" if:
  - It is in one's possession, or
  - It is in one's view, after being in one's possession, or
  - It was in one's possession and one placed it under lock, or
  - It is in a designated secure area.

6.2 Responsibilities

The Site Manager will be responsible for monitoring all COC activities and for collecting legally admissible COC documentation for the permanent project file, and will perform to following tasks:

- Review sample labels or tags, closure tapes, and COC records.
- Train all field sampling personnel in the methodologies for carrying out COC activities and the proper use of all COC and record documents.
- Monitor the implementation of COC procedures.
- Submit copies of the completed COC records to the Project Chemist.

6.3 Chain-of-Custody

Chain-of-custody is initiated in the laboratory when the empty sample containers are shipped for use in the field. When the empty containers are received from the laboratory, they will be checked for any breach of custody including, but not limited to, incomplete COC records, broken COC seals, or any evidence of tampering. Filled sample containers will be returned to the laboratory using appropriate COC procedures. Upon receipt of the samples, the laboratory sample custodian will check for any breach of custody. The Laboratory Project Manager shall notify the responsible parties immediately if there are any problems with the COC documentation.

6.4 Sample Containers and Holding Times

Sample container and preservation requirements and analytical holding times for the analytical methods being used for the Polymer Applications Site must comply with the most current version of NYSDEC's Analytical Services Protocol (ASP). All holding times begin with the validated time of sample receipt (VTSR) at the laboratory.

7.0 ANALYTICAL PROCEDURES

The specific analytical methods to be used for the analysis of samples collected, and the quality control criteria to be followed by each laboratory when performing the analyses must be approved by the NYSDEC.

8.0 CALIBRATION PROCEDURES AND FREQUENCY

In order to obtain a high level of precision and accuracy during sample processing and analysis procedures, laboratory and field instruments must be calibrated properly. Several analytical support areas must be considered so the integrity of standards and reagents is upheld prior to instrument calibration. The following sections describe the analytical support areas and laboratory instrument calibration procedures.

8.1 Analytical Support Areas

Prior to generating quality data, several analytical support areas must be considered:

Standard/Reagent Preparation - Primary reference standards and secondary standard solutions shall be obtained from sources traceable to National Institute of Standards and Technology, or other reliable commercial sources to ensure the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished as per the methods referenced on Table 1. All standards and standard solutions are to be formally documented (i.e., in a bound logbook) and should identify the supplier, lot number, purity/concentration, receipt/preparation date, preparer's name, method of preparation, expiration date, and any other pertinent information. All standard solutions shall be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory shall continually monitor the quality of the standards and reagents through well-documented procedures.

Balances - The analytical balances shall be calibrated and maintained in accordance with manufacture specifications. Calibration is conducted with two American Society of Testing Materials Class 1 weights that bracket the expected balance use range. The laboratory shall check the accuracy of the balances daily and properly document results in permanently bound logbooks.

Refrigerators/Freezers - The temperature of the refrigerators and freezers within the laboratory shall be monitored and recorded daily. This will verify that the quality of the standards and reagents is not compromised and the integrity of the analytical samples is upheld. Appropriate acceptance ranges (4°C ± 2°C for refrigerators) shall be clearly posted on each unit in service.

Water Supply System – Laboratories performing water/solid/waste sample analyses must maintain a sufficient supply of analyte-free water for all project needs. The grade of the water must be of the highest quality in order to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses, and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis by the laboratory.

Air Supply System – Laboratories performing air/soil vapor sample analyses must maintain a sufficient supply of analyte-free air for all project needs. The grade of air must be of the highest quality in order to eliminate false-positives from the analytical results. Appropriate documentation of the quality of the air supply system(s) will be performed on a regular basis by the laboratory.

Sample Containers - All sample containers supplied by the laboratories shall meet the requirements of the analytical methods being used and/or the requirements specified in the NYSDEC Analytical Services Protocol (most current), whichever is more stringent. Pre-cleaned sample containers may be purchased by the laboratory and provided for sample collection as long as the containers meet the requirements of each analytical method and/or the most current NYSDEC ASP document, whichever is more stringent. Documentation of sample cleaning procedures and/or certifications provided by vendors shall be maintained by the laboratories.

Air Sampling Canisters - All Summa (or equivalent) canisters supplied by the laboratories must be cleaned following the requirements of the analytical methods. The canisters shall be individually or batch certified analyte-free to a level below the laboratory quantitation limit for each analyte. Documentation showing the certification of the canisters shall be submitted in each laboratory report package.

8.2 Laboratory Instruments

Calibration of laboratory instruments is required to verify that the analytical system is operating properly and at the sensitivity necessary to meet the project-required quantitation limits for each analytical method. Each instrument for organic analysis shall be calibrated with standards appropriate to the type of instrument and linear range established within the analytical method(s). Calibration of laboratory instruments will be performed according to the analytical methods required for the work assignment.

Calibration of an instrument must be performed prior to the analysis of any samples (initial calibration) and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still properly calibrated. If the contract laboratory cannot meet the method-required calibration requirements, corrective action shall be taken as discussed in Section 11.0. All corrective action procedures taken by the contract laboratory are to be documented, summarized within the report case narrative, and submitted with the analytical results.

8.3 Field Instruments

Various types of portable instruments may be used in the field during this work assignment, which may include one or more of the following: multi-purpose meters capable of measuring pH, conductivity, dissolved oxygen, oxidation/reduction (redox) potential, and/or temperature; photoionization detectors used to monitor organic vapors; and multi-gas meters and analyte-specific devices (e.g. Drager tubes/chips) for health and safety purposes. Other instruments may also be used as needed. All calibration and maintenance of field instrumentation shall be performed according the manufacturer's requirements, and shall be documented by the Site Manager.

9.0 INTERNAL QUALITY CONTROL CHECKS

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as determining the effect that sample matrix may have on data being generated. Two types of internal checks are performed - batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the laboratory will be determined by the analytical methods and any other requirements identified in the SMP.

QC results that vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers to the analytical data, and/or an assessment of the impact these corrective measures have on the established data quality objectives. Quality control samples, including any project-specific QC samples, will be analyzed as discussed below.

9.1 Batch QC

Method Blanks - A method blank is defined as laboratory demonstrated analyte-free water that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Method blanks are analyzed at a frequency of one per analytical batch or as required by the analytical methods. Concentrations of all analytes in the method blanks should be below the quantitation limits identified in the method. The Laboratory Project Manager shall contact the responsible parties to determine the appropriate course of action if analyte concentrations in any blank are greater than the quantitation limit.

Laboratory Control Samples (LCS) – An LCS, or matrix spike blank (MSB), is an aliquot of laboratory demonstrated analyte-free water spiked (fortified) with all, or a representative group, of the analytes being analyzed. The LCS (or MSB) recoveries and RPD are a measure of precision and accuracy that are used to verify that the analysis being performed is in control. LCS (or MSB) analyses shall be performed as required by the analytical methods. Acceptance criteria for LCS (or MSB) analyses are specified in the analytical methods.

9.2 Matrix-Specific QC

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples – MS/MSD samples consist of an aliquot of a sample that is spiked (fortified) with known concentrations of specific compounds

as stipulated by the methodology. The MS/MSD samples are subjected to the entire analytical procedure in order to assess both accuracy and precision of the method for the matrix by measuring the percent recovery (%R) for each analyte and the RPD between the concentrations of each analyte in the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs samples will be collected and analyzed at the frequency of 5% of the total number of samples collected, or one per sampling event, whichever is less. Acceptance criteria for MS/MSD analyses are specified in the analytical method.

Matrix Duplicates (MD) - The matrix duplicate (MD) is a second aliquot of a sample that is prepared and analyzed in a manner identical to that used for the parent sample. Collection of matrix duplicate samples provides for the evaluation of precision both in the field and at the laboratory by comparing the analytical results of two samples taken from the same location. A matrix duplicate may be performed instead of the matrix spike duplicate. Every effort will be made to obtain replicate samples; however, due to interferences, lack of homogeneity, and the nature of soil samples, the analytical results are not always reproducible.

9.3 Additional QC

Additional QC samples that may be collected as part of the work assignment are described in this section. The specific number and type of QC samples to be collected are identified below.

Equipment/Rinsate Blanks – An equipment or rinsate blank is used to indicate potential contamination from sample instruments used to collect and transfer samples, and also serves as a measure of potential contamination from ambient sources during sample collection. When collecting water samples, the equipment blank is a sample of laboratory demonstrated analyte-free water passed over and/or through cleaned sampling equipment. The water must originate from one common source within the laboratory and must be the same water used by the laboratory when performing the analyses (i.e., for method blanks). Equipment blanks should be collected, transported, and analyzed in the same manner as the samples acquired that day. Equipment blanks typically are not required when using dedicated and/or disposable sampling equipment.

Field Blanks – A field blank is used to indicate potential contamination from sample collection containers and/or from ambient sources during sample collection. For example, a field blank is collected by pouring laboratory demonstrated analyte-free water directly into clean sample collection containers. The water must originate from one common source within the laboratory and must be the same water used by the laboratory when performing the analyses (i.e., for method blanks). Field blanks should be collected, transported, and analyzed in the same manner as the samples acquired that day. Field blanks typically are collected only when ambient conditions may present a risk of contamination to field samples.

Trip Blanks - Trip blanks are only required when collecting aqueous samples for volatile organics or dissolved gas analyses. They are not required for non-aqueous matrices or for analysis of any other parameters. They consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte-free water. Trip blanks accompany the empty sample containers that are shipped from the laboratory into the field, and then back to the laboratory along with the collected samples for analysis. These bottles are never opened in the field. Trip blanks must return to the laboratory with the same set of containers they accompanied to the field. Since volatiles and dissolved gasses will not be collected for this work assignment, trip blanks are not required.

Field Duplicates – A field duplicate (FD) sample pair consists of two independent samples that are collected at approximately the same time and place, using the same collection methods. Both are containerized, handled, and analyzed in an identical manner. Field duplicates are useful in documenting the precision of the sampling process, and also provide a measure of analysis precision. Field duplicates are typically labeled so that the laboratory cannot determine or identify the location from which the field duplicate was collected. Field duplicates will be collected at a rate of 5%, or at least one per sampling event.

10.0 CALCULATION OF DATA QUALITY INDICATORS

10.1 Precision

Precision is evaluated using results from field or matrix duplicate, MS/MSD, and/or LCS/LCSD (MSB/MSBD) analyses. The RPD between the concentrations detected in the above-listed sample pairs is calculated using the following formula:

$$RPD = \left| \frac{(X_1 - X_2)}{[(X_1 + X_2)/2]} \right| x\,100\%$$

where:

X_1 = *Measured value of sample, MS, or LCS (MSB)*

X_2 = *Measured value of field (or matrix) duplicate, MSD, or LCSD (MSBD)*

RPD criteria are provided by the laboratory per the analytical methods.

10.2 Accuracy

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. Analytical accuracy is expressed as the percent recovery (%R) of a compound or analyte that has been added to the environmental sample or laboratory demonstrated analyte-free matrix at known concentrations before analysis. Accuracy will be determined from MS, MSD, LCS (MSB) samples as well as from surrogate compounds that are added to samples prior to extraction and analysis (typically used for organic fractions only). Accuracy is calculated using the following formula:

$$\%R = \frac{(X_s - X_u)}{K} x\,100\%$$

where:

X_s - *Measured value of the spike sample*

X_u - *Measured value of the unspiked sample*

K - *Known amount of spike in the sample*

Accuracy criteria are provided by the laboratory per the analytical methods.

10.3 Completeness

Completeness is calculated on a per matrix basis for the project and is calculated as follows:

$$\%\ Completeness = \frac{(N - X_n)}{N}\ x\ 100\%$$

where:

N - *Number of valid measurements expected to be obtained*

X_n - *Number of invalid measurements*

11.0 CORRECTIVE ACTIONS

The Site Manager will discuss with and receive approval from the NYSDEC or other responsible parties prior to taking any corrective actions in the field that may need to be implemented in order to meet project objectives. The Site Manager will document any corrective actions taken in the Field Log Book.

Laboratory corrective actions shall be implemented to resolve problems and restore proper functioning to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. A discussion of the corrective actions to be taken is presented in the following sections.

11.1 Incoming Samples

The laboratory shall document problems noted during sample receipt. The Laboratory Project Manager will contact the responsible parties as soon as possible if any problems are encountered. All corrective actions shall be documented thoroughly.

11.2 Sample Holding Times

If any sample extractions and/or analyses exceed method holding time requirements, the Laboratory Project Manager will contact the responsible parties immediately for problem resolution. All corrective actions shall be documented thoroughly.

11.3 Instrument Calibration

Sample analysis shall not be allowed until all laboratory instrumentation is properly calibrated in accordance with method requirements. If any initial/continuing calibration standards fail to meet the required criteria, recalibration must be performed and, if necessary, all samples going back to the previous acceptable continuing calibration standard must be reanalyzed.

11.4 Quantitation Limits

The laboratory must make every attempt to meet all quantitation limits required to meet, for example, TOGS 1.1.1 Class GA groundwater standards or guidance values. It should be noted that these limits are based on undiluted samples analyses. Sample-specific quantitation limits may be affected by any dilution that is needed because of elevated analyte concentrations, and/or matrix interferences. If difficulties arise in achieving the required quantitation limits due to a particular sample matrix, the Laboratory Project Manager will contact the responsible parties for problem resolution. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory shall report results from both the initial analyses and secondary dilution analyses. Dilution should only be used to bring target analytes within the linear range of calibration. If samples are analyzed at a dilution with no target analytes detected, the Laboratory Project Manager shall contact the responsible parties so that appropriate corrective actions can be initiated.

11.5 Method QC

All QC samples, including blanks, matrix spikes, matrix spike duplicates, matrix duplicates, surrogate recoveries, laboratory control samples, and other method-specified QC samples, shall meet the acceptance criteria specified in the analytical method. Failure to these criteria will result in the possible qualification of all affected data. When the criteria are not met, the affected sample(s) should be reanalyzed within the required holding times to verify the presence or absence of matrix effects. It should be noted that reanalysis is not always required. The Laboratory Project Manager shall contact the responsible parties to discuss possible corrective actions should unusually difficult sample matrices be encountered. The laboratory shall follow the requirements of the analytical methods and any instructions provided by the responsible parties when determining if samples require reanalysis. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria as defined by the data validation guidelines identified in Section 12.2, or as otherwise identified for the work assignment.

11.6 Calculation Errors

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review, calculation and/or reporting errors exist, the laboratory will be requested to

reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

12.0 DATA REDUCTION, VALIDATION, AND USABILITY

NYSDEC ASP Category B deliverable requirements (or equivalent) will be required for documentation and reporting of all data. Where applicable, the standard NYSDEC Data Package Summary Forms should be completed by the analytical laboratories and included in the deliverable data packages.

12.1 Data Reduction

Laboratory analytical data are first generated in raw form at the instrument. These data may be either graphic or printed tabular form. Specific data generation procedures and calculations are found in each of the referenced methods. Analytical results must be reported consistently. Results for aqueous samples will be reported in concentration units of micrograms per liter (µg/L) or milligrams per liter (mg/L). Results for air or soil vapor samples will be reported in concentration units of micrograms per cubic meter ($\mu g/m^3$) or parts per billion, by volume (ppbv).

Identification of all analytes must be accomplished with an authentic standard of the analyte traceable to NIST or other reliable commercial sources. Data reduction will be performed by individuals experienced with a particular analysis and knowledgeable of requirements.

12.2 Data Validation

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use.

Data validation will be performed by the responsible party and/or an environmental chemist under his/her supervision. All analytical samples collected will receive a limited data review. This review will include a review of holding times, completeness of all required deliverables, review of QC results (blanks, instrument tunings, calibration standards, calibration verifications, surrogates recoveries, spike recoveries, replicate analyses, and laboratory controls) to determine if the data are within the protocol-required limits and specifications, a determination that all samples were analyzed using established and agreed upon analytical protocols, an evaluation of the raw data to confirm the results provided in the data summary sheets, and a review of laboratory data qualifiers. The analytical methods, as well as the general guidelines

presented in one or more of the most current USEPA Region II quality assurance documents will be used to aid the chemist during the data review. The specific USEPA Region II validation guidelines to be followed will vary based on the required analytical parameters for each work assignment, and will be documented in the Data Usability Summary Report (Section 12.3).

12.3 Data Usability

A Data Usability Summary Report (DUSR) (NYSDEC *DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 2B - Guidance for Data Deliverables and the Development of Data Usability Summary Reports*, May 2010) will be submitted to NYSDEC, and will describe the samples and the analytical parameters. Data deficiencies, analytical protocol deviations, and quality control problems will be identified and their effect on the data will be discussed. The DUSR will also include recommendations on resampling/reanalysis.

13.0 PREVENTIVE MAINTENANCE

The laboratory is responsible for maintaining its analytical equipment. Preventive maintenance is provided on a regular basis to minimize down-time and the potential interruption of analytical work. Instruments are maintained in accordance with the manufacturer's recommendations. If instruments require maintenance, only trained laboratory personnel or manufacturer-authorized service specialists are permitted to do the work. Maintenance activities will be documented and kept in permanent logs. These logs will be available for inspection by auditing personnel.

Maintenance of field instrumentation will be performed as needed according to the manufacturer’s requirements.

14.0 PERFORMANCE AND SYSTEMS AUDITS

Audits are evaluations of laboratory QA/QC procedures, and are performed before or shortly after systems are operational, and on an ongoing basis thereafter. Problems detected during these audits shall be reviewed by the Laboratory QA Manager and other laboratory management personnel, and corrective action shall be instituted as necessary.

14.1 Performance Audits

Performance audits are conducted by introducing control samples into the data measurement, reduction, and reporting processes. These control samples may include performance evaluation samples, or field samples spiked with known amounts of analytes. In addition to conducting internal reviews and performance audits as part of its established quality assurance program, the laboratory is required to take part in regularly-scheduled performance audits/evaluations from state and federal agencies. They are typically conducted as part of the certification process and to evaluate laboratory performance and analytical measurement systems. Acceptable performance on evaluation samples and audits is required for certification and accreditation. The laboratory shall use the information provided from these audits to monitor and assess the quality of its performance, and to take appropriate corrective actions as needed.

14.2 Systems Audits

Systems audits are thorough, on-site qualitative audits of facilities, equipment/instrumentation, personnel, training procedures, record keeping, data review/management, and reporting aspects of a system. They provide a qualitative measure of the data produced by one section of, or the entire, measurement process. The audits are performed against a set of requirements, which may include laboratory standard operating procedures, a quality assurance project plan or work plan, a standard method, and/or a project statement of work. The primary objective of the systems audits is to verify that all procedures are being performed according to the requirements specified above. Systems audits are performed internally by the Laboratory QA Manager, and also by external parties such as state and federal regulatory agencies and private-sector clients. Typically, state and federal agencies perform systems audits in conjunction with performance audits/evaluations during the laboratory certification process. As part of its QA program, the Laboratory QA Manager shall also conduct

periodic checks and audits of the analytical, data reduction, and reporting systems. The purpose of these is to verify that the systems are operating properly, and that personnel are adhering to established procedures and documenting the required information. These checks and audits assist in determining or detecting where problems are occurring.

REFERENCES

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