ARCADIS Design & Consultancy for natural and built assets

National Fuel Gas Distribution Corporation

Site Management Plan

Former Buffalo Service Station – Off-Site
Site #C915194A
Buffalo, Erie County, New York

May 2016; Revised May 2021, November 2023

SITE MANAGEMENT PLAN

Former Buffalo Service Station – Off-Site
Site #C915194A
Buffalo, Erie County, New York

Certification Statement

I, Scott Powlin, P.G., certify that I am currently a Qualified Environmental Professional as in defined in 6 NYCRR Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER *Technical Guidance for Site Investigation and Remediation* (DER-10).

Date 11/3/2023

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ACRONYMS AND ABBREVIATIONS

AMSL	above mean sea level, North American Vertical Datum 1988
BTEX	benzene, toluene, ethylbenzene, and xylenes
BSA	Buffalo Sewer Authority
BSS	Buffalo Service Station
CAMP	Community Air Monitoring Plan
COC	Certificate of Completion
CSOs	combined sewer overflows
DNAPL	dense non-aqueous phase liquid
ECL	Environmental Conservation Law
ECs	Engineering Controls
EE	Environmental Easement
EN	Environmental Notice
EWP	Excavation Work Plan
ft. bgs	feet below ground surface
ft/day	feet per day
HASP	Health and Safety Plan
ICs	Institutional Controls
LTCP	long term control plan
mg/kg	milligrams per kilogram
MGP	manufactured gas plant
NAPL	non-aqueous phase liquid
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSTA	New York State Thruway Authority
OSHA	Occupational Safety and Health Organization
PAHs	polycyclic aromatic hydrocarbons
PRRs	Periodic Review Reports
SC	Site Characterization
SCO	soil cleanup objective

SI	South Interceptor
SMP	Site Management Plan
SVI	soil vapor intrusion
SVOCs	semi-volatile organic compounds
TAL	Target Analyte List
TCL	Target Compound List
TOGS	Technical and Operational Guidance Series
VOCs	volatile organic compounds
WSP	WSP Engineering of New York, P.C.

EXECUTIVE SUMMARY

The following provides a brief summary of the institutional controls implemented for the Site, as well as the inspections, maintenance and reporting activities required by this Site Management Plan:

Site Identification:	Former Buffalo Service Station – Off-Site Buffalo, Erie County, New York New York State Department of Environmental Conservation (NYSDEC) Site No. C915194A
Institutional Controls ("ICs"):	1. The Site may be used for commercial and industrial use. 2. The Site may not be used for a higher level of use, such as unrestricted residential, or restricted residential use as defined in DER-10 / Technical Guidance for Site Investigation and Remediation (May 2010), without an amendment to each the Environmental Easement and Environmental Notice, respectively, as approved by the NYSDEC. 3. Compliance with the Environmental Easement, and Environmental Notice, and this SMP by the owners of the Site and National Fuel and its successors. 4. ICs identified in the Environmental Easement and Environmental Notice may not be discontinued without an amendment to or extinguishment of the Environmental Easement and/or Environmental Notice, respectively. 5. All future activities on the Site that will disturb remaining impacts (as defined in Section 1.4.1) must be conducted in accordance with this SMP. 6. The use of the groundwater underlying the Site is prohibited. 7. Vegetable gardens and farming on the Site are prohibited. 8. Data and information pertinent to Site management must be reported at the frequency and in a manner as defined in this SMP.
Engineering Controls ("ECs"):	There are no ECs for the Site.

Site Identification:	Former Buffalo Service Station – Off-Site Buffalo, Erie County, New York New York State Department of Environmental Conservation (NYSDEC) Site No. C915194A
Inspections:	Frequency:
1. Site-wide Inspection	Annually First 5 Years; Every 3 Years after 5th Year
Monitoring:	No monitoring required.
Maintenance:	No maintenance required.
Reporting:	Frequency:
1. Periodic Review Report	Annually First 5 Years; Every 3 years after 5th Year.

Further descriptions of the above requirements are provided in detail in subsequent sections of this Site Management Plan.

1 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAMS

1.1 Introduction

This Site Management Plan ("SMP") is a required element of the remedial program for the Former Buffalo Service Station (BSS) Off-Site (Site#C915194A) located in the City of Buffalo, County of Erie, State of New York (hereinafter referred to as the "Site") under the Inactive Hazardous Waste Disposal Site Remedial Program administered by New York State Department of Environmental Conservation (NYSDEC).

1.1.1 General

National Fuel Gas Distribution Corporation ("National Fuel") entered into an Administrative Order on Consent dated July 7, 2011 (Index #B9-0695-05-06A, Site #C915194A) with the NYSDEC to investigate and, to the extent necessary, remediate the approximately 0.6-acre Site located in Buffalo, Erie County, New York. Site investigation has been completed in accordance with this Administrative Order on Consent ("Order on Consent"), including Site Characterization ("SC") that was performed from January 2012 to August 2013. The SC was conducted to evaluate the potential presence of manufactured gas plant ("MGP")-related impacts associated with the former BSS site, which is located adjacent to the eastern edge of the Site. The Order on Consent requires National Fuel to investigate and, to the extent necessary, remediate potentially contaminated media at the Site. The location and boundaries of this 0.6-acre Site are provided on Figures 1 and 2, and are more fully described and shown in the metes and bounds description and on the survey map that is part of the Environmental Easement ("EE") provided in Appendix J and the Environmental Notice ("EN") provided in Appendix K.

After completion of the investigation work described in the *Site Characterization Report* ("SC Report") (ARCADIS, Dec. 2015), some limited contamination remains at this Site, including residual MGP-related impacts identified in the subsurface at this Site, which are hereafter referred to as "Impacts." Institutional Controls ("ICs") have been incorporated into the Site remedy to control exposure to remaining Impacts to ensure protection of public health and the environment. The EE granted to the NYSDEC and the EN filed by the NYSDEC both require compliance with this SMP and all ICs placed on the Site, respectively. This SMP was prepared to manage Impacts at the Site until the EE and the EN have been extinguished in accordance with Environmental Conservation Law (ECL) Article 71, Title 36. All reports associated with the Site and with the respective EE area or the respective EN area can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in Table 2 of this SMP.

This SMP was prepared by ARCADIS of New York, Inc. ("ARCADIS"), on behalf of National Fuel, in accordance with the requirements of NYSDEC's DER-10: ("*Technical Guidance for Site Investigation and Remediation")*, dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs that are required by the EE and by the EN, for each respective portion of the Site.

1.1.2 Purpose

This SMP is to address Impacts at the Site. Engineering Controls (ECs) have not been incorporated into the Site remedy due to the limited extent of Impacts at the Site and groundwater at the Site and the low risk of exposure to the Impacts. An EE has been granted to the NYSDEC by the City of Buffalo with regard to the portion of the Site owned by the City of Buffalo and an EN has been placed by the NYSTA with regard to the portion of the Site owned by NYSTA. The EE and EN have each been recorded with the Erie County Clerk. Any reference to the EE or EN in this SMP shall be with reference to the City of Buffalo owned portion and the NYSTA owned portion of the property respectively. The EE and EN each require compliance with this SMP and all ICs placed on the Site. The ICs place restrictions on Site use and mandate monitoring and reporting measures for all ICs. This SMP specifies the methods necessary to ensure compliance with all ICs required by the EE and EN for the Impacts. This SMP has been approved by the NYSDEC, and compliance with this SMP is required by National Fuel pursuant to the Order On Consent, by the grantor of the EE and the grantor's successors and assigns, and by the property owner(s) affected by the EN pursuant to any applicable legal requirements. This SMP may only be revised with the approval of the NYSDEC.

This SMP provides a detailed description of all procedures required to manage Impacts including: (1) implementation and management of all ICs; (2) performance of periodic Site inspections; and (3) submittal of Periodic Review Reports ("PRRs"). Table 1 provides a summary of property use limitations for properties comprising the Site, notification requirements for activities conducted at the Site, and activities that would require implementation of certain requirements under this SMP.

It is important to note that:

- This SMP details the Site-specific implementation procedures that are required by the EE and the EN. Failure to properly implement the SMP is a violation of the EE and the EN, which is grounds for revocation of the Certificate of Completion ("COC"), release or closure letter.
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375, and the Order on Consent (Index #B9-0695-05-06A; Site #C915194A) for the Site, and thereby subject to applicable penalties.

1.1.3 Roles and Responsibilities

The roles and responsibilities for entities involved with implementation of certain aspects of this SMP are as follows:

- The NYSDEC will review and approve future ground intrusive plans, Health and Safety Plans (HASPs), Community Air Monitoring Plans (CAMPs), and PRRs.
- The City of Buffalo (as partial Site owner) will comply with the SMP and allow NYSDEC and National Fuel and its successors access to the portion of the Site owned by the City of Buffalo.
- The NYSTA (as partial Site owner) will comply with the SMP and allow NYSDEC and National Fuel and its successors access to the portion of the Site owned by the NYSTA, with prior notification to NYSTA.

- National Fuel or its successors (as the remedial party) will complete Site inspections as outlined in this SMP, submit PRRs to NYSDEC, and will be responsibly engaged during any excavation activities which penetrate the soil more than 12 feet below ground surface (bgs) or below 570 feet above mean sea level (amsl). In the event that one of the Site owners requests that National Fuel undertake subsurface work, and National Fuel agrees, then National Fuel will be responsible for proper implementation of the Excavation Work Plan with the support and cooperation of the Site owner. National Fuel will review any Site owner requests in good faith and notify the Site owner of its decision in writing.

The contact information for the entities identified above is provided in Table 2.

1.1.4 Revisions

Revisions to this SMP will be proposed in writing to the NYSDEC's project manager. In accordance with the EE and the EN 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. Updates to the contact information provided in Table 2 will be provided by National Fuel on an as-needed basis.

1.2 Site Background

A summary of relevant Site background information is provided in the following subsections.

1.2.1 Site Location and Description

The Site is located in the City of Buffalo, County of Erie, New York, and is bordered to the northeast by Block 110.60 Lot 2-2.1 and southwest by Block 110.60 Lot 1-1.2 on Erie County, New York Tax Maps. As shown on Figure 2, the Site is approximately 120 feet by 185 feet and extends from the eastern edge of Fourth Street, under and to a chain link fence located just beyond the western edge of the New York State Interstate I-190 overpass. To the west of this chain link fence and outside of the boundary of the Site lies a railroad. The Site consists of the two adjoining portions of real property which have been identified in this SMP as the Environmental Easement Area (0.128± Acres, and also referred to as the "EEA") and the Environmental Notice Area (0.381± Acres, and also referred to as the "ENA"). The EEA is approximately 120 feet by 46.30 feet, and shares its western border with the ENA which covers an approximate area of 120 feet by 138.36 feet. The boundaries of the Site, and of the EEA and the ENA are more fully described and show in Appendix J and Appendix K, respectively. Subject to any exceptions that might exist, including but not limited to any easements or other property interests, the EEA is owned by the City of Buffalo, whereas the ENA is owned by the people of the State of New York and under the jurisdiction of the NYSTA. With the exception of a small area that extends past the concrete curb marking the border of the street, the EEA may be characterized as lying almost entirely beneath Fourth Street (shown in Figure 2 and in the map contained in Appendix J and K). The eastern border of the ENA lies just slightly west of Fourth Street. Less than 20 feet to the west, a 6-foot tall galvanized chain-link fence is located which runs almost parallel with the shared border. This 6-foot chain link fence was placed by the NYSTA to deter trespassing under the I-190 overpass and also serves as an approximate marker of the northbound edge of the overhead ramp. An approximate 11.5-foot diameter concrete sewer situated approximately 9 feet bgs runs parallel with and beneath the northbound lane of the NYS Thruway

overpass (I-190), bisecting the eastern portion of the ENA. An approximate 15-inch diameter reinforced concrete storm sewer pipe, situated approximately 3-5 ft. bgs, runs parallel with and beneath the northbound lane of Fourth Street in the eastern portion of the EEA. A 23-kilovolt electrical line (encased in a concrete duct bank) roughly bisects the Site and both the ENA and the EEA in the east-west direction. Underground cables and conduits owned by NYSTA at the time of issuance of this SMP are located running parallel to the 6-foot tall galvanized chain-link fence in the eastern portion of the ENA. Groundwater in the vicinity of the Site is not used as a drinking water supply (Groundwater Technology, 1996). It is important to note that the utilities listed in this Section 1.2.1 above should not be considered comprehensive or definitive and may not represent all underground utilities within the boundaries of the Site (or the EEA or ENA, respectively).

1.2.2 Site History

Historical use of the Site was determined primarily through a review of available Sanborn Fire Insurance maps and atlases of the Buffalo, New York area. Based on a review of this information, the Site was historically the location of the confluence between the former Wilkeson Slip and the former Erie Canal. The historical locations of the former Wilkeson Slip and the former Erie Canal are shown on Figure 2 and on the McIntosh & McIntosh Survey Map included as part of both Appendix J and K. During a period around 1925, a small portion of the Site (adjacent to the slip and canal) was used as lumber storage owned by Montgomery Door and Box Company.

The Wilkeson Slip is believed to have been contaminated with coal tar waste from the former Buffalo Service Station (BSS), a manufactured gas plant (MGP). The Wilkeson Slip was filled in between 1895 and 1915 and the Erie Canal was filled in the 1930's. The BSS was operated by various companies from 1848 to 1948. National Fuel Gas owned the BSS property until 2005. During remedial action at the BSS site in 2006, a large portion of the Wilkeson Slip was cleaned up by Duke Realty under the Brownfield Cleanup Program (BSS, Site No. 915194). In 2012, a sheet pile was placed along the eastern side of Fourth Street in the Slip and the remaining portion of the Wilkeson Slip within Duke Realty property was remediated pursuant to a NYSDEC approved remedy.

1.2.3 Geologic Conditions

Topographic relief at the Site is flat, and the land surface elevation is approximately 580 ft. amsl. The SC Report identified two principal overburden geologic units beneath the Site:

- Fill – The fill consists of silt, clay, fine to coarse sand, fine to coarse gravel, slag, and bricks. The fill is approximately 6 to 21 feet in thickness. The fill thickness is greatest in the area of the 11.5-foot diameter sewer beneath the I-190 Thruway overpass. Native soils would have been excavated to allow for construction of the sewer on the bedrock surface.
- Alluvium – A native alluvial deposit of clay, silt, fine sand, and gravel is observed beneath the fill. The alluvial deposit was observed in every boring completed during the SC, suggesting that the deposit is continuous across the Site. As observed during the 2012 Fourth Street Utility Corridor Excavation, some areas of this deposit are primarily comprised of clay. The clay-rich areas of the alluvium are expected to be confining with respect to downward dense non-aqueous phase liquid (DNAPL) movement. The thickness of the alluvium ranges from 7 to 18 feet.

Bedrock was encountered at a depth of 21 to 25 ft. bgs. Based on a review of geologic mapping, the bedrock beneath the Site area is the Ordovician-aged Onondaga limestone (Rickard, L. V. and Fisher, D. W., 1970).

The geologic cross-sections included as Figures 3 and 4 show the vertical distribution of these units in the Site area.

1.2.4 Hydrogeological Conditions

The hydrogeology at the Site has been characterized based on information obtained from the SC field activities. The water table beneath the Site is encountered at approximately 6 to 10 ft. bgs, within the fill materials. The hydraulic conductivity measured at former monitoring well locations ranges from 2 to 125 feet per day (ft/day). The variable hydraulic conductivity is expected due to the highly variable grain sizes observed in the fill and underlying alluvium. Groundwater movement will favor the more permeable sand and gravel deposits. The overall groundwater flow direction is to the west-southwest. This is because the nearest surface water body, Niagara River/Lake Erie confluence, is to the west of the Site. Groundwater elevation contours are shown on Figure 5. [Note: The groundwater monitoring wells at this Site were decommissioned in November 2016].

1.3 Summary of Site Characterization Findings

An SC was performed to evaluate the presence of MGP-related impacts at the Site (i.e., attributed to the adjacent former BSS site located east of the Site). The results of the SC are described in detail in the following report:

- *Site Characterization Report Former Buffalo Service Station – Off-Site Site #C915194A*, Buffalo, New York, May 2013; Revised November 2013 and December 2015 (ARCADIS, 2015).

The SC field investigations consisted of the following general activities:

- Drilling ten soil borings: seven on the NYSTA property and three on the City of Buffalo property.
- Converting four soil borings to monitoring wells AW-01 through AW-04.
- Collecting up to three soil samples from each soil boring (total of 21 soil samples and 2 duplicate samples) for analysis of Target Compound List (TCL) volatile organic compounds (VOCs), TCL semi-VOCs (SVOCs), Target Analyte List (TAL) inorganics, total cyanide, and free cyanide.
- Collecting two rounds of groundwater samples from each of the four new monitoring wells for analysis of TCL VOCs, TCL SVOCs, TAL Metals, total cyanide, and free cyanide.
- Measuring water levels at monitoring wells AW-01 through AW-04, MW-01, and MW-08 on December 28, 2012, February 18, 2013, March 6, 2013, and August 27, 2013.
- Conducting an assessment of the 11.5-foot diameter sewer beneath the I-190 Thruway overpass to evaluate the potential for Site-related impacts to the sewer from any impacts at the Site.

Soil borings were drilled to bedrock refusal at approximately 21 to 25 feet below grade, depending on location. The locations of the soil borings and monitoring wells are shown on Figure 2. Soil boring and monitoring well construction logs are provided in Appendix A.

Soil and groundwater samples collected during the SC were analyzed in accordance with methods described in the NYSDEC's Analytical Services Protocol with Category B reporting packages. All laboratory reports were validated, and Data Usability Summary Reports were prepared.

The relevant findings of the SC subsurface investigations are summarized below, including a summary discussion of the soil and groundwater quality and a sewer assessment of the 11.5 ft. diameter combined sewer located beneath the I-190 Thruway overpass.

1.3.1 Soil Quality

The only visual indications of potential impacts to the subsurface observed during the SC were black staining in soil boring AW-04 at 20 to 21 ft. bgs and soil boring AB-04 at 10 to 12 ft. bgs, and in the eastern portion of the ENA a trace sheen was observed at AB-04 from 12.3 to 12.5 ft. bgs. at the eastern edge of the Site. Some soil boring samples showed PID readings. Refer to Figure 2 for the locations of these borings. Although obvious MGP-related impacts (i.e., coal tar, MGP-like odors purifier waste) were not observed during the SC activities, MGP-related impacts were observed during investigations/remedial activities completed at/near the Site prior to finalization of the SC, as part of the 2003 Pre-Design Investigation (Retec, 2004) and the 2012 Fourth Street Utility Corridor Excavation as follows:

2003 Pre-Design Investigation (Retec, 2004)

- Observations at one boring (RB-37; Figure 2) completed in 2003 in connection with the investigation of the former BSS site indicate that coal tar is potentially located in an isolated region in the ENA near the western edge of Fourth Street. During the drilling of RB-37, "hydrocarbon-like odor and sheen" were observed at depths of 12 to 16 ft. bgs and "visible NAPL blebs" were observed from 18 to 19 ft. bgs. In addition, as shown on Figure 6, elevated levels of polycyclic aromatic hydrocarbons (PAHs) were detected in an analytical sample collected from the soil interval containing these impacts. Also, PAHs were detected in the soil sample collected from 17.5 to 19.5 ft. bgs at a concentration of 11,185 milligrams per kilogram (mg/kg). The soil cleanup standard for total PAHs[1] is 500 mg/kg.

2012 Fourth Street Utility Corridor Excavation

- Observations made during the 2012 Fourth Street Utility Corridor Excavation (excavation limits shown on Figure 2 as Cells A and B) suggest that coal tar is located beneath Fourth Street (and within the limits of the slip). Coal tar was observed to enter the excavation at approximately 18 ft. bgs from beneath the eastern edge of Fourth Street. Coal tar was not observed outside the west and east edges of the slip during the excavation. In addition, coal tar was observed within the excavation at approximately 15 to 18 ft. bgs above an approximately 3- to 5-foot thick clay unit (assumed to be the native alluvium). The clay unit lies directly on the bedrock surface. Coal tar was not observed below the clay surface.

2012 Soil Sampling [Ref: Site Characterization Report – December 2015]

Soil sampling results in comparison to NYSDEC commercial use soil cleanup objectives (SCOs) are presented in Appendix B. The soil analytical results for the typical MGP-related constituents (benzene,

[1] NYSDEC CP-51, Table 1 note a.

toluene, ethylbenzene, and xylenes [BTEX], PAHs, and total cyanide) are shown on Figure 6. A summary of the SC soil sampling results is provided below.

- None of the soil samples contained VOC concentrations above the NYSDEC SCOs.
- Four soil samples collected from soil borings AB-01, AW-02, AB-03, and AW-04 contained concentrations of PAHs slightly above SCOs. The highest levels of PAHs were detected in the interval above the bedrock in the two westernmost (farthest from the former slip) soil borings, AB-01 and AB-03. The other two samples were collected from within the fill material.
- Metals were detected in all soil samples, but only three samples contained concentrations above SCOs. These soil samples were also collected from the westernmost soil borings, AB-01 and AB-03.
- Total and/or free cyanide was not detected in soil samples at concentrations above SCOs.

1.3.2 Groundwater Quality

The groundwater sampling results in comparison to NYSDEC Class GA Standards and Guidance Values (NYSDEC, 1998) are presented in Appendix C. The groundwater analytical results for the typical MGP-related constituents (BTEX, PAHs, and total cyanide) are shown on Figure 7. A summary of the SC groundwater sampling results is provided below. Some BTEX and PAH compounds were detected above applicable NYSDEC criteria in groundwater from two SC monitoring wells located within and near the former Wilkeson Slip. These detections are possibly associated with the dissolution of MGP-related impacts (principally coal tar) observed beneath the eastern edge of Fourth Street (observed during the Fourth Street Utility Corridor Excavation) and at a soil boring (RB-37) installed at the western edge of Fourth Street during a 2003 investigation.

- One VOC (benzene) was detected at a concentration above Class GA Standards in samples collected from monitoring well AW-03. Three VOCs (benzene, ethylbenzene, and xylenes) were detected at concentrations above Class GA Standards in samples collected from monitoring well AW-04. Monitoring well AW-04 is located just outside the Fourth Street Utility Corridor Excavation and southeast of the former slip, and monitoring well AW-03 is located in the approximate terminus of the former slip, within the eastern half of the Site. Groundwater sampled from monitoring wells AW-01 and AW-02, which are downgradient from monitoring wells AW-03 and AW-04, did not contain VOCs above Class GA Standards.
- Acenaphthene and benzo(a)anthracene were detected in groundwater from monitoring well AW-03 at concentrations above the Class GA Guidance Values. Naphthalene and phenol were detected in groundwater from monitoring well AW-04 at concentrations above the Class GA Guidance Values. PAHs were not detected at concentrations above Class GA Standards or Guidance Values in groundwater samples collected from monitoring wells AW-01 and AW-02.
- Metals were detected in all groundwater samples above Class GA Standards. The metals detected include barium, iron, magnesium, manganese, and sodium.
- Total and/or free cyanide was detected in groundwater from monitoring wells AW-01, AW-03, and AW-04, but at concentrations well below the Class GA Standard.

1.3.3 Sewer Assessment

An evaluation was conducted to determine if the 11.5-foot diameter combined sewer (a.k.a., South Interceptor ["SI"]) located beneath the I-190 Thruway overpass could be impacted by MGP-related residuals (principally coal tar) and whether potential impacts could pose a risk for direct discharge to surface water bodies. The evaluation consisted of reviewing design drawings obtained from the Buffalo Sewer Authority (BSA) for the SI, titled Buffalo Sewer Authority Intercepting Sewer, Division H, Canal Section, dated April 1936. The BSA documents reviewed were assumed to represent as-built conditions. Additional information that supplements the design drawings was also included in the evaluation based on ARCADIS' institutional knowledge of the BSA's combined sewer system. In addition, knowledge obtained during the subsurface SC activities and soil excavation activities completed during the Fourth Street Utility Corridor Excavation was also considered.

The following conclusions are made based on information obtained and assumptions made during the assessment of the 11.5-foot diameter sewer:

- *The SI is Relatively "Water Tight"*: The SI is a semi-elliptical structure formed with a top and bottom section that are constructed with 18 inches of reinforced concrete, and the joints between the sections are sealed with a 10-gauge copper plate and asphalt coating. This construction is substantial compared to a brick-and-mortar structure that is often associated with sewers of this age. The SI is likely relatively "water-tight" compared to typical brick-and-mortar type structures. A review of the groundwater contours presented on Figure 5 indicates that the Site groundwater table is not depressed in the area of the SI. This indicates that, if the SI was collecting groundwater, it is not having a significant effect on the groundwater level. This further implies that the amount of groundwater collected by the SI in the Site area is likely negligible.
- *Coal Tar Entering the Sewer Should Be Negligible*: Since the amount of water collected by the SI in the Site area is likely negligible, it is reasonable to assume that the amount of Site-related coal tar (if any) entering the SI would also be negligible. In the unlikely event that coal tar or impacted groundwater were to enter the SI, the volume of sewage flowing through the SI, especially during wet weather, would overwhelm any potential influence the coal tar may have on the quality of water in the sewer (which is likely already impacted by general sewage waste).
- *Site Impacts Would Not Be Discharged to a Surface Water Without Treatment*: Since the SI does not have a CSO between the Site and the BSA Sewage Treatment Plant on Bird Island, any potential coal tar entering the SI would not be discharged to a surface water body (i.e., Black Rock Canal), but rather would receive some form of treatment at the BSA's treatment plant.

1.4 Summary of Impacts and Remedial Actions

1.4.1 Remaining Impacts:

Given the information presented in the SC Report, it is possible that a small region of residual coal tar remains beneath Fourth Street (Figure 3) at a depth of approximately 15 to 19 ft. bgs. The residual coal tar appears to extend from beneath the eastern edge of Fourth Street (from the west side of the Fourth

Street Utility Corridor Excavation sheeting) slightly past the western edge of Fourth Street reaching at least as far west as soil boring RB-36 and to soil boring RB-37.

Wastes observed on the adjacent former BSS site include trace to saturated quantities of coal tar, coal tar sheen, soils with hydrocarbon odor, elevated PID readings, and/or blue-stained soils; although only a small region of coal tar may be present on the Site (as described above). The chemical constituents identified at the adjacent site include BTEX, PAHs, total cyanide, and mercury.

1.4.2 Remedial Actions

As per the Decision Document, dated August 23, 2016, the selected remedy for the Site is no action with institutional controls. The institutional controls for the Site are the approved EE and EN. The controls will restrict use of groundwater, soil excavation activities, and land uses. Numerous remedial activities were completed in connection with the adjacent former BSS site in 2005, 2006, and 2012 to address the impacts associated with the adjacent site described above.

2 INSTITUTIONAL CONTROL PLAN

This section summarizes the ICs that have been established for the Site.

2.1 Introduction

2.1.1 General

Since Impacts exist beneath the Site, ICs are required to protect human health and the environment. This Institutional Control Plan ("IC Plan") describes the procedures for the implementation and management of all ICs at the Site. The IC Plan is one component of the SMP and is subject to revision by the NYSDEC. Given the limited extent of Impacts and the results of the SC, no engineering controls are required or included as a component of the final Site remedy.

2.1.2 Purpose

This plan provides:

- A description of all ICs on the Site.
- The basic implementation and intended role of each IC.
- A description of the key components of the ICs set forth in the EE and the EN.
- A description of the features and ICs to be evaluated during each required inspection and periodic review.
- A description of plans and procedures to be followed for implementation of ICs, such as the implementation of the Excavation Work Plan ("EWP") (as provided in Appendix D) for the proper handling of Impacts that may be disturbed during maintenance or redevelopment work on the Site.
- Any other provisions necessary to identify or establish methods for implementing the ICs required by the Site remedy, as determined by the NYSDEC.

2.2 Institutional Controls

A series of ICs is required by the Decision Document issued by the NYSDEC in August 2016 to: mitigate the potential exposures from the Impacts, namely: (1) prevent future exposure to Impacts by controlling disturbances of the subsurface Impacts; and (2) limit the use and development of the Site to commercial or industrial uses only. Adherence to these ICs on the Site is required by the respective EE and the EN and will be implemented under this SMP. These ICs are:

- Compliance with the EE and this SMP by the owners of the Controlled Property and National Fuel and its successors. The Controlled Property is defined as any property or properties contained within the limits of the Site as shown on Figure 2.
- 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.

ICs identified in the EE and EN may not be discontinued without an amendment to or extinguishment of the EE and EN, respectively.

The Site has a series of ICs in the form of site restrictions. Adherence to these ICs is required by the EE and EN. Site restrictions that apply to the Site are:

- The Site may only be used for commercial or industrial use as described in 6 NYCRR Part 375-1.8(g); provided that the long-term ICs included in this SMP are employed.
- The Site may not be used for a higher level of use, such as unrestricted residential, or restricted residential use as defined in DER-10 / Technical Guidance for Site Investigation and Remediation (May, 2010), without an amendment to each the EE and EN, respectively, as approved by the NYSDEC.
- All future activities on the Site that will disturb Impacts must be conducted in accordance with this SMP;
- The use of the groundwater underlying the Site is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County DOH to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
- Vegetable gardens and farming on the Site are prohibited;
- National Fuel will submit to NYSDEC a written statement that certifies, under penalty of perjury, that, to the best of their knowledge: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitutes a violation or failure to comply with the SMP. These certifications shall be submitted by National Fuel annually for the first five years and then every three years thereafter, or an alternate period of time that NYSDEC may allow. NYSDEC and National Fuel retain the right to access such EEA subject to the Environmental Easement at any time in order to evaluate the continued maintenance of any and all institutional controls. Upon being provided reasonable advance notice and subject to the prior approval and issuance of the requisite permits, NYSTA agrees to provide NYSDEC and National Fuel access to the ENA to evaluate the continued maintenance of any and all institutional controls.

2.2.1 Excavation Work Plan

The Site has been restricted to commercial or industrial use. As further described below, the property owners (City of Buffalo and NYSTA or their successors), will be responsible for reporting any future intrusive work that will encounter or disturb the remaining Impacts, including any modifications to the existing surface cover (e.g., roads, sidewalks, vegetated soil) to the NYSDEC and National Fuel. The City of Buffalo and NYSTA will coordinate with National Fuel to ensure that any excavation work will be performed in compliance with this SMP and the EWP. Specifically, the City of Buffalo and NYSTA will coordinate with National Fuel to ensure proper implementation of the EWP, including all notifications, reporting, and oversight (e.g., by qualified environmental professionals, when necessary) National Fuel or its successors (as the remedial party) will also be engaged during any excavation activities which disturb the soil at the Site more than 12 ft. bgs (or

below 570 ft. amsl), or during any excavation activities at any soil depths which have encountered remaining impacts, or encountered any wastes consistent with what has been observed and/or remediated at the adjacent BSS site(s). Any such activities will be performed in compliance with the EWP attached as Appendix D to this SMP. In the event that one of the Site owners requests that National Fuel undertake subsurface work, and National Fuel agrees, then National Fuel will be responsible for proper implementation of the EWP with the support and cooperation of the Site owner. National Fuel will review any Site owner requests in good faith and notify the Site owner of its decision in writing. Any work conducted at depths more than 12 ft. bgs (or below 570 ft. amsl) must also be conducted in accordance with the procedures defined in the EWP, HASP, CAMP, FSP, and the QASAPP, if any, prepared for the Site. Samples of these documents are provided in the following appendices:

Appendix E: Health and Safety Plan (HASP)

Appendix F: New York State Department of Health (NYSDOH) Community Air Monitoring Plan (CAMP)

Appendix G: Field Sampling Plan (FSP)

Appendix H: Quality Assurance Sampling and Analysis Project Plan (QASAPP)

The HASP must be compliant with Occupational Safety and Health Administration's (OSHA's) regulation 29 CFR 1910.120.

Grade elevations can change at the Site during various types of improvements (e.g., new asphalt). As such, the bottom elevation of any future invasive work on the Site should be surveyed relative to the North American Vertical Datum of 1988 to confirm whether the procedures defined in the EWP should be followed. The EWP will need to be followed if the bottom elevation of any future invasive work is below 570 ft. amsl.

Invasive work that may encounter or disturb the soil containing Impacts (more than 12 ft. bgs, or an below an elevation of 570 feet) must be performed in accordance with applicable federal, state, and local rules and regulations to protect worker health and safety. In addition, contractors performing any invasive activities more than 12 feet (or below an elevation of 570 feet) will also prepare and maintain a Site and task-specific HASP on Site during the work activities. The contractor's HASP will cover all personnel who will be employed by the contractor to perform the work at the Site, including direct employees and subcontractors. If the Contractor does not wish to include subcontractors under the HASP, the subcontractor will be responsible for developing and implementing a HASP that meets the applicable requirements. The contractor and any subcontractors will submit the task-specific HASP to the NYSDEC for review prior to initiating intrusive activities. The contractor must have a qualified safety professional[2] prepare and sign their task-specific HASP and verify current Occupational Safety and Health Administration (OSHA) requirements and protocols. The task-specific HASP will include information on activities anticipated to be conducted. All contractors or subcontractors who may come into contact with potentially impacted environmental media will follow the task-specific HASP detailing the procedures that will be utilized to comply with applicable regulations. The contractor has the sole responsibility for confirming that the worksite is safe, neat, and maintained in an orderly condition, and is free from

[2] As defined by OSHA.

hazards. The Site-specific EWP, HASP and CAMP will also be submitted to National Fuel for the purposes of providing National Fuel with notice and for its records. National Fuel will review the EWP, HASP and CAMP before it is finalized by contractors or subcontractors.

Until such time as the EE and EN, respectively, have been extinguished in accordance with ECL Article 71, Title 36, any HASPs, CAMPs, FSPs, and/or QASAPPs, prepared pursuant to this SMP, will be prepared and/or updated based on future changes to state and federal health and safety requirements, and specific methods employed by future contractors, with the notification provided in Section A-1 of the EWP. Any intrusive construction work more than 12 ft. bgs (below 570 ft. amsl) will be performed in compliance with the EWP, HASP, CAMP and FSP, and QASAPP, if any, and will be included in the periodic inspection and certification reports required to be conducted and submitted by National Fuel, as the remedial party, under the SMP (See Section 3).

The Site owners (NYSTA and City of Buffalo), associated parties (i.e., contractors), and National Fuel, to the extent that it is 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 impacts, and for structures that may be affected by excavations (such as thruway overpass foundations and bridge footings). The Site Owners will ensure that Site development activities will not interfere with, or otherwise impair or compromise, the ICs described in this SMP. Should one be developed, the Site-specific EWP, HASP and CAMP will also be submitted to National Fuel for the purposes of providing National Fuel with notice and for its records. National Fuel will be responsible for review of the EWP, HASP and CAMP before it is finalized by contractors or subcontractors and submitted to NYSDEC for approval.

Should intrusive work be conducted more than 12 ft. bgs (below 570 ft. amsl) and soil is required to be removed and disposed in accordance with the EWP, the cleanup levels to be met upon removal of the impacted soil will meet levels specified in 6 NYCRR Part 375 SCOs for restricted use commercial.

2.2.2 Soil Vapor Intrusion Evaluation

Prior to the construction of any enclosed structures located at the Site, the party responsible for construction will either (1) perform an evaluation to determine whether any mitigation measures are necessary to eliminate potential exposure to vapors in the proposed structure; or (2) install a soil vapor intrusion (SVI) mitigation system as an element of the building foundation. 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 by the party responsible for construction and submitted to the NYSDEC and NYSDOH for approval. The work plan will also be submitted to National Fuel for the purposes of providing notice of the proposed work and for their records. This work plan will be developed in accordance with the most recent NYSDOH “Guidance for Evaluating Vapor Intrusion in the State of New York” (NYSDOH, 2006). 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 (not yet validated) 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 and National Fuel, along with a recommendation for follow-up action, such as mitigation, if required. SVI sampling results, evaluations, and follow-up actions will also be summarized in the next PRR.

2.3 Notifications

This subsection summarizes the notification requirements associated with the ICs established for the Site. Notifications will be submitted by the property owners (NYSTA and City of Buffalo) to National Fuel, as the remedial party, and to the NYSDEC for the following reasons:

- Sixty (60) day advance notice of any proposed changes in Site use that are required under the terms of the Order On Consent, 6 NYCRR Part 375 and/or the ECL.
- Fifteen (15) day advance notice of any proposed ground-intrusive activities pursuant to the EWP.
- Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that has the potential to alter the Site, with written confirmation within seven (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 and National Fuel within 45 days and shall describe and document actions taken.

Contact information is located in Table 2, attached hereto.

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

- At least 45 days prior to, or expeditiously from receiving knowledge of the change, the relevant property owner (City of Buffalo, NYSTA, or their successors) will notify the NYSDEC and National Fuel, or its successors, in writing of the proposed change. This will include a certification that the prospective purchaser has been provided with a copy of the Order on Consent and all approved work plans and reports, including this SMP.
- Within 15 days from the date of transfer of all or part of the Site, the relevant property owner will provide notice in writing to NYSDEC and National Fuel (where applicable), confirming the new owner/Remedial Party's name, contact representative, and contact information. The form of such notice, if applicable, is set forth in section 6 of the EE and is enforced by the EE.

In the event of an emergency situation (e.g., flooding, utility disruption, bridge failure, etc.), individuals planning to disturb potentially impacted soil or groundwater must provide notification to National Fuel and the NYSDEC with as much notice prior to initiating work as practicable and appropriate. If prior notification is not possible during an emergency situation, notifications should be made within 24 hours or as soon as feasible after the emergency has been resolved.

It is understood that priority will be given to implement emergency procedures involving the I-190 overpass to protect the safety of the traveling public. Once a potential emergency situation involving the overpass has become stabilized, the NYSTA will complete all remaining work in conformance with the SMP.

2.4 Contingency Plan

The Contingency Plan outlines response activities to be implemented in the event of an emergency. Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions.

2.4.1 Emergency Telephone Numbers

In the event of any environmentally related emergency or unplanned occurrence requiring assistance at the Site, the property owners (City of Buffalo or NYSTA), will contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. These emergency contact lists must be maintained in an easily accessible location. Once appropriate emergency personnel are contacted, the property owners will contract National Fuel to inform National Fuel of the environmentally related emergency.

Emergency Contact Numbers

Agency	Telephone Number
Medical, Fire, Police	911
One Call Center	800.272.4480[1]
Poison Control Center	800.222.1222
Pollution Toxic Chemical Oil Spill	800.424.8802
NYSDEC Spills Hotline	800.457.7362

Note:
1. Three-day notice required for utility mark out.

2.4.2 Map and Directions to Health Facility

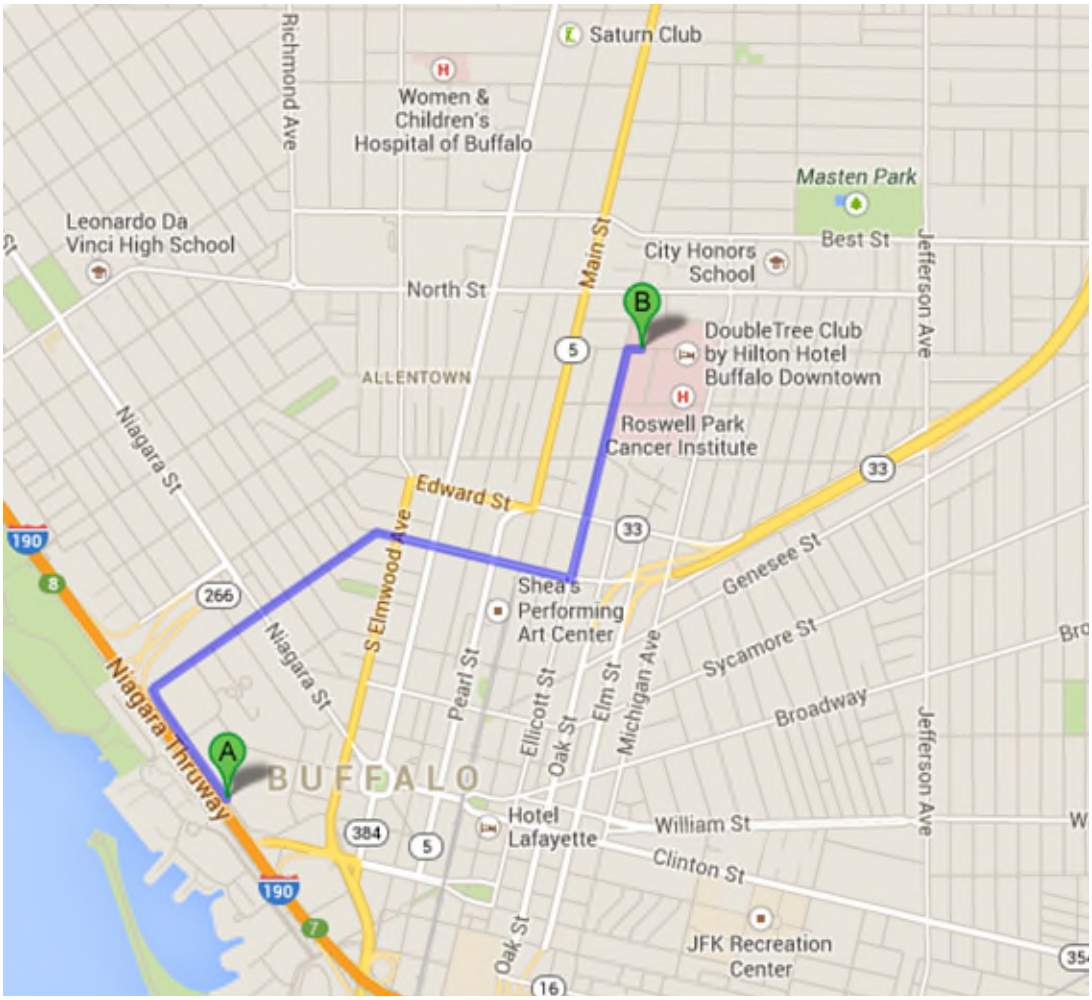
Information for the nearest medical facility is provided below:

Nearest Hospital Name: Buffalo General Medical Center
Hospital Location: 100 High St, Buffalo, NY 14203
Hospital Telephone: 716.859.5600

Directions to the nearest medical facility from the Site are as follows:

1. Head northwest on 4th Street
2. Continue onto Carolina Street
3. Turn right onto West Tupper Street
4. Turn left onto Ellicott Street
5. Turn right onto High Street. Destination will be on the left.

Map Showing Route from the Site to the Hospital



2.4.3 Response Procedures

When appropriate, the fire department and any 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.

3 SITE MONITORING PLAN

This section summarizes the monitoring requirements that have been established for the Site.

3.1 Introduction

3.1.1 General

The Monitoring Plan describes the requirements for evaluating the effectiveness and condition of the ICs. National Fuel or its successors will be responsible for Site monitoring, including any and all inspections and reporting at the Site Because there is no active treatment system or monitoring well network required for this Site, performance monitoring is not applicable. 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:

- Assessing compliance with applicable NYSDEC standards, criteria and guidance.
- Evaluating Site information periodically to confirm that the ICs continue to be effective in protecting public health and the environment.
- Preparing the necessary reports for the various monitoring activities.

To adequately address these issues, this Monitoring Plan provides information on:

- Reporting requirements.
- Annual inspection and periodic certification.

The Site will be inspected by National Fuel once per year for the first 5 years and once every 3 years thereafter, pending NYSDEC frequency approval. The inspection program is summarized in the following table and outlined in detail in Sections 3.2 and 3.3 below.

Inspection Schedule

Inspection Program	Frequency[1]	Matrix	Analysis
1	Annual (for first 5 years)	Site Conditions and ICs	Visual inspection of Site surface conditions
2	Once every 3 years (After first 5 years)	Site Conditions and ICs	Visual inspection of Site surface conditions

Note:
1. The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH.

3.2 Site-Wide Inspection

A comprehensive Site-wide inspection will be conducted by National Fuel for the first 5 years and once every 3 years thereafter, regardless of the frequency of the PRR. The inspections will determine and document the following:

Any party seeking access to the New York State Thruway Authority (NYSTA) right of way must obtain an NYSTA Work permit prior to accessing or performing any inspections and/or work on NYSTA Right-of-Way. The NYSTA Buffalo Division Permit Coordinator shall be contacted to acquire such permit(s).

The reporting requirements are outlined in the PRR section of this plan (Section 4.3).

If an emergency occurs, such as a natural disaster (e.g., flooding, utility disruption, etc.) that may result in ground disturbance, National Fuel will be notified by the property owner within 24 hours. An inspection of the Site will be conducted within 5 days of the event, or as soon as practicably appropriate and safe, by a qualified environmental professional (i.e., National Fuel or its contactor) as determined by NYSDEC, to verify the continued effectiveness of the ICs at the Site.

Site-wide inspections will be performed by National Fuel on a regular schedule at a minimum of once a year for the first 5 years and once every 3 years thereafter. During these inspections, an inspection form will be completed (Appendix I). The form will compile sufficient information to assess the following:

- If ICs continue to be protective of human health and the environment by confirming that no intrusive work has been completed that was not compliant with this SMP.
- Compliance with requirements of this SMP and the EE and EN, including compliance with all ICs.
- If Site records are complete and up to date.
- Changes, or needed changes, to the Site monitoring.
- General Site conditions at the time of the inspection.
- Confirm that Site records (contact information provided in Table 2, HASP, and CAMP, if applicable) are up to date.

3.2.1 Inspection Forms

A general Site-wide inspection form will be completed by National Fuel during the Site-wide inspection (see Appendix I). These forms are subject to NYSDEC revision. All applicable inspection forms and other records, generated for the Site during the reporting period will be provided by National Fuel in electronic format in the PRR.

3.3 Inspection Reporting Requirements

All forms, and other relevant reporting formats used during the inspection events, will be (1) subject to approval by NYSDEC and (2) submitted at the time of the PRR, as specified in the Reporting Plan of this SMP.

All inspection results will be reported by National Fuel to NYSDEC on a periodic basis in the PRR. The report (or letter) will include, at a minimum:

- Date of event.
- Personnel conducting inspection.
- Description of the activities performed.
- Any observations, conclusions, or recommendations.

A summary of the monitoring program deliverables are summarized in the table below.

Schedule of Inspection Reports

Task	Reporting Frequency[1]
Annual Inspection (for first 5 years)	Annually
Inspection (Once every 3 years after first 5 years)	Every 3 Years after first 5 Years

Note:
1. The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH.

4 CERTIFICATIONS AND REPORTING

This section of the SMP presents a discussion of National Fuel's Site inspection, annual certification, and reporting requirements associated with the ICs for the Site.

4.1 Evaluation of Records and Reporting

The results of the inspection 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.
- The Site remedy continues to be protective of public health and the environment.

4.2 Certification of Institutional Controls

Following each inspection, National Fuel is responsible to ensure that 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 public health and environment.
- Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control.
- Through the EE and EN, access to the Site will continue to be provided to NYSDEC and National Fuel to evaluate Site conditions, including access to evaluate the continued maintenance of this control.
- Use of the Site is compliant with the EE and EN.
- 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 or Owner's Designated Site Representative]: [and I have been authorized and designated by all Site owners to sign this certification] for the Site."

The signed certification will be included in the PRR described below.

4.3 Periodic Review Report

A PRR will be submitted by National Fuel to the Department every year (for the first 5 years and every 3 years thereafter), beginning fifteen months after the No Further Action Letter is issued. In the event that

either parcel comprising the Site is subdivided into further separate parcels with different ownership, only a single PRR will be prepared that addresses the Site described in each the EE and the EN, included as Appendix J and K respectively, to this SMP. The report will be prepared in accordance with NYSDEC DER-10 and submitted within 30 days of the end of each certification period. The report will include:

- Identification, assessment and certification of all ICs required by the remedy for the Site.
- Results of the required 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.
- A Site evaluation, which includes the following:
  - Any new conclusions or observations regarding Site impacts based on inspections.
  - Recommendations regarding any necessary changes to the remedy and/or Site Monitoring Plan.
  - The overall performance and effectiveness of the remedy.
  - If intrusive activities have been conducted at the Site during the reporting period, the report will also include the following:
    - Verification that all work was performed in conformance with this SMP.
    - Plans showing the areas and the depth of activities.
    - Text narrative describing the activities performed, health and safety monitoring performed (both site-specific and community air monitoring, as required), volume of material removed from the Site, and disposal locations for media (e.g., soil, water); a discussion of the sampling performed and associated analytical results; a description of any problems encountered; and other pertinent information necessary to document that the Site activities were performed pursuant to this SMP.
    - Waste disposal documentation, including waste profiles, test results, facility acceptance letters, manifests, bills-of-lading, and facility receipts.

The PRR will be submitted by National Fuel, 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 REFERENCES

ARCADIS, 2013. Site Characterization Report, Former Buffalo Service Station – Off-Site, Buffalo, New York, May 2013, Revised, November 2013 and December 2015.

WSP Engineering of New York, P.C. (WSP), 2013. Construction Completion Report – Fourth Street Utility Corridor Excavation, January 31, 2013.

ESC Engineering of New York, P.C. (ESC), 2006. Final Remedial Action Report, Brownfield Cleanup Program, Former Buffalo Service Center (C915194), Buffalo Urban Renewal Agency West Site (C915195), Buffalo, New York, October 2, 2006

Groundwater Technology, 1996. Sensitive Receptor Survey Report National Fuel Gas Distribution Corporation Buffalo Service Center, Buffalo, New York, April 5, 1996.

NYSDEC. 1998. Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1., Ambient Water Quality Standards and Guidance Values, June 1998.

NYSDOH, 2006. Guidance for Evaluating Vapor Intrusion in the State of New York, October 2006.

NYSDEC, 2010. DER-10 Technical Guidance for Site Investigation and Remediation, May 2010.

RETEC, 2004. Pre-Design Investigation Results Report, Buffalo Service Center, Buffalo, NY, February 5, 2004.

Rickard, L. V. and Fisher, D. W., 1970. Geologic Map of New York – Niagara Sheet. New York State Museum and Science Service.

TABLES

Table 1
SMP Requirements Summary

Site Management Plan
Former Buffalo Service Station – Off-Site
Site #C915194A
Buffalo, Erie County, New York

Limitations on Property Use
Property use needs to remain commercial or industrial
Disturbance of the subsurface below 12 ft (570 ft amsl) requires the use of the SMP (see below)
No use of groundwater from the site
No farming on the site

Event	Permit
Work on NYSTA Property	All work implementing the internal controls of the SMP to be completed by National Fuel, the NYSDEC and/or their consultants and subcontractors will require authorization pursuant to a NYSTA Work Permit.
Work on City Property	All work to be completed by National Fuel, the NYSDEC, and/or their consultants and subcontractors will require notification to the City of Buffalo and written access approval from the City.

Event	Notification
Natural disaster (flood, utility disruption)	Notification to the NYSDEC and National Fuel as soon as reasonably possible after the event (i.e., within 24 hrs); A Qualified Environmental Professional (as approved by the NYSDEC) to conduct site inspection within 5 days or as soon as its safe.
Change in site use	60-day advanced notice by Site owner to NYSDEC and National Fuel
Ground intrusion work	15-day advanced notice by Site owner to NYSDEC and National Fuel
Emergency that may alter the site	Verbal notification by Site owner to NYSDEC and National Fuel by noon of the following day, or as soon as possible after safety of the public has been addressed.
Excavation from ground surface to 12 ft bgs (570 ft amsl)	Notification to NYSDEC and National Fuel by Site owner.
Excavation deeper than 12 ft bgs (570 ft amsl)	Requires following the SMP, EWP, development of a HASP, CAMP, FSP, and QASAPP, and all personnel onsite during the intrusive work must be OHSA HAZWHOPER 40 hour trained.

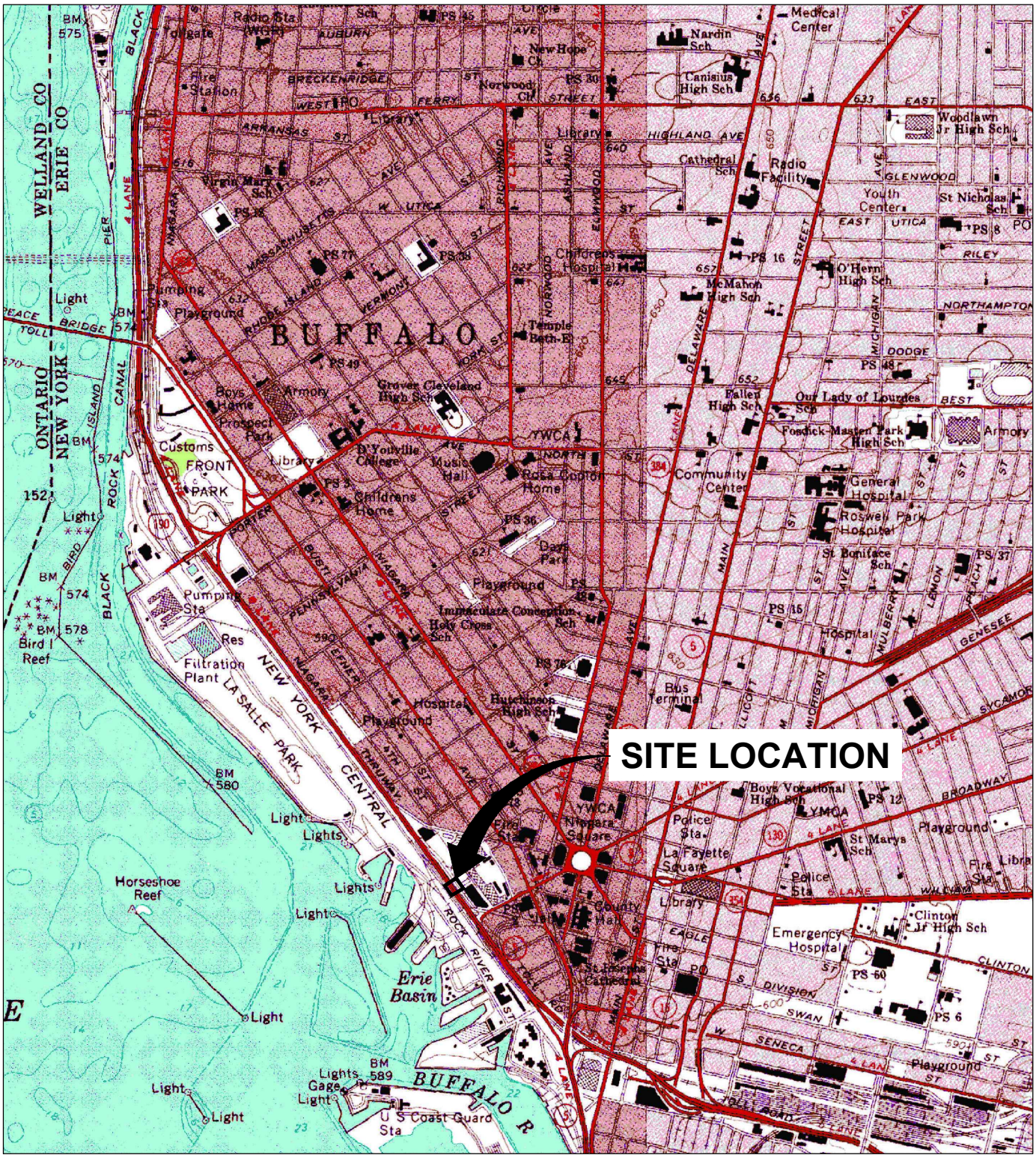
Notes:
SMP: Site Management Plan
HASP: Health and Safety Plan
CAMP: Community Air Monitoring Plan
EWP: Excavation Work Plan
FSP: Field Sampling Plan
QASAPP: Quality Assurance Sampling and Analysis Project Plan
Site owner: The New York State Thruway Authority and the City of Buffalo and their successors
ft bgs: feet below ground surface
amsl: above mean sea level, as referenced to the North American Vertical Datum 1988.

Table 2
Contact Information

Site Management Plan
Former Buffalo Service Station – Off-Site
Site #C915194A
Buffalo, Erie County, New York

Agency	Contact Information
Andrew Zwack Assistant Engineer NYSDEC - Region 9 Division of Environmental Remediation	700 Delaware Avenue Buffalo, NY 14209 716.851.7220 andrew.zwack@dec.ny.gov
Jacquelyn Nealon Project Manager	NYSDOH 547 River Street, Room 300 Troy, NY 12180 800.458.1158 ext. 27880
Tanya Alexander National Fuel Gas Distribution Corporation	6363 Main Street Williamsville, NY 14221 716.857.7410
NYSTA	Thomas S. Moore Buffalo Division Environmental Specialist 2 tom.moore@thruway.ny.gov office: 716.635.6291 cell: 716.982.7450
City of Buffalo	1. Commissioner of the City of Buffalo's Department of Public Works Parks and Streets 65 Niagara Square, Room 502 City Hall Buffalo, NY 14202 2. Executive Director of the City of Buffalo's Office of Strategic Planning 65 Niagara Square, Room 920 City Hall Buffalo, NY 14202 3. Corporation Counsel of the City of Buffalo/Law Dept. 65 Niagara Square, Room 1100 City Hall Buffalo, NY 14202 4. Assistant Corporation Counsel John Heffron 65 Niagara Square, Room 1100 City Hall Buffalo, NY 14202

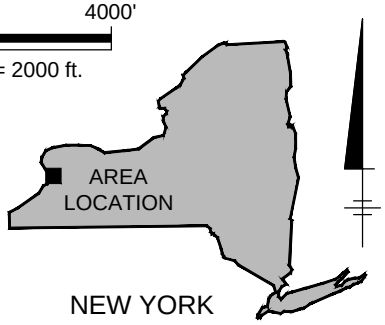
FIGURES



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUADS., BUFFALO NW, NY-ON, AND BUFFALO NE, 1965.

0 2000' 4000'

Approximate Scale: 1 in. = 2000 ft.

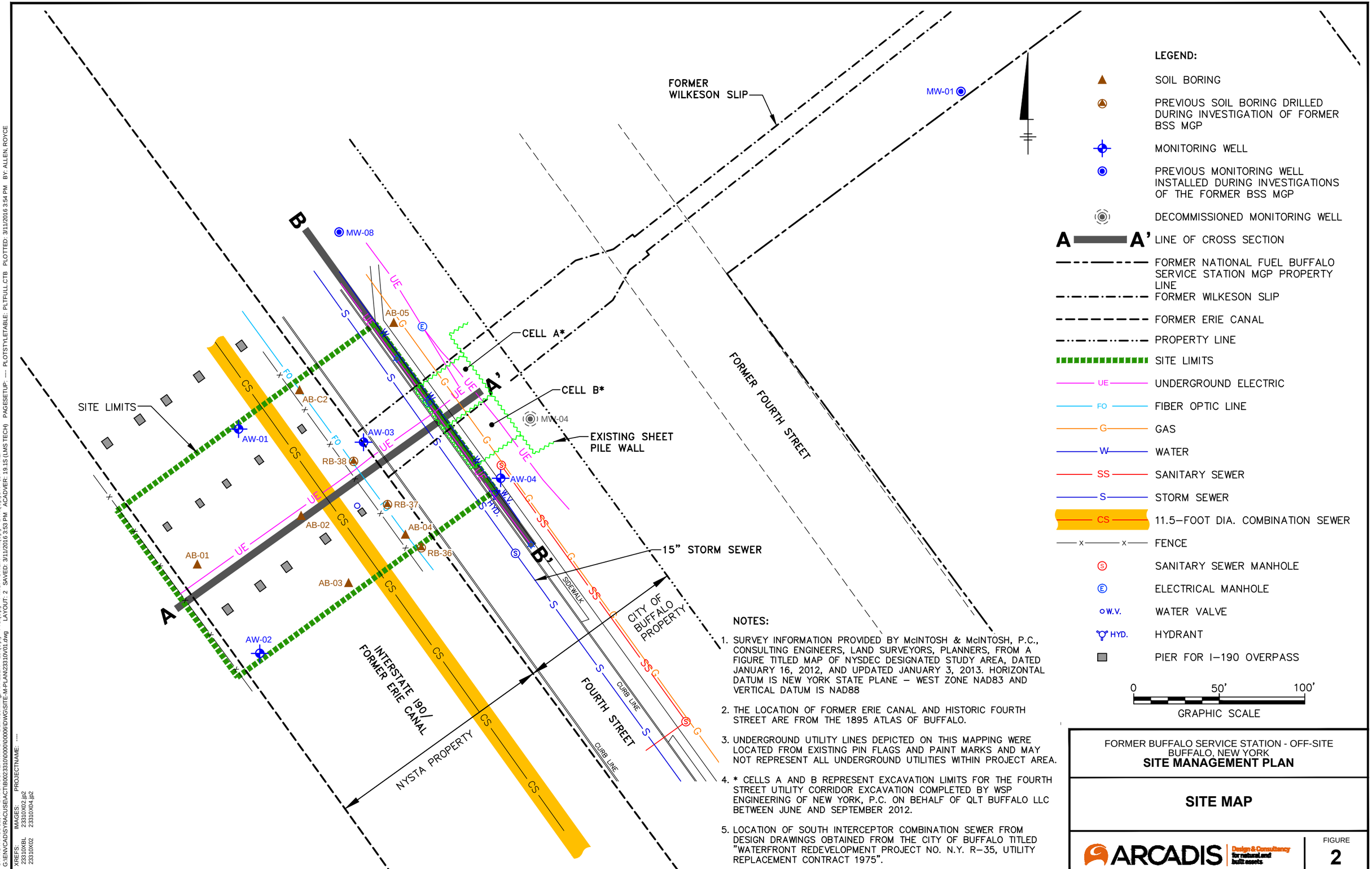


FORMER BUFFALO SERVICE STATION - OFF-SITE
BUFFALO, NEW YORK
SITE MANAGEMENT PLAN

SITE LOCATION MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1



LEGEND:

- SOIL BORING
- PREVIOUS SOIL BORING DRILLED DURING INVESTIGATION OF FORMER BSS MGP
- MONITORING WELL
- PREVIOUS MONITORING WELL INSTALLED DURING INVESTIGATIONS OF THE FORMER BSS MGP
- DECOMMISSIONED MONITORING WELL
- A — A' LINE OF CROSS SECTION
- FORMER NATIONAL FUEL BUFFALO SERVICE STATION MGP PROPERTY LINE
- FORMER WILKESON SLIP
- FORMER ERIE CANAL
- PROPERTY LINE
- SITE LIMITS
- UE UNDERGROUND ELECTRIC
- FO FIBER OPTIC LINE
- G GAS
- W WATER
- SS SANITARY SEWER
- S STORM SEWER
- CS 11.5–FOOT DIA. COMBINATION SEWER
- FENCE
- SANITARY SEWER MANHOLE
- ELECTRICAL MANHOLE
- W.V. WATER VALVE
- HYD. HYDRANT
- PIER FOR I–190 OVERPASS

0 50' 100'

GRAPHIC SCALE

NOTES:

1. SURVEY INFORMATION PROVIDED BY McINTOSH & McINTOSH, P.C., CONSULTING ENGINEERS, LAND SURVEYORS, PLANNERS, FROM A FIGURE TITLED MAP OF NYSDEC DESIGNATED STUDY AREA, DATED JANUARY 16, 2012, AND UPDATED JANUARY 3, 2013. HORIZONTAL DATUM IS NEW YORK STATE PLANE – WEST ZONE NAD83 AND VERTICAL DATUM IS NAD88
2. THE LOCATION OF FORMER ERIE CANAL AND HISTORIC FOURTH STREET ARE FROM THE 1895 ATLAS OF BUFFALO.
3. UNDERGROUND UTILITY LINES DEPICTED ON THIS MAPPING WERE LOCATED FROM EXISTING PIN FLAGS AND PAINT MARKS AND MAY NOT REPRESENT ALL UNDERGROUND UTILITIES WITHIN PROJECT AREA.
4. * CELLS A AND B REPRESENT EXCAVATION LIMITS FOR THE FOURTH STREET UTILITY CORRIDOR EXCAVATION COMPLETED BY WSP ENGINEERING OF NEW YORK, P.C. ON BEHALF OF QLT BUFFALO LLC BETWEEN JUNE AND SEPTEMBER 2012.
5. LOCATION OF SOUTH INTERCEPTOR COMBINATION SEWER FROM DESIGN DRAWINGS OBTAINED FROM THE CITY OF BUFFALO TITLED "WATERFRONT REDEVELOPMENT PROJECT NO. N.Y. R–35, UTILITY REPLACEMENT CONTRACT 1975".

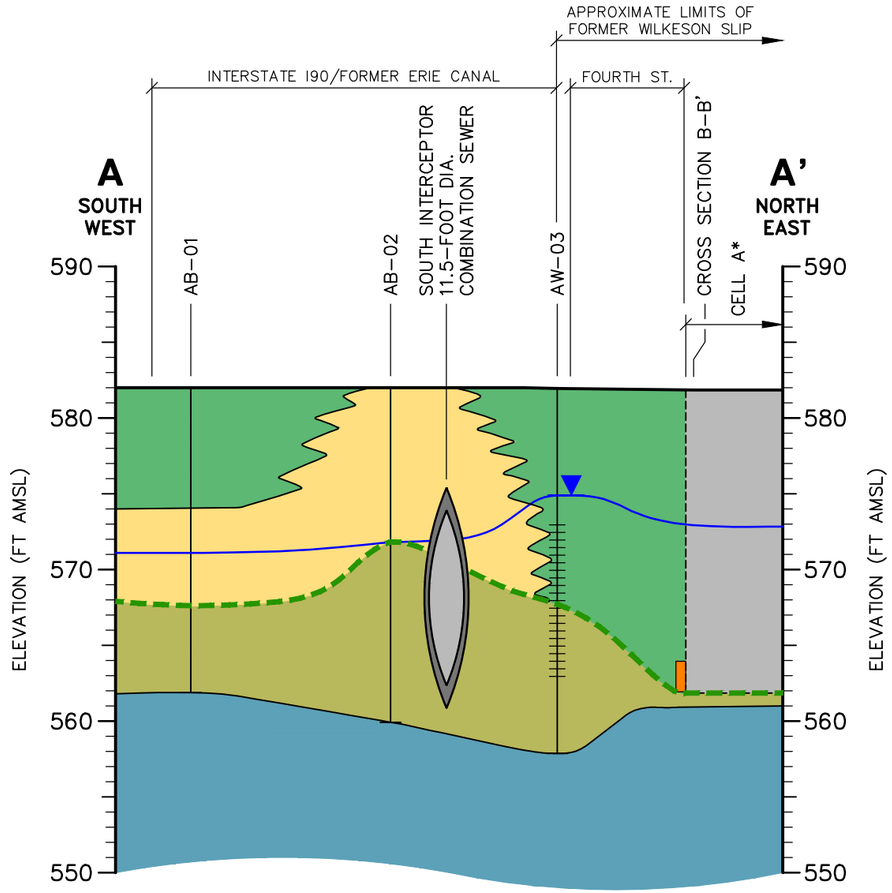
FORMER BUFFALO SERVICE STATION - OFF-SITE
BUFFALO, NEW YORK
SITE MANAGEMENT PLAN

SITE MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE
2

CITY:SYRACUSE, NY DV/GROUP:ENV/M-DV DB:A.Schilling, R.ALLEN LD:(Opt) PIC:(Opt) PM:S. POWLIN TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENV\CAD\SYRACUSE\ACTIB\023310\00000\00006\DWG\SITE-M-PLAN23310V01.dwg LAYOUT: 2 SAVED: 3/11/2016 3:53 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/11/2016 3:54 PM BY: ALLEN, ROYCE
XREFS: 23310XBL 23310X02
IMAGES: 23310X02.jp2 23310X04.jp2 PROJECTNAME: ----



LEGEND:

- WELL OR BORING ID (AB-01)
- GROUND SURFACE
- GROUNDWATER ELEVATION (2/18/13)
- LITHOLOGIC CONTACT (DASHED WHERE INFERRED)
- FILL AND NATIVE SOIL CONTACT
- SCREEN
- BOTTOM OF BORING
- COAL TAR
- FINE TO COARSE SAND AND GRAVEL
- SILT AND SAND
- SILT AND CLAY
- ONONDAGA LIMESTONE

NOTE:

1. * CELL A REPRESENTS EXCAVATION LIMITS FOR THE FOURTH STREET UTILITY CORRIDOR EXCAVATION COMPLETED BY WSP ENGINEERING OF NEW YORK, P.C. ON BEHALF OF QLT BUFFALO LLC BETWEEN JUNE AND SEPTEMBER 2012.
2. SURVEY INFORMATION PROVIDED BY McINTOSH & McINTOSH, P.C., CONSULTING ENGINEERS, LAND SURVEYORS, PLANNERS, FROM A FIGURE TITLED MAP OF NYSDEC DESIGNATED STUDY AREA, DATED JANUARY 16, 2012, AND UPDATED JANUARY 3, 2013. HORIZONTAL DATUM IS NEW YORK STATE PLANE – WEST ZONE NAD83 AND VERTICAL DATUM IS NAD88.
3. LOCATION OF SOUTH INTERCEPTOR COMBINATION SEWER FROM DESIGN DRAWINGS OBTAINED FROM THE CITY OF BUFFALO TITLED "WATERFRONT REDEVELOPMENT PROJECT NO. N.Y. R-35, UTILITY REPLACEMENT CONTRACT 1975".

VERTICAL EXAGGERATION = 5X

0 10' 20'

VERTICAL SCALE

0 50' 100'

HORIZONTAL SCALE

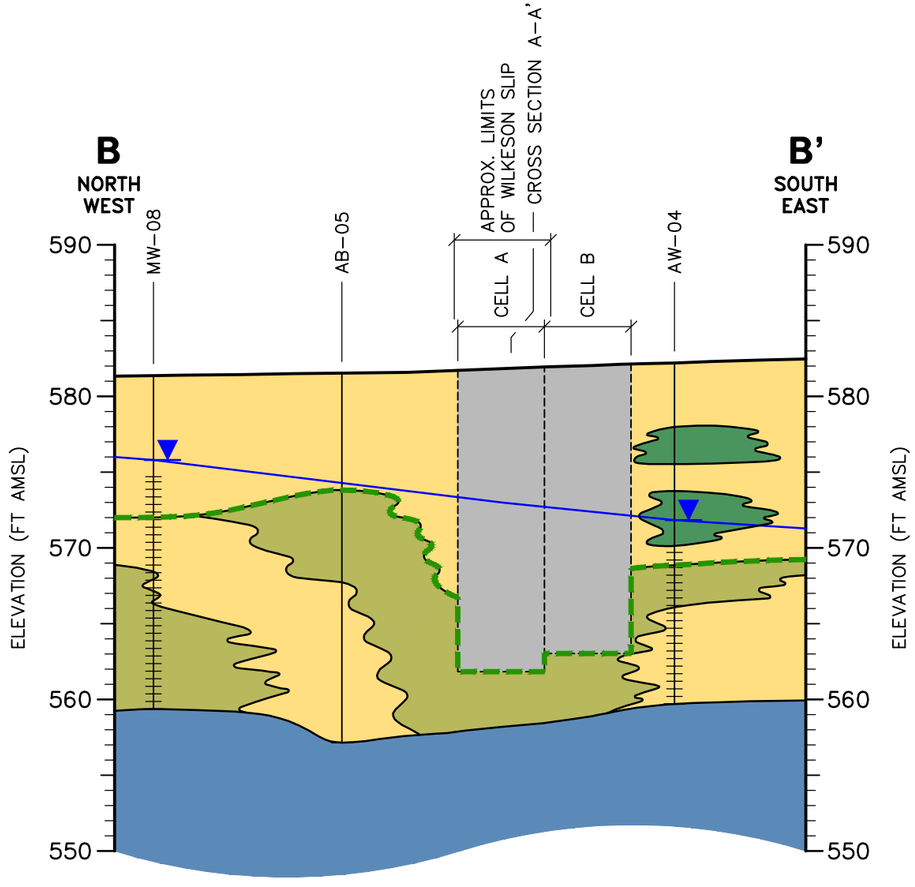
FORMER BUFFALO SERVICE STATION - OFF-SITE
BUFFALO, NEW YORK
SITE MANAGEMENT PLAN

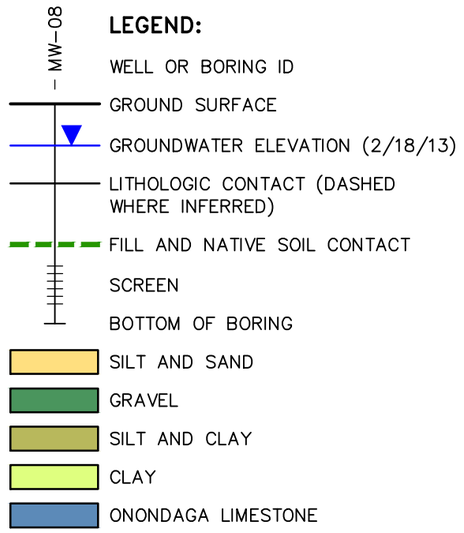
CROSS SECTION A-A'

ARCADIS Design & Consultancy for natural and built assets

FIGURE 3

CITY:SYRACUSE, NY DIV/GROUP:ENV/IM-DV DB:A.Schilling, R. ALLEN LD:(Opt) PIC:(Opt) PM:S. POWLIN TM:(Opt) LYR:(Opt)ON=*;OFF=REF*
G:\ENV\CADD\SYRACUSE\ACTIVE\B0023310\0000\0006\DWG\SITE-M-PLAN\23310V02.dwg LAYOUT: 3 SAVED: 3/11/2016 3:56 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/11/2016 3:57 PM BY: ALLEN, ROYCE
XREFS: IMAGES: PROJECTNAME: ----
23310XBL 23310X02.jp2
23310X04.jp2





NOTE:

1. * CELLS A AND B REPRESENT EXCAVATION LIMITS FOR THE FOURTH STREET UTILITY CORRIDOR EXCAVATION COMPLETED BY WSP ENGINEERING OF NEW YORK, P.C. ON BEHALF OF QLT BUFFALO LLC BETWEEN JUNE AND SEPTEMBER 2012.
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VERTICAL EXAGGERATION = 5X

0 10' 20'

VERTICAL SCALE

0 50' 100'

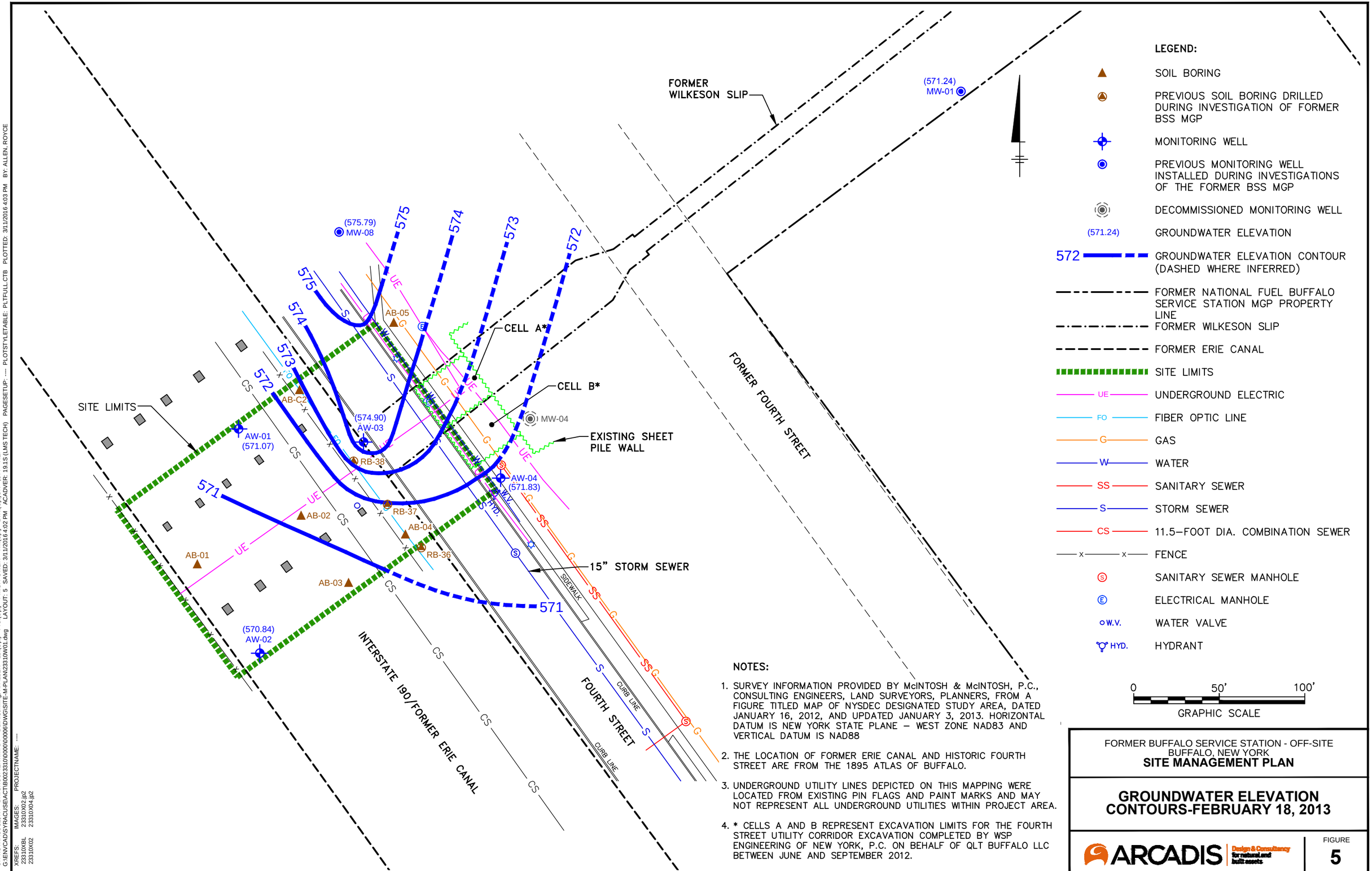
HORIZONTAL SCALE

FORMER BUFFALO SERVICE STATION - OFF-SITE
BUFFALO, NEW YORK
SITE MANAGEMENT PLAN

CROSS SECTION B-B'

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4



LEGEND:

- SOIL BORING
- PREVIOUS SOIL BORING DRILLED DURING INVESTIGATION OF FORMER BSS MGP
- MONITORING WELL
- PREVIOUS MONITORING WELL INSTALLED DURING INVESTIGATIONS OF THE FORMER BSS MGP
- DECOMMISSIONED MONITORING WELL
- (571.24) GROUNDWATER ELEVATION
- 572 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- FORMER NATIONAL FUEL BUFFALO SERVICE STATION MGP PROPERTY LINE
- FORMER WILKESON SLIP
- FORMER ERIE CANAL
- SITE LIMITS
- UE UNDERGROUND ELECTRIC
- FO FIBER OPTIC LINE
- G GAS
- W WATER
- SS SANITARY SEWER
- S STORM SEWER
- CS 11.5–FOOT DIA. COMBINATION SEWER
- x x FENCE
- (S) SANITARY SEWER MANHOLE
- (E) ELECTRICAL MANHOLE
- W.V. WATER VALVE
- HYD. HYDRANT

0 50' 100'
GRAPHIC SCALE

NOTES:

1. SURVEY INFORMATION PROVIDED BY McINTOSH & McINTOSH, P.C., CONSULTING ENGINEERS, LAND SURVEYORS, PLANNERS, FROM A FIGURE TITLED MAP OF NYSDEC DESIGNATED STUDY AREA, DATED JANUARY 16, 2012, AND UPDATED JANUARY 3, 2013. HORIZONTAL DATUM IS NEW YORK STATE PLANE – WEST ZONE NAD83 AND VERTICAL DATUM IS NAD88
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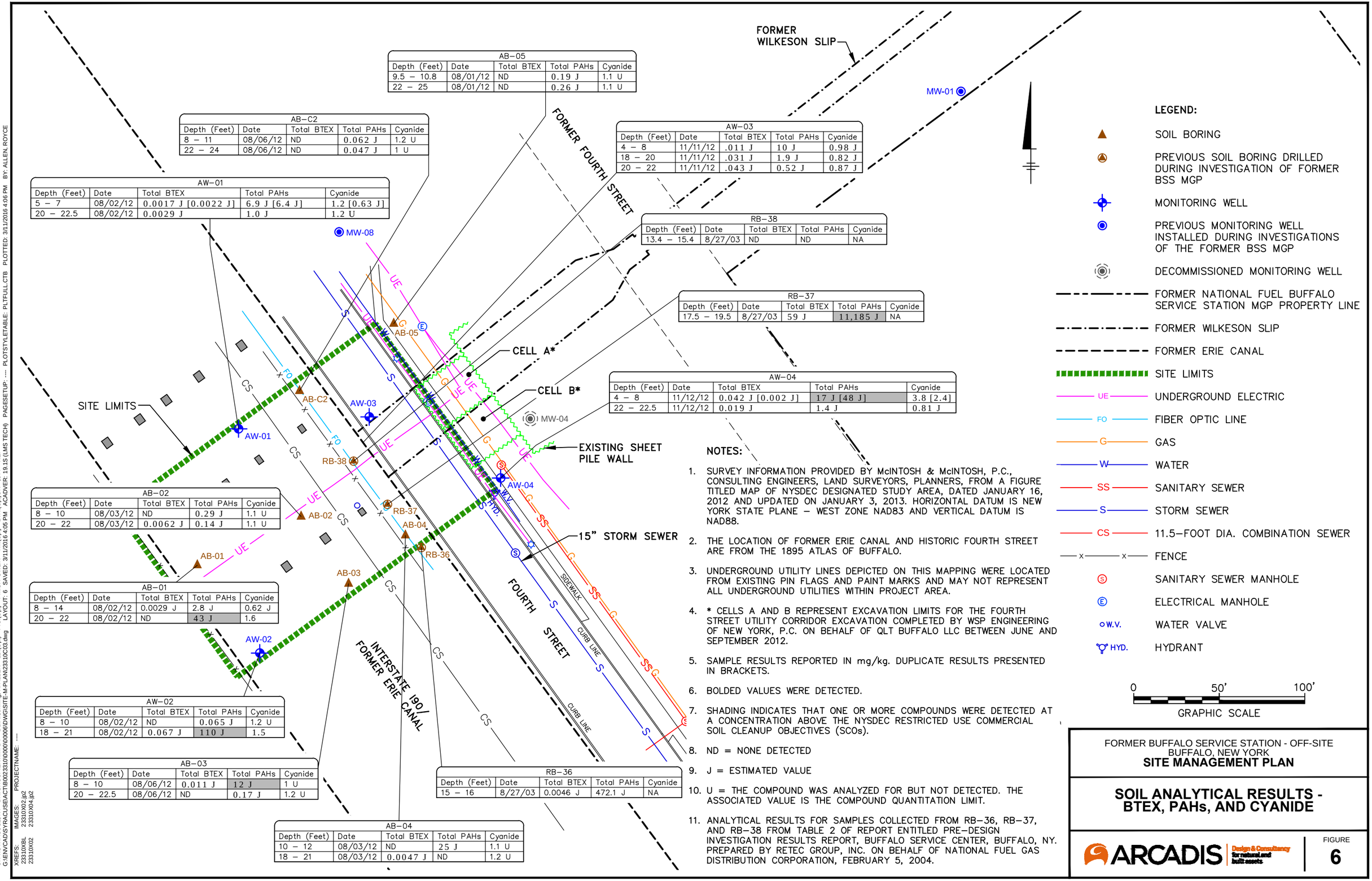
3. UNDERGROUND UTILITY LINES DEPICTED ON THIS MAPPING WERE LOCATED FROM EXISTING PIN FLAGS AND PAINT MARKS AND MAY NOT REPRESENT ALL UNDERGROUND UTILITIES WITHIN PROJECT AREA.
4. * CELLS A AND B REPRESENT EXCAVATION LIMITS FOR THE FOURTH STREET UTILITY CORRIDOR EXCAVATION COMPLETED BY WSP ENGINEERING OF NEW YORK, P.C. ON BEHALF OF QLT BUFFALO LLC BETWEEN JUNE AND SEPTEMBER 2012.

FORMER BUFFALO SERVICE STATION - OFF-SITE
BUFFALO, NEW YORK
SITE MANAGEMENT PLAN

GROUNDWATER ELEVATION CONTOURS-FEBRUARY 18, 2013

ARCADIS Design & Consultancy for natural and built assets

FIGURE 5



AB–05				
Depth (Feet)	Date	Total BTEX	Total PAHs	Cyanide
9.5 – 10.8	08/01/12	ND	0.19 J	1.1 U
22 – 25	08/01/12	ND	0.26 J	1.1 U

AB–C2				
Depth (Feet)	Date	Total BTEX	Total PAHs	Cyanide
8 – 11	08/06/12	ND	0.062 J	1.2 U
22 – 24	08/06/12	ND	0.047 J	1 U

AW–03				
Depth (Feet)	Date	Total BTEX	Total PAHs	Cyanide
4 – 8	11/11/12	.011 J	10 J	0.98 J
18 – 20	11/11/12	.031 J	1.9 J	0.82 J
20 – 22	11/11/12	.043 J	0.52 J	0.87 J

AW–01				
Depth (Feet)	Date	Total BTEX	Total PAHs	Cyanide
5 – 7	08/02/12	0.0017 J [0.0022 J]	6.9 J [6.4 J]	1.2 [0.63 J]
20 – 22.5	08/02/12	0.0029 J	1.0 J	1.2 U

RB–38				
Depth (Feet)	Date	Total BTEX	Total PAHs	Cyanide
13.4 – 15.4	8/27/03	ND	ND	NA

RB–37				
Depth (Feet)	Date	Total BTEX	Total PAHs	Cyanide
17.5 – 19.5	8/27/03	59 J	11,185 J	NA

AW–04				
Depth (Feet)	Date	Total BTEX	Total PAHs	Cyanide
4 – 8	11/12/12	0.042 J [0.002 J]	17 J [48 J]	3.8 [2.4]
22 – 22.5	11/12/12	0.019 J	1.4 J	0.81 J

AB–02				
Depth (Feet)	Date	Total BTEX	Total PAHs	Cyanide
8 – 10	08/03/12	ND	0.29 J	1.1 U
20 – 22	08/03/12	0.0062 J	0.14 J	1.1 U

AB–01				
Depth (Feet)	Date	Total BTEX	Total PAHs	Cyanide
8 – 14	08/02/12	0.0029 J	2.8 J	0.62 J
20 – 22	08/02/12	ND	43 J	1.6

AW–02				
Depth (Feet)	Date	Total BTEX	Total PAHs	Cyanide
8 – 10	08/02/12	ND	0.065 J	1.2 U
18 – 21	08/02/12	0.067 J	110 J	1.5

AB–03				
Depth (Feet)	Date	Total BTEX	Total PAHs	Cyanide
8 – 10	08/06/12	0.011 J	12 J	1 U
20 – 22.5	08/06/12	ND	0.17 J	1.2 U

RB–36				
Depth (Feet)	Date	Total BTEX	Total PAHs	Cyanide
15 – 16	8/27/03	0.0046 J	472.1 J	NA

AB–04				
Depth (Feet)	Date	Total BTEX	Total PAHs	Cyanide
10 – 12	08/03/12	ND	25 J	1.1 U
18 – 21	08/03/12	0.0047 J	ND	1.2 U

NOTES:

1. SURVEY INFORMATION PROVIDED BY McINTOSH & McINTOSH, P.C., CONSULTING ENGINEERS, LAND SURVEYORS, PLANNERS, FROM A FIGURE TITLED MAP OF NYSDEC DESIGNATED STUDY AREA, DATED JANUARY 16, 2012 AND UPDATED ON JANUARY 3, 2013. HORIZONTAL DATUM IS NEW YORK STATE PLANE – WEST ZONE NAD83 AND VERTICAL DATUM IS NAD88.
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4. * CELLS A AND B REPRESENT EXCAVATION LIMITS FOR THE FOURTH STREET UTILITY CORRIDOR EXCAVATION COMPLETED BY WSP ENGINEERING OF NEW YORK, P.C. ON BEHALF OF QLT BUFFALO LLC BETWEEN JUNE AND SEPTEMBER 2012.
5. SAMPLE RESULTS REPORTED IN mg/kg. DUPLICATE RESULTS PRESENTED IN BRACKETS.
6. BOLDED VALUES WERE DETECTED.
7. SHADING INDICATES THAT ONE OR MORE COMPOUNDS WERE DETECTED AT A CONCENTRATION ABOVE THE NYSDEC RESTRICTED USE COMMERCIAL SOIL CLEANUP OBJECTIVES (SCOs).
8. ND = NONE DETECTED
9. J = ESTIMATED VALUE
10. U = THE COMPOUND WAS ANALYZED FOR BUT NOT DETECTED. THE ASSOCIATED VALUE IS THE COMPOUND QUANTITATION LIMIT.
11. ANALYTICAL RESULTS FOR SAMPLES COLLECTED FROM RB–36, RB–37, AND RB–38 FROM TABLE 2 OF REPORT ENTITLED PRE–DESIGN INVESTIGATION RESULTS REPORT, BUFFALO SERVICE CENTER, BUFFALO, NY. PREPARED BY RETEC GROUP, INC. ON BEHALF OF NATIONAL FUEL GAS DISTRIBUTION CORPORATION, FEBRUARY 5, 2004.

LEGEND:

- SOIL BORING
- PREVIOUS SOIL BORING DRILLED DURING INVESTIGATION OF FORMER BSS MGP
- MONITORING WELL
- PREVIOUS MONITORING WELL INSTALLED DURING INVESTIGATIONS OF THE FORMER BSS MGP
- DECOMMISSIONED MONITORING WELL
- FORMER NATIONAL FUEL BUFFALO SERVICE STATION MGP PROPERTY LINE
- FORMER WILKESON SLIP
- FORMER ERIE CANAL
- SITE LIMITS
- UE — UNDERGROUND ELECTRIC
- FO — FIBER OPTIC LINE
- G — GAS
- W — WATER
- SS — SANITARY SEWER
- S — STORM SEWER
- CS — 11.5–FOOT DIA. COMBINATION SEWER
- x — x — FENCE
- Ⓢ — SANITARY SEWER MANHOLE
- Ⓔ — ELECTRICAL MANHOLE
- o W.V. — WATER VALVE
- HYD. — HYDRANT

0 50’ 100’

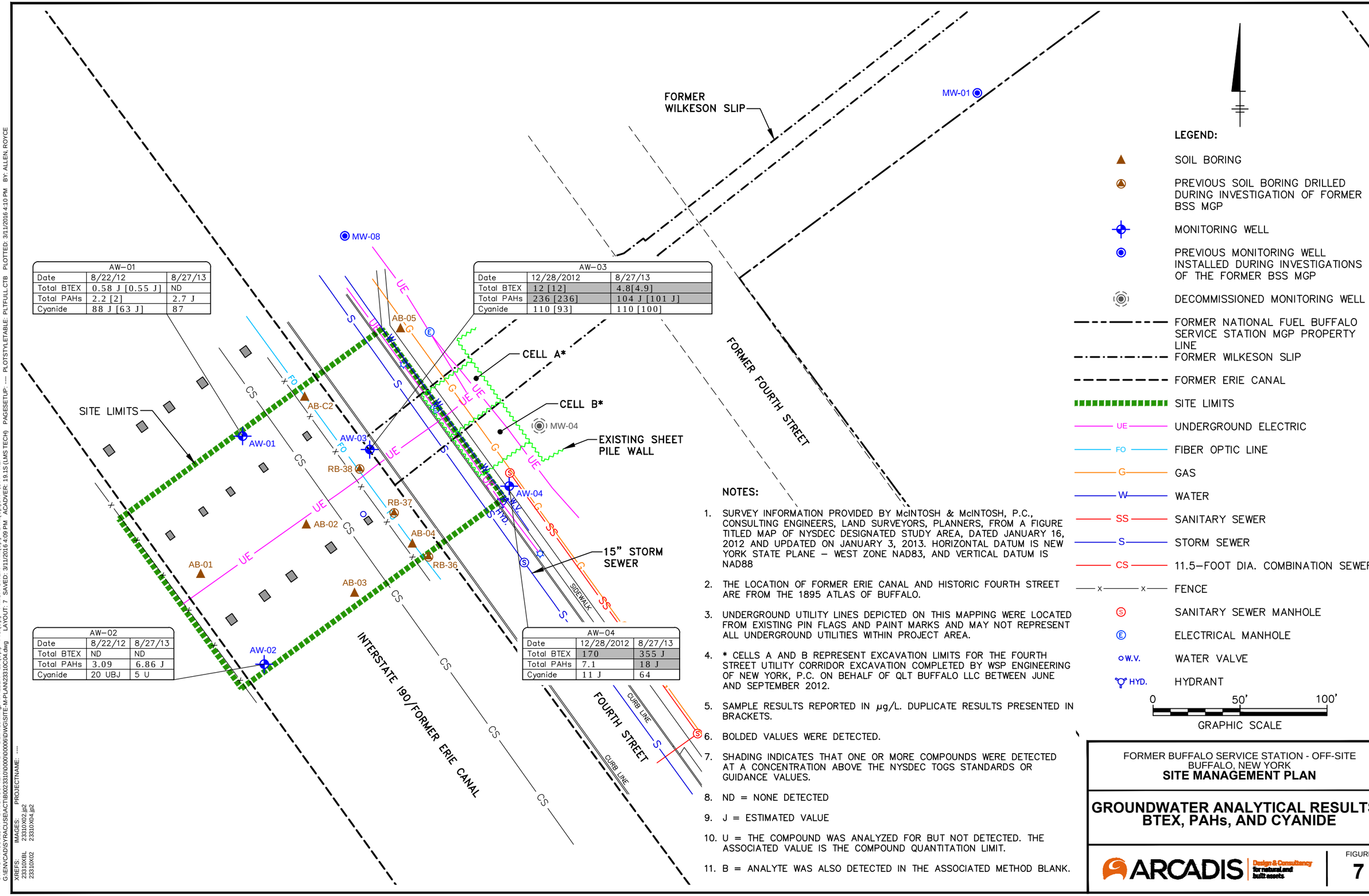
GRAPHIC SCALE

FORMER BUFFALO SERVICE STATION - OFF-SITE
BUFFALO, NEW YORK
SITE MANAGEMENT PLAN

SOIL ANALYTICAL RESULTS - BTEX, PAHs, AND CYANIDE

ARCADIS Design & Consultancy for natural and built assets

FIGURE 6



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5. SAMPLE RESULTS REPORTED IN µg/L. DUPLICATE RESULTS PRESENTED IN BRACKETS.
6. BOLDED VALUES WERE DETECTED.
7. SHADING INDICATES THAT ONE OR MORE COMPOUNDS WERE DETECTED AT A CONCENTRATION ABOVE THE NYSDEC TOGS STANDARDS OR GUIDANCE VALUES.
8. ND = NONE DETECTED
9. J = ESTIMATED VALUE
10. U = THE COMPOUND WAS ANALYZED FOR BUT NOT DETECTED. THE ASSOCIATED VALUE IS THE COMPOUND QUANTITATION LIMIT.
11. B = ANALYTE WAS ALSO DETECTED IN THE ASSOCIATED METHOD BLANK.

LEGEND:

- SOIL BORING
- PREVIOUS SOIL BORING DRILLED DURING INVESTIGATION OF FORMER BSS MGP
- MONITORING WELL
- PREVIOUS MONITORING WELL INSTALLED DURING INVESTIGATIONS OF THE FORMER BSS MGP
- DECOMMISSIONED MONITORING WELL
- FORMER NATIONAL FUEL BUFFALO SERVICE STATION MGP PROPERTY LINE
- FORMER WILKESON SLIP
- FORMER ERIE CANAL
- SITE LIMITS
- UE — UNDERGROUND ELECTRIC
- FO — FIBER OPTIC LINE
- G — GAS
- W — WATER
- SS — SANITARY SEWER
- S — STORM SEWER
- CS — 11.5–FOOT DIA. COMBINATION SEWER
- x — x — FENCE
- Ⓢ — SANITARY SEWER MANHOLE
- Ⓔ — ELECTRICAL MANHOLE
- ○ W.V. — WATER VALVE
- HYD. — HYDRANT

0 50' 100'
GRAPHIC SCALE

FORMER BUFFALO SERVICE STATION - OFF-SITE
BUFFALO, NEW YORK
SITE MANAGEMENT PLAN

GROUNDWATER ANALYTICAL RESULTS - BTEX, PAHs, AND CYANIDE

ARCADIS Design & Consultancy for natural and built assets

FIGURE 7

CITY:SYRACUSE, NY DIV/GROUP:ENV/IM-DV DB:A.Schilling, R.ALLEN LD:(Opt) PIC:(Opt) PM:S.POWLIN TM:(Opt) LYR:(Opt)ON=*;OFF=REF*
G:\ENV\CADD\SYRACUSE\ACT\B0023310\0000\0006\DWG\SITE-M-PLAN\23310C04.dwg LAYOUT: 7 SAVED: 3/11/2016 4:09 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/11/2016 4:10 PM BY: ALLEN, ROYCE
XREFS: 23310XBL 23310X02 IMAGES: 23310X02.jp2 23310X04.jp2 PROJECTNAME: ----

APPENDIX A

Soil Boring and Monitoring Well Construction Logs

Date Start/Finish: 7/31-8/2/2012
Drilling Company: Parratt Wolff, Inc.
Driller's Name: Layne Pech
Drilling Method: Hollow Stem Auger
Sampling Method: 2" / 3" x 2' Split Spoon
Rig Type: Truck Mounted IRA300/Percussion Hammer

Northing: 1051493.38
Easting: 1067397.49
Casing Elevation: NA

Borehole Depth: 22' bgs
Surface Elevation: 579.88' AMSL

Descriptions By: Nicholas (Klaus) Beyrle

Well/Boring ID: **AB-01**

Client: National Fuel

Location: Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	580	NA	0-2	NA	0.0			Dark gray to black fine to coarse SAND and very fine to medium subrounded to subangular GRAVEL, little Silt, little-trace Boulders. [FILL]	
		NA	2-4	NA	0.0			Trace Brick fragments at 2-4' bgs.	
		NA	4-5	NA	NA				
5	575	NA	5-6	0.1	NA			NO RECOVERY. ROCK in spoon tip.	
		1	6-8	0.0	NA				
		2	8-10	0.4	0.0			Brown CLAY, some Silt, little fine to medium Gravel, wet. Water table at 8' bgs. [FILL]	Borehole tremie-grouted to grade with cement/bentonite grout.
10	570	3	10-12	0.3	0.0			Gray broken ROCK fragments, wet. [FILL]	
		4	12-14	0.8	0.0			Brown CLAY and fine to coarse GRAVEL, soft, wet. [FILL]	
15	565	5	14-16	0.3	1.3			Very coarse angular GRAVEL covered in brown Silty CLAY. Black/dark gray Clayey SILT in tip of shoe, slight odor.	

ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 8-14' bgs as AB-01 (8-14) and from 20-21' bgs as AB-01 (20-21) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Client: National Fuel

Well/Boring ID: **AB-01**

Borehole Depth: 22' bgs

Site Location:
Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
		6	16-18	0.6	0.0			Black to dark gray Clayey SILT and medium to very coarse angular GRAVEL, trace Fiber, soft, slight odor, moist.	
		7	18-20	1.0	0.0			Black/dark gray/gray Clayey SILT, trace Rootlets and Fiber, soft, low plasticity, moist.	Borehole tremie-grouted to grade with cement/bentonite grout.
20	560	8	20-22	0.8	1.6			Broken pieces of ROCK (Bedrock), spoon abandonment was at 20.5' bgs (top of weathered rock) and the tone of hammer changed at 21.6' bgs (competent bedrock).	
								End of boring at 22' bgs.	
25	555								
30	550								
35	545								

ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 8-14' bgs as AB-01 (8-14) and from 20-21' bgs as AB-01 (20-21) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Date Start/Finish: 7/31-8/3/2012
Drilling Company: Parratt Wolff, Inc.
Driller's Name: Layne Pech
Drilling Method: Hollow Stem Auger
Sampling Method: 2" / 3" x 2' Split Spoon
Rig Type: Truck Mounted IRA300/Percussion Hammer

Northing: 1051521.84
Easting: 1067458.21
Casing Elevation: NA

Borehole Depth: 22.2' bgs
Surface Elevation: 580.33' AMSL

Descriptions By: Nicholas (Klaus) Beyrle

Well/Boring ID: **AB-02**

Client: National Fuel

Location: Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	580	NA	0-2	NA	0.0			Dark brown SILT and very fine SAND, little Clay and fine to medium angular Gravel, trace medium to very coarse Gravel, moist to dry. [FILL]	
		NA	2-4	NA	0.0			Trace red Brick fragments at 2-4' bgs.	
		NA	4-5	NA	0.0				
5	575	NA	5-6	0.0	NA			NO RECOVERY. Rock in spoon tip.	
		1	6-8	0.4	0.0			Broken ROCK fragments, wet. Water table at 8' bgs. [FILL]	
		2	8-10	0.8	0.0			Brown broken ROCK fragments covered in brown SILT, some Clay and very fine to medium angular Gravel, wet. [FILL]	Borehole tremie-grouted to grade with cement/bentonite grout.
10	570	3	10-12	0.8	0.0			Brown CLAY, little Silt, trace very fine to fine Sand, soft, moist to wet.	
		4	12-14	1.4	0.0				
15	565	5	14-16	0.7	0.0			Stiff, Sand is absent at 14-16' bgs.	

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 8-10' bgs as AB-02 (8-10) and from 20-22' bgs as AB-02 (20-22) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

ARCADIS
Infrastructure, environment, buildings

Client: National Fuel

Well/Boring ID: **AB-02**

Borehole Depth: 22.2' bgs

Site Location:
Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
		6	16-18	0.6	0.0			Brown SILT, trace Clay, very fine Sand and very coarse angular Gravel, fine to medium angular Gravel in tip of shoe.	
		7	18-20	1.4	0.0			Brown SILT, trace Clay, very fine Sand and very coarse angular Gravel.	Borehole tremie-grouted to grade with cement/bentonite grout.
20	560	8	20-22	0.7	0.0			Dark gray broken ROCK fragments.	
		9	22-22.2	0.2	0.0			BEDROCK. Spoon refusal at 22.2' bgs.	
								End of boring at 22.2' bgs.	
25	555								
30	550								
35	545								

ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 8-10' bgs as AB-02 (8-10) and from 20-22' bgs as AB-02 (20-22) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Date Start/Finish: 7/31-8/6/2012
Drilling Company: Parratt Wolff, Inc.
Driller's Name: Layne Pech
Drilling Method: Hollow Stem Auger
Sampling Method: 2" / 3" x 2' Split Spoon
Rig Type: Truck Mounted IRA300/Percussion Hammer

Northing: 1051482.58
Easting: 1067485.96
Casing Elevation: NA

Borehole Depth: 22.5' bgs
Surface Elevation: 580.35' AMSL

Descriptions By: Nicholas (Klaus) Beyrle

Well/Boring ID: **AB-03**

Client: National Fuel

Location: Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	580	NA	0-2	NA	NA			Fine to very coarse angular GRAVEL. [FILL]	
		NA	2-4	NA	NA			Very little matrix amid all the rocks.	
		NA	4-5	NA	NA				
5	575	NA	5-6	NA	0.0			Brown/black medium to fine SAND and SILT, some very fine to medium subangular Gravel, trace very coarse Gravel, Rock in tip of shoe. [FILL]	
		1	6-8	0.9	1.6			ROCK in spoon tip.	
		2	8-10	0.8	0.0			Brown SILT, trace Clay, wet. Water at 8' bgs. [FILL]	Borehole tremie-grouted to grade with cement/bentonite grout.
10	570	3	10-12	0.5	0.0			Dark brown Clayey SILT, little to trace very fine to medium subrounded to subangular Gravel, low plasticity, soft, moist. [FILL]	
		4	12-14	0.7	0.0			COAL. [FILL] Black FRAGMENTS. [FILL]	
15	565	5	14-16	0.4	0.0			Brown CLAY, high plasticity, stiff, moist.	

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Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 8-10' bgs as AB-03 (8-10) and from 20-22.5' bgs as AB-03 (20-22.5) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Client: National Fuel

Well/Boring ID: **AB-03**

Borehole Depth: 22.5' bgs

Site Location:
Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
		6	16-18	1.1	0.0			Brown CLAY, high plasticity, stiff, moist. Stiff at 16-16.3' bgs and 16.5-16.6' bgs, otherwise medium stiff at 16-18' bgs.	
		7	18-20	0.7	0.0			Stff between 18-20' bgs.	Borehole tremie-grouted to grade with cement/bentonite grout.
20	560	8	20-22	1.4	0.0			Brown CLAY, high plasticity, stiff, moist. Color of CLAY is brown to black at 20.3-21' bgs, white at 21-21.1' bgs and brown at 21.1-21.5' bgs.	
		9	22-22.5	0.5	0.0			Piece of broken rock (BEDROCK). Spoon refusal at 22.5' bgs.	
								End of boring at 22.5' bgs.	
25	555								
30	550								
35	545								

ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 8-10' bgs as AB-03 (8-10) and from 20-22.5' bgs as AB-03 (20-22.5) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Date Start/Finish: 8/1-8/3/2012
Drilling Company: Parratt Wolff, Inc.
Driller's Name: Layne Pech
Drilling Method: Hollow Stem Auger
Sampling Method: 2" / 3" x 2' Split Spoon
Rig Type: Truck Mounted IRA300/Percussion Hammer

Northing: 1051510.80
Easting: 1067519.16
Casing Elevation: NA

Borehole Depth: 21' bgs
Surface Elevation: 581.79' AMSL

Descriptions By: Nicholas (Klaus) Beyrle

Well/Boring ID: **AB-04**

Client: National Fuel

Location: Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH / ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0 / 580	NA	0-2	NA	NA			Dark brown fine to coarse SAND, SILT and very fine to medium angular GRAVEL. [FILL]	Borehole tremie-grouted to grade with cement/bentonite grout.
	NA	2-4	NA	NA				
	NA	4-5	NA	NA				
5	NA	5-6	0.5	0.0			Brown fine to coarse SAND and stiff very fine to medium subrounded to subangular GRAVEL, some Silt, moist to dry. [FILL]	
575	1	6-8	0.5	0.0			Brown/gray SILT, trace Clay and Gravel, soft, moist.	
	2	8-10	2.0	0.0			Dark brown SILT, some Organic material, trace Wood pieces.	
							Gray/black-gray SILT, medium soft, vein of stained material (2.3 mm wide and 0.2' long), odor at 9.8-10' bgs.	
10	3	10-12	1.6	0.0			Gray/black-gray SILT, medium soft, trace areas of black staining with odor, some stains connect to form "veins" ranging from 2-4 mm wide, longest one is 0.2', moist.	
570							Gray Silt, little trace Clay, no staining, moist at 11.4-11.6' bgs.	
	4	12-14	0.9	0.0			Trace sheen on water at 12.3-12.45' bgs.	
							Dark brown Clayey SILT, trace Rootlets and very fine Sand, soft, moist.	
15	5	14-16	1.0	0.0			Gray very fine SAND and SILT.	

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Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 10-12' bgs as AB-04 (10-12) and from 18-21' bgs as AB-04 (18-21) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Client: National Fuel

Well/Boring ID: **AB-04**

Borehole Depth: 21' bgs

Site Location:
Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	565	6	16-18	0.6	0.0			Brown/pink to brown Clayey SILT and very fine SAND, trace very fine to medium subangular Gravel, medium soft, moist.	
		7	18-20	1.2	0.0			Brown/pink-brown SILT, some Clay, little very fine Sand, firm, low plasticity, moist.	Borehole tremie-grouted to grade with cement/bentonite grout.
20		8	20-21	0.7	0.0			Brown and gray mottled alternating layers of Silty CLAY and SILT. Silty CLAY layers are approximately 0.02' thick. Brown Clayey SILT, Rock fragments in the tip of shoe, moist at 20.5-20.7' bgs.	
	560							Spoon refusal at 21' bgs, bedrock at 21' bgs is confirmed by sending auger down the borehole. End of boring at 21' bgs.	
25									
	555								
30									
	550								
35									

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Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 10-12' bgs as AB-04 (10-12) and from 18-21' bgs as AB-04 (18-21) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Date Start/Finish: 7/31-8/1/2012
Drilling Company: Parratt Wolff, Inc.
Driller's Name: Layne Pech
Drilling Method: Hollow Stem Auger
Sampling Method: 2" / 3" x 2' Split Spoon
Rig Type: Truck Mounted IRA300/Percussion Hammer

Northing: 1051634.58
Easting: 1067512.36
Casing Elevation: NA

Borehole Depth: 25' bgs
Surface Elevation: 580.88' AMSL

Descriptions By: Nicholas (Klaus) Beyrle

Well/Boring ID: **AB-05**

Client: National Fuel

Location: Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	580	1	0-2	NA	NA			Coarse GRAVEL and ROAD base on top of geotech fabric. [FILL]	
								CONCRETE. [FILL]	
		2	2-4	NA	NA			Dark gray SILT, little Clay, trace very fine to fine Gravel, hard, dense, moist to dry. [FILL]	
		3	4-5	NA	NA				
5		4	5-6	NA	NA			No descriptions recorded.	
	575	5	6-8	0.0	NA			No Recovery.	
		6	8-10	0.1	0.0			Dark gray medium to coarse SAND and Clayey SILT, trace fine to medium rounded Gravel, moist.	Borehole tremie-grouted to grade with cement/bentonite grout.
10									
	570	7	10-12	1.6	0.0			Dark gray SILT, trace Clay, wet at 10-10.8' bgs, saturated at 10.8-11.6' bgs. Water at 10.8' bgs.	
								Loose between 12-12.8' bgs.	
		8	12-14	2.0	0.0			Black SILT and ORGANIC material, trace Rootlets.	
								Gray very fine to fine SAND, wet.	
								Gray fine SAND, saturated.	
15		9	14-16	2.0	0.0			Brown with gray mottled CLAY, semi-soft, moist.	
	565								

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Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 9.5-10.8' bgs as AB-05 (9.5-10.8) and from 22-25' bgs as AB-05 (22-25) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Client: National Fuel

Well/Boring ID: **AB-05**

Borehole Depth: 25' bgs

Site Location:
Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
		10	16-18	2.0	0.0			Gray very fine to fine SAND and SILT, dilatent, saturated.	
		11	18-20	0.6	0.0			Gray fine to very fine SAND and SILT, dilatent, saturated.	
20	560							Brown CLAY, trace Silt, medium stiff.	
		12	20-22	2.0	0.0			Light gray fine to medium SAND and SILT, little to trace very fine to medium rounded Gravel, soft, moist.	Borehole tremie-grouted to grade with cement/bentonite grout.
		13	22-24	0.8	0.0				
		14	24-25	0.0	0.0			ROCK fragments, gray fine to medium SAND and SILT. Refusal at 25' bgs. BEDROCK at 25' bgs.	
25	555							End of boring at 25' bgs.	
30	550								
35	545								

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Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 9.5-10.8' bgs as AB-05 (9.5-10.8) and from 22-25' bgs as AB-05 (22-25) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Date Start/Finish: 8/1-8/6/2012
Drilling Company: Parratt Wolff, Inc.
Driller's Name: Layne Pech
Drilling Method: Hollow Stem Auger
Sampling Method: 2" / 3" x 2' Split Spoon
Rig Type: Truck Mounted IRA300/Percussion Hammer

Northing: 1051595.26
Easting: 1067457.28
Casing Elevation: NA

Borehole Depth: 24.2' bgs
Surface Elevation: 581.63' AMSL

Descriptions By: Nicholas (Klaus) Beyrle

Well/Boring ID: **AB-C2**

Client: National Fuel

Location: Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH / ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0								
580	NA	0-2	NA	0.0			TOPSOIL. [FILL] Coarse ASPHALT and ROCK debris. [FILL]	
							CONCRETE. [FILL]	
	NA	2-4	NA	0.0			Brown Clayey SILT, little to trace fine to medium angular Gravel, trace Boulders, moist to dense. [FILL]	
	NA	4-5	NA	0.0				
5	NA	5-6	0.9	0.0			Brown fine to coarse SAND and fine to medium subangular GRAVEL, little Silt, dry. [FILL]	
575	1	6-8	2.0	0.0			Gray SILT, little to trace Clay, trace orange mottling, stiff, moist. Medium stiff at 6.78' bgs. At 7.3, 0.5" wide layer of black Organic material (rootlets).	
	2	8-10	0.2	0.0				Borehole tremie-grouted to grade with cement/bentonite grout.
10	3	10-12	1.7	0.0			Gray SILT, trace Clay, soft, low plasticity, moist. Wet at 11.4-11.7' bgs. Water at 11' bgs.	
570	4	12-14	1.7	0.0			Little to trace very fine SAND, trace Rootlets, moist to wet at 12-14' bgs.	
15	5	14-16	1.8	1.3				

ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 8-11' bgs as AB-C2 (8-11) and from 22-24' bgs as AB-C2 (22-24) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Client: National Fuel

Well/Boring ID: **AB-C2**

Borehole Depth: 24.2' bgs

Site Location:
Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
								Gray SILT, trace Clay, soft, low plasticity, moist.	
	565	6	16-18	1.4	0.0			Brown SILT, wet.	
		7	18-20	1.1	0.0			Red, brown and gray mottled Silty CLAY, stiff, low plasticity.	
20		8	20-22	2.0	0.0				Borehole tremie-grouted to grade with cement/bentonite grout.
	560							Brown/gray to brown very fine to medium SAND and medium to very coarse rounded GRAVEL, moist.	
		9	22-24	1.8	0.0				
		10	24-24.2	0.2	NA			ROCK fractured. Spoon refusal at 24.2' bgs.	
25								End of boring at 24.2' bgs.	
	555								
30									
	550								
35									

ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 8-11' bgs as AB-C2 (8-11) and from 22-24' bgs as AB-C2 (22-24) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Date Start/Finish: 8/1-8/2/2012
Drilling Company: Parratt Wolff, Inc.
Driller's Name: Layne Pech
Drilling Method: Hollow Stem Auger
Sampling Method: 2" / 3" x 2' Split Spoon
Rig Type: Truck Mounted IRA300/Percussion Hammer

Northing: 1051573.06
Easting: 1067421.63
Casing Elevation: 580.21' AMSL

Borehole Depth: 23.5' bgs
Surface Elevation: 580.57' AMSL

Descriptions By: Nicholas (Klaus) Beyrle

Well/Boring ID: **AW-01**

Client: National Fuel

Location: Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description
0	580	NA	0-2	NA	0.0			Coarse GRAVEL/ASPHALT. [FILL]
								COBBLES (Limestone). [FILL]
		NA	2-4	NA	NA			Mainly large COBBLES and BRICK, very little matrix of dark gray/brown fine to coarse Sand and Silt and very fine to medium gravel, moist to dry. [FILL]
		NA	4-5	NA	NA			
5	575	NA	5-7	2.0	0.0			Gray very fine to coarse angular GRAVEL and medium to coarse SAND, trace fine Sand and Silt, dry. [FILL]
								Brown very fine to medium SAND, trace fine to medium rounded Gravel, dry to moist. [FILL]
								Brown/tan brown CLAY, trace Silt and very fine Gravel, plasticity, medium stiff, moist. [FILL]
		1	7-8	0.0	NA			NO RECOVERY.
		2	8-10	0.0	NA			NO RECOVERY. Rock in tip of shoe. [FILL]
10	570	3	10-12	0.05	0.0			Brown very fine to medium GRAVEL and fine to coarse SAND, dry. Water on rods at about 10' bgs. [FILL]
		4	12-14	0.3	0.0			Brown very fine to medium GRAVEL and fine to coarse SAND, some Silt, little to trace Clay, brittle, dry. Spoons are pushing material out of way easily. [FILL]
15	565	5	14-16	0.3	0.0			Brown CLAY, some Silt, trace very fine Sand and fine to medium Gravel, moist.

Well/Boring Construction

- Steel flushmount cover
- Locking J-Plug
- Concrete Pad (0-0.5' bgs)
- Sand Drain (0.5-1.5' bgs)
- Neat Cement Grout (1.5-9.5' bgs)
- 2" Sch 40 PVC Riser (0.5-13.5' bgs)
- Bentonite Pellets (9.5-11.5' bgs)
- #0 Silica Sand Pack (11.5-23.5' bgs)
- 2" Sch 40 PVC 0.010" Slot Screen (13.5-23.5' bgs)

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Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 5-7' bgs as AW-01 (5-7) and from 20-22.5' bgs as AW-01 (20-22.5) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Client: National Fuel

Well/Boring ID: **AW-01**

Borehole Depth: 23.5' bgs

Site Location:
Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
								Brown CLAY, some Silt, trace very fine Sand and fine to medium Gravel, moist.	
		6	16-18	1.3	0.0			Brown/Black varved SILT, trace very fine Sand and Clay, medium stiff, moist.	#0 Silica Sand Pack (11.5-23.5' bgs)
		7	18-20	1.4	0.0			Brown/gray CLAY, trace Silt and fine to medium rounded Gravel, soft, moist.	2" Sch 40 PVC 0.010" Slot Screen (13.5-23.5' bgs)
20	560	8	20-22	0.4	0.0				
		9	22-23.5	0.6	0.0			Broken ROCK fragments. Spoon refusal at 22.5' bgs. Augers sent down to 23.5' bgs, BEDROCK at 23.5' bgs.	
								End of boring at 23.5' bgs.	
25	555								
30	550								
35	545								

ARCADIS
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Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 5-7' bgs as AW-01 (5-7) and from 20-22.5' bgs as AW-01 (20-22.5) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Date Start/Finish: 7/31-8/2/2012
Drilling Company: Parratt Wolff, Inc.
Driller's Name: Layne Pech
Drilling Method: Hollow Stem Auger
Sampling Method: 2" / 3" x 2' Split Spoon
Rig Type: Truck Mounted IRA300/Percussion Hammer

Northing: 1051442.05
Easting: 1067434.05
Casing Elevation: 580.22' AMSL

Borehole Depth: 21' bgs
Surface Elevation: 580.50' AMSL

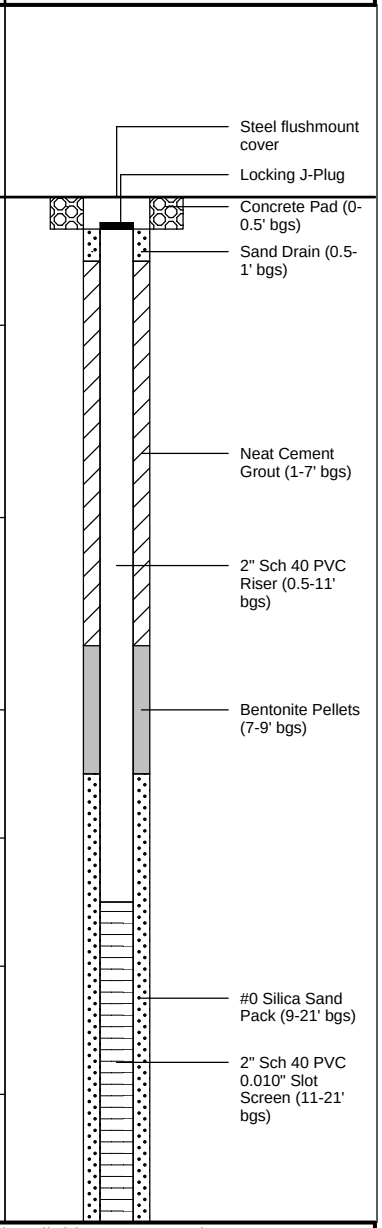
Descriptions By: Nicholas (Klaus) Beyrle

Well/Boring ID: **AW-02**

Client: National Fuel

Location: Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description
0	580	NA	0-2	NA	0.0			Dark brown to black CLAY and SILT, some fine to coarse angular Gravel, trace Boulders. Coarse GRAVEL and ASPHALT between 0-1' bgs. [FILL]
		NA	2-4	NA	0.0			Dark brown to black fine to coarse SAND and fine to very coarse GRAVEL, trace Silt, dry to moist. [FILL]
		NA	4-5	NA	0.0			
5	575	NA	5-6	0.25	0.0			ROCK fragments in tip of shoe, dry. [FILL]
		1	6-8	0.2	0.0			
		2	8-10	1.1	0.0			Black Silty CLAY, trace medium to fine angular Gravel, soft, medium plasticity, moist. [FILL]
10	570	3	10-12	0.2	0.0			Brown CLAY, fine to coarse angular Gravel, wet. Water table at 10' bgs.
		4	12-14	1.6	0.0			Brown CLAY, some Silt, little to trace fine to medium angular Gravel, trace medium sand between 12.5-12.9' bgs, soft.
15	565	5	14-16	2.0	6.4			Brown between14-14.3' bgs and black between 14.3-16' bgs Clayey SILT, trace very fine Sand and tiny Fibers throughout, soft, slight odor, moist.



Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 8-10' bgs as AW-02 (8-10) and from 18-21' bgs as AW-02 (18-21) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

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Infrastructure, environment, buildings

Client: National Fuel

Well/Boring ID: **AW-02**

Borehole Depth: 21' bgs

Site Location:
Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
		6	16-18	1.4	4.8			Brown at 14-14.3' bgs and black at 14.3-16' bgs Clayey SILT, trace very fine Sand and tiny Fibers throughout, soft, slight odor, moist. Piece of wood in shoe, smells like Pine at 16-17.1' bgs.	#0 Silica Sand Pack (9-21' bgs)
		7	18-20	1.0	14.1			No wood, trace fine fibers still present at 18-20' bgs.	2" Sch 40 PVC 0.010" Slot Screen (11-21' bgs)
20	560	8	20-21	0.4	9.6			Some of the fibers are little longer and appear to be wood. Spoon refusal at 21' bgs.	
								End of boring at 21' bgs.	
25	555								
30	550								
35	545								

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Samples collected from 8-10' bgs as AW-02 (8-10) and from 18-21' bgs as AW-02 (18-21) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

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Date Start/Finish: 11/11/12
Drilling Company: Parrott Wolff
Driller's Name: Shawn Bodah
Drilling Method: Direct Push
Sampling Method: 2" / 3" x 2' Split Spoon
Rig Type: Truck Mounted Geoprobe

Northing: 1051565.39
Easting: 1067494.69
Casing Elevation: 581.44' AMSL

Borehole Depth: 23.5' bgs
Surface Elevation: 581.96' AMSL

Descriptions By: Jeff Brayer

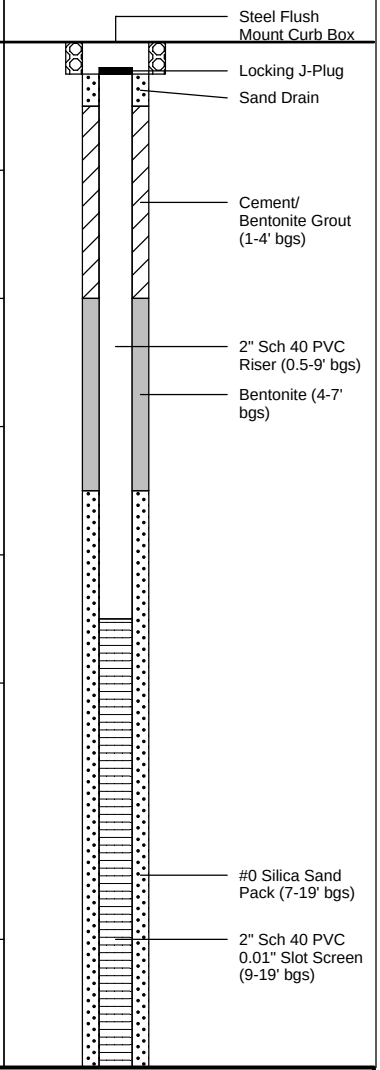
Well/Boring ID: **AW-03**

Client: National Fuel

Location: Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH / ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description
0 / 581							
0 / 580	1	NA	NA	0.0			Brown crushed CONCRETE, SLAG-like material and SAND, some Silt and Organics, moist. [FILL]
							Brown crushed CONCRETE, SLAG-like material and SAND, some Silt and Cobble, moist. [FILL] Hard digging.
5							Dark brown coarse GRAVEL, some medium Sand and Slag-like material, trace Silt, moist. [FILL]
575	2	6-8	0.3	0.0			Coarse angular GRAVEL and coarse SAND, Shale rock fragments, wet at 6.2' bgs. [FILL]
	3	8-10	1.2	0.0			Fine to coarse GRAVEL, some Slag-like material and medium Shale rock fragments, wet. [FILL]
10	4	10-12	0.7	0.0			Red to brown fine to coarse GRAVEL, angular SLAG-like material (pitted and brittle), fine SAND and angular SHALE rock fragments. [FILL]
570	5	12-14	0.3	0.0			
15	6	14-16	0.9	0.0			Clayey SILT and black PLASTIC, some Organic (plant matter) and Wood, trace fine Sand.

Well/Boring Construction



Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Analytical samples were collected: AW-03 (4-8), AW-03 (18-20) and AW-03 (20-22) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

ARCADIS
Infrastructure, environment, buildings

Client: National Fuel

Well/Boring ID: **AW-03**

Borehole Depth: 23.5' bgs

Site Location:
Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
	565	7	16-18	0.2	0.0			SHALE (rock fragments) and ORGANIC, Rock stuck in split spoon.	#0 Silica Sand Pack (7-19' bgs)
		8	18-20	1.9	3.2			Brown Silty CLAY, low plasticity, solvent-like smell. Red-brown Silty CLAY and medium SAND, laminated with Sand lense from 19.5' - 20.0' bgs, solvent-like smell.	2" Sch 40 PVC 0.01" Slot Screen (9-19' bgs)
20		9	20-22	2.0	0.4			Brown Silty CLAY, trace Gravel at 22.0' bgs, petroleum-like odor. Brown CLAY, lamination of medium Sand, trace Gravel at 22' bgs, stiff, Shale rock stuck in split spoon shoe.	2" Sch 40 PVC Sump (19-21' bgs)
	560	10	22-24	1.0	0.2				Grout (19-23.5' bgs)
								Refusal at 23.5' bgs	
25									
	555								
30									
	550								
35									

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Analytical samples were collected: AW-03 (4-8), AW-03 (18-20) and AW-03 (20-22) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

ARCADIS
Infrastructure, environment, buildings

Date Start/Finish: 11/12/12
Drilling Company: Parrott Wolff
Driller's Name: Shawn Bodah
Drilling Method: Direct Push
Sampling Method: 2" / 3" x 2' Split Spoon
Rig Type: Truck Mounted Geoprobe

Northing: 1051544.36
Easting: 1067574.83
Casing Elevation: 581.95' AMSL

Borehole Depth: 22.5' bgs
Surface Elevation: 582.19' AMSL

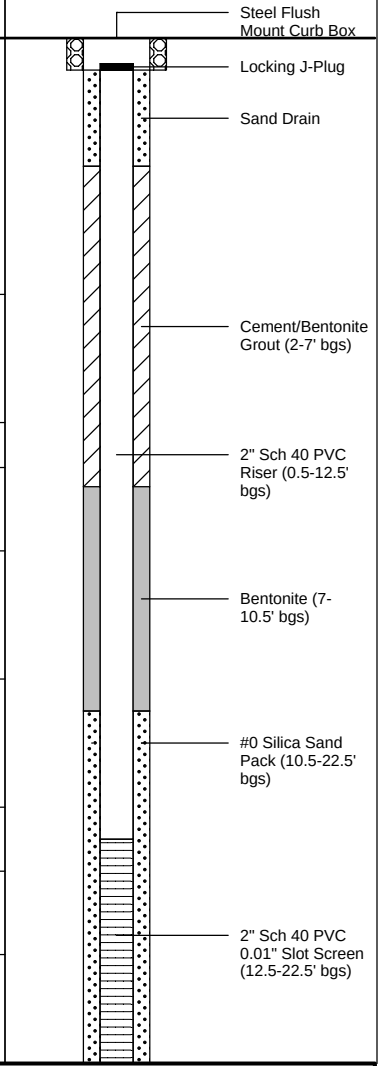
Descriptions By: Jeff Brayer

Well/Boring ID: **AW-04**

Client: National Fuel

Location: Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH / ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description
585							
0							
	1	NA	NA	0.0			SILT and coarse SAND, red Brick (pieces), Clay pipe fragments and Organic material, moist. [FILL]
580							Coarse Gravel/Slag-like material.
							Dark brown coarse GRAVEL, some medium Sand and Slag like-material, trace Silt, moist. [FILL]
5							
	2	6-8	2.0	0.0			SILT, black Organic layer, trace Clay, wet.
575							Brown to yellow fine Silty SAND.
	3	8-10	0.5	0.0			Medium to coarse GRAVEL, some fine to coarse Sand, trace Silt.
10							
	4	10-12	2.0	0.0			Grey to red-brown fine to coarse GRAVEL, fine to medium Sand, trace Wood fibers, wet.
570							
	5	12-14	2.0	0.0			Brown fine Silty SAND and ORGANIC (wood and straw).
							Black SILT, trace fine Sand and Organic (plant fibers and immature peat).
	6	14-16	1.6	0.0			Black SILT and CLAY, trace brown to red fine Sand and Silt, medium plasticity, wet.
15							



ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Analytical samples were collected: AW-04 (4-8) and AW-04 (22-22.5) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

Client: National Fuel

Well/Boring ID: **AW-04**

Borehole Depth: 22.5' bgs

Site Location:
Former Wilkson Slip/Canal Area
Buffalo, NY

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
		7	16-18	2.0	0.0			Black to brown SAND and SILT, laminated medium to fine Sand, Silt, and Organic (fibers).	#0 Silica Sand Pack (10.5-22.5' bgs)
	565							Black to brown CLAY, some Silt, high plasticity.	
		8	18-20	2.0	0.0			Brown SAND and SILT, wet.	
20									2" Sch 40 PVC 0.01" Slot Screen (12.5-22.5' bgs)
		9	20-22	2.0	0.0			Brown SAND and SILT, vertical seams of black Sand, discoloration, wet.	
								Brown SILT, trace fine Sand.	
	560	10	22-24	0.5	8.5	X		Red-brown CLAY, laminated Silt, Bedrock in tip of sampler, stiff, gasoline/fuel oil-like odor.	
								Refusal at 22.5' bgs	
25									
	555								
30									
	550								
35									

ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level

Analytical samples were collected: AW-04 (4-8) and AW-04 (22-22.5) for analysis of TCL VOC, TCL SVOC, Cyanide, Free Cyanide, Mercury, TAL Metals.

Soil boring was hand-cleared to 5' bgs prior to drilling.

RETEC
1001 W Seneca St, Suite 204
Ithaca, NY 14850

Boring ID: RB-36

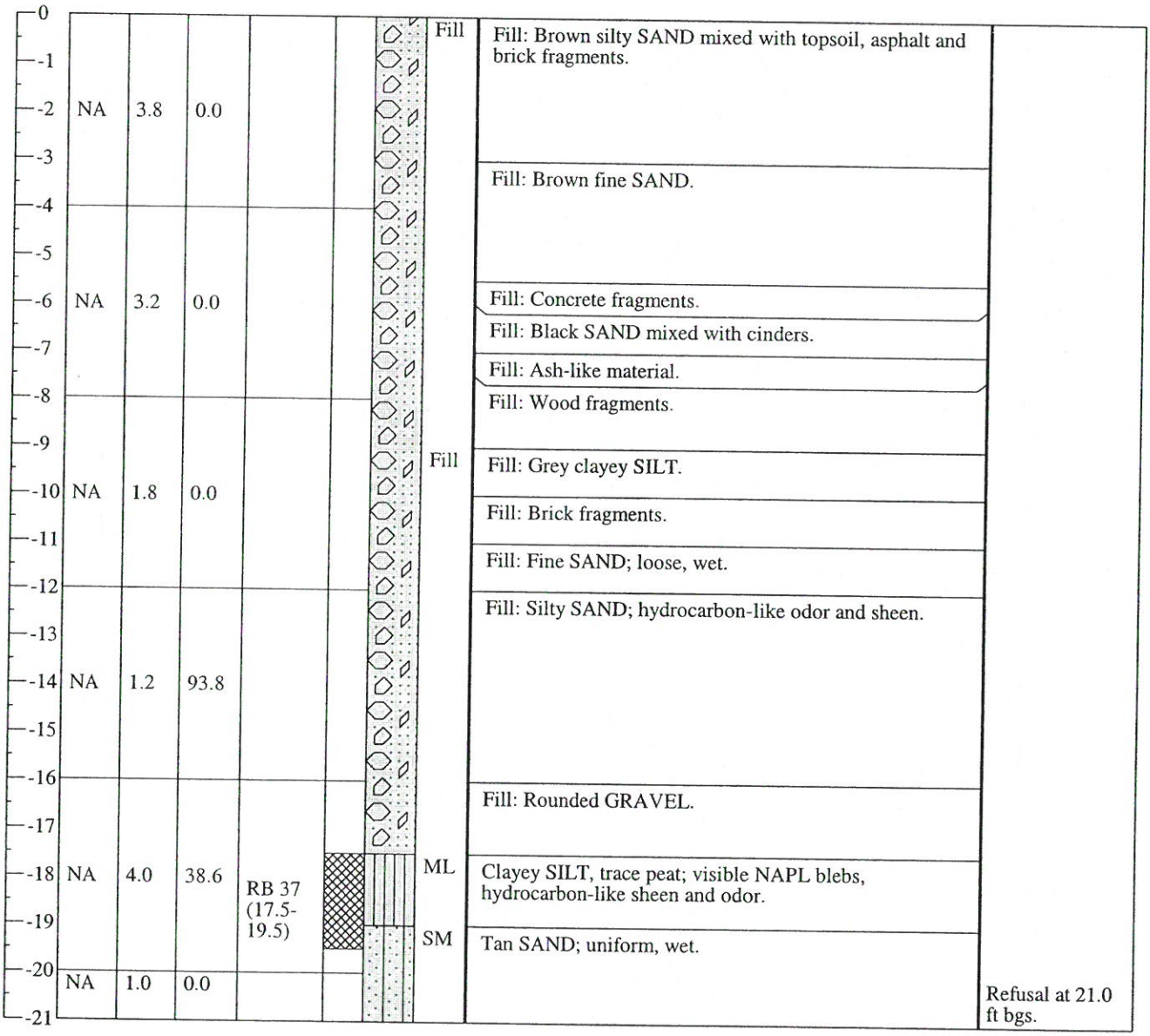
Project Name:	Buffalo Service Center	**Drilling Method:**	Direct Push
Project Number:	NFGD1-15979-500	**Sampling Method:**	Macrocore
Date Started:	8/27/03	**Ground Elevation (ft/msl):**	582.01
Date Finished:	8/27/03	**Total Depth (ft):**	23.0 ft bgs
Drilling Company:	SLC	**Logged By:**	J Edwards

Depth (Feet)	Blow Counts	Recovery (Feet)	PID (ppm)	Sample ID	Sample Interval	Lithology	USCS	Geologic Description	Remarks
0							Fill	Fill: SAND mixed with topsoil, concrete, gravel, asphalt and brick fragments.	
-1									
-2	NA	3.2	0.0						
-3									
-4								Fill: Clayey SILT.	
-5								Fill: Silty SAND, some gravel.	
-6	NA	3.1	0.0					Fill: Brown SAND, some gravel.	
-7								Fill: Black coarse SAND; wet.	
-8							Fill	Fill: Brown coarse SAND mixed with cinders, glass fragments, black silt and gravel; wet.	
-9									
-10	NA	2.4	0.0						
-11									
-12									
-13									
-14	NA	4.0	0.0						
-15				RB 36 (15-16)			ML	Black and grey SILT, trace peat material; wet.	
-16								Tan SAND, trace rounded gravel; uniform, wet.	
-17							SM		
-18	NA	3.8	0.0						
-19							ML	Brown and grey clayey SILT; firm, moist.	
-20									
-21	NA	2.8	0.0						
-22									
-23									Refusal at 23.0 ft bgs.

RETEC
1001 W Seneca St, Suite 204
Ithaca, NY 14850

Boring ID: RB-37

Project Name:	Buffalo Service Center	**Drilling Method:**	Direct Push
Project Number:	NFGD1-15979-500	**Sampling Method:**	Macrocore
Date Started:	8/27/03	**Ground Elevation (ft/msl):**	582.21
Date Finished:	8/27/03	**Total Depth (ft):**	21.0 ft bgs
Drilling Company:	SLC	**Logged By:**	J Edwards

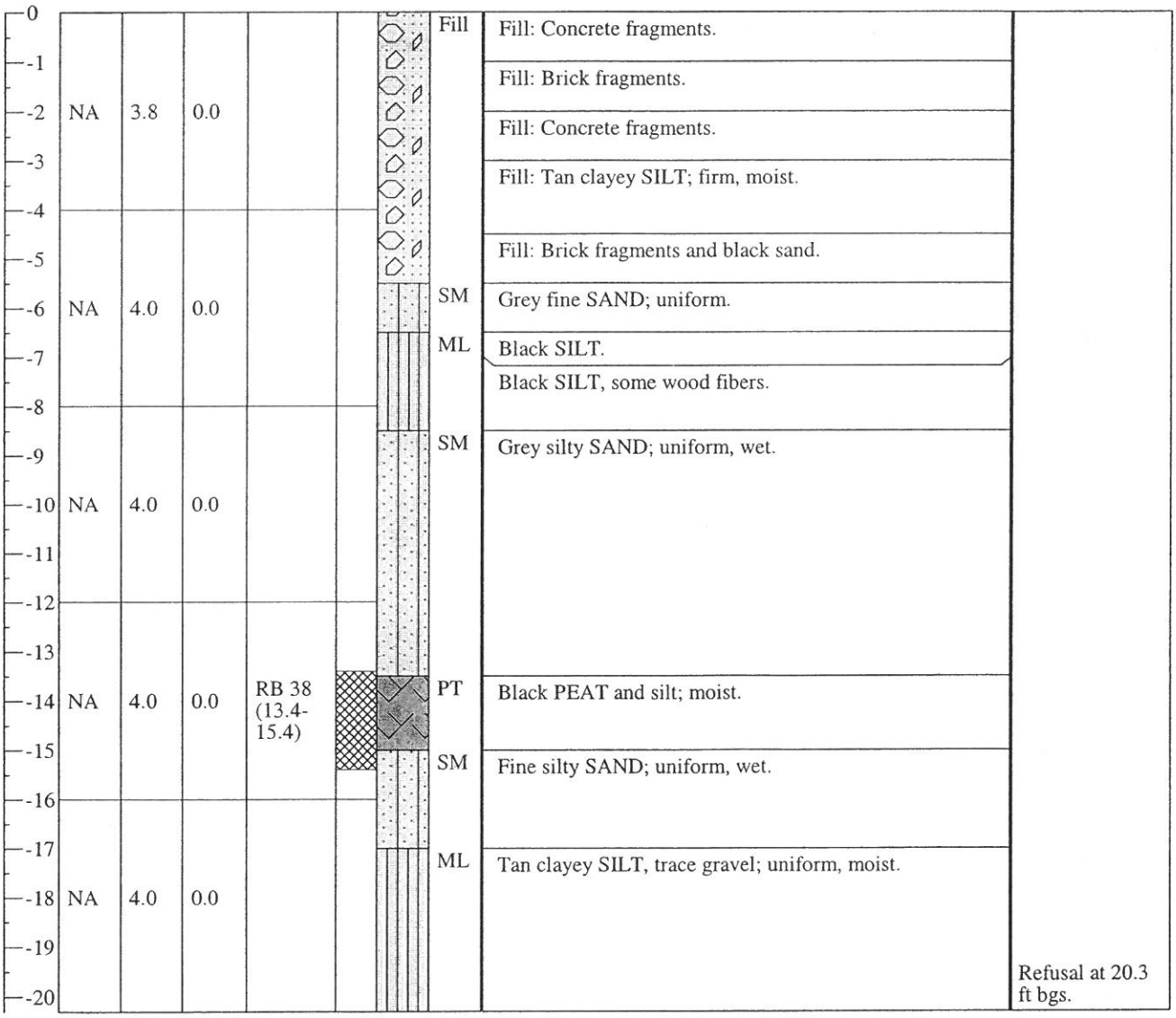


Depth (Feet)	Blow Counts	Recovery (Feet)	PID (ppm)	Sample ID	Sample Interval	Lithology	USCS	Geologic Description	Remarks
0							Fill	Fill: Brown silty SAND mixed with topsoil, asphalt and brick fragments.	
-1									
-2	NA	3.8	0.0						
-3								Fill: Brown fine SAND.	
-4									
-5									
-6	NA	3.2	0.0					Fill: Concrete fragments.	
-7								Fill: Black SAND mixed with cinders.	
-8								Fill: Ash-like material.	
-9								Fill: Wood fragments.	
-10	NA	1.8	0.0				Fill	Fill: Grey clayey SILT.	
-11								Fill: Brick fragments.	
-12								Fill: Fine SAND; loose, wet.	
-13								Fill: Silty SAND; hydrocarbon-like odor and sheen.	
-14	NA	1.2	93.8						
-15									
-16									
-17								Fill: Rounded GRAVEL.	
-18	NA	4.0	38.6	RB 37 (17.5-19.5)			ML	Clayey SILT, trace peat; visible NAPL blebs, hydrocarbon-like sheen and odor.	
-19							SM	Tan SAND; uniform, wet.	
-20	NA	1.0	0.0						Refusal at 21.0 ft bgs.
-21									

RETEC
1001 W Seneca St, Suite 204
Ithaca, NY 14850

Boring ID: RB-38

Project Name:	Buffalo Service Center	**Drilling Method:**	Direct Push
Project Number:	NFGD1-15979-500	**Sampling Method:**	Macrocore
Date Started:	8/27/03	**Ground Elevation (ft/msl):**	582.22
Date Finished:	8/27/03	**Total Depth (ft):**	20.3 ft bgs
Drilling Company:	SLC	**Logged By:**	J Edwards



APPENDIX B

Summary of Soil Sample Analytical Results

Table 4
Summary of Soil Sample Analytical Results

Site Characterization
National Fuel Gas Distribution Corporation
Former Buffalo Service Station - Off-Site
Buffalo, NY

Location ID:		Restricted	Restricted	AB-01	AB-01	AB-02	AB-02	AB-03	AB-03-	AB-04	AB-04	AB-05	AB-05	AB-C2
Sample Depth(Feet):		Use SCOs	Use SCOs	8 - 14	20 - 22	8 - 10	20 - 22	8 - 10	20 - 22.5	10 - 12	18 - 21	9.5 - 10.8	22 - 25	8 - 11
Date Collected:	Units	Residential	Commercial	08/02/12	08/02/12	08/03/12	08/03/12	08/06/12	08/06/12	08/03/12	08/03/12	08/01/12	08/01/12	08/06/12
Volatile Organics														
1,1,1-Trichloroethane	mg/kg	100	500	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
1,1,2,2-Tetrachloroethane	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
1,1,2-trichloro-1,2,2-trifluoroethane	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
1,1,2-Trichloroethane	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
1,1-Dichloroethane	mg/kg	26	240	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
1,1-Dichloroethene	mg/kg	100	500	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
1,2,4-Trichlorobenzene	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0022 J	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
1,2-Dibromo-3-chloropropane	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
1,2-Dibromoethane	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
1,2-Dichlorobenzene	mg/kg	100	500	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
1,2-Dichloroethane	mg/kg	3.1	30	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
1,2-Dichloropropane	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
1,3-Dichlorobenzene	mg/kg	49	280	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
1,4-Dichlorobenzene	mg/kg	13	130	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0015 J	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
2-Butanone	mg/kg	100	500	0.029 U	0.13 J	0.03 U	0.031 U	0.026 U	0.023 J	0.26 U	0.029 U	0.0069 J	0.15	0.016 J
2-Hexanone	mg/kg	- -	- -	0.029 U	0.3 U	0.03 U	0.031 U	0.026 U	0.031 U	0.26 U	0.029 U	0.031 U	0.03 U	0.031 U
4-Methyl-2-pentanone	mg/kg	- -	- -	0.029 U	0.3 U	0.03 U	0.031 U	0.0026 J	0.031 U	0.26 U	0.029 U	0.031 U	0.03 U	0.031 U
Acetone	mg/kg	100	500	0.029 UB	0.39	0.011 J	0.019 J	0.011 J	0.015 J	0.093 J	0.0095 J	0.04 UB	0.03 UB	0.039
Benzene	mg/kg	4.8	44	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0011 J	0.0062 U	0.0059 U	0.0063 U
Bromodichloromethane	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Bromoform	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Bromomethane	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 UJ	0.0061 UJ	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 UJ
Carbon Disulfide	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Carbon Tetrachloride	mg/kg	2.4	22	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Chlorobenzene	mg/kg	100	500	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Chloroethane	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 UJ	0.0061 UJ	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 UJ
Chloroform	mg/kg	49	350	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Chloromethane	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
cis-1,2-Dichloroethene	mg/kg	100	500	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
cis-1,3-Dichloropropene	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Cyclohexane	mg/kg	- -	- -	0.011	0.023 J	0.001 J	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Dibromochloromethane	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Dichlorodifluoromethane	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 UJ	0.0061 UJ	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 UJ
Ethylbenzene	mg/kg	41	390	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0015 J	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Isopropylbenzene	mg/kg	- -	- -	0.0057 U	0.053 J	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Methyl acetate	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0049 J	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Methyl tert-butyl ether	mg/kg	100	500	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Methylcyclohexane	mg/kg	- -	- -	0.013	0.056 J	0.002 J	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Methylene Chloride	mg/kg	100	500	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U

See Notes on Page 9.

Table 4
Summary of Soil Sample Analytical Results

Site Characterization
National Fuel Gas Distribution Corporation
Former Buffalo Service Station - Off-Site
Buffalo, NY

Location ID:		Restricted	Restricted	AB-01	AB-01	AB-02	AB-02	AB-03	AB-03-	AB-04	AB-04	AB-05	AB-05	AB-C2
Sample Depth(Feet):		Use SCOs	Use SCOs	8 - 14	20 - 22	8 - 10	20 - 22	8 - 10	20 - 22.5	10 - 12	18 - 21	9.5 - 10.8	22 - 25	8 - 11
Date Collected:	Units	Residential	Commercial	08/02/12	08/02/12	08/03/12	08/03/12	08/06/12	08/06/12	08/03/12	08/03/12	08/01/12	08/01/12	08/06/12
Volatile Organics (Cont.)														
Styrene	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Tetrachloroethene	mg/kg	19	150	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.00072 J	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Toluene	mg/kg	100	500	0.0017 J	0.06 U	0.0059 U	0.0062 J	0.0012 J	0.0061 U	0.053 U	0.0036 J	0.0062 U	0.0059 U	0.0063 U
trans-1,2-Dichloroethene	mg/kg	100	500	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
trans-1,3-Dichloropropene	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Trichloroethene	mg/kg	21	200	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Trichlorofluoromethane	mg/kg	- -	- -	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 UJ	0.0061 UJ	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 UJ
Vinyl Chloride	mg/kg	0.9	13	0.0057 U	0.06 U	0.0059 U	0.0063 U	0.0052 U	0.0061 U	0.053 U	0.0058 U	0.0062 U	0.0059 U	0.0063 U
Xylenes (total)	mg/kg	100	500	0.0012 J	0.12 UB	0.012 U	0.013 U	0.0083 J	0.012 UB	0.11 U	0.012 U	0.012 U	0.012 U	0.013 UB
Total BTEX	mg/kg	- -	- -	0.0029 J	ND	ND	0.0062 J	0.011 J	ND	ND	0.0047 J	ND	ND	ND
Total VOCs	mg/kg	- -	- -	0.0269 J	0.652 J	0.014 J	0.0252 J	0.02902 J	0.0429 J	0.093 J	0.0142 J	0.0069 J	0.15	0.055 J
Semivolatile Organics														
1,1'-Biphenyl	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.031 J	0.2 U	0.21 U	0.2 U	1.1 U
2,2'-Oxybis(1-Chloropropane)	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
2,4,5-Trichlorophenol	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
2,4,6-Trichlorophenol	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
2,4-Dichlorophenol	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
2,4-Dimethylphenol	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
2,4-Dinitrophenol	mg/kg	- -	- -	3.8 U	4.8 U	3.9 U	0.42 U	7 U	0.4 U	0.41 U	0.39 U	0.41 U	0.39 U	2.1 U
2,4-Dinitrotoluene	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
2,6-Dinitrotoluene	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
2-Chloronaphthalene	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
2-Chlorophenol	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
2-Methylnaphthalene	mg/kg	- -	- -	1.9 U	0.46 J	2 U	0.22 U	3.6 U	0.2 U	0.037 J	0.2 U	0.21 U	0.2 U	1.1 U
2-Methylphenol	mg/kg	100	500	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
2-Nitroaniline	mg/kg	- -	- -	3.8 U	4.8 U	3.9 U	0.42 U	7 U	0.4 U	0.41 U	0.39 U	0.41 U	0.39 U	2.1 U
2-Nitrophenol	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
3,3'-Dichlorobenzidine	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
3-Nitroaniline	mg/kg	- -	- -	3.8 U	4.8 U	3.9 U	0.42 U	7 U	0.4 U	0.41 U	0.39 U	0.41 U	0.39 U	2.1 U
4,6-Dinitro-2-methylphenol	mg/kg	- -	- -	3.8 U	4.8 U	3.9 U	0.42 U	7 U	0.4 U	0.41 U	0.39 U	0.41 U	0.39 U	2.1 U
4-Bromophenyl-phenylether	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
4-Chloro-3-Methylphenol	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
4-Chloroaniline	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
4-Chlorophenyl-phenylether	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
4-Methylphenol	mg/kg	100	500	3.8 U	4.8 U	3.9 U	0.42 U	7 U	0.4 U	0.41 U	0.39 U	0.41 U	0.39 U	2.1 U
4-Nitroaniline	mg/kg	- -	- -	3.8 U	4.8 U	3.9 U	0.42 U	7 U	0.4 U	0.41 U	0.39 U	0.41 U	0.39 U	2.1 U
4-Nitrophenol	mg/kg	- -	- -	3.8 U	4.8 U	3.9 U	0.42 U	7 U	0.4 U	0.41 U	0.39 U	0.41 U	0.39 U	2.1 U
Acenaphthene	mg/kg	100	500	1.9 U	1.1 J	2 U	0.22 U	3.6 U	0.014 J	3.9	0.2 U	0.21 U	0.2 U	1.1 U
Acenaphthylene	mg/kg	100	500	1.9 U	0.22 J	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Acetophenone	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Anthracene	mg/kg	100	500	1.9 U	1.3 J	2 U	0.22 U	0.28 J	0.2 U	2.7	0.2 U	0.21 U	0.2 U	1.1 U

See Notes on Page 9.

Table 4
Summary of Soil Sample Analytical Results

Site Characterization
National Fuel Gas Distribution Corporation
Former Buffalo Service Station - Off-Site
Buffalo, NY

Location ID: / Sample Depth(Feet): / Date Collected:	Units	Restricted Use SCOs Residential	Restricted Use SCOs Commercial	AB-01 8 - 14 08/02/12	AB-01 20 - 22 08/02/12	AB-02 8 - 10 08/03/12	AB-02 20 - 22 08/03/12	AB-03 8 - 10 08/06/12	AB-03- 20 - 22.5 08/06/12	AB-04 10 - 12 08/03/12	AB-04 18 - 21 08/03/12	AB-05 9.5 - 10.8 08/01/12	AB-05 22 - 25 08/01/12	AB-C2 8 - 11 08/06/12
Semivolatile Organics (Cont.)														
Atrazine	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Benzaldehyde	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Benzo(a)anthracene	mg/kg	1	5.6	0.29 J	3.4	2 U	0.22 U	1.1 J	0.2 U	1.2	0.2 U	0.21 U	0.028 J	1.1 U
Benzo(a)pyrene	mg/kg	1	1	0.27 J	**3.1**	2 U	0.015 J	**1.1 J**	0.025 J	0.65	0.2 U	0.022 J	0.026 J	1.1 U
Benzo(b)fluoranthene	mg/kg	1	5.6	0.45 J	4.6	2 U	0.018 J	1.4 J	0.025 J	0.98	0.2 U	0.035 J	0.039 J	0.062 J
Benzo(g,h,i)perylene	mg/kg	100	500	1.9 U	1 J	2 U	0.22 U	0.56 J	0.2 U	0.17 J	0.2 U	0.21 U	0.2 U	1.1 U
Benzo(k)fluoranthene	mg/kg	3.9	56	0.18 J	1.8 J	2 U	0.011 J	0.48 J	0.017 J	0.41	0.2 U	0.016 J	0.016 J	1.1 U
bis(2-Chloroethoxy)methane	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
bis(2-Chloroethyl)ether	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
bis(2-Ethylhexyl)phthalate	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	1.8 J	0.094 J	0.1 J	0.2 U	0.21 U	0.29	1.1 U
Butylbenzylphthalate	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Caprolactam	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Carbazole	mg/kg	- -	- -	1.9 U	0.47 J	2 U	0.22 U	3.6 U	0.2 U	0.31	0.2 U	0.21 U	0.2 U	1.1 U
Chrysene	mg/kg	3.9	56	0.29 J	3.3	0.13 J	0.017 J	1.2 J	0.025 J	0.91	0.2 U	0.026 J	0.03 J	1.1 U
Dibenzo(a,h)anthracene	mg/kg	0.33	0.56	1.9 U	0.43 J	2 U	0.22 U	0.21 J	0.2 U	0.069 J	0.2 U	0.21 U	0.2 U	1.1 U
Dibenzofuran	mg/kg	59	350	1.9 U	0.7 J	2 U	0.22 U	3.6 U	0.2 U	2.7	0.2 U	0.21 U	0.2 U	1.1 U
Diethylphthalate	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Dimethylphthalate	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Di-n-Butylphthalate	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Di-n-Octylphthalate	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.0077 J	0.2 U	0.21 U	0.2 U	1.1 U
Fluoranthene	mg/kg	100	500	0.52 J	7.2	0.16 J	0.031 J	2.2 J	0.031 J	5.3	0.2 U	0.039 J	0.044 J	1.1 U
Fluorene	mg/kg	100	500	1.9 U	1.2 J	2 U	0.22 U	3.6 U	0.2 U	4	0.2 U	0.21 U	0.2 U	1.1 U
Hexachlorobenzene	mg/kg	1.2	6	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Hexachlorobutadiene	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Hexachlorocyclopentadiene	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Hexachloroethane	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Indeno(1,2,3-cd)pyrene	mg/kg	0.5	5.6	1.9 U	0.98 J	2 U	0.22 U	0.49 J	0.2 U	0.17 J	0.2 U	0.21 U	0.012 J	1.1 U
Isophorone	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Naphthalene	mg/kg	100	500	1.9 U	2.1 J	2 U	0.22 U	3.6 U	0.2 U	0.057 J	0.2 U	0.21 U	0.2 U	1.1 U
Nitrobenzene	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
N-Nitroso-di-n-propylamine	mg/kg	- -	- -	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
N-Nitrosodiphenylamine	mg/kg	- -	- -	1.9 U	2.5 U	2 U*	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Pentachlorophenol	mg/kg	6.7	6.7	3.8 U	4.8 U	3.9 U	0.42 U	7 U	0.4 U	0.41 U	0.39 U	0.41 U	0.39 U	2.1 U
Phenanthrene	mg/kg	100	500	0.41 J	5.6	2 U	0.015 J	1.6 J	0.2 U	1.1	0.2 U	0.025 J	0.03 J	1.1 U
Phenol	mg/kg	100	500	1.9 U	2.5 U	2 U	0.22 U	3.6 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	1.1 U
Pyrene	mg/kg	100	500	0.39 J	5.6	2 U	0.028 J	1.8 J	0.03 J	3.3	0.2 U	0.03 J	0.035 J	1.1 U
Total PAHs	mg/kg	- -	- -	2.8 J	43.39 J	0.29 J	0.135 J	12.42 J	0.167 J	24.953 J	ND	0.193 J	0.26 J	0.062 J
Total SVOCs	mg/kg	- -	- -	2.8 J	44.56 J	0.29 J	0.135 J	14.22 J	0.261 J	28.1017 J	ND	0.193 J	0.55 J	0.062 J

See Notes on Page 9.

Table 4
Summary of Soil Sample Analytical Results

Site Characterization
National Fuel Gas Distribution Corporation
Former Buffalo Service Station - Off-Site
Buffalo, NY

Location ID: / Sample Depth(Feet): / Date Collected:	Units	Restricted Use SCOs Residential	Restricted Use SCOs Commercial	AB-01 8 - 14 08/02/12	AB-01 20 - 22 08/02/12	AB-02 8 - 10 08/03/12	AB-02 20 - 22 08/03/12	AB-03 8 - 10 08/06/12	AB-03- 20 - 22.5 08/06/12	AB-04 10 - 12 08/03/12	AB-04 18 - 21 08/03/12	AB-05 9.5 - 10.8 08/01/12	AB-05 22 - 25 08/01/12	AB-C2 8 - 11 08/06/12
Inorganics														
Aluminum	mg/kg	- -	- -	7,390 J	8,690 J	6,500 J	11,600 J	3,300 J	11,700 J	7,550 J	6,450 J	5,230 J	3,210 J	8,520 J
Antimony	mg/kg	- -	- -	15.9 U	2.1 J	18.5 U	20 U	0.72 J	17.7 U	19.2 U	17.7 U	18.7 U	19.7 U	20.7 U
Arsenic	mg/kg	16	16	5.9	**25.8**	4.9	6	4.7	4.7	4.7	2.1 J	2.8	1.9 J	3.1
Barium	mg/kg	400	400	61.8 J	230 J	57.6 J	70.9 J	45.9 J	99.3 J	56 J	75.2 J	35 J	31.8 J	53.1 J
Beryllium	mg/kg	72	590	0.42	0.59	0.36	0.55	0.26	0.61	0.61	0.32	0.34	0.19 J	0.54
Cadmium	mg/kg	4.3	9.3	0.26	3.3	0.3	0.27	0.27	0.22 J	0.35	0.24	0.21 J	0.21 J	0.34
Calcium	mg/kg	- -	- -	65,000 J	35,200 J	107,000 J	69,400 J	152,000 J	48,900 J	11,200 J	60,000 J	2,300 J	86,800 J	3,670 J
Chromium	mg/kg	- -	- -	18.9 J	54.3 J	14.8 J	16.1 J	10.6 J	17.2 J	13.4 J	10.5 J	11.8 J	9.1 J	13.4 J
Cobalt	mg/kg	- -	- -	7.5	8.6	6.3	10.1	3.3	9.6	7.7	5.6	8.6	3.4	9.4
Copper	mg/kg	270	270	18.7	154	18.2	18.5	26.9	18.7	25.4	13	15.1	7.3	23.3
Iron	mg/kg	- -	- -	15,400 J	19,500 J	21,400 J	18,200 J	13,500 J	18,000 J	14,800 J	11,000 J	9,890 J	7,060 J	21,800 J
Lead	mg/kg	400	1,000	83 J	932 J	54.2 J	23.7 J	148 J	22.7 J	43.3 J	13.4 J	25.5 J	8.4 J	14.5 J
Magnesium	mg/kg	- -	- -	13,200	11,600	49,300	25,900	23,400	18,200	4,710	26,700	2,450	29,100	3,640
Manganese	mg/kg	2,000	10,000	317	309	443	534	250	407	203	420	96.5	232	243
Mercury	mg/kg	0.81	2.8	0.2	**4.4**	0.16	0.015 J	0.21	0.046	0.034	0.022 U	0.013 J	0.014 J	0.031
Nickel	mg/kg	310	310	19.3	37.9	17.3	23.8	11.2	22.5	23.3	12.8	19.9	8	25.6
Potassium	mg/kg	- -	- -	1,360 J	1,120 J	1,730 J	2,690 J	764 J	2,440 J	606 J	1,310 J	688	892 J	976 J
Selenium	mg/kg	180	1,500	4.2 U	1.8 J	4.9 U	5.3 U	4.6 U	4.7 U	5.1 U	4.7 U	5 U	5.2 U	5.5 U
Silver	mg/kg	180	1,500	0.53 U	5.6	0.62 U	0.67 U	0.58 U	0.59 U	0.64 U	0.59 U	0.62 U	0.66 U	0.69 U
Sodium	mg/kg	- -	- -	996	2,330	1,400	649	1,090	1,220	546	403	108 J	376	343
Thallium	mg/kg	- -	- -	6.4 U	0.52 J	7.4 U	8 U	0.4 J	0.35 J	7.7 U	7.1 U	7.5 U	7.9 U	8.3 U
Vanadium	mg/kg	- -	- -	16.2 J	19.5 J	14.7 J	22.5 J	8.4 J	23.6 J	19.5 J	15.2 J	13.4 J	10.3 J	17.3 J
Zinc	mg/kg	10,000	10,000	94.6 J	865 J	165 J	64.6 J	137 J	63.6 J	73.7 J	49.9 J	59.2 J	40 J	71.5 J
Miscellaneous														
Cyanide	mg/kg	27	27	0.62 J	1.6	1.1 U	1.1 U	1 U	1.2 U	1.1 U	1.2 U	1.1 U	1.1 U	1.2 U
Cyanide, Free	mg/kg	- -	- -	0.12 J	0.24 J	0.13 J	0.87	0.53 UB	0.62 UB	0.71	0.56 U	0.46 J	0.55 U	0.93 UB
Percent Moisture	%	- -	- -	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Percent Solids	%	- -	- -	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

See Notes on Page 9.

Table 4
Summary of Soil Sample Analytical Results

Site Characterization
National Fuel Gas Distribution Corporation
Former Buffalo Service Station - Off-Site
Buffalo, NY

Location ID: / Sample Depth(Feet): / Date Collected:	Units	Restricted Use SCOs Residential	Restricted Use SCOs Commercial	AB-C2 22 - 24 08/06/12	AW-01 5 - 7 08/02/12	AW-01 20 - 22.5 08/02/12	AW-02 8 - 10 08/02/12	AW-02 18 - 21 08/02/12	AW-03 4 - 8 11/11/12	AW-03 18 - 20 11/11/12	AW-03 20 - 22 11/11/12	AW-04 4 - 8 11/12/12	AW-04 22 - 22.5 11/12/12
Volatile Organics													
1,1,1-Trichloroethane	mg/kg	100	500	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
1,1,2,2-Tetrachloroethane	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
1,1,2-trichloro-1,2,2-trifluoroethane	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
1,1,2-Trichloroethane	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
1,1-Dichloroethane	mg/kg	26	240	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
1,1-Dichloroethene	mg/kg	100	500	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 UJ]	0.0057 U
1,2,4-Trichlorobenzene	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
1,2-Dibromo-3-chloropropane	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
1,2-Dibromoethane	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
1,2-Dichlorobenzene	mg/kg	100	500	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 UJ]	0.0057 U
1,2-Dichloroethane	mg/kg	3.1	30	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
1,2-Dichloropropane	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
1,3-Dichlorobenzene	mg/kg	49	280	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
1,4-Dichlorobenzene	mg/kg	13	130	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
2-Butanone	mg/kg	100	500	0.2	0.028 U [0.027 U]	0.0084 J	0.031 U	0.061 J	0.029 U	0.027 U	0.028 U	0.031 U [0.027 U]	0.028 U
2-Hexanone	mg/kg	- -	- -	0.027 U	0.028 U [0.027 U]	0.033 U	0.031 U	0.31 UJ	0.029 U	0.027 U	0.028 U	0.031 U [0.027 U]	0.028 U
4-Methyl-2-pentanone	mg/kg	- -	- -	0.027 U	0.028 U [0.027 U]	0.033 U	0.031 U	0.31 UJ	0.029 U	0.027 U	0.028 U	0.031 U [0.027 U]	0.028 U
Acetone	mg/kg	100	500	0.027 U	0.013 J [0.014 J]	0.033	0.02 J	0.23 J	0.03	0.027 U	0.0066 J	0.031 U [0.027 U]	0.028 U
Benzene	mg/kg	4.8	44	0.0055 U	0.0056 U [0.0054 U]	0.002 J	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0029 J	0.0069 [0.0055 UJ]	0.0073
Bromodichloromethane	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Bromoform	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Bromomethane	mg/kg	- -	- -	0.0055 UJ	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Carbon Disulfide	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Carbon Tetrachloride	mg/kg	2.4	22	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Chlorobenzene	mg/kg	100	500	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 UJ]	0.0057 U
Chloroethane	mg/kg	- -	- -	0.0055 UJ	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Chloroform	mg/kg	49	350	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Chloromethane	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
cis-1,2-Dichloroethene	mg/kg	100	500	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 UJ]	0.0057 U
cis-1,3-Dichloropropene	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Cyclohexane	mg/kg	- -	- -	0.0055 U	0.0021 J [0.0018 J]	0.00093 J	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Dibromochloromethane	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Dichlorodifluoromethane	mg/kg	- -	- -	0.0055 UJ	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Ethylbenzene	mg/kg	41	390	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.027	0.034	0.029 J [0.002 J]	0.0059
Isopropylbenzene	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.024 J	0.0059 U	0.0099	0.017	0.0013 J [0.0055 U]	0.0016 J
Methyl acetate	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Methyl tert-butyl ether	mg/kg	100	500	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Methylcyclohexane	mg/kg	- -	- -	0.0055 U	0.0027 J [0.002 J]	0.0065 U	0.0062 U	0.016 J	0.0059 UJ	0.0053 UJ	0.0057 UJ	0.0062 UJ [0.0055 UJ]	0.0057 UJ
Methylene Chloride	mg/kg	100	500	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0031 J	0.0027 J	0.0057 U	0.0062 U [0.0037 J]	0.0057 U

See Notes on Page 9.

Table 4
Summary of Soil Sample Analytical Results

Site Characterization
National Fuel Gas Distribution Corporation
Former Buffalo Service Station - Off-Site
Buffalo, NY

Location ID: / Sample Depth(Feet): / Date Collected:	Units	Restricted Use SCOs Residential	Restricted Use SCOs Commercial	AB-C2 22 - 24 08/06/12	AW-01 5 - 7 08/02/12	AW-01 20 - 22.5 08/02/12	AW-02 8 - 10 08/02/12	AW-02 18 - 21 08/02/12	AW-03 4 - 8 11/11/12	AW-03 18 - 20 11/11/12	AW-03 20 - 22 11/11/12	AW-04 4 - 8 11/12/12	AW-04 22 - 22.5 11/12/12
Volatile Organics (Cont.)													
Styrene	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Tetrachloroethene	mg/kg	19	150	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.00089 J	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 UJ]	0.0057 U
Toluene	mg/kg	100	500	0.0055 U	0.0017 J [0.0022 J]	0.00068 J	0.0062 U	0.062 UJ	0.0011 J	0.0036 J	0.0065	0.0049 J [0.0055 UJ]	0.0057 U
trans-1,2-Dichloroethene	mg/kg	100	500	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 UJ]	0.0057 U
trans-1,3-Dichloropropene	mg/kg	- -	- -	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Trichloroethene	mg/kg	21	200	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 UJ]	0.0057 U
Trichlorofluoromethane	mg/kg	- -	- -	0.0055 UJ	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Vinyl Chloride	mg/kg	0.9	13	0.0055 U	0.0056 U [0.0054 U]	0.0065 U	0.0062 U	0.062 UJ	0.0059 U	0.0053 U	0.0057 U	0.0062 U [0.0055 U]	0.0057 U
Xylenes (total)	mg/kg	100	500	0.011 UB	0.011 UB [0.011 UB]	0.013 U	0.012 U	0.067 J	0.012 U	0.011 U	0.011 U	0.0011 J [0.011 U]	0.0054 J
Total BTEX	mg/kg	- -	- -	ND	0.0017 J [0.0022 J]	0.00268 J	ND	0.067 J	0.0011 J	0.0306 J	0.0434 J	0.0419 J [0.002 J]	0.0186 J
Total VOCs	mg/kg	- -	- -	0.2	0.0195 J [0.02 J]	0.04501 J	0.02089 J	0.398 J	0.0342 J	0.0432 J	0.067 J	0.0432 J [0.0057 J]	0.0202 J
Semivolatile Organics													
1,1'-Biphenyl	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	0.32 J	0.028 J	0.012 J	0.2 U	1 U [0.077 J]	0.2 U
2,2'-Oxybis(1-Chloropropane)	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
2,4,5-Trichlorophenol	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
2,4,6-Trichlorophenol	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
2,4-Dichlorophenol	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
2,4-Dimethylphenol	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.099 J
2,4-Dinitrophenol	mg/kg	- -	- -	0.36 U	3.7 U [7.2 U]	0.43 U	2 U	5.2 U	0.4 U	0.38 U	0.39 U	2 U [1.8 UJ]	0.38 U
2,4-Dinitrotoluene	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
2,6-Dinitrotoluene	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
2-Chloronaphthalene	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
2-Chlorophenol	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
2-Methylnaphthalene	mg/kg	- -	- -	0.19 U	0.1 J [3.7 U]	0.22 U	1 U	2.9	0.098 J	0.0071 J	0.2 U	0.066 J [0.28 J]	0.2 U
2-Methylphenol	mg/kg	100	500	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
2-Nitroaniline	mg/kg	- -	- -	0.36 U	3.7 U [7.2 U]	0.43 U	2 U	5.2 U	0.4 U	0.38 U	0.39 U	2 U [1.8 U]	0.38 U
2-Nitrophenol	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
3,3'-Dichlorobenzidine	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
3-Nitroaniline	mg/kg	- -	- -	0.36 U	3.7 U [7.2 U]	0.43 U	2 U	5.2 U	0.4 U	0.38 U	0.39 U	2 U [1.8 U]	0.38 U
4,6-Dinitro-2-methylphenol	mg/kg	- -	- -	0.36 U	3.7 U [7.2 U]	0.43 U	2 U	5.2 U	0.4 U	0.38 U	0.39 U	2 U [1.8 U]	0.38 U
4-Bromophenyl-phenylether	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
4-Chloro-3-Methylphenol	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
4-Chloroaniline	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
4-Chlorophenyl-phenylether	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
4-Methylphenol	mg/kg	100	500	0.36 U	3.7 U [7.2 U]	0.43 U	2 U	5.2 U	0.4 U	0.38 U	0.39 U	2 U [1.8 U]	0.38 U
4-Nitroaniline	mg/kg	- -	- -	0.36 U	3.7 U [7.2 U]	0.43 U	2 U	5.2 U	0.4 U	0.38 U	0.39 U	2 U [1.8 U]	0.38 U
4-Nitrophenol	mg/kg	- -	- -	0.36 U	3.7 U [7.2 U]	0.43 U	2 U	5.2 U	0.4 U	0.38 U	0.39 U	2 U [1.8 U]	0.38 U
Acenaphthene	mg/kg	100	500	0.19 U	0.087 J [3.7 U]	0.017 J	1 U	2.9	0.14 J	0.41	0.12 J	0.18 J [0.97]	0.013 J
Acenaphthylene	mg/kg	100	500	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	0.89 J	0.04 J	0.0062 J	0.2 U	0.16 J [0.2 J]	0.2 U
Acetophenone	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Anthracene	mg/kg	100	500	0.19 U	0.2 J [3.7 U]	0.027 J	1 U	3.5	0.26	0.075 J	0.011 J	0.69 J [2]	0.2 U

See Notes on Page 9.

Table 4
Summary of Soil Sample Analytical Results

Site Characterization
National Fuel Gas Distribution Corporation
Former Buffalo Service Station - Off-Site
Buffalo, NY

Location ID: / Sample Depth(Feet): / Date Collected:	Units	Restricted Use SCOs Residential	Restricted Use SCOs Commercial	AB-C2 22 - 24 08/06/12	AW-01 5 - 7 08/02/12	AW-01 20 - 22.5 08/02/12	AW-02 8 - 10 08/02/12	AW-02 18 - 21 08/02/12	AW-03 4 - 8 11/11/12	AW-03 18 - 20 11/11/12	AW-03 20 - 22 11/11/12	AW-04 4 - 8 11/12/12	AW-04 22 - 22.5 11/12/12
Semivolatile Organics (Cont.)													
Atrazine	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Benzaldehyde	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Benzo(a)anthracene	mg/kg	1	5.6	0.19 U	0.58 J [3.7 U]	0.11 J	1 U	**9**	0.86	0.078 J	0.2 U	1.4 [3.7]	0.013 J
Benzo(a)pyrene	mg/kg	1	1	0.0094 J	0.69 J [0.71 J]	0.11 J	1 U	**8.8**	1	0.16 J	0.096 J	**1.6 [3.7]**	0.2 U
Benzo(b)fluoranthene	mg/kg	1	5.6	0.014 J	1 J [0.84 J]	0.11 J	0.065 J	**13**	1.3	0.2	0.13 J	1.9 [4.5]	0.12 J
Benzo(g,h,i)perylene	mg/kg	100	500	0.19 U	0.28 J [0.47 J]	0.058 J	1 U	2.8	0.36 J	0.025 J	0.2 U	0.34 J [1.3]	0.2 U
Benzo(k)fluoranthene	mg/kg	3.9	56	0.0088 J	0.38 J [0.36 J]	0.057 J	1 U	4.6	0.57	0.047 J	0.0073 J	1.1 [2.3]	0.0033 J
bis(2-Chloroethoxy)methane	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
bis(2-Chloroethyl)ether	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
bis(2-Ethylhexyl)phthalate	mg/kg	- -	- -	0.43	1.9 U [3.7 U]	0.14 J	1 U	2.7 U	0.65	0.13 J	0.16 J	1 U [0.95 U]	1.4
Butylbenzylphthalate	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Caprolactam	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Carbazole	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	0.69 J	0.098 J	0.17 J	0.097 J	0.11 J [0.62 J]	0.2 U
Chrysene	mg/kg	3.9	56	0.015 J	0.55 J [0.6 J]	0.088 J	1 U	8	0.75	0.072 J	0.014 J	1.4 [3.3]	0.0052 J
Dibenzo(a,h)anthracene	mg/kg	0.33	0.56	0.19 U	1.9 U [3.7 U]	0.028 J	1 U	**0.63 J**	0.23	0.2 U	0.2 U	**0.8 J [0.94 J]**	0.2 U
Dibenzofuran	mg/kg	59	350	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	1.3 J	0.084 J	0.22	0.043 J	0.13 J [0.65 J]	0.008 J
Diethylphthalate	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Dimethylphthalate	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Di-n-Butylphthalate	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Di-n-Octylphthalate	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.15 J	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Fluoranthene	mg/kg	100	500	0.19 U	1.1 J [1.2 J]	0.15 J	1 U	17	1.4	0.15 J	0.021 J	2.6 J [8.1 J]	0.0039 J
Fluorene	mg/kg	100	500	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.3 J	0.13 J	0.19 J	0.027 J	0.27 J [1.1 J]	0.0083 J
Hexachlorobenzene	mg/kg	1.2	6	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Hexachlorobutadiene	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Hexachlorocyclopentadiene	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Hexachloroethane	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Indeno(1,2,3-cd)pyrene	mg/kg	0.5	5.6	0.19 U	0.26 J [0.4 J]	0.058 J	1 U	2.4 J	0.38	0.14 J	0.2 U	0.89 J [1.6]	0.2 U
Isophorone	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Naphthalene	mg/kg	100	500	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	6.6	0.83	0.067 J	0.042 J	0.16 J [0.36 J]	1.2
Nitrobenzene	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
N-Nitroso-di-n-propylamine	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
N-Nitrosodiphenylamine	mg/kg	- -	- -	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Pentachlorophenol	mg/kg	6.7	6.7	0.36 U	3.7 U [7.2 U]	0.43 U	2 U	5.2 U	0.4 U	0.38 U	0.39 U	2 U [1.8 U]	0.38 U
Phenanthrene	mg/kg	100	500	0.19 U	0.81 J [0.8 J]	0.053 J	1 U	12	0.87	0.22	0.032 J	1.6 J [6.8 J]	0.011 J
Phenol	mg/kg	100	500	0.19 U	1.9 U [3.7 U]	0.22 U	1 U	2.7 U	0.2 U	0.2 U	0.2 U	1 U [0.95 U]	0.2 U
Pyrene	mg/kg	100	500	0.19 U	0.84 J [1 J]	0.15 J	1 U	13 J	1.1	0.1 J	0.019 J	1.9 J [7.1 J]	0.2 U
Total PAHs	mg/kg	- -	- -	0.0472 J	6.877 J [6.38 J]	1.016 J	0.065 J	110.32 J	10.318 J	1.9473 J	0.5193 J	17.056 J [48.25 J]	1.3777 J
Total SVOCs	mg/kg	- -	- -	0.4772 J	6.877 J [6.38 J]	1.156 J	0.065 J	112.63 J	11.328 J	2.4793 J	0.8193 J	17.296 J [49.597 J]	2.8847 J

See Notes on Page 9.

Table 4
Summary of Soil Sample Analytical Results

Site Characterization
National Fuel Gas Distribution Corporation
Former Buffalo Service Station - Off-Site
Buffalo, NY

Location ID: / Sample Depth(Feet): / Date Collected:	Units	Restricted Use SCOs Residential	Restricted Use SCOs Commercial	AB-C2 22 - 24 08/06/12	AW-01 5 - 7 08/02/12	AW-01 20 - 22.5 08/02/12	AW-02 8 - 10 08/02/12	AW-02 18 - 21 08/02/12	AW-03 4 - 8 11/11/12	AW-03 18 - 20 11/11/12	AW-03 20 - 22 11/11/12	AW-04 4 - 8 11/12/12	AW-04 22 - 22.5 11/12/12
Inorganics													
Aluminum	mg/kg	- -	- -	2,290 J	5,740 J [5,200 J]	9,960 J	11,600 J	8,780 J	10,100	4,190	6,220	6,000 J [10,500 J]	9,160
Antimony	mg/kg	- -	- -	16.8 U	16.9 U [16.4 U]	18.6 U	16.8 U	4.3 J	97 J	16.1 UJ	19.4 UJ	17.2 UJ [16.7 UJ]	18.8 UJ
Arsenic	mg/kg	16	16	2.7	5.5 [4.8]	4.9	4.9	**34**	15.4	2.8	3.2	6.2 [5.4]	4.2
Barium	mg/kg	400	400	23.5 J	48.2 J [47.2 J]	77.2 J	78.6 J	357 J	81 J	48.9 J	64.6 J	55.8 J [143 J]	91 J
Beryllium	mg/kg	72	590	0.13 J	0.4 [0.51]	0.5	0.58	0.59	0.59	0.2 J	0.3	0.47 [1.9]	0.47
Cadmium	mg/kg	4.3	9.3	0.27	0.64 [0.35]	0.22 J	0.24	2.6	0.45	0.25	0.22 J	0.38 [0.4]	0.27
Calcium	mg/kg	- -	- -	106,000 J	75,700 J [75,100 J]	37,900 J	22,900 J	18,600 J	28,900	53,300	61,400	103,000 [90,500 J]	83,900
Chromium	mg/kg	- -	- -	5.1 J	13.1 J [10.7 J]	15.3 J	17.8 J	74.9 J	21	6.7	9.9	8.8 [7.9]	14
Cobalt	mg/kg	- -	- -	2.4	5.8 [4.6]	8.8	11	9.9	5.3	3.7	5.3	4.9 [4.9]	7.5
Copper	mg/kg	270	270	5.6	18.4 [18.7]	16.1	18.4	213	25.6	8.4	11.7	17.8 [19.6]	16.7
Iron	mg/kg	- -	- -	5,740 J	16,000 J [12,700 J]	16,000 J	18,000 J	22,100 J	12,100	8,100	11,200	12,000 [12,600 J]	16,900
Lead	mg/kg	400	1,000	4.7 J	124 J [93 J]	27.2 J	19.3 J	2,640 J	949	9.8	11.3	45.5 [47.1]	15.9
Magnesium	mg/kg	- -	- -	26,300	28,100 [30,700]	11,800	11,900	8,760	10,500	25,100	26,500	38,600 J [17,900 J]	36,300
Manganese	mg/kg	2,000	10,000	187	496 [341]	302	374	297	323	325	386	525 J [950 J]	555
Mercury	mg/kg	0.81	2.8	0.018 J	0.055 [0.074]	0.096	**4.5**	**6.4**	0.092 J	0.024 UJ	0.023 UJ	0.035 J [0.062 J]	0.024 UJ
Nickel	mg/kg	310	310	5.8	14.6 [14.8]	19.9	25.7	46.8	13	7.9	11.3	13.4 [14.9]	16.4
Potassium	mg/kg	- -	- -	724 J	1,000 J [848 J]	1,500 J	1,590 J	1,010 J	1,410 J	1,160 J	1,740 J	1,060 J [1,110 J]	2,550 J
Selenium	mg/kg	180	1,500	4.5 U	4.5 U [1.2 J]	5 U	4.5 U	2.1 J	5.1 U	4.3 U	5.2 U	4.6 U [1.1 J]	5 U
Silver	mg/kg	180	1,500	0.56 U	0.56 U [0.55 U]	0.62 U	0.56 U	4.1	0.64 U	0.54 U	0.65 U	0.57 U [0.56 U]	0.63 U
Sodium	mg/kg	- -	- -	248	359 [305]	451	447	670	487	328	394	252 [423]	288
Thallium	mg/kg	- -	- -	6.7 U	6.8 U [6.5 U]	0.42 J	6.7 U	9.4 U	7.7 U	6.4 U	7.8 U	6.9 U [6.7 U]	7.5 U
Vanadium	mg/kg	- -	- -	7.8 J	17.8 J [11.4 J]	20.7 J	23.1 J	19.6 J	28.5	11.6	16.2	12 [11.1]	19.5
Zinc	mg/kg	10,000	10,000	68.1 J	168 J [84.2 J]	59.7 J	77.4 J	1,730 J	171 J	58.6 J	53.3 J	70.7 J [74.7 J]	60.2 J
Miscellaneous													
Cyanide	mg/kg	27	27	1 U	1.2 [0.63 J]	1.2 U	1.2 U	1.5	0.98 J	0.82 J	0.87 J	3.8 [2.4]	0.81 J
Cyanide, Free	mg/kg	- -	- -	0.69 UB	0.42 J [0.49 U]	0.34 J	1.3	1.7	0.52 J	2.5 U	0.27 J	0.13 J [0.18 J]	0.14 J
Percent Moisture	%	- -	- -	NA	NA	NA	NA	NA	18	15	16	18 [11]	16
Percent Solids	%	- -	- -	NA	NA	NA	NA	NA	82	85	84	82 [89]	84

See Notes on Page 9.

Table 4
Summary of Soil Sample Analytical Results

Site Characterization
National Fuel Gas Distribution Corporation
Former Buffalo Service Station - Off-Site
Buffalo, NY

Notes:
Restricted Use SCO Residential: NYSDEC 6 NYCRR Part 375 Restricted Use Soil Cleanup Objectives for Protection of Residential Use.
Bold font and shading indicates that the sample result exceeds the NYSDEC 6 NYCRR Part 375 Restricted Use Soil Cleanup Objectives for Protection of Commercial Use.
Results reported in milligrams per kilogram (mg/kg); also expressed as parts per million (ppm).
[ ] Bracketed results represent a duplicate sample.
B: Analyte was also detected in the associated method blank.
J: Indicates an estimated value.
ND: None detected.
U: The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

APPENDIX C

Summary of Groundwater Sample Analytical Results

Table 5
Summary of Groundwater Sample Analytical Results

Site Characterization
National Fuel Gas Distribution Corporation
Former Buffalo Service Station - Off-Site
Buffalo, NY

Location ID: / Date Collected:	NYSDEC TOGS 1.1.1 Standards and Guidance Values	Units	AW-01 08/22/12	AW-01 08/27/13	AW-02 08/22/12	AW-02 08/27/13	AW-03 12/28/12	AW-03 08/27/13	AW-04 12/28/12	AW-04 08/27/13
Volatile Organics										
1,1,1-Trichloroethane	5	ug/L	1 U [1 U]	3.3 U	1 U	3.3 U	5 U [5 U]	3.3 U [3.3 U]	5 U	8.2 U
1,1,2,2-Tetrachloroethane	5	ug/L	1 U [1 U]	0.84 U	1 U	0.84 U	5 U [5 U]	0.84 U [0.84 U]	5 U	2.1 U
1,1,2-trichloro-1,2,2-trifluoroethane	5	ug/L	1 U [1 U]	1.2 U	1 U	1.2 U	5 U [5 U]	1.2 U [1.2 U]	5 U	3.1 U
1,1,2-Trichloroethane	1	ug/L	1 U [1 U]	0.92 U	1 U	0.92 U	5 U [5 U]	0.92 U [0.92 U]	5 U	2.3 U
1,1-Dichloroethane	5	ug/L	1 U [1 U]	1.5 U	1 U	1.5 U	5 U [5 U]	1.5 U [1.5 U]	5 U	3.8 U
1,1-Dichloroethene	5	ug/L	1 U [1 U]	1.2 U	1 U	1.2 U	5 U [5 U]	1.2 U [1.2 U]	5 U	2.9 U
1,2,4-Trichlorobenzene	5	ug/L	1 U [1 U]	1.6 U	1 U	1.6 U	5 U [5 U]	1.6 U [1.6 U]	5 U	4.1 U
1,2-Dibromo-3-chloropropane	0.04	ug/L	1 U [1 U]	1.6 UJ	1 U	1.6 UJ	5 U [5 U]	1.6 UJ [1.6 UJ]	5 U	3.9 UJ
1,2-Dibromoethane	0.0006	ug/L	1 U [1 U]	2.9 U	1 U	2.9 U	5 U [5 U]	2.9 U [2.9 U]	5 U	7.3 U
1,2-Dichlorobenzene	3	ug/L	1 U [1 U]	3.2 U	1 U	3.2 U	5 U [5 U]	3.2 U [3.2 U]	5 U	7.9 U
1,2-Dichloroethane	0.6	ug/L	1 U [1 U]	0.84 U	1 U	0.84 U	5 U [5 U]	0.84 U [0.84 U]	5 U	2.1 U
1,2-Dichloropropane	1	ug/L	1 U [1 U]	2.9 U	1 U	2.9 U	5 U [5 U]	2.9 U [2.9 U]	5 U	7.2 U
1,3-Dichlorobenzene	3	ug/L	1 U [1 U]	3.1 U	1 U	3.1 U	5 U [5 U]	3.1 U [3.1 U]	5 U	7.8 U
1,4-Dichlorobenzene	3	ug/L	1 U [1 U]	3.4 U	1 U	3.4 U	5 U [5 U]	3.4 U [3.4 U]	5 U	8.4 U
2-Butanone	50	ug/L	10 U [10 U]	5.3 U	10 U	5.3 U	50 U [50 U]	5.3 U [5.3 U]	50 U	13 U
2-Hexanone	50	ug/L	5 U [5 U]	5 U	5 U	5 U	25 U [25 U]	5 U [5 U]	25 U	12 U
4-Methyl-2-pentanone	- -	ug/L	5 U [5 U]	8.4 U	5 U	8.4 U	25 U [25 U]	8.4 U [8.4 U]	25 U	21 U
Acetone	50	ug/L	10 U [10 U]	12 U	10 U	12 U	50 U [50 U]	12 U [12 U]	50 U	30 U
Benzene	1	ug/L	**0.58 J [0.55 J]**	1.6 U	1 U	1.6 U	**12 [12]**	**4.8 [4.9]**	**170**	**310**
Bromodichloromethane	50	ug/L	1 U [1 U]	1.6 UJ	1 U	1.6 U	5 U [5 U]	1.6 U [1.6 U]	5 U	3.9 U
Bromoform	50	ug/L	1 U [1 U]	1 UJ	1 U	1 UJ	5 U [5 U]	1 UJ [1 UJ]	5 U	2.6 UJ
Bromomethane	5	ug/L	1 U [1 UJ]	2.8 UJ	1 U	2.8 U	5 U [5 U]	2.8 U [2.8 U]	5 U	6.9 U
Carbon Disulfide	60	ug/L	1 U [1 U]	0.76 UJ	1 U	0.76 UJ	5 U [5 U]	0.76 UJ [0.76 UJ]	5 U	1.9 UJ
Carbon Tetrachloride	5	ug/L	1 U [1 U]	1.1 U	1 U	1.1 U	5 U [5 U]	1.1 U [1.1 U]	5 U	2.7 U
Chlorobenzene	5	ug/L	1 U [1 U]	3 U	1 U	3 U	5 U [5 U]	3 U [3 U]	5 U	7.5 U
Chloroethane	5	ug/L	1 U [1 U]	1.3 UJ	1 U	1.3 U	5 U [5 U]	1.3 U [1.3 U]	5 U	3.2 U
Chloroform	7	ug/L	1 U [1 U]	1.4 U	1 U	1.4 U	5 U [5 U]	1.4 U [1.4 U]	5 U	3.4 U
Chloromethane	5	ug/L	1 U [1 U]	1.4 UJ	1 U	1.4 U	5 U [5 U]	1.4 U [1.4 U]	5 U	3.5 U
cis-1,2-Dichloroethene	5	ug/L	1 U [1 U]	3.2 U	1 U	3.2 U	5 U [5 U]	3.2 U [3.2 U]	5 U	8.1 U
cis-1,3-Dichloropropene	0.4	ug/L	1 U [1 U]	1.4 U	1 U	1.4 U	5 U [5 U]	1.4 U [1.4 U]	5 U	3.6 U
Cyclohexane	- -	ug/L	1 U [1 U]	0.72 UJ	1 U	0.72 UJ	5 U [5 U]	0.72 UJ [0.72 UJ]	5 U	1.8 UJ
Dibromochloromethane	50	ug/L	1 U [1 U]	1.3 UJ	1 U	1.3 U	5 U [5 U]	1.3 U [1.3 U]	5 U	3.2 U
Dichlorodifluoromethane	5	ug/L	1 U [1 U]	2.7 U	1 U	2.7 U	5 U [5 U]	2.7 U [2.7 U]	5 U	6.8 U
Ethylbenzene	5	ug/L	1 U [1 U]	3 U	1 U	3 U	5 U [5 U]	3 U [3 U]	**4 J**	**36**
Isopropylbenzene	5	ug/L	1 U [1 U]	3.2 U	1 U	3.2 U	5 U [5 U]	3.2 U [3.2 U]	5 U	7.9 U
Methyl acetate	- -	ug/L	1 U [1 U]	2 U	1 U	2 U	5 U [5 U]	2 U [2 U]	5 U	5 U
Methyl tert-butyl ether	10	ug/L	1 U [1 U]	0.64 U	1 U	0.64 U	5 U [5 U]	0.64 U [0.64 U]	5 U	1.6 U
Methylcyclohexane	- -	ug/L	1 U [1 U]	0.64 U	1 U	0.64 U	5 U [5 U]	0.64 U [0.64 U]	5 U	1.6 U
Methylene Chloride	5	ug/L	1 U [1 U]	1.8 U	1 U	1.8 U	**4.3 J [3 J]**	1.8 U [1.8 U]	5 U	4.4 U
Styrene	5	ug/L	1 U [1 U]	2.9 U	1 U	2.9 U	5 U [5 U]	2.9 U [2.9 U]	5 U	7.3 U

See Notes on Page 4.

Table 5
Summary of Groundwater Sample Analytical Results

Site Characterization
National Fuel Gas Distribution Corporation
Former Buffalo Service Station - Off-Site
Buffalo, NY

Location ID: / Date Collected:	NYSDEC TOGS 1.1.1 Standards and Guidance Values	Units	AW-01 08/22/12	AW-01 08/27/13	AW-02 08/22/12	AW-02 08/27/13	AW-03 12/28/12	AW-03 08/27/13	AW-04 12/28/12	AW-04 08/27/13
Volatile Organics (Cont.)										
Tetrachloroethene	5	ug/L	1 U [1 U]	1.4 U	1 U	1.4 U	5 U [5 U]	1.4 U [1.4 U]	5 U	3.6 U
Toluene	5	ug/L	1 U [1 U]	2 U	1 U	2 U	5 U [5 U]	2 U [2 U]	5 U	5.1 U
trans-1,2-Dichloroethene	5	ug/L	1 U [1 U]	3.6 U	1 U	3.6 U	5 U [5 U]	3.6 U [3.6 U]	5 U	9 U
trans-1,3-Dichloropropene	0.4	ug/L	1 U [1 U]	1.5 U	1 U	1.5 U	5 U [5 U]	1.5 U [1.5 U]	5 U	3.7 U
Trichloroethene	5	ug/L	1 U [1 U]	1.8 U	1 U	1.8 U	5 U [5 U]	1.8 U [1.8 U]	5 U	4.6 U
Trichlorofluoromethane	5	ug/L	1 U [1 U]	3.5 U	1 U	3.5 U	5 U [5 U]	3.5 U [3.5 U]	5 U	8.8 U
Vinyl Chloride	2	ug/L	1 U [1 U]	3.6 U	1 U	3.6 U	5 U [5 U]	3.6 U [3.6 U]	5 U	9 U
Xylenes (total)	5	ug/L	2 U [2 U]	2.6 U	2 U	2.6 U	10 U [10 U]	2.6 U [2.6 U]	10 U	**8.9 J**
Total BTEX	- -	ug/L	**0.58 J [0.55 J]**	ND	ND	ND	**12 [12]**	**4.8 [4.9]**	**174 J**	**354.9 J**
Total VOCs	- -	ug/L	**0.58 J [0.55 J]**	ND	ND	ND	**16.3 J [15 J]**	**4.8 [4.9]**	**174 J**	**354.9 J**
Semivolatile Organics										
1,1'-Biphenyl	5	ug/L	4.7 U [4.7 U]	0.62 U	4.8 U	0.6 U	**4.5 J [4.4 J]**	**1.2 J [1.1 J]**	4.7 U	0.62 U
2,2'-Oxybis(1-Chloropropane)	5	ug/L	4.7 U [4.7 U]	0.49 U	4.8 U	0.48 U	5 U [5 U]	0.49 U [0.5 U]	4.7 U	0.49 U
2,4,5-Trichlorophenol	- -	ug/L	4.7 U [4.7 U]	0.45 U	4.8 U	0.44 U	5 U [5 U]	0.45 U [0.46 U]	4.7 U	0.45 U
2,4,6-Trichlorophenol	- -	ug/L	4.7 U [4.7 U]	0.58 U	4.8 U	0.57 U	5 U [5 U]	0.57 U [0.59 U]	4.7 U	0.58 U
2,4-Dichlorophenol	5	ug/L	4.7 U [4.7 U]	0.48 U	4.8 U	0.47 U	5 U [5 U]	0.48 U [0.49 U]	4.7 U	0.48 U
2,4-Dimethylphenol	50	ug/L	4.7 U [4.7 U]	0.47 U	4.8 U	0.46 U	5 U [5 U]	0.47 U [0.48 U]	**11 J**	**14**
2,4-Dinitrophenol	10	ug/L	9.4 U [9.4 U]	2.1 U	9.6 U	2.1 U	9.9 U [9.9 U]	2.1 U [2.1 U]	9.5 U	2.1 U
2,4-Dinitrotoluene	5	ug/L	4.7 U [4.7 U]	0.42 U	4.8 U	0.41 U	5 U [5 U]	0.42 U [0.43 U]	4.7 U	0.42 U
2,6-Dinitrotoluene	5	ug/L	4.7 U [4.7 U]	0.38 UJ	4.8 U	0.37 UJ	5 U [5 U]	0.38 UJ [0.39 UJ]	4.7 U	0.38 UJ
2-Chloronaphthalene	10	ug/L	4.7 U [4.7 U]	0.43 U	4.8 U	0.43 U	5 U [5 U]	0.43 U [0.44 U]	4.7 U	0.43 U
2-Chlorophenol	- -	ug/L	4.7 U [4.7 U]	0.5 U	4.8 U	0.49 U	5 U [5 U]	0.5 U [0.51 U]	4.7 U	0.5 U
2-Methylnaphthalene	- -	ug/L	4.7 U [4.7 U]	0.57 U	4.8 U	0.56 U	**39 [41]**	0.56 U [0.58 U]	**1.6 J**	0.57 U
2-Methylphenol	- -	ug/L	4.7 U [4.7 U]	0.38 U	4.8 U	0.37 U	5 U [5 U]	0.38 U [0.39 U]	4.7 UJ	0.38 U
2-Nitroaniline	5	ug/L	9.4 U [9.4 U]	0.4 U	9.6 U	0.39 U	9.9 U [9.9 U]	0.4 U [0.41 U]	9.5 U	0.4 U
2-Nitrophenol	- -	ug/L	4.7 U [4.7 U]	0.45 U	4.8 U	0.44 U	5 U [5 U]	0.45 U [0.46 U]	4.7 U	0.45 U
3,3'-Dichlorobenzidine	5	ug/L	4.7 U [4.7 U]	0.38 U	4.8 U	0.37 U	5 U [5 U]	0.38 U [0.39 U]	4.7 U	0.38 U
3-Nitroaniline	5	ug/L	9.4 U [9.4 U]	0.45 UJ	9.6 U	0.44 UJ	9.9 U [9.9 U]	0.45 UJ [0.46 UJ]	9.5 U	0.45 UJ
4,6-Dinitro-2-methylphenol	- -	ug/L	9.4 U [9.4 U]	2.1 U	9.6 U	2 U	9.9 U [9.9 U]	2.1 U [2.1 U]	9.5 U	2.1 U
4-Bromophenyl-phenylether	- -	ug/L	4.7 U [4.7 U]	0.43 UJ	4.8 U	0.42 UJ	5 U [5 U]	0.42 UJ [0.44 UJ]	4.7 U	0.43 UJ
4-Chloro-3-Methylphenol	- -	ug/L	4.7 U [4.7 U]	0.43 U	4.8 U	0.42 U	5 U [5 U]	0.42 U [0.44 U]	4.7 U	0.43 U
4-Chloroaniline	5	ug/L	4.7 U [4.7 U]	0.56 UJ	4.8 U	0.55 UJ	5 U [5 U]	0.55 UJ [0.57 UJ]	4.7 U	0.56 UJ
4-Chlorophenyl-phenylether	- -	ug/L	4.7 U [4.7 U]	0.33 U	4.8 U	0.32 U	5 U [5 U]	0.33 U [0.34 U]	4.7 U	0.33 U
4-Methylphenol	- -	ug/L	9.4 U [9.4 U]	0.34 U	9.6 U	0.33 U	9.9 U [9.9 U]	0.34 U [0.35 U]	9.5 U	0.34 U
4-Nitroaniline	5	ug/L	9.4 U [9.4 U]	0.24 UJ	9.6 U	0.23 UJ	9.9 U [9.9 U]	0.24 UJ [0.24 UJ]	9.5 U	0.24 UJ
4-Nitrophenol	- -	ug/L	9.4 U [9.4 U]	1.4 U	9.6 U	1.4 U	9.9 U [9.9 U]	1.4 U [1.5 U]	9.5 U	1.4 U
Acenaphthene	20	ug/L	**2.2 J [2 J]**	**2.7 J**	**1.1 J**	**3.3 J**	**81 [80]**	**43 [41]**	**1.9 J**	**1.8 J**
Acenaphthylene	- -	ug/L	4.7 U [4.7 U]	0.36 U	4.8 U	0.35 U	**0.78 J [0.75 J]**	**0.39 J [0.4 J]**	4.7 U	0.36 U
Acetophenone	- -	ug/L	4.7 U [4.7 U]	0.51 U	4.8 U	0.5 U	**5 U [0.96 J]**	4.7 UB [0.52 U]	4.7 U	4.7 UB
Anthracene	50	ug/L	4.7 U [4.7 U]	0.26 U	4.8 U	**0.32 J**	**7.9 [8.3]**	**5.4 [5]**	4.7 U	0.26 U

See Notes on Page 4.

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Summary of Groundwater Sample Analytical Results

Site Characterization
National Fuel Gas Distribution Corporation
Former Buffalo Service Station - Off-Site
Buffalo, NY

Location ID: / Date Collected:	NYSDEC TOGS 1.1.1 Standards and Guidance Values	Units	AW-01 08/22/12	AW-01 08/27/13	AW-02 08/22/12	AW-02 08/27/13	AW-03 12/28/12	AW-03 08/27/13	AW-04 12/28/12	AW-04 08/27/13
Semivolatile Organics (Cont.)										
Atrazine	7.5	ug/L	4.7 U [4.7 U]	0.43 U	4.8 U	0.43 U	5 U [5 U]	0.43 U [0.44 U]	4.7 U	0.43 U
Benzaldehyde	- -	ug/L	4.7 U [4.7 U]	**0.43 J**	4.8 U	**0.31 J**	5 U [5 U]	**0.44 J [0.41 J]**	4.7 U	**0.42 J**
Benzo(a)anthracene	0.002	ug/L	4.7 U [4.7 U]	0.34 U	4.8 U	0.33 U	5 U [5 U]	**0.35 J [0.36 J]**	4.7 U	0.34 U
Benzo(a)pyrene	- -	ug/L	4.7 U [4.7 U]	0.44 U	4.8 U	0.44 U	5 U [5 U]	0.44 U [0.45 U]	4.7 U	0.44 U
Benzo(b)fluoranthene	0.002	ug/L	4.7 U [4.7 U]	0.32 U	4.8 U	0.31 U	5 U [5 U]	0.32 U [0.33 U]	4.7 U	0.32 U
Benzo(g,h,i)perylene	- -	ug/L	4.7 U [4.7 U]	0.33 UJ	4.8 U	0.32 U	5 U [5 U]	0.33 U [0.34 U]	4.7 U	0.33 U
Benzo(k)fluoranthene	0.002	ug/L	4.7 U [4.7 U]	0.69 U	4.8 U	0.68 U	5 U [5 U]	0.69 U [0.71 U]	4.7 U	0.69 U
bis(2-Chloroethoxy)methane	5	ug/L	4.7 U [4.7 U]	0.33 U	4.8 U	0.32 U	5 U [5 U]	0.33 U [0.34 U]	4.7 U	0.33 U
bis(2-Chloroethyl)ether	- -	ug/L	4.7 U [4.7 U]	0.38 U	4.8 U	0.37 U	5 U [5 U]	0.38 U [0.39 U]	4.7 U	0.38 U
bis(2-Ethylhexyl)phthalate	5	ug/L	4.7 U [4.7 U]	1.7 U	4.8 U	1.7 U	5 U [5 U]	4.7 UB [1.7 U]	4.7 U	1.7 U
Butylbenzylphthalate	50	ug/L	4.7 U [4.7 U]	0.4 U	4.8 U	0.39 U	5 U [5 U]	0.4 U [0.41 U]	4.7 U	0.4 U
Caprolactam	- -	ug/L	4.7 U [4.7 U]	2.1 U	4.8 U	2 U	5 UJ [5 UJ]	2.1 U [2.1 U]	4.7 UJ	2.1 U
Carbazole	- -	ug/L	4.7 U [4.7 U]	0.28 U	4.8 U	**0.71 J**	**10 [11]**	**4.7 [4.8]**	4.7 U	0.28 U
Chrysene	0.002	ug/L	4.7 U [4.7 U]	0.31 U	4.8 U	0.31 U	5 U [5 U]	0.31 U [0.32 U]	4.7 U	0.31 U
Dibenzo(a,h)anthracene	- -	ug/L	4.7 U [4.7 U]	0.4 UJ	4.8 U	0.39 U	5 U [5 U]	0.4 U [0.41 U]	4.7 U	0.4 U
Dibenzofuran	- -	ug/L	9.4 U [9.4 U]	0.48 U	9.6 U	**0.79 J**	**41 [40]**	**17 [16]**	9.5 U	0.48 U
Diethylphthalate	50	ug/L	4.7 U [4.7 U]	0.21 U	4.8 U	0.2 U	5 U [5 U]	0.21 U [0.21 U]	4.7 U	0.21 U
Dimethylphthalate	50	ug/L	4.7 U [4.7 U]	0.34 U	4.8 U	0.33 U	5 U [5 U]	0.34 U [0.35 U]	4.7 U	0.34 U
Di-n-Butylphthalate	50	ug/L	4.7 U [4.7 U]	**0.4 J**	4.8 U	**0.48 J**	5 U [5 U]	**0.51 J [0.66 J]**	4.7 U	**0.57 J**
Di-n-Octylphthalate	50	ug/L	**1.9 J [4.7 U]**	0.44 U	4.8 U	0.44 U	5 U [5 U]	0.44 U [0.45 U]	4.7 U	0.44 U
Fluoranthene	50	ug/L	4.7 U [4.7 U]	0.38 U	4.8 U	**1.6 J**	**6.7 [6.6]**	**6.2 [5.9]**	4.7 U	0.38 U
Fluorene	50	ug/L	4.7 U [4.7 U]	0.34 U	4.8 U	**0.9 J**	**47 [45]**	**23 [23]**	4.7 U	0.34 U
Hexachlorobenzene	0.04	ug/L	4.7 U [4.7 U]	0.48 U	4.8 U	0.47 U	5 U [5 U]	0.48 U [0.49 U]	4.7 U	0.48 U
Hexachlorobutadiene	0.5	ug/L	4.7 U [4.7 U]	0.64 U	4.8 U	0.63 U	5 U [5 U]	0.64 U [0.66 U]	4.7 U	0.64 U
Hexachlorocyclopentadiene	5	ug/L	4.7 U [4.7 U]	0.56 U	4.8 U	0.55 U	5 U [5 U]	0.55 U [0.57 U]	4.7 U	0.56 U
Hexachloroethane	5	ug/L	4.7 U [4.7 U]	0.56 U	4.8 U	0.55 U	5 U [5 U]	0.55 U [0.57 U]	4.7 U	0.56 U
Indeno(1,2,3-cd)pyrene	0.002	ug/L	4.7 U [4.7 U]	0.44 UJ	4.8 U	0.44 U	5 U [5 U]	0.44 U [0.45 U]	4.7 U	0.44 U
Isophorone	50	ug/L	4.7 U [4.7 U]	0.41 U	4.8 U	0.4 U	5 U [5 U]	0.4 U [0.42 U]	4.7 U	0.41 U
Naphthalene	10	ug/L	4.7 U [4.7 U]	0.72 U	**1.4 J**	0.7 U	**4.9 J [4.6 J]**	0.71 U [0.73 U]	**3.6 J**	**12**
Nitrobenzene	0.4	ug/L	4.7 U [4.7 U]	0.27 U	4.8 U	0.27 U	5 U [5 U]	0.27 U [0.28 U]	4.7 U	0.27 U
N-Nitroso-di-n-propylamine	- -	ug/L	4.7 U [4.7 U]	0.51 U	4.8 U	0.5 U	5 U [5 U]	0.51 U [0.52 U]	4.7 U	0.51 U
N-Nitrosodiphenylamine	50	ug/L	4.7 U [4.7 U]	0.48 U	4.8 U	0.47 U	5 U [5 U]	0.48 U [0.49 U]	4.7 U	0.48 U
Pentachlorophenol	1	ug/L	9.4 U [9.4 U]	2.1 U	9.6 U	2 U	9.9 U [9.9 U]	2.1 U [2.1 U]	9.5 U	2.1 U
Phenanthrene	50	ug/L	4.7 U [4.7 U]	4.7 UB	4.8 U	4.6 UB	**45 [46]**	**23 [23]**	4.7 U	0.42 U
Phenol	1	ug/L	4.7 U [4.7 U]	0.37 U	4.8 U	0.36 U	5 U [5 U]	0.37 U [0.38 U]	4.7 U	**4.1 J**
Pyrene	50	ug/L	4.7 U [4.7 U]	0.32 U	**0.59 J**	**0.74 J**	**3.7 J [3.6 J]**	**2.4 J [2.6 J]**	4.7 U	0.32 U
Total PAHs	- -	ug/L	**2.2 J [2 J]**	**2.7 J**	**3.09 J**	**6.86 J**	**235.98 J [235.85 J]**	**103.74 J [101.26 J]**	**7.1 J**	**17.9 J**
Total SVOCs	- -	ug/L	**4.1 J [6.7 J]**	**3.53 J**	**3.09 J**	**9.15 J**	**291.48 J [292.21 J]**	**127.59 J [124.23 J]**	**18.1 J**	**32.89 J**

See Notes on Page 4.

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Site Characterization
National Fuel Gas Distribution Corporation
Former Buffalo Service Station - Off-Site
Buffalo, NY

Location ID: / Date Collected:	NYSDEC TOGS 1.1.1 Standards and Guidance Values	Units	AW-01 08/22/12	AW-01 08/27/13	AW-02 08/22/12	AW-02 08/27/13	AW-03 12/28/12	AW-03 08/27/13	AW-04 12/28/12	AW-04 08/27/13
Inorganics										
Aluminum	- -	mg/L	**0.071 J [0.086 J]**	0.06 U	**0.3**	**0.11 J**	0.2 U [0.2 U]	0.06 U [0.06 U]	**2.2**	**0.064 J**
Antimony	0.003	mg/L	0.02 U [0.02 U]	0.0068 U	0.02 U	0.0068 U	0.02 U [0.02 U]	0.0068 U [0.0068 U]	0.02 U	0.0068 U
Arsenic	0.025	mg/L	0.01 U [0.01 U]	0.0056 U	0.01 U	0.0056 U	**0.0085 J [0.0058 J]**	**0.0076 J [0.0056 U]**	0.01 U	0.0056 U
Barium	1	mg/L	**0.052 [0.052]**	**0.051**	**1.8**	**0.53**	**0.094 [0.094]**	**0.063 [0.063]**	**1.1**	**0.7**
Beryllium	0.003	mg/L	0.002 U [0.002 U]	0.0003 U	0.002 U	0.0003 U	0.002 U [0.002 U]	0.0003 U [0.0003 U]	0.002 U	0.0003 U
Cadmium	0.005	mg/L	**0.001 U [0.00053 J]**	0.0005 U	0.001 U	0.0005 U	0.001 U [0.001 U]	0.0005 U [0.0005 U]	0.001 U	0.0005 U
Calcium	- -	mg/L	**294 [301]**	**344**	**376**	**183**	**373 [372]**	**245 [243]**	**453**	**374**
Chromium	0.05	mg/L	0.004 U [0.004 U]	**0.0018 J**	**0.0019 J**	**0.0015 J**	**0.0025 J [0.0028 J]**	**0.0021 J [0.0022 J]**	**0.0046**	**0.0023 J**
Cobalt	- -	mg/L	**0.004 U [0.00071 J]**	**0.00071 J**	**0.0039 J**	0.00063 U	**0.00068 J [0.004 U]**	0.00063 U [0.00063 U]	**0.00094 J**	0.00063 U
Copper	0.2	mg/L	**0.01 U [0.0022 J]**	**0.002 J**	**0.0031 J**	**0.002 J**	**0.0024 J [0.01 U]**	**0.0016 U [0.0017 J]**	**0.0037 J**	**0.0024 J**
Iron	0.3	mg/L	**15.1 [15.3]**	**11.9**	**7.6**	0.32 UB	**15.5 [15.4]**	**16.3 [16.1]**	**15.9**	**14.1**
Lead	0.025	mg/L	0.005 U [0.005 U]	0.003 U	**0.0095**	0.003 U	0.005 U [0.005 U]	0.003 U [0.003 U]	0.005 U	0.003 U
Magnesium	35	mg/L	**19.6 [19.7]**	**19.9**	**68.2**	**32**	**23 [22.8]**	**13.8 [13.6]**	**83.2**	**64.4**
Manganese	0.3	mg/L	**0.77 [0.78]**	**0.8**	**0.71**	**0.38**	**1.4 [1.4]**	**0.76 [0.75]**	**0.83**	**0.75**
Mercury	0.0007	mg/L	0.0002 U [0.0002 U]	0.00012 U	0.0002 U	0.00012 U	0.0002 U [0.0002 U]	0.00012 U [0.00012 U]	0.0002 U	0.00012 U
Nickel	0.1	mg/L	0.01 U [0.01 U]	0.0013 U	0.01 U	0.0013 U	0.01 U [0.01 U]	0.0013 U [0.0013 U]	**0.0026 J**	0.0013 U
Potassium	- -	mg/L	**9.7 [9.7]**	**11.4**	**19.5**	**16.3**	**11.4 [11.2]**	**10.1 [10]**	**49.8**	**46.8**
Selenium	0.01	mg/L	0.015 U [0.015 U]	0.0087 U	0.015 U	0.0087 U	0.015 U [0.015 U]	0.0087 U [0.0087 U]	0.015 U	0.0087 U
Silver	0.05	mg/L	0.003 U [0.003 U]	0.0017 U	0.003 U	0.0017 U	0.003 U [0.003 U]	0.0017 U [0.0017 U]	0.003 U	0.0017 U
Sodium	20	mg/L	**498 [504]**	**521**	**8,090**	**764**	**352 [351]**	**341 [337]**	**649**	**631**
Thallium	0.0005	mg/L	0.02 U [0.02 U]	0.01 U	0.02 U	0.01 U	0.02 U [0.02 U]	0.01 U [0.01 U]	0.02 U	0.01 U
Vanadium	- -	mg/L	**0.0041 J [0.0047 J]**	**0.0025 J**	**0.0042 J**	0.0015 U	**0.0036 J [0.0037 J]**	**0.0029 J [0.0028 J]**	**0.0091**	**0.0057**
Zinc	2	mg/L	**0.0034 J [0.0026 J]**	0.0015 U	**0.014**	0.01 UB	**0.0024 J [0.0024 J]**	0.01 UB [0.01 UB]	**0.011**	0.01 UB
Miscellaneous										
Cyanide	0.2	mg/L	**0.088 J [0.063 J]**	**0.087**	0.02 UBJ	0.005 U	**0.11 [0.093 J]**	**0.11 [0.1]**	**0.011 J**	**0.064**
Cyanide, Free	- -	mg/L	0.002 UB [0.002 UB]	NA	0.002 U	NA	**0.005 U [0.0016 J]**	NA	0.005 U	NA

Notes:
NYSDEC TOGS 1.1.1 Water Standards and Guidance Value exceedances are shaded.
ug/L - micrograms per liter; mg/L = milligrams per liter.
Bolded values are detected.
[ ] Bracketed results represent a duplicate sample.
B: Analyte was also detected in the associated method blank.
J: Indicates an estimated value.
ND: None detected.
U: The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
NA: Not Available/Not Applicable.

APPENDIX D

Excavation Work Plan

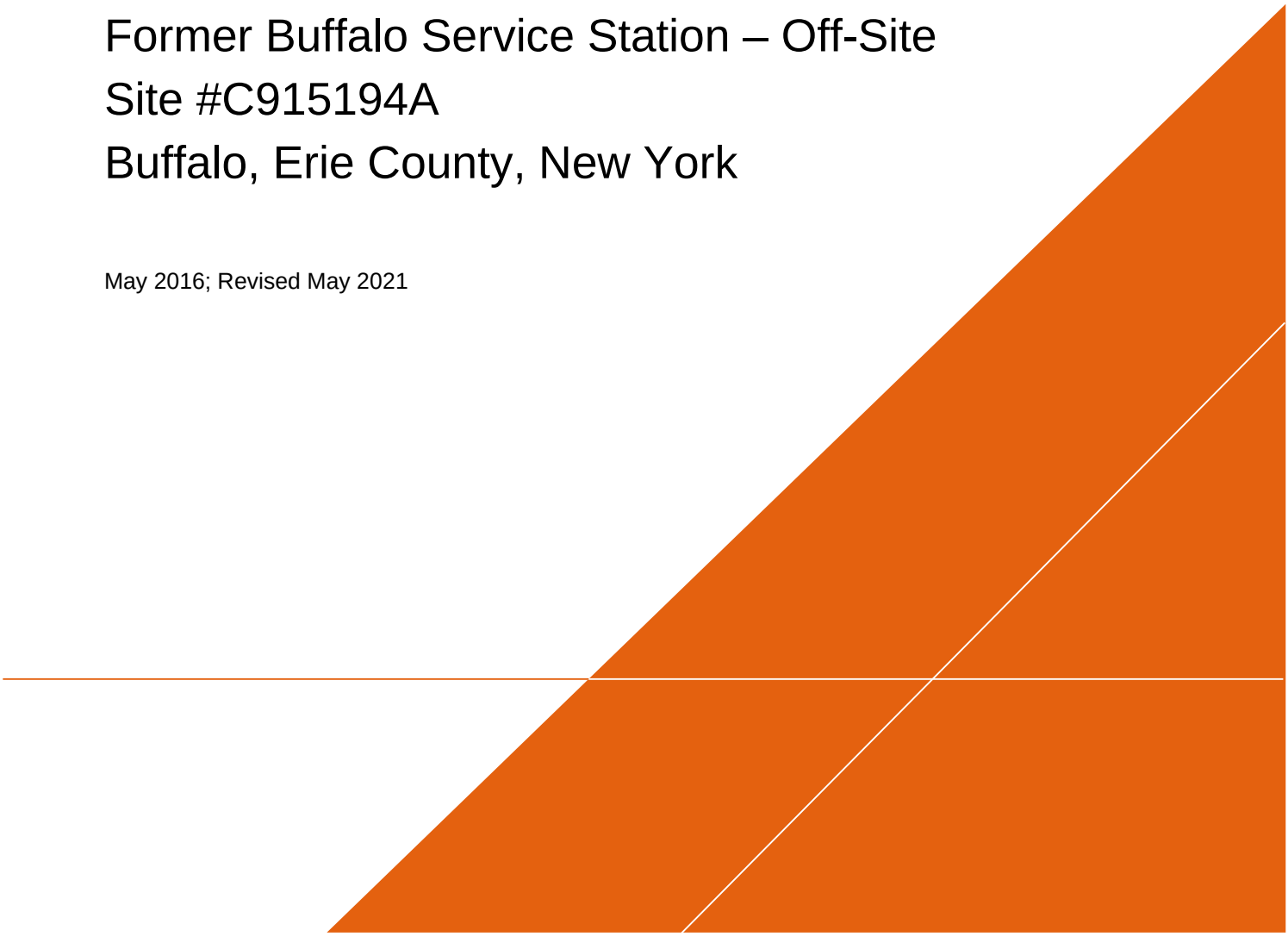
ARCADIS Design & Consultancy for natural and built assets

National Fuel Gas Distribution Corporation

EXCAVATION WORK PLAN

Former Buffalo Service Station – Off-Site
Site #C915194A
Buffalo, Erie County, New York

May 2016; Revised May 2021



EXCAVATION WORK PLAN

Former Buffalo Service Station – Off-Site
Site #C915194A
Buffalo, Erie County, New York

Prepared for:

National Fuel Gas Distribution Corporation

6363 Main Street

Williamsville, New York 14221-5887

Prepared by:

Arcadis of New York, Inc.

One Lincoln Center

110 West Fayette Street, Suite 300

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Our Ref.:

30075637

Date:

May 2016; Revised May 2021

CONTENTS

ACRONYMS AND ABBREVIATIONS

CAMP	Community Air Monitoring Plan
CY	cubic-yard
EWP	Excavation Work Plan
ft. amsl	feet above mean sea level, North American Vertical Datum 1988
ft. bgs	feet below ground surface
HASP	Health and Safety Plan
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
SCO	soil cleanup objective
SMP	Site Management Plan
SVOC	semi-volatile organic compound
TAL	target analyte list
TCL	target compound list
VOC	volatile organic compound

This *Excavation Work Plan* (EWP) has been prepared to support the *Site Management Plan* (SMP) for the Former Buffalo Service Station Off-Site site, NYSDEC Site No. C915194A (hereinafter, the "Site"), under the Inactive Hazardous Waste Disposal Site Remedial Program administered by New York State Department of Environmental Conservation (NYSDEC). Site work has been completed in accordance with Administrative Order on Consent ("Order On Consent")(Index # B9-0695-05-06A), Site #C915194A, dated January 2011, which National Fuel Gas Distribution Corporation ("National Fuel") entered into with the NYSDEC to investigate and, to the extent necessary, remediate the approximately 0.6-acre Site located in the City of Buffalo, Erie County, New York. The Site is defined as an approximately 120 feet by 180 feet area located under Fourth Street and the I-190 overpass in the City of Buffalo, Erie County, New York. After completion of the investigation work described in the *Site Characterization Report* ("SC Report") (ARCADIS, Dec. 2015), some limited contamination remains at this Site, including residual MGP-related impacts identified in the subsurface at this Site, which are hereafter referred to as "Impacts."

The Site owners (i.e., New York State Thruway Authority [NYSTA] and City of Buffalo or their respective successors), will be responsible for reporting any future intrusive work that will encounter or disturb remaining Impacts, including any modifications to the existing surface cover (e.g., roads, sidewalks, vegetated soil) to the NYSDEC and National Fuel. The City of Buffalo and NYSTA will coordinate with National Fuel to ensure that any excavation work will be performed in compliance with this EWP under the SMP. National Fuel, as the remedial party, will also be responsibly engaged during any excavation activities which will penetrate the soil more than 12 feet below ground surface (bgs) or below 570 feet above mean sea level (amsl), or upon discovery that any remaining Impacts have been encountered or disturbed at the Site at any depths.

Specifically, proper implementation of this EWP, including all notifications, reporting, and oversight (e.g., by qualified environmental professionals, where applicable), will be the responsibility of the Site owners (City of Buffalo and NYSTA) to the extent that the Site owners undertake or authorize subsurface work. However, in the event that one of the Site owners requests that National Fuel undertake subsurface work and, National Fuel agrees, then National Fuel will be responsible for proper implementation of this EWP with the support and cooperation of the Site owner. ***National Fuel will review any Site owner requests in good faith and notify the Site owner of its decision in writing.*** In the event that a property owner grants access to a third party for subsurface invasive or intrusive activities, the third party grantee shall also be responsible for safe execution of all invasive or intrusive work performed consistent with this EWP. The party responsible for proper implementation of this EWP as specified above shall be "the EWP Responsible Party".

Site activities that disturb soil at depths above 12 ft. bgs or above an elevation of 570 ft. amsl will only require notification by the City of Buffalo and NYSTA to the NYSDEC and National Fuel as the remedial party, as described below; whereas all of the requirements of this EWP will otherwise govern any subsurface disturbances at the Site below 570 ft. amsl or more than 12 ft. bgs.

1 NOTIFICATION

At least 15 days prior to the start of any excavation or intrusive work anticipated to encounter or disturb remaining Impacts, the Site owners will notify the NYSDEC and National Fuel in writing. In the event of an emergency, verbal notifications can be made and written notifications will follow as soon as feasible after the emergency has been resolved or abated. It is understood that priority will be given to implement

emergency procedures involving the I-190 overpass to protect the safety of the travelling public. Once a potential emergency situation involving the overpass has become stabilized, all remaining work will be completed in conformance with the SMP and this EWP. Currently, these notifications will be made to:

Andrew Zwack
Assistant Engineer
NYSDEC - Region 9
Division of Environmental Remediation
700 Delaware Avenue
Buffalo, New York 14209
716.851.7220

Tanya Alexander
National Fuel Gas Distribution Corporation
6363 Main Street
Williamsville, New York 14221
716.857.7410

If activities will include excavations that are less than 12 feet in depth (or above 570 ft. amsl), the notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for re-grading (if necessary), and intrusive elements or utilities to be installed below the Site.
- A schedule for the work, detailing the start and completion of all intrusive work.

If activities will include excavations that are deeper than 12 ft. bgs (or below 570 ft. amsl), the notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for re-grading (if necessary), intrusive elements or utilities to be installed below the Site, estimated volumes of soil that may contain remaining impacts (as defined in the SMP) to be excavated or re-worked, and the location of soil piles.
- A summary of the applicable components of this EWP.
- 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 statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120.
- A copy of the contractor's, and any subcontractors', if applicable, health and safety plan (HASP), in electronic format. The contractor may use the HASP provided in Appendix D of the SMP. However, the contractor must have a qualified safety professional prepare and sign their task-specific HASP and verify current Occupational Safety and Health Administration (OSHA) requirements and protocols.

- A copy of the contractor's community air monitoring plan (CAMP). An example CAMP is included in Appendix F of the SMP. The contractor may either use the CAMP provided in the SMP or have a qualified safety professional prepare a CAMP.
- Identification of disposal facilities for potential waste streams.
- Identification of sources of any anticipated backfill, along with all required chemical testing requirements/results.

Upon completion of Site activities that disturb soils deeper than 12 ft. bgs (or below 570 ft. amsl), the EWP Responsible Party is responsible for providing the NYSDEC and National Fuel (to the extent that National Fuel is not the EWP Responsible Party) with a report of the completed activities, including any deviations from the information provided in the initial notification (above), identification of unknown or unexpected contaminated media identified during invasive Site work, as-built drawings including any changes to site cover, and shipping manifests and waste disposal receipts for any materials shipped off-Site for disposal. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

The remainder of this EWP only applies to Site activities that will disturb soils deeper than 12 ft. bgs (or below 570 ft. amsl).

2 SOIL SCREENING METHODS

The EWP Responsible Party is responsible for ensuring that all soil screening methods comply with this EWP. Visual, olfactory and instrument-based soil screening will be performed by a qualified environmental professional (or person under their supervision), as approved by the NYSDEC during all excavations into known or potentially remaining Impacts. 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.

The upper 12 ft. of soil will be segregated as material that can be returned to the subsurface or used as cover soil (as appropriate). Soils below 12 ft. bgs will be segregated, based on previous environmental data and screening results summarized in the SMP and Site Characterization Report:

- Soil that requires off-Site disposal,
- Soil that requires testing,
- Soil that can be returned to the subsurface, and
- Soil that can be used as cover soil (as appropriate).

Should intrusive work be conducted more than 12 ft. bgs (below 570 ft. amsl) and soil is required to be removed and disposed in accordance with the EWP, the cleanup levels to be met upon removal of the impacted soil will meet levels specified in 6 NYCRR Part 375 SCOs for restricted use commercial.

3 STOCKPILE METHODS

The EWP Responsible Party is responsible for ensuring that all stockpile methods comply with this EWP. Stockpiles of excavated material (Soil Stockpiles) will, at minimum, be placed on top of polyethylene sheeting. If required by NYSDEC, Soil Stockpiles shall be placed within an engineered staging area. Soil Stockpiles will be continuously encircled with a berm and/or silt fence. Soil stockpiles will be kept covered when not in use with appropriately anchored tarps or polyethylene sheeting. Soil Stockpiles will be routinely inspected, and damaged tarp covers will be promptly replaced.

Hay bales or silt fences will be used as needed near catch basins, and other discharge points. Additional details regarding sediment and erosion controls are provided in Section 11.

Stockpiles and other locations of sediment and erosion control measures 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 by the EWP Responsible Party as long as field work is being implemented, and available for inspection by NYSDEC. The logbook will be made available to the NYSDEC upon request after field work has concluded.

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 EWP Responsible Party is responsible for safe execution of all invasive and other work performed under this EWP including, without limitation, ensuring that a qualified environmental professional, or person under their supervision, (hereinafter, the "QEP") will oversee all invasive work, including but not limited to the excavation and load-out of all excavated material. The presence of utilities and easements on the Site will be investigated by the QEP prior to initiating intrusive work. The QEP will determine whether such utilities and easements pose a risk or impediment to the planned work under this EWP.

Vehicles loaded with materials leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate federal, state, local, and New York State Department of Transportation (NYSDOT) requirements (and all other applicable transportation requirements).

Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site soil tracking by the QEP. A truck wash will be operated on-Site, as necessary, based on consultation with NYSDEC. The QEP will monitor that all outbound trucks are washed at the truck wash before leaving the Site (as necessary) until the activities performed under this section are complete. The QEP will monitor 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 more than 12 ft. bgs (or below 570 ft. amsl). Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

5 MATERIALS TRANSPORT OFF-SITE

The EWP Responsible Party is responsible for ensuring that all transportation of materials off-Site is in compliance with this EWP. Transportation 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 or mess-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.

The truck transport route for all vehicles leaving the Site with material destined for off-Site treatment and/or disposal is as follows:

- From the Site, proceed southeast on Fourth Street.
- Veer Left onto West Genesee Street.
- Turn Right onto South Elmwood Avenue.
- Turn Right onto Church Street.
- Merge onto I-190 North/South by veering left or right, respectively.

All trucks loaded with Site materials will exit the vicinity of the Site using only this approved truck route. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) prohibiting off-Site queuing of trucks entering the facility; (c) limiting total distance to major highways; (d) promoting safety in access to highways; and (e) overall safety in transport. Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site excavation and development.

Trucks will be prohibited from stopping and idling in the neighborhood outside the Site. Queuing of trucks will be performed on-Site, to the extent feasible, in order to minimize off-Site disturbance. Off-Site queuing will be prohibited.

6 MATERIALS DISPOSAL OFF-SITE

For management, transportation, and disposal or treatment purposes, the property owner initiating the invasive activities (either NYSTA or City of Buffalo, as the case may be), and/or any third-party grantee, are considered co-generators. All soil excavated and removed from the Site will be treated as impacted and regulated material and will be manifested, transported and disposed of in accordance with all local, state (including 6 NYCRR Part 360) and federal regulations. If disposal of soil 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 the Site will not occur without formal NYSDEC approval.

Off-Site treatment and/or 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 (e.g. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, construction and demolition [C/D] recycling facility, etc.). Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report (described in Section 4 of the SMP). This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

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

7 MATERIALS REUSE ON-SITE

Chemical criteria for on-Site reuse of material must be approved by NYSDEC. The QEP will ensure that procedures defined for material reuse in this EWP are followed and that unacceptable material does not remain on-Site.

Excavated soil/fill that is free of visible stains and obvious odors shall be considered potentially suitable for on-Site reuse. Material potentially suitable for on-Site reuse shall be placed on polyethylene sheeting in stockpiles not to exceed 250 cubic-yards (CYs). The stockpiled potentially reusable material shall be covered as described in Section 3 of this EWP. Stockpiled potentially reusable material shall be sampled and analyzed to evaluate if the material can be replaced or must be transported for off-Site disposal. The frequency and method of characterization sampling will be in accordance with NYSDEC DER-10 / Technical Guidance for Site Investigation and Remediation Table 5.4(e)10 - Recommended Number of Soil Samples for Soil Imported To or Exported from a Site (below).

Table 5.4(e)10
Recommended Number of Soil Samples for Soil Imported To or Exported From a Site

Contaminant	VOCs	SVOCs, Inorganics & PCBs/Pesticides	
Soil Quantity (cubic yards)	Discrete Samples	Composite	Discrete Samples/Composite
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
➢ 1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER		

The composite sample shall be formed by placing equal portions of soil from each of the discrete grab sampling locations into a pre-cleaned, stainless steel bowl (or dedicated container). The composite sample shall be thoroughly homogenized using a stainless steel scoop or trowel before being transferred into the sample containers provided by the laboratory. The discrete volatile organic compound (VOC) samples will be collected from approximately 12-inches into the soil pile. The discrete VOC samples will not be homogenized or composited. The filled sample containers shall be labeled and transported to the

laboratory using a chain-of-custody form. Each sample will be submitted for laboratory analysis for the constituents required by treatment/disposal facilities and NYSDEC.

Impacted on-Site material, including historic fill more than 12 ft. bgs (or below 570 ft. amsl) and impacted soil, that is acceptable for reuse on-Site will be placed below a demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Concrete crushing or processing on-Site will not be performed without prior NYSDEC approval.

8 WATER MANAGEMENT

Groundwater removed from the excavation will be handled, transported and disposed in accordance with applicable local, state, and federal regulations. Water from the excavation will not be recharged back to the land surface or subsurface of the Site, but will be managed off-Site.

Efforts shall be made to minimize the amount of water that could enter an excavation (e.g., installing a berm around the excavation or covering the excavation to prevent runoff from entering during precipitation). Water accumulated in excavations shall be pumped out during or after precipitation events (as appropriate), containerized, characterized, and appropriately disposed. Containerized water shall be sampled and analyzed for the chemicals of concern known to be in the area as determined by previous analytical results, which at a minimum, may include benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), total cyanide, and mercury as well as analytes required by potential off-Site treatment/disposal facilities.

Water shall be discharged to the local sewer authority (if authorized), transported off-Site for proper disposal, or treated on-Site via a treatment system that has been approved by the NYSDEC and most appropriate depending on the results of the aforementioned testing.

9 SITE COVER RESTORATION

After the completion of soil removal, and any other invasive activities, the existing Site cover will be restored in-kind. If the type of Site cover changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the existing Site cover. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in any updates to the SMP.

10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for importation onto the Site will be approved by the QEP and will be in compliance with provisions in this EWP prior to receipt at the Site.

Imported material shall be sampled in accordance with the frequency requirements presented in Table 5.4(e)10 of the May 2010 NYSDEC document *DER-10: Technical Guidance for Site Investigation and Remediation* (DER-10). Imported material to be used at the Site shall meet the constituent levels presented in Appendix 5 of DER-10, as approved by NYSDEC. NYSDEC will be notified by the EWP Responsible Party and provided with the analytical results prior to the importation of soil. 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.

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d). 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, material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites shall not be imported to the Site.

11 STORMWATER POLLUTION PREVENTION

General stormwater pollution prevention activities to be conducted in support of Site excavation activities include the following:

- Silt fencing or hay bales will be installed around the entire perimeter of the construction area.
- 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 this EWP 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.
- Installed barriers (e.g., silt fences, check dams, etc.) and hay bales will be inspected once a week and after every storm event by a QEP. Results of inspections will be recorded in a logbook and maintained at the Site and by the EWP Responsible Party, as long as field work is being implemented, and available for inspection by NYSDEC. All necessary repairs shall be made immediately. The logbook will be made available to the NYSDEC upon request after field work has concluded.

12 CONTINGENCY PLAN

If underground tanks or other previously unidentified impacted or contaminated materials or sources are found during subsurface excavations or development-related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition. The EWP Responsible Party will be the responsible party with regards to the contingency plan and all responsibilities set forth in this section.

Samples of non-aqueous phase liquids (NAPL), if present, and of surrounding soils, sediment, and product, etc. will be collected for laboratory analysis as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (i.e., Target

Analyte List [“TAL”] metals, including total cyanide, target compound list [“TCL”] VOCs and TCL SVOCs, TCL pesticides, and polychlorinated biphenyls [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 (identified in Section 1 of this EWP) by the EWP Responsible Party. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report (“PRR”) prepared pursuant to Section 4 of the SMP.

13 COMMUNITY AIR MONITORING PLAN

The EWP Responsible Party will be responsible for the implementation of the community air monitoring plan. Community air monitoring for VOCs and particulates will be conducted for soil disturbance activities, in accordance with the May 2010 New York State Department of Health (NYSDOH) generic CAMP included as Appendix F to the SMP. The quantity and locations of community air monitoring stations will be determined in conjunction with the NYSDOH, based on the size and location of the proposed excavation. At a minimum, one upwind monitoring location and one downwind monitoring location will be utilized. These locations will be adjusted on a daily basis, or more frequently based on actual wind directions, to provide upwind and downwind monitoring stations. Exceedances of action levels listed in the CAMP will be reported by the EWP Responsible Party to the Project Managers for NYSDEC and NYSDOH.

14 ODOR CONTROL PLAN

The EWP Responsible Party will be responsible for the implementation of the odor control plan. This odor control plan addresses emissions of off-Site nuisance odors. Specific odor control methods to be used on a routine basis are discussed below.

If nuisance odors are identified at the Site boundary, or if odor complaints are received, work will be halted, and the EWP Responsible Party will be responsible for identifying the source of odors and correct accordingly. Work will not resume until all nuisance odors have been abated. The QEP will notify the NYSDEC and the NYSDOH 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 EWP Responsible Party. Any such measures that are implemented will be discussed in the Periodic Review Report (described in Section 4 of the SMP). Note that both the contractor and the QEP have the responsibility to stop work in the event of nuisance odors, dust exceedance (discussed in Section 15), and other nuisances. All necessary means will be employed by the ERP Responsible Party to prevent on- and off-Site nuisance odors. 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, polyethylene sheeting, or 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: (a) direct load-out of soils to trucks for off-Site disposal, (b) use of chemical odorants in spray or misting systems; and (c) 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.

15 DUST CONTROL PLAN

The EWP Responsible Party will be responsible for the implementation of the dust control plan. Dust (i.e., particulate) monitoring will be performed in accordance with the CAMP included as Appendix F to the SMP. A dust suppression plan that addresses dust management during invasive on-Site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-Site water truck for road wetting. The truck will be capable of spraying palatable water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing 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.

16 NOISE

The EWP Responsible Party will be responsible for the implementation of noise controls during any ground invasive activities. A plan will be developed by a QEP and utilized by the contractor implementing the work for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX E

Generic Health and Safety Plan

ARCADIS
Infrastructure · Water · Environment · Buildings

Generic Health and Safety Plan

Revision 11 9/20/2012

Project Name:	Former Buffalo Service Station – Off-Site Site #C915194A Buffalo, New York
Project Number:	B0023310
Client Name:	National Fuel Gas Distribution Corporation
Date:	April 2014
Revision:	0

Approvals:

HASP Developer:	David Rodriguez
HASP Reviewer:	
Project Manager:	Scott Powlin

Emergency Information

Site Address: 24 4th Street, Buffalo, New York 14201

Emergency Phone Numbers:

Emergency (fire, police, ambulance)		911
Emergency (facility specific, if applicable):		
Emergency Other (specify)		
Client Contact	Tanya Alexander	716.857.6944
NYSDEC Project Manager	Andrew Zwack	716.851.7220
Project H&S	TBD	--
Task Manager	TBD	--
Project Manager	TBD	--
Corporate H&S Specialist	TBD	--
Corporate H&S Director	TBD	--

Hospital Name and Address: Buffalo General Medical Center
100 High St, Buffalo, NY 14203

Hospital Phone Number: 716.859.5600

Incident Notification Process

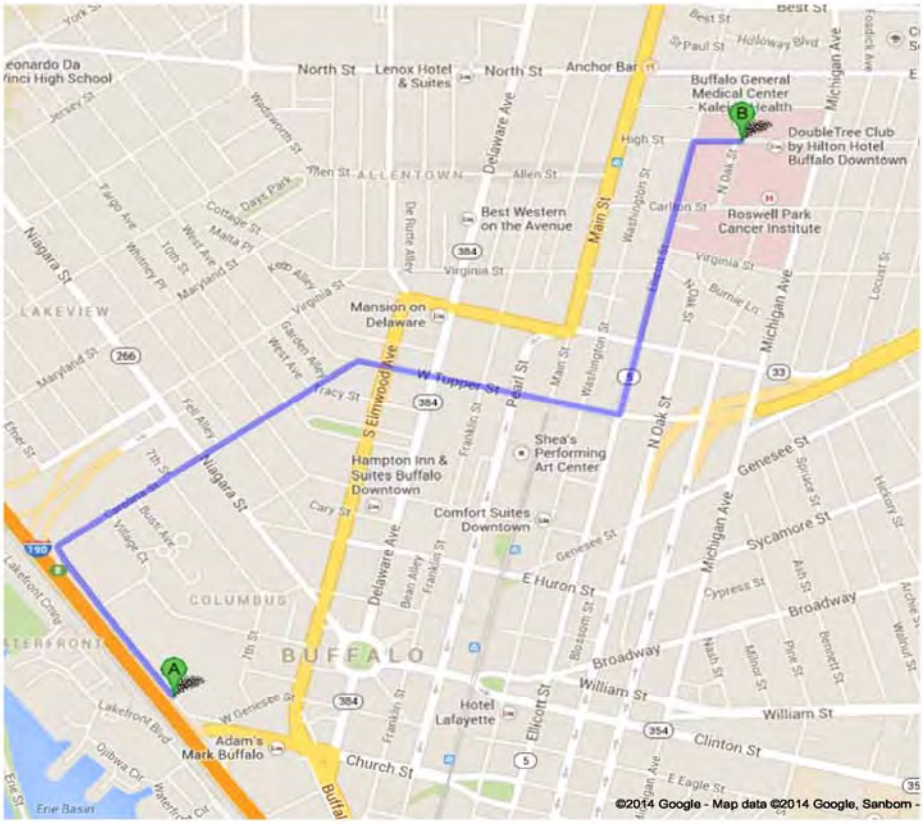
1	Dial 911/Facility Emergency Number/WorkCare as applicable	
2	Contact PM/Supervisor	TBD
3	Contact Corporate H&S	TBD
4	Contact Client	Tanya Alexander
5	NYSDEC Contact	Andrew Zwack

.

Route to the Hospital

Google

Directions to Buffalo General Medical Center - Kaleida Health
100 High St, Buffalo, NY 14203
2.0 mi – about **8 mins**



A 24 4th St, Buffalo, NY 14201

1.	Head northwest on 4th St toward Village Ct About 54 secs	go 0.4 mi total 0.4 mi
2.	Continue onto Carolina St About 2 mins	go 0.6 mi total 1.0 mi
↱	3. Turn right onto W Tupper St About 2 mins	go 0.4 mi total 1.4 mi
↰	4. Turn left onto Ellicott St About 2 mins	go 0.5 mi total 1.9 mi
↱	5. Turn right onto High St Destination will be on the left	go 413 ft total 2.0 mi

B **Buffalo General Medical Center - Kaleida Health**
100 High St, Buffalo, NY 14203

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2014 Google, Sanborn

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

General Information

Site Type (select all applicable where work will be conducted):

- ☐ Active
- ☑ Bridge
- ☐ Buildings
- ☐ Commercial
- ☐ Construction
- ☐ Government
- ☐ Inactive
- ☐ Industrial
- ☐ Landfill
- ☐ Marine
- ☐ Mining
- ☐ Parking Lot/Private Roadway
- ☐ Railroad
- ☐ Remote Area
- ☐ Residential
- ☐ Retail
- ☑ Roadway (public, inlcuing right-of-way)
- ☑ Secure
- ☐ Unknown
- ☑ Unsecured
- ☑ Utility
- ☐ Other (specify): _____

Surrounding Area and Topography (select one):

☐ Surrounding area and topography are presented in the project work plan

☑ Surrounding area and topography (*briefly describe*):

The Site is located in Buffalo, New York and is approximately 120 feet by 180 feet and extends from the eastern edge of Fourth Street, under and to the west edge of the NYS Interstate I-190 overpass. Topographic relief at the Site is flat and the land surface elevation is approximately 580 feet above mean sea level.

Site Background (select one):

☐ Site background is presented in the project work plan

☑ Site background (*briefly describe)* :

The Site was historically the location of the confluence between the former Erie Canal and the former Wilkeson Slip, which have been the subject of extensive historical waste disposal and filling activity. The Site is located adjacent to the western edge of the former Buffalo Service Station site, where non-aqueous phase liquids were disposed, spilled, or leaked from the gas holders, and potentially other structures at various locations that no longer exist. However, only limited impacts have been observed at the Site.

Project Tasks

The following tasks are identified for this project:

Examples: "Drilling/soil sampling", "Surveying", "General Inspections", "Construction Management/Inspections"

1 Site Walk/Inspection
2 Excavation
3
4
5

☐ Subcontractor H&S information is attached
☑ Utility clearance required.
☐

☐ Standards apply to augment JSA
[list standard(s) below]

Roles and Responsibilities

	Name	*Role*	*Additional Responsibilities (Describe)*
1	TBD	PM	Overalll management of project
2	TBD	TM	Coordinate all fieldwork
3	TBD	Field Lead	
4	TBD	SSO	
5			
6			

Training

All ARCADIS employees are required to have the following training:

☑ 40 hr HAZWOPER w current refresh.
☐ 24 hr HAZWOPER
☐ 10 hr Construction
☐ HazMat #1 (Ground/Air/MOT)
☐ HazMat #4 (MOT)
☐ HazCom/Emergency Action Plan
☐ H&S Orientation (classroom); or
☐ H&S Orientation (on-line)
☑ PPE
☐ Respiratory protection
☐ MSHA
☐ Smith System (on-line)
☐ OTS/eRailsafe
☐ Client specific:
☐ Other:

Selected employees are required to have the following additional training:

		Names or Numbers from above
☐	Not applicable	
☑	First aid/CPR/BBP	TBD - all on-site personnel
☐	30 hr Construction	
☐	10 hr Construction	
☑	HazMat #1 (Gr./Air/MOT)	TBD - all on-site personnel
☐	HazMat #4 (MOT)	
☐	Confined space entrant	
☐	Confined space rescue	
☐	Excavation CP	
☐	Electrical (NFPA 70E)	
☐	Lockout/Tagout	
☐	H&S Orientation (class)	
☐	OTS/eRailsafe	
☐	Smith Sys. (hands on)	
☐	Boating safety	
☐	Other:	

Hazard Analysis

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings*		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low.	4 - Medium.	8 - High	12 - High

Task 1: Site Walk/Inspection

Hazardous Activity #1

Field-Mobilization/Demobilization - from a site

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	L	Driving	M	Electrical	-
Environmental	-	Gravity	M	Mechanical	-	Motion	L
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Low if utilizing:

Primary Controls: TRACK Field H&S Handbook Engineering Controls

Secondary Controls: JSAs Job Briefing/Site Awareness PPE (see HASP "PPE" section) Admin. Controls

Hazardous Activity #2

Field-Ambient environment - exposure heat, cold, sun, weather, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	L
Environmental	L	Gravity	M	Mechanical	-	Motion	L
Personal Safety	M	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK PPE (see HASP "PPE" section) Field H&S Handbook

Secondary Controls: H&S Standards Engineering Controls Admin. Controls Specialized Equipment

Hazardous Activity #3

General-Vehicle -motor vehicle operation (all types on roadways)

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	-
Environmental	-	Gravity	-	Mechanical	-	Motion	-
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Low if utilizing:

Primary Controls: TRACK Smith System (on line) Inspections

Secondary Controls: JSAs Admin. Controls

Hazardous Activity #4

Field-Traffic - working on or adjacent to roadways

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	-
Environmental	-	Gravity	-	Mechanical	-	Motion	M
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium. Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK Traffic Control Plan (TCP) Engineering Controls PPE (see HASP "PPE" section) Engineering Judgement Employee Required

Secondary Controls: H&S Standards Job Briefing/Site Awareness Admin. Controls Specialized Equipment

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings*		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low.	4 - Medium.	8 - High	12 - High

Task 2: **Excavation**

Hazardous Activity #1

Field-Ambient environment - exposure heat, cold, sun, weather, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	L
Environmental	L	Gravity	M	Mechanical	-	Motion	L
Personal Safety	M	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK PPE (see HASP "PPE" section) Field H&S Handbook

Secondary Controls: H&S Standards Engineering Controls Admin. Controls Specialized Equipment

Hazardous Activity #2

Field-Traffic - working on or adjacent to roadways

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	-
Environmental	-	Gravity	-	Mechanical	-	Motion	M
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium. Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK Traffic Control Plan (TCP) Engineering Controls PPE (see HASP "PPE" section) Engineering Judgement Employee Required

Secondary Controls: H&S Standards Job Briefing/Site Awareness Admin. Controls Specialized Equipment

Hazardous Activity #3

Field-Excavation - soil removal, installation or removal piping, tanks or utilities, geologic investigations, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	-	Electrical	-
Environmental	-	Gravity	H	Mechanical	H	Motion	H
Personal Safety	-	Pressure	-	Radiation	-	Sound	M

Overall Unmitigated Risk: High Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK H&S Standards Excavation Awareness Training Excavation Competent Person Training (designated person) Engineering Controls

Secondary Controls: JSAs HASP Job Briefing/Site Awareness Client Training/Briefing Cont/Emerg. Planning PPE (see HASP "PPE" section) Specialized Equipment Housekeeping Inspections

Hazardous Activity #4

Field-Utilities - drilling, digging or excavating in the vicinity of subsurface utilities

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	H	Driving	-	Electrical	H
Environmental	-	Gravity	-	Mechanical	-	Motion	L
Personal Safety	-	Pressure	M	Radiation	-	Sound	-

Overall Unmitigated Risk: High Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK H&S Standards Engineering Controls Admin. Controls Inspections Specialized Equipment

Secondary Controls: JSAs Field H&S Handbook Job Briefing/Site Awareness Cont/Emerg. Planning Engineering Controls Admin. Controls

Hazard Communication (HazCom)/Global Harmonization System (GHS)

☑ HAZCOM/GHS for this project is managed by the client or general contractor

List the chemicals anticipated to be used on this project per HazCom/GHS requirements.
(Modify quantities as needed)

	Acids/Bases	Qty
☑	Not applicable	
☐	Hydrochloric acid	<500 ml
☐	Nitric acid	<500 ml
☐	Sulfuric acid	<500 ml
☐	Sodium hydroxide	<500 ml
☐	Zinc acetate	<500 ml
☐	Ascorbic acid	<500 ml
☐	Acetic acid	<500 ml
☐	Other:	
	_____	
	_____	
	_____	

	Decontamination	Qty
☐	Not applicable	
☑	Alconox	≤ 5 lbs
☑	Liquinox	≤ 1 gal
☐	Acetone	≤ 1 gal
☐	Methanol	≤ 1 gal
☐	Hexane	≤ 1 gal
☐	Isopropyl alcohol	≤ 4 gal
☐	Nitric acid	≤ 1 L
☐	Other:	
	_____	
	_____	
	_____	

	Calibration	Qty.
☐	Not applicable	
☑	Isobutylene/air	1 cyl
☐	Methane/air	1 cyl
☐	Pentane/air	1 cyl
☐	Hydrogen/air	1 cyl
☐	Propane/air	1 cyl
☐	Hydrogen sulfide/air	1 cyl
☐	Carbon monoxide/air	1 cyl
☐	pH standards (4,7,10)	≤ 1 gal
☐	Conductivity standards	≤ 1 gal
☐	Other:	
	_____	

	Fuels	Qty.
☐	Not applicable	
☑	Gasoline	≤ 5 gal
☑	Diesel	≤ 5 gal
☐	Kerosene	≤ 5 gal
☐	Propane	1 cyl
☐	Other:	
	_____	

	Kits	Qty.
☑	Not applicable	
☐	Hach (specify):	_____ 1 kit
☐	DTECH (specify):	_____ 1 kit
☐	EPA 5035 Soil (specify kit):	_____ 1 kit
☐	Other:	
	_____	_____
	_____	_____

	Remediation	Qty.
☑	Not applicable	
☐	_____	
☐	_____	
☐	_____	
☐	_____	
☐	_____	

	Other:	Qty.
☐	Not applicable	
☑	Spray paint	≤ 6 cans
☐	WD-40	≤ 1 can
☐	Pipe cement	≤ 1 can
☐	Pipe primer	≤ 1 can
☐	Mineral spirits	≤ 1 gal

		Qty.
☐	_____	
☐	_____	
☐	_____	
☐	_____	
☐	_____	
☐	_____	

Material safety data sheets (MSDSs)/Safety Data Sheets (SDSs) must be available to field staff.
Indicate below how MSDS information will be provided:

☐ Not applicable
☑ Printed copy in company vehicle
☐ Printed copy in the project trailer/office
☐ Printed copy attached
☐ Electronic copy on field computer

☑ Contractor MSDSs/SDSs are not applicable
☐ Contractor MSDSs/SDSs are attached
☐ Contractor MSDSs/SDSs will be on site and located: _____

☐ Bulk quantities of the following materials will be stored: _____

Contact the project H&S contact for information in determining code and regulatory requirements associated with bulk storage of materials.

Monitoring

☐ Chemical air monitoring is not required for this project.

For projects requiring air monitoring, list the relevant constituents representing a hazard to site workers.

Constituent	Max. Conc.	Units	TWA	Units	STEL	Units	IDLH	Units	LEL/UEL (%)	VD Air=1	VP (mm Hg)	IP (eV)
Benzene	0.002	mg/kg	0.5	p	2.5	p	500	p,N	1.2/7.8	2.8	75	9.24
Toluene	0.006	mg/kg	20	p	150	p,N	500	p,N	1.1/7.1	3.1	21	8.82
Ethylbenzene	0.002	mg/kg	20	p	125	p	800	p,N	0.8/6.7	3.7	874	8.86
Xylenes	0.067	mg/kg	100	p	150	p	900	p,N	1.1/7.0	3.7	9	8.44
Naphthalene	2.1	mg/kg	10	p,s	15	p,s	250	p,N	0.9/5.9	4.4	0.08	8.12
None			9999	-	0	-	0	-	0	0	0	0

Notes: TWAs are ACGIH 8 hr-TLVs unless noted. p-ppm m-mg/m3 s- skin c-ceiling r- resipirable i-inhalable c2- ceiling (2 hr) se-sensitizer "9999" - NA O-OSHA PEL N-NIOSH 10 hr REL "#N/A" -Constituent is not in database, manually enter information

Monitoring Equipment and General Protocols

Air monitoring is required for any task or activity where employees have potential exposure to vapors or particulates above the TWA. Action levels below are appropriate for most situations. Contact the project H&S contact for all stop work situations. Select monitoring frequency and instruments to be used.

Monitoring Frequency: 15 Minute intervals

Indicator Tube/Chip Frequency: >PID/FID action level at 15 minute intervals

	Instrument	Action Levels			Actions
☑	Photoionization Detector	0	<	0.500	Continue work
		>1	-	5.000	Sustained >5 min. continuous monitor, review eng. controls and PPE, proceed with caution
		>5	to	50 ppm	Stop Work; Contact Safety Manager prior to upgrade to Level C
	Lamp (eV): 10.6		>	50 ppm	Sustained >5 min. stop work, contact SSO
☐	Flame Ionization Detector (FID)		<	0.0	Continue work
		0.0	-	0.0	Sustained >5 min. continuous monitor, review eng. controls and PPE, use caution
			>	0.0	Sustained >5 min. stop work, contact SSO
☐	LEL/O2 Meter	0-5% LEL			Continue work
		>5-10% LEL			Continuous monitor, review eng. controls, proceed with caution
		>10% LEL			Stop work, evacuate, contact SSO
		19.5%-23.5% O2			Normal, continue work
		<19.5% O2			O2 deficient, stop work, evacuate, cont. SSO
		>23.5% O2			O2 enriched, stop work, evacuate, contact SSO
☐	Indicator: ☐ tube ☐ chip	≤PEL/TLV			Continue work
		>PEL/TLV			Stop work, review eng. controls and PPE, contact SSO
	Compound(s):				
☑	Particulate Monitor (mists, aerosols, dusts in mg/m^3)		<	2.5	Continue work
		2.5	-	5.00	Use engineering controls, monitor continuously
			>	5.00	Stop work, review controls, contact SSO
☐	Other:	Specify:			Specify:

One or more consituents above is listed with a skin notation. Avoid conditions where dusts, mists, or aerosols are created. Avoid skin contact with impacted media.

Personal Protective Equipment (PPE)

See JSA for the task being performed for PPE requirements. *If the work is not conducted under a JSA, refer to the governing document for PPE requirements. At a minimum, the following checked PPE is required for* *all tasks during field work* *not covered by a JSA on this project:*

Level D or Level D Modified:

☑	Hard hat	☐	Snake chaps/guards	☐	Coveralls:		
☑	Safety glasses	☐	Briar chaps	☐	Apron:		
☐	Safety goggles	☐	Chainsaw chaps	☑	Chem. resistant gloves:	Nitrile	
☐	Face shield	☐	Sturdy boot	☐	Gloves other:		
☑	Hearing protection	☑	Steel toe boot	☐	Chemical boot:		
☐	Rain suit	☐	Metatarsal boot	☐	Boot other:		
☐	Other:			☑	Traffic vest:		
				☐	Life vest:		

Specify Type:

Task specific PPE:

Comments:

Medical Surveillance (*check all that apply*)

- ☐ Medical Surveillance is not required for this project.
- ☑ HAZWOPER medical surveillance applies to all site workers on the project.
- ☑ HAZWOPER medical surveillance applies to all subcontractors on the project.
- ☐ HAZWOPER medical surveillance applies to all site workers on the project except:

- ☐ Other medical surveillance required (describe type and who is required to participate):

- ☐ Client drug and/or alcohol testing required.

Hazardous Materials Shipping and Transportation (*check all that apply*)

- ☐ Not applicable, no materials requiring a Shipping Determination will be transported or shipped
- ☑ A Shipping Determination has been reviewed and provided to field staff
- ☐ A Shipping Determination is attached
- ☐ All HazMat will be transported under Materials of Trade
- ☐ Other (specify):

Roadway Work Zone Safety (*check all that apply*)

- ☐ Not applicable for this project
- ☑ All or portions of the work conducted under a TCP
- ☐ All or portions of the work conducted under a STAR Plan
- ☐ TCP or STAR Plan provided to field staff
- ☐ TCP or STAR Plan attached
- ☐ Other (specify):

Site Control (*check all that apply*)

- ☐ Not applicable for this project.
- ☐ Site control protocols are addressed in JSA or other supporting document (attach)
- ☑ Maintain an exclusion zone of 20 ft. around the active work area
- ☐ Site control is integrated into the STAR Plan or TCP for the project
- ☐ Level C site control - refer to Level C Supplement attached
- ☐ Other (specify):

Decontamination (*check all that apply*)

- ☐ Not applicable for this project.
- ☐ Decontamination protocols are addressed in JSA or other governing document (attach)
- ☑ Level D work- wash hands and face prior to consuming food, drink or tobacco.
- ☐ Level D Modified work- remove coveralls and contain, wash hands and face prior to consuming food, drink or tobacco. Ensure footwear is clean of site contaminants
- ☐ Level C work - refer to the Level C supplement attached.
- ☐ Other (specify):

Sanitation *(check all that apply)*

- ☑ Mobile operation with access to off-site restrooms and potable water
- ☐ Restroom facilities on site provided by client or other contractor
- ☐ Project to provide portable toilets (1 per 20 workers)
- ☐ Potable water available on site
- ☐ Project to provide potable water (assume 1 gal./person/day)
- ☐ Project requires running water (hot and cold, or tepid) with soap and paper towels

Safety Briefings (*check all that apply*)

- ☑ Safety briefing required daily
- ☐ Safety briefing required twice a day
- ☐ Safety briefings required at the following frequency: _____
- ☐ Subcontractors to participate in ARCADIS safety briefings
- ☐ ARCADIS to participate in client/contractor safety briefings
- ☐ Other (specify):

Safety Equipment and Supplies

Safety equipment/supply requirements are addressed in the JSA for the task being performed. *If work is not performed under a JSA, the following safety equipment is required to be present on site in good condition (Check all that apply):*

- ☑ First aid kit
- ☐ Bloodborne pathogens kit
- ☐ Fire extinguisher
- ☐ Eyewash (ANSI compliant)
- ☑ Eyewash (bottle)
- ☑ Drinking water
- ☐ Other: _____

- ☑ Insect repellent
- ☑ Sunscreen
- ☐ Air horn
- ☑ Traffic cones
- ☐ 2-way radios
- ☐ Heat stress monitor

_____

_____

H&S Program (*check all that apply*)

- ☐ H&S metrics are provided on the account level, refer to account guidance
- ☑ TIP required at the following frequency on this project:
  Select One: _____ mhrs 1 time(s) _____ Define: _____
- ☐ H&S Field Assessment required at the following frequency on this project:
  Select One: _____ mhrs _____ time(s) _____ Define: _____
- ☐ Other (specify):

List tasks anticipated for TIP activity:

Excavation

Signatures

I have read, understand and agree to abide by the requirements presented in this health and safety plan. I understand that I have the absolute right to stop work if I recognize an unsafe condition affecting my work until corrected.

Printed Name	Signature	Date

Add additional sheets if necessary

- ☑ Subcontractor Acknowledgement Form attached

You have an absolute right to STOP WORK if unsafe conditions exist!

Attachment 1

HASP Forms

ARCADIS

Document Control Number:TGM - _____

TGM + *project number plus date as follows: xxxxxxxx.xxxx.xxxxx - dd/mm/year*

TAILGATE HEALTH & SAFETY MEETING FORM

This form documents the tailgate meeting conducted in accordance with the Project HASP. Personnel who perform work operations on-site during the day are required to attend this meeting and to acknowledge their attendance, at least daily.

Project Name:			**Project Location:**
Date:	**Time:**	**Conducted by:**	**Signature/Title:**
Client:		**Client Contact:**	**Subcontractor companies:**

TRACKing the Tailgate Meeting

Think through the Tasks (list the tasks for the day):

1 _____ 3 _____ 5 _____

2 _____ 4 _____ 6 _____

Other Hazardous Activities - Check the box if there are any other ARCADIS, Client or other party activities that may pose hazards to ARCADIS operations ☐ If there are none, write "None" here: _____

If yes, describe them here: _____

How will they be controlled? _____

Prework Authorization - check activities to be conducted that require permit issuance or completion of a checklist or similar before work begins:

	Doc #		Doc #		Doc #
☐ Not applicable		☐ Working at Height		☐ Confined Space	
☐ Energy Isolation (LOTO)		☐ Excavation/Trenching		☐ Hot Work	
☐ Mechanical Lifting Ops		☐ Overhead & Buried Utilities		☐ Other permit	

Discuss following questions (for some review previous day's post activities). **Check if yes :**

☐ Incidents from day before to review?	☐ Lessons learned from the day before?	☐ Any Stop Work Interventions yesterday?
☐ Any corrective actions from yesterday?	☐ Will any work deviate from plan?	☐ If deviations, notify PM & client
☐ JLAs or procedures are available?	☐ Field teams to "dirty" JLAs, as needed?	☐ All equipment checked & OK?
☐ Staff has appropriate PPE?	☐ Staff knows Emergency Plan (EAP)?	☐ Staff knows gathering points?

Comments: _____

Recognize the hazards (check all those that are discussed) (Examples are provided) and **A**ssess the Risks (Low, Medium, High - circle risk level) - Provide an overall assessment of hazards to be encountered today and briefly list them under the hazard category.

☐ Gravity (i.e., ladder, scaffold, trips) (L M H)	☐ Motion (i.e., traffic, moving water) (L M H)	☐ Mechanical (i.e., augers, motors) (L M H)
☐ Electrical (i.e., utilities, lightning) (L M H)	☐ Pressure (i.e., gas cylinders, wells) (L M H)	☐ Environment (i.e., heat, cold, ice) (L M H)
☐ Chemical (i.e., fuel, acid, paint) (L M H)	☐ Biological (i.e., ticks, poison ivy) (L M H)	☐ Radiation (i.e., alpha, sun, laser) (L M H)
☐ Sound (i.e., machinery, generators) (L M H)	☐ Personal (i.e. alone, night, not fit) (L M H)	☐ Driving (i.e. car, ATV, boat, dozer) (L M H)

Continue TRACK Process on Page 2

TAILGATE HEALTH & SAFETY MEETING FORM - Pg. 2

Control the hazards (Check all and discuss those methods to control the hazards that will be implemented for the day): Review the HASP, applicable JLAs, and other control processes. Discuss and document any additional control processes.

- [x] **STOP WORK AUTHORITY** (Must be addressed in every Tailgate meeting - (*See statements below*)

☐ Elimination	☐ Substitution	☐ Isolation
☐ Engineering controls	☐ Administrative controls	☐ Monitoring
☐ General PPE Usage	☐ Hearing Conservation	☐ Respiratory Protection
☐ Personal Hygiene	☐ Exposure Guidelines	☐ Decon Procedures
☐ Emergency Action Plan (EAP)	☐ Fall Protection	☐ Work Zones/Site Control
☐ JLA to be developed/used ***(specify)***	☐ LPO conducted ***(specify job/JLA)***	☐ Traffic Control
☐	☐	☐ Other ***(specify)***
☐	☐	☐

Signature and Certification Section - Site Staff and Visitors

Name/Company/Signature	Initial & Sign in Time	Initial & Sign out Time	I have read and understand the HASP

Important Information and Numbers

All site staff should arrive fit for work. If not, they should report to the supervisor any restrictions or concerns.

In the event of an injury, employees will call WorkCare at 1.800.455.6155 and then notify the field supervisor who will, in turn, notify Corp H&S at 1.720.344.3844.

In the event of a motor vehicle accident, employees will notify the field supervisor who will then notify Corp H&S at 1.720.344.3844 and then Corp Legal at 1.720.344.3756.

In the event of a utility strike or other damage to property of a client or 3rd party, employees will immediately notify the field supervisor, who will then immediately notify Corp Legal at 1.678.373.9556 and Corp H&S at 1.720.344.3500

Visitor Name/Co - not involved in work

	In	Out
	In	Out
	In	Out
	In	Out

I will STOP the job any time anyone is concerned or uncertain about health & safety or if anyone identifies a hazard or additional mitigation not recorded in the site, project, job or task hazard assessment.

I will be alert to any changes in personnel, conditions at the work site or hazards not covered by the original hazard assessments.

If it is necessary to **STOP THE JOB,** I will perform **TRACK**; and then amend the hazard assessments or the HASP as needed.

I will not assist a subcontractor or other party with their work unless it is absolutely necessary and then only after I have done TRACK and I have thoroughly controlled the hazard.

Post Daily Activities Review - Review at end of day or before next day's work (Check those applicable and explain:)

- ☐ Lessons learned and best practices learned today: _____
- ☐ Incidents that occurred today: _____
- ☐ Any Stop Work interventions today? _____
- ☐ Corrective/Preventive Actions needed for future work: _____
- ☐ Any other H&S issues: _____

Keep H&S 1st in all things

WorkCare - 1.800.455.6155
Near Loss Hotline - 1.866.242.4304

Real Time Exposure Monitoring Data Collection Form

Document all air monitoring conducted on the Site below. Keep this form with the project file.

Site Name: _____ Date: _____

Instrument: _____ Model: _____ Serial #: _____

Calibration Method: (Material used settings, etc.)	
Calibration Results:	
Calibrated By:	

Activity Being Monitored	Compounds/Hazards Monitored	Time	Reading	Action Required? Y/N

Describe Any Actions Taken as a Result of this Air Monitoring and Why (does it match Table 5-1):

_____

_____

Employee Signature Form

I certify that I have read, understand, and will abide by the safety requirements outlined in this HASP.

Printed Name	Signature	Date

Subcontractor Acknowledgement: Receipt of HASP Signature Form

ARCADIS claims no responsibility for the use of this HASP by others although subcontractors working at the site may use this HASP as a guidance document. In any event, ARCADIS does not guarantee the health and/or safety of any person entering this site. Strict adherence to the health and safety guidelines provided herein will reduce, but not eliminate, the potential for injury at this site. To this end, health and safety becomes the inherent responsibility of personnel working at the site.

Printed Name	Company	Signature	Date

Visitor Acknowledgement and Acceptance of HASP Signature Form

By signing below, I waive, release and discharge the owner of the site and ARCADIS and their employees from any future claims for bodily and personal injuries which may result from my presence at, entering, or leaving the site and in any way arising from or related to any and all known and unknown conditions on the site.

Name	Company	Reason for Visit	Date/Time On Site	Date/Time Off Site

Hazardous Materials Transportation Form

	Vehicle (place X in box)	Type (pick-up, car, box truck, etc.)
Personal		
Rental		
ARCADIS owned/leased		
Government owned		
Trailer		

Materials Transported	Quantity	Storage/Transport Container

List Trained Drivers:

_____

_____

Hazardous Materials Shipment Form

Material Description and Proper Shipping Name (per DOT or IATA)	Shipment Quantity	DOT Hazard Classification	Shipment Method (air/ground)

List Shipper (i.e., who we are offering the shipment to):

_____

_____

List Trained Employee(s):

_____

_____

Attachment 2

Utility Checklist

ARCADIS
Infrastructure · Water · Environment · Buildings

Utilities and Structures Checklist

Project: _____
Project Number: _____
Date: _____
Work locations applicable to this clearance checklist:

Pre-Field Work

One Call or "811" notified 48-72 hours in advance of work? ☐ Yes ☐ No
Utility companies notified during the One Call process ☐ See attached ticket

_____ _____ _____ _____
_____ _____ _____ _____
_____ _____ _____ _____

List any other utilities requiring notification: ☐ None

_____ _____ _____ _____

Client provided utility maps or "as built" drawings showing utilities? ☐ Yes ☐ No

Field Work

Markings present: ☐ Paint ☐ Pin flags/stakes ☐ Other ☐ None

Subsurface Utility Lines of Evidence Used (3 Minimum):

☐ One Call/"811"
☐ Client Provided Maps/Drawings **OR** ☐ Maps/Drawings requested but not provided
☐ Client Clearance
☐ Interviews: Name(s)/Affiliation(s) _____
_____
_____

Did persons interviewed indicate depths of any utilities in the subsurface?
☐ Yes, depths provided:

☐ Did not know or refused to answer

Comments:

☐ Site Inspection
☐ GPR
☐ Air-Knife
☐ Hydro-Knife
☐ Public Records/Maps
☐ Radiofrequency
☐ Metal Detector
☐ Handauger
☐ Potholing
☐ Probing
☐ Private Locator: Name and Company: _____
☐ Marine Locator: Name and Company: _____
☐ Other:

_____
_____

Tips for Successful Utility Location:
1. No excessive turning or downward force of handaugers/shovels, etc.
2. No hammering- no pickaxes-no digging bars-no hurrying or shortcutting
3. Select alternate/backup locations for clearance
4. Utilities may run directly under asphalt/concrete or be > 5 ft depth
5. Be on site when utilizing private utility locators

T R A C K

ARCADIS
Infrastructure · Water · Environment · Buildings

Site Inspection

During inspections look for the following ("YES" requires follow up investigation):

		Utility color codes		
a)	Natural gas line present (evidence of a gas meter)?	Yellow	☐ Yes	☐ No
b)	Evidence of subsurface electric lines :	Red		
	i) Conduits to ground from electric meter?		☐ Yes	☐ No
	ii) Overhead electric lines absent		☐ Yes	☐ No
	iii) Light poles, electric devices with no overhead lines?		☐ Yes	☐ No
c)	Evidence of water lines:	Blue		
	i) Water meter on site?		☐ Yes	☐ No
	ii) Fire hydrants in vicinity of work?		☐ Yes	☐ No
	iii) Irrigation systems?		☐ Yes	☐ No
d)	Evidence of sewers or storm drains:	Green		
	i) Restrooms or kitchen on site?		☐ Yes	☐ No
	ii) Gutter down spouts going into ground		☐ Yes	☐ No
	iii) Grates in ground in work area		☐ Yes	☐ No
e)	Evidence of telecommunication lines:	Orange		
	i) Fiber optic warning signs in areas?		☐ Yes	☐ No
	ii) Lines from cable boxes running into ground?		☐ Yes	☐ No
	iii) Conduits from power poles running into ground?		☐ Yes	☐ No
	iv) Aboveground boxes or housings in work area?		☐ Yes	☐ No
f)	Underground storage tanks:			
	i) Tank pit present?		☐ Yes	☐ No
	ii) Product lines running to dispensers/buildings?		☐ Yes	☐ No
	iii) Vent present away from tank pit?		☐ Yes	☐ No
g)	Proposed excavation markings in work area?	White	☐ Yes	☐ No
h)	Other:			
	i) Evidence of linear asphalt or concrete repair		☐ Yes	☐ No
	ii) Evidence of linear ground subsidence or change in vegetation?		☐ Yes	☐ No
	iii) Manholes or valve covers in work area?		☐ Yes	☐ No
	iv) Warning signs ("Call Before you Dig", etc) on or adjacent to site?		☐ Yes	☐ No
	v) Utility color markings not illustrated in this checklist?		☐ Yes	☐ No
i)	Aboveground lines in or near the work area:			
	i) < 50 kV within 10 ft of work area?		☐ Yes	☐ No
	ii) >50 - 200 kV within 15 ft of work area?		☐ Yes	☐ No
	iii) >200-350 kV within 20 ft of work area?		☐ Yes	☐ No
	iv) >350-500 kV within 25 ft of work area?		☐ Yes	☐ No
	v) >500-750 kV within 35 ft or work area?		☐ Yes	☐ No
	vi) >750-1000 kV within 45 ft of work area?		☐ Yes	☐ No

Comments:

Do not initiate intrusive work if utilities are suspected to be present in area and are not located, markings are over 14 days old, or if clearance methods provide incomplete or conflicting information. Do not perform intrusive work within 30 inches of a utility marking without hand clearing.

Name and signature of person completing the checklist:

Name: _____

Signature: _____

Date: _____

Attachment 3

MSDS

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 25.05.2012 Revision: 24.05.2012

1 Identification of the substance/mixture and of the company/undertaking

· **1.1 Product identifier**

· **Trade name: ALCONOX**

· **Application of the substance / the preparation** Cleaning material/ Detergent

· **1.3 Details of the supplier of the Safety Data Sheet**

· **Manufacturer/Supplier:**
Alconox, Inc.
30 Glenn St., Suite 309
White Plains, NY 10603
Phone: 914-948-4040

· **Further information obtainable from:** Product Safety Department

· **1.4 Emergency telephone number:**
ChemTel Inc.
(800)255-3924, +1 (813)248-0585

2 Hazards identification

· **2.1 Classification of the substance or mixture**

· **Classification according to Regulation (EC) No 1272/2008**

GHS05 corrosion

Eye Dam. 1 H318 Causes serious eye damage.

GHS07

Skin Irrit. 2 H315 Causes skin irritation.

· **Classification according to Directive 67/548/EEC or Directive 1999/45/EC**

Xi; Irritant

R38-41: Irritating to skin. Risk of serious damage to eyes.

· **Information concerning particular hazards for human and environment:**
The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

· **Classification system:**
The classification is according to the latest editions of the EU-lists, and extended by company and literature data.

· **2.2 Label elements**

· **Labelling according to Regulation (EC) No 1272/2008**
The product is classified and labelled according to the CLP regulation.

· **Hazard pictograms**

GHS05

· **Signal word** Danger

· **Hazard-determining components of labelling:**
Benzenesulfonic Acid, Sodium Salts

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· **Hazard statements**
H315 Causes skin irritation.
H318 Causes serious eye damage.
· **Precautionary statements**

P280	Wear protective gloves/protective clothing/eye protection/face protection.
P264	Wash thoroughly after handling.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/physician.
P321	Specific treatment (see on this label).
P362	Take off contaminated clothing and wash before reuse.
P332+P313	If skin irritation occurs: Get medical advice/attention.
P302+P352	IF ON SKIN: Wash with plenty of soap and water.

· **Hazard description:**
· **WHMIS-symbols:**
D2B - Toxic material causing other toxic effects

· **NFPA ratings (scale 0 - 4)**

Health = 1
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = 1
Fire = 0
Reactivity = 0

· **2.3 Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **3.2 Mixtures**
· **Description:** Mixture of substances listed below with nonhazardous additions.

· **Dangerous components:**		
CAS: 68081-81-2	Benzenesulfonic Acid, Sodium Salts Xi R38-41 Eye Dam. 1, H318 Skin Irrit. 2, H315	10-25%
CAS: 497-19-8 EINECS: 207-838-8 Index number: 011-005-00-2	sodium carbonate Xi R36 Eye Irrit. 2, H319	2,5-10%

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CAS: 7722-88-5 EINECS: 231-767-1	tetrasodium pyrophosphate substance with a Community workplace exposure limit	2,5-10%
CAS: 151-21-3 EINECS: 205-788-1	sodium dodecyl sulphate Xn R21/22; Xi R36/38	2,5-10%
	Acute Tox. 4, H302; Acute Tox. 4, H312; Skin Irrit. 2, H315; Eye Irrit. 2, H319	

· **Additional information:** For the wording of the listed risk phrases refer to section 16.

4 First aid measures

· **4.1 Description of first aid measures**
· **After inhalation:** Supply fresh air; consult doctor in case of complaints.
· **After skin contact:**
Immediately wash with water and soap and rinse thoroughly.
If skin irritation continues, consult a doctor.
· **After eye contact:**
Remove contact lenses if worn.
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
· **After swallowing:**
Do not induce vomiting; call for medical help immediately.
Rinse out mouth and then drink plenty of water.
· **4.2 Most important symptoms and effects, both acute and delayed**
No further relevant information available.
· **4.3 Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Firefighting measures

· **5.1 Extinguishing media**
· **Suitable extinguishing agents:**
CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· **5.2 Special hazards arising from the substance or mixture**
No further relevant information available.
· **5.3 Advice for firefighters**
· **Protective equipment:**
Wear self-contained respiratory protective device.
Wear fully protective suit.

6 Accidental release measures

· **6.1 Personal precautions, protective equipment and emergency procedures**
Product forms slippery surface when combined with water.
· **6.2 Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **6.3 Methods and material for containment and cleaning up:**
Pick up mechanically.
Clean the affected area carefully; suitable cleaners are:
Warm water
· **6.4 Reference to other sections**
See Section 7 for information on safe handling.

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See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

· **7.1 Precautions for safe handling**
Prevent formation of dust.
Keep receptacles tightly sealed.
· **Information about fire - and explosion protection:** No special measures required.

· **7.2 Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** No special requirements.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:** Protect from humidity and water.
· **7.3 Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

· **Additional information about design of technical facilities:** No further data; see item 7.

· **8.1 Control parameters**

· **Ingredients with limit values that require monitoring at the workplace:**	
7722-88-5 tetrasodium pyrophosphate	
REL (USA)	5 mg/m³
TLV (USA)	TLV withdrawn
EV (Canada)	5 mg/m³

· **Additional information:** The lists valid during the making were used as basis.

· **8.2 Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing
Wash hands before breaks and at the end of work.
Avoid contact with the skin.
Avoid contact with the eyes and skin.
· **Respiratory protection:**
In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use self-contained respiratory protective device.
· **Protection of hands:**

Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation

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· **Material of gloves**
Butyl rubber, BR
Nitrile rubber, NBR
Natural rubber, NR
Neoprene gloves
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
· **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· **Eye protection:**

Safety glasses

· **Body protection:** Protective work clothing

9 Physical and chemical properties

· **9.1 Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Powder
Colour:	White
· **Odour:**	Odourless
· **Odour threshold:**	Not determined.
· **pH-value (10 g/l) at 20°C:**	9,5 (- NA for Powder form)
· **Change in condition**	
Melting point/Melting range:	Undetermined.
Boiling point/Boiling range:	Undetermined.
· **Flash point:**	Not applicable.
· **Flammability (solid, gaseous):**	Not determined.
· **Ignition temperature:**	
Decomposition temperature:	Not determined.
· **Self-igniting:**	Product is not selfigniting.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits:**	
Lower:	Not determined.
Upper:	Not determined.
· **Vapour pressure:**	Not applicable.
· **Density at 20°C:**	1,1 g/cm³
· **Relative density**	Not determined.
· **Vapour density**	Not applicable.

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· **Evaporation rate**	Not applicable.
· **Solubility in / Miscibility with water:**	Soluble.
· **Segregation coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not applicable.
Kinematic:	Not applicable.
· **Solvent content:**	
Organic solvents:	0,0 %
Solids content:	100 %
· **9.2 Other information**	No further relevant information available.

10 Stability and reactivity

· **10.1 Reactivity**
· **10.2 Chemical stability**
· **Thermal decomposition / conditions to be avoided:**
No decomposition if used according to specifications.
· **10.3 Possibility of hazardous reactions**
Reacts with acids.
Reacts with strong alkali.
Reacts with strong oxidizing agents.
· **10.4 Conditions to avoid** No further relevant information available.
· **10.5 Incompatible materials:** No further relevant information available.
· **10.6 Hazardous decomposition products:**
Carbon monoxide and carbon dioxide
Phosphorus compounds
Sulphur oxides (SOx)

11 Toxicological information

· **11.1 Information on toxicological effects**
· **Acute toxicity:**
· **Primary irritant effect:**
· **on the skin:** Irritant to skin and mucous membranes.
· **on the eye:** Strong irritant with the danger of severe eye injury.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**
The product shows the following dangers according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version:
Irritant
Swallowing will lead to a strong caustic effect on mouth and throat and to the danger of perforation of esophagus and stomach.

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Trade name: ALCONOX

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12 Ecological information

· **12.1 Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **12.2 Persistence and degradability** No further relevant information available.
· **12.3 Bioaccumulative potential** Not worth-mentioning accumulating in organisms
· **12.4 Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 2 (German Regulation) (Self-assessment): hazardous for water
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.
· **12.5 Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **12.6 Other adverse effects** No further relevant information available.

13 Disposal considerations

· **13.1 Waste treatment methods**
· **Recommendation**
Smaller quantities can be disposed of with household waste.
Small amounts may be diluted with plenty of water and washed away. Dispose of bigger amounts in accordance with Local Authority requirements.
The surfactant used in this product complies with the biodegradability criteria as laid down in Regulation (EC) No. 648/2004 on detergents. Data to support this assertion are held at the disposal of the competent authorities of the Member States and will be made available to them, at their direct request or at the request of a detergent manufacturer.

· **Uncleaned packaging:**
· **Recommendation:** Disposal must be made according to official regulations.
· **Recommended cleansing agents:** Water, if necessary together with cleansing agents.

14 Transport information

· **14.1 UN-Number**	
· **DOT, ADR, ADN, IMDG, IATA**	N/A
· **14.2 UN proper shipping name**	
· **DOT, ADR, ADN, IMDG, IATA**	N/A
· **14.3 Transport hazard class(es)**	
· **DOT, ADR, ADN, IMDG, IATA**	
· **Class**	N/A
· **14.4 Packing group**	
· **DOT, ADR, IMDG, IATA**	N/A
· **14.5 Environmental hazards:**	
· **Marine pollutant:**	No

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· **14.6 Special precautions for user**	Not applicable.
· **14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **UN "Model Regulation":**	N/A

15 Regulatory information

· **15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **United States (USA)**
· **SARA**

· **Section 355 (extremely hazardous substances):**
None of the ingredients is listed.

· **Section 313 (Specific toxic chemical listings):**
None of the ingredients is listed.

· **TSCA (Toxic Substances Control Act):**
All ingredients are listed.

· **Proposition 65 (California):**

· **Chemicals known to cause cancer:**
None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for males:**
None of the ingredients is listed.

· **Chemicals known to cause developmental toxicity:**
None of the ingredients is listed.

· **Carcinogenic Categories**

· **EPA (Environmental Protection Agency)**
None of the ingredients is listed.

· **TLV (Threshold Limit Value established by ACGIH)**
None of the ingredients is listed.

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
None of the ingredients is listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**
None of the ingredients is listed.

· **Canada**

· **Canadian Domestic Substances List (DSL)**
All ingredients are listed.

· **Canadian Ingredient Disclosure list (limit 0.1%)**
None of the ingredients is listed.

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· **Canadian Ingredient Disclosure list (limit 1%)**	
497-19-8	sodium carbonate
7722-88-5	tetrasodium pyrophosphate
151-21-3	sodium dodecyl sulphate

· **15.2 Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Relevant phrases**
H302 Harmful if swallowed.
H312 Harmful in contact with skin.
H315 Causes skin irritation.
H318 Causes serious eye damage.
H319 Causes serious eye irritation.

R21/22 Harmful in contact with skin and if swallowed.
R36 Irritating to eyes.
R36/38 Irritating to eyes and skin.
R38 Irritating to skin.
R41 Risk of serious damage to eyes.

· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)

GAS INNOVATIONS

MATERIAL SAFETY DATA SHEET (MSDS) ISOBUTYLENE

PRODUCT IDENTIFICATION	▪D.O.T. SHIPPING NAME	Isobutylene
	▪SYNONYM (S)	Liquefied Petroleum Gas, Isobutene, 2 Methylpropene
	▪D.O.T. I.D. NUMBER	UN-1055
	▪D.O.T. HAZZARD CLASS	2.1 Flammable Gas
	▪D.O.T. LABEL (S)	Flammable Gas
	▪C.A.S. NUMBER	115-11-7
	▪CHEMICAL FORMULA	C_4H_8 or $(CH_3)_2C:CH_2$
PHYSICAL DATA	▪MOLECULAR WEIGHT	56.108
	▪FREEZING POINT	-140.4°C, -220.6°F
	▪BOILING POINT	-6.9°C, 19.6°F
	▪VAPOR PRESSURE	168 kPa (gauge), 24.3 psig @21.1°C
	▪SPECIFIC VOLUME	0.418m_3/kg, 6.7 ft_3/lb @ 1 atm, 21.1°C
	▪RELATIVE DENSITY, (air=1)	1.947 @ 1 atm, 25°C
	▪SOLUBILITY IN WATER	Negligible
	▪DESCRIPTION	At room temperature and atmospheric pressure isobutene is a colorless, flammable gas, with an unpleasant odor. It is shipped as a liquefied gas under its own vapor pressure.
FIRE AND EXPLOSION HAZARD DATA	▪FLAMMABLE LIMITS IN AIR	1.8 – 9.6 % by volume
	▪AUTO-IGNITION TEMPERATURE	465°C, 869°F
	▪ FIRE FIGHTING PROCEDURES	The only safe way to extinguish an isobutylene fire is to stop the flow of gas. If the flow cannot be stopped, let the fire burn out while cooling the cylinder and the surroundings using a water spray. Personnel may have to wear approach type protective suits and positive pressure self-contained breathing apparatus. Firefighters' turnout gear may be inadequate. Small secondary fires may be brought under control by using carbon dioxide or a dry chemical fire extinguisher and stopping the flow.

Date prepared: September 7, 2007

18005 E. Hwy 225 La Porte, TX 77571 www.gasinnovations.com Ph: 281-471-2200 Fax: 281-471-2201

	▪UNUSUAL HAZARDS	1. Cylinders exposed to fire may rupture with violent force. Extinguish surrounding fire and keep cylinders cool by applying water from a maximum possible distance with a water spray. 2. Flammable gases may spread from a spill after the fire is extinguished and be subject to re-ignition.
HEALTH HAZARD DATA	▪ PERMISSIBLE EXPOSURE LIMITS	OSHA TWA None established. ASGIH TWA None established.
	▪ ACCUTE EFFECTS OVEREXPOSURE	Isobutylene is a simple asphyxiant. Inhalation of high concentrations may cause rapid respiration, dizziness, fatigue, and nausea. Massive exposure may cause unconsciousness and death. Contact with the liquid phase or with the cold has escaping from a cylinder may cause frostbite.
	▪ CHRONIC EFFECTS OF OVEREXPOSURE	None known.
FIRST AID INFORMATION	▪ INHALATION	Move victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.
	▪ CONTACT	Treat for frostbite.
REACTIVITY DATE	▪ STABILITY	(X) Stable. ( ) Unstable.
	▪ INCOMPATIBILITY	Oxidizing materials and compounds that can add across double bonds.
	▪ HAZARDOUS DECOMPOSITION/ OXIDATION PRODUCTS	Carbon monoxide, carbon dioxide.
	▪ POLYMERIZATION	(X) Will not occur ( ) May occur
SPILL OR LEAKAGE PROCEDURE		Shut off all ignition sources and ventilate the area. For controlling large flow, personnel may have to wear approach-type protective suits and positive pressure self-contained breathing apparatus.

Date prepared: September 7, 2007

PRECAUTIONS

▪ STORAGE RECOMMENDATIONS	Cylinders should be stored and used in dry, cool, well-ventilated areas away from sources of heat or ignition. Do not store with oxidizers
▪ PERSONAL PROTECTIVE EQUIPMENT	1. Eye protection – Safety glasses should be worn. 2. Respiratory protection – Approved respiratory equipment must be worn when airborne concentrations exceed safe levels. 2. Skin protection – No specific equipment is required. Gloves are recommended for cylinder handling.
▪ BEFORE USING THE GAS	1. Secure the cylinder to prevent it from failing or being Knocked over. 2. Leak check the lines and equipment. 3. Have an emergency plan covering steps to be taken in the event of an accidental release.

DISCLAIMER

The information, recommendations, and suggestions herein were compiled form reference material and other sources believed to be reliable. However, the MSDS's accuracy or completeness is not guaranteed by Gas Innovations or its affiliates, nor is any responsibility assumed or implied for any loss or damage resulting from inaccuracies or omissions. Since conditions of use are beyond our control, no warranties of merchantability or fitness for a particular purpose are expressed or implied. This MSDS is not intended as a license to operate under, or recommendation to infringe on, any patents. Appropriate warnings and safe handling procedures should be provided to handlers and users.

Date prepared: September 7, 2007

APPENDIX F

Generic Community Air Monitoring Plan

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (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 can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

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

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should 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 must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (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 must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can 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 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

APPENDIX G

Field Sampling Plan

ARCADIS Design & Consultancy for natural and built assets

National Fuel Gas Distribution Corporation

APPENDIX G – FIELD SAMPLING PLAN

Former Buffalo Service Station – Off-Site
Site #C915194A
Buffalo, Erie County, New York

May 2016; Revised May 2021

APPENDIX G – FIELD SAMPLING PLAN

Former Buffalo Service Station – Off-Site
Site #C915194A
Buffalo, Erie County, New York

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Date:

May 2016; Revised May 2021

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FIGURES

ATTACHMENTS

1 INTRODUCTION

1.1 General

This Field Sampling Plan (FSP) was prepared on behalf of National Fuel Gas Distribution Corporation (National Fuel) to support the Site Management Plan (SMP) for the Former Buffalo Service Station (BSS) Off-Site site located in Buffalo, New York ("Site").

This FSP contains field procedures and sample collection methods to be used to characterize environmental media as needed for future site investigation, redevelopment, and/or utility installation and maintenance, if necessary. The FSP includes procedures to: (1) collect, visually characterize, and analyze soil samples; (2) evaluate subsurface conditions and structures; and (3) monitor groundwater.

Site background information, including a summary of the Site Characterization results, are included in the SMP. The FSP should be used in conjunction with the Excavation Work Plan (EWP), the Quality Assurance Sampling and Analysis Project Plan Project Plan (QASAPP), the Health and Safety Plan (HASP), and the Community Air Monitoring Plan (CAMP) included as Appendices to the SMP.

The EWP outlines actions to be performed for any intrusive work below 12 feet below grade (570 feet above mean sea level [AMSL]). The QASAPP outlines the procedures that will be used to ensure that data collected and subsequent reports are of high enough quality to meet project objectives, as well as a description of general field and laboratory procedures. The HASP presents the procedures and practices to be followed during ground-intrusive activities to promote the safety of workers, and is designed to prevent occupational injuries and worker exposures to chemical, physical and biological hazards. The CAMP provides a measure of protection for the downwind communities from potential airborne release of residual impacts during intrusive work activities.

1.2 Overview of Field Activities

The following field activities will potentially be performed in connection with future site activities:

- Drilling soil borings
- Installing monitoring wells
- Measuring fluid levels
- Collecting soil samples during the advancement of the monitoring wells and soil borings
- Excavating test pits
- Collecting groundwater samples
- Conducting a geophysical survey
- Conducting a site survey

2 FIELD ACTIVITIES

2.1 General Field Guidelines

All underground utilities will be identified prior to any drilling or subsurface sampling. Public and privately owned utilities will be located by contacting Dig Safely New York such that responsible agencies can mark their underground utilities at the Site. Site access agreements will be obtained prior to conducting any field work. Other potential on site hazards such as traffic, overhead power lines, and building hazards will be identified during a site reconnaissance visit.

Field log books will be maintained by the Field Manager/ Site Supervisor and other team members to provide a daily record of significant events, observations, and measurements during the field investigation.

Information pertinent to the field investigation and/or sampling activities will also be recorded in the log books. The books will be bound with consecutively numbered pages. Entries in the log book will include, at a minimum, the following information:

- Name of author, date of entry, and physical/environmental conditions during field activity
- Purpose of sampling activity
- Location of sampling activity
- Name of field crew members
- Name of any site visitors
- Sample media (soil, sediment, groundwater, etc.)
- Sample collection method
- Number and volume of sample(s) taken
- Description of sampling point(s)
- Volume of groundwater removed before sampling (where appropriate)
- Preservatives used
- Date and time of collection
- Sample identification number(s)
- Field observations
- Any field measurements made, such as pH, temperature, conductivity, water-level, etc.

All original data recorded in field log books and Chain of Custody (COC) records will be written with indelible ink. If an error is made in these documents, the individual entering the data will make all corrections simply by crossing a single line through the error and entering the correct information. The erroneous information will not be erased or made illegible. Any subsequent error discovered on an

accountable document will be corrected by the person who made the entry. All subsequent corrections will be initialed and dated.

2.2 Sample Labeling, Packing, and Shipping

Each sample will be given a unique identification. With this type of identification, no two samples will have the same label.

Samples will be promptly labeled upon collection with the following information:

- Project number and site
- Unique sample identification
- Analysis required
- Date and time sampled
- Sample type (composite or grab)
- Preservative, if applicable

Clear tape will be secured over the sample label and the COC will be initiated. A sample COC form is included on Figure G-1.

If samples are to be shipped by commercial carrier (e.g., UPS), sample bottles/jars will be packed in coolers containing the following:

- One-to-two inches of vermiculite or bubble wrap on the bottom of the cooler
- Water ice packaged in re-sealable plastic bags
- Sufficient vermiculite or bubble wrap to fill in the remaining area
- The completed COC in a re-sealable plastic bag, taped in place on the inside cover of the cooler

The cooler will then be sealed with tape. If the cooler contains a drain plug, it must be sealed with duct tape. Appropriate shipping labels, such as "this-end-up" and "fragile" stickers will be affixed to the cooler. Samples will be hand delivered or delivered by an express carrier within 48 hours of sample collection. The express carrier will not be required to sign the COC form; however, the shipping receipt should be retained by the sampler, and forwarded to the project files.

2.3 Equipment Decontamination

2.3.1 Drill Rig Decontamination

A decontamination pad will be lined with plastic sheeting on a surface sloped to a sump. The sump must also be lined and of sufficient volume to contain approximately 20 gallons of decontamination water. All drilling equipment including rear-end of drilling rig, augers, bits, rods, tools, split spoon samplers, and tremie pipe will be cleaned on the decontamination pad with a high pressure hot water "steam cleaner" unit and scrubbed with a wire brush, as needed, to remove dirt, grease, and oil before beginning work in the project area. If heavy accumulations of tars or oils are present on the downhole tools, a citrus-based

cleaner (e.g., Citra-Solv®) may be used to aid in equipment cleaning. Tools, drill rods, and augers will be placed on sawhorses, decontaminated pallets, or polyethylene plastic sheets following steam cleaning. Direct contact with the ground will be avoided. The back of the drill rig and augers, rods, and tools will be decontaminated between each drilling location according to the above procedures. Decontamination water will be contained in a dedicated plastic tank or 55-gallon open-top drums located on site. All open-top drums will remain closed when not in use.

Following decontamination of all heavy site equipment, the decontamination pad will be decommissioned. The decommissioning will be completed by:

- Transferring the bulk of the remaining liquids and solids into the drums, tanks, and roll-offs.
- Rolling the sheeting used in the decontamination pad onto itself to prevent discharge of the remaining materials to the ground surface. Once rolled up, the polyethylene sheeting will be placed in the roll-off or drums used for disposal of personal protective equipment (PPE) and disposable equipment.

Unless sealed in manufacturer's packaging, polyvinyl chloride (PVC) monitoring well casing screens will be decontaminated by the above procedures before installation.

2.3.2 Sampling Equipment Decontamination

Prior to every entry into each borehole, all non-dedicated bowls, spoons, hand augers, bailers, and filtering equipment will be washed with potable water and a detergent (such as Alconox). Decontamination may take place at the sampling location as long as all liquids are contained in pails, buckets, etc. The sampling equipment will then be rinsed with potable water, followed by a 10% "pesticide-grade" methanol rinse, and finally a distilled water rinse. When sampling for inorganic constituents in an aqueous phase, an additional rinse step will be added prior to the rinse with methanol. The rinse step will entail a rinse with a 10% "ultra pure-grade" nitric acid followed by a distilled water rinse. Between rinses, equipment will be placed on polyethylene sheets or aluminum foil if necessary. At no time will washed equipment be placed directly on the ground. Equipment will be either be used immediately or wrapped in plastic or aluminum foil for storage or transportation from the designated decontamination area to the sampling location.

2.4 Drilling Procedures

The drilling and geological logging methods to be used are as follows:

- Boreholes in the overburden will be drilled using hollow stem auger or direct push techniques. If difficult drilling conditions are encountered in the subsurface soils, alternate drilling methods may be used.
- Boreholes drilled using hollow stem augers will be advanced using a drill rig equipped with 3- or 4-inch hollow stem augers. Soil samples will be collected continuously to the bottom of the borings using 2-foot-long, 2-inch diameter discrete split spoon samplers advanced 2 feet per sampling run. Sampling method ASTM D1586-84 (Standard Method for Penetration Test and Split-Barrel Sampling of Soils) will be followed, unless otherwise authorized by the Field Manager/Site Supervisor.

- Boreholes drilled using direct push techniques will be advanced using either a truck or tractor mounted push/percussion drill rig. Soil samples will be collected continuously to the bottom of the borings using 2- or 4-foot-long, 2-inch diameter Macrocore® samplers, equipped with disposable PVC liners, advanced 2 to 4 feet per sampling run.
- For samples that may be submitted for chemical analysis, split spoons will be decontaminated, as specified in Section 2.3.2, between uses. Sample descriptions, photoionization detector (PID) readings, and location will be recorded in the field book.
- Upon completion of each boring, the borehole will be sealed with a bentonite/cement grout tremied in place from the bottom of the borehole up.
- A plywood sheet or tub may be placed around the auger or casing when drilling to contain cuttings.
- Cuttings will be placed in a drum or roll off. Decontamination water will be placed in drums or plastic tanks. Soil cuttings and decontamination water will be picked up and containerized at the end of each work day. The roll-offs or open-top drums used to contain the solids will be covered when not in use.

Pertinent notes regarding the drilling work will be recorded in the field book.

2.5 Test Pit Excavation

Test pits may be excavated using a decontaminated track-mounted backhoe as appropriate. The following materials would be available, as required, during test pit excavation:

- Appropriate PPE, as required in the site HASP
- Backhoe with bucket
- Shovel
- Plastic sheeting
- Stainless steel shovel, scoop, hand auger, or hand trowel
- Stainless steel pan
- Appropriate sample containers and packing materials, if required
- Potable water
- Steam cleaning equipment
- Photoionization detector (PID)
- Camera/video camera
- Sample containers and forms
- Test pit/trench log
- Ground stakes

The following procedures would be followed during test-pit excavation:

1. Identify the test pit/trench number on an appropriate log or in the designated field notebook, along with the temperature, weather, date, time, and personnel at the Site.
2. Set up decontamination station and decontaminate the backhoe, bucket, shovel, and other sampling apparatus with a high-pressure steam rinse using a tap water source.
3. Put on appropriate health and safety equipment.
4. Place the plastic sheeting on the ground next to the test pit/trench location.
5. Position backhoe and personnel at upwind (to the extent feasible) locations of the test pit/trench area.
6. Turn on the PID. Measure and record on the test pit/trench log background PID readings on the log or in the field book.
7. Excavate the soil with the backhoe in approximately one-foot increments. At each interval, examine and classify the soils in accordance with the Unified Soil Classification System. Record these observations in the test pit/trench log or field book. Also screen the soil samples with a PID. These measurements would also be recorded in a test pit/trench log and/or field notebook.
8. If the contents of the test pit/trench visually appear to consist of site residues, the test pit/trench contents may be sampled. If sampling is required, the test pit/trench will be sampled with a shovel if the test pit/trench is less than 3 feet deep. If the test pit/trench is greater than three feet deep, then the test pit/trench would be sampled with the backhoe bucket. The contents of the bucket would then be sampled with a cleaned stainless steel hand trowel.
9. If sampling is required, the samples would be collected in the appropriate containers and placed immediately in a cooler of wet ice to maintain a 4ºC temperature for preservation. Volatile organic samples would be collected immediately after sample retrieval. Next, a sufficient amount of the remaining soil would be removed from the sampling device and homogenized by mixing thoroughly in a clean stainless steel pan with a clean stainless steel trowel. Samples would be selected for analytical characterization only if visible residues are present and/or relatively high PID screening readings are measured.
10. The test pit/trench would be terminated when significant residues are encountered or the limit (reach) of the backhoe, or refusal (whichever is encountered first).
11. Soils generated during test pitting would be staged on plastic during excavation, monitored for PID readings and visual observations, and then placed back into the test pit/trench. Clean fill will be placed at the surface.
12. A labeled stake would be placed at the test pit/trench location.
13. A photograph of each location before, during, and after each test pit/trench is excavated will be taken.
14. The backhoe, backhoe bucket, and all tools used at the test pit/trench area would be decontaminated using a high-pressure steam rinse using a tap water source. Decontamination water and residual materials associated with decontamination would be contained.

2.6 Sample Description

Collected samples will be described by persons who have been trained in soil description procedures and have a degree in geology or a geology-related discipline. The procedure that will be followed for describing soils is contained in Attachment G-1.

2.7 Subsurface Soil Analytical Sampling Procedure

Subsurface soils collected from the unconsolidated fill and soils beneath the Site using split spoon or Macrocore® sampling methods will be selected for laboratory analysis based on:

- their position in relation to potential source areas.
- the visual presence of source materials.
- the relative levels of volatile organics based on PID field screening measurements.
- the discretion of the field manager.

Samples selected for laboratory analysis will be placed in the appropriate containers provided by the laboratory. Sample containers for volatile organic analyses will be filled first. Next, a sufficient amount of the remaining soil will be homogenized by mixing the sample in a decontaminated stainless steel tray or bowl with a decontaminated stainless steel trowel or disposable scoop. Laboratory-supplied sample containers for other analytes will then be filled. Duplicate samples will be collected at the frequency detailed in the QA/SAPP by alternately filling two sets of sample containers.

Where there is sufficient sample volume, representative portions of each soil sample will be placed in a one-pint jar or re-closable plastic bag, labeled, and stored on site. This container will be labeled with the following:

- Site
- Boring number
- Interval sampled
- Date
- Initials of sampling personnel

2.8 Monitoring Well Installation and Development

Monitoring wells may be installed during future activities as the Site. After completion of drilling and well installation, all wells will be developed to establish hydraulic connection between the well and the formation. The following procedures will be used to install, and develop monitoring wells.

2.8.1 Monitoring Well Specifications

Figure G-2 shows details of a typical monitoring well construction for shallow wells installed in unconsolidated soils that do not penetrate a presumed confining layer. The overburden monitoring wells will be installed according to the following specifications:

- PVC 2-inch diameter, threaded, flush-joint casing and 10-foot-long, 0.010-inch or 0.020-inch slot screens will be installed, depending on the grain size of the material being screened.
- A sump, 2 feet in length and grouted in place with cement, may be attached to the bottom of the screen for potential collection of dense non-aqueous phase liquids (DNAPLs), if present.
- The top of the casing will extend approximately 2 feet above ground surface given site-specific considerations; otherwise, flush-mount casings will be used.
- The annulus around the screens will be backfilled with an appropriate size of silica sand to a minimum height of 1 foot above the top of the screen, assuming there is sufficient room to install an appropriate surface seal above the sand.
- An approximately 2-foot-thick (depending on conditions) chipped bentonite seal or slurry (30 gallons water to 25 to 30 pounds bentonite, or relative proportions) will be placed above the sand pack.
- The remainder of the annular space will be filled with a cement/bentonite grout to approximately 2 feet below grade. The grout will be placed with a tremie pipe from the bottom up. The grout will consist of a cement mixture of one 94 pound bag of Portland cement, approximately 5 pounds of granular bentonite, and approximately 7 gallons of water. The grout will be allowed to set for a minimum of 24 hours before wells are developed.
- Each monitoring well will have a vented cap and be protected at the surface with a 4-inch steel casing containing a locking cap. The protective casing will extend approximately 1 to 2 feet below ground surface (bgs) and be set in concrete. In some areas, it may be necessary to provide flush-mounted surface completions.
- A concrete seal or pad, approximately 2 feet in diameter and 1.5 feet deep, will be installed.

The following characteristics of each newly installed well will be recorded in the field log book:

- Date/time of construction
- Drilling method and drilling fluid used
- Approximate well location
- Borehole diameter and well casing diameter
- Well depth
- Drilling and lithologic logs
- Casing materials
- Screen materials and design
- Casing and screen joint type
- Screen slot size/length
- Filter pack material/size
- Filter pack placement method

- Sealant materials
- Sealant placement method
- Well development procedure
- Type of protective well cap
- Detailed drawing of well (including dimensions)

2.8.2 Monitoring Well Development

A minimum of 24 hours after installation, the monitoring wells will be developed by surging/bailing, using a centrifugal pump and dedicated polyethylene tubing, or by Waterra positive displacement pumps and dedicated polyethylene tubing, or other methods at the discretion of the Field Manager/Site Supervisor. The development water will be contained in a tank on site or in drums. The wells will be developed until the water removed from the well is reasonably free of visible sediment (50 nephelometric turbidity units [NTUs]), if possible, or until the turbidity levels stabilize, assuming a minimum of 10 well volumes of water have been removed from the monitoring well during development. Following development, wells will be allowed to recover for at least one week before groundwater is purged and sampled. All monitoring well development will be overseen by a field geologist and the duration, method of development, and approximate volume of water removed will be recorded in the field book.

2.9 Fluid-level Measurements

The following procedure will be used to measure fluid-level depths at monitoring wells:

- Decontaminate the water level probe or oil/water interface probe (for wells expected to contain non-aqueous phase liquids [NAPLs]).
- Measure the static fluid-level, fluid interfaces (i.e., NAPL/water interface), and sound the bottom of the well (if applicable) with reference to the surveyed elevation mark on the top of the PVC casing. Record all measurements to nearest 0.01 foot and record in the field book.

The measurements will be made in as short a timeframe as practical to minimize temporal fluctuations in hydraulic conditions.

2.10 Low-Flow Groundwater Sampling Procedures for Monitoring Wells

This protocol describes the procedures to be used to collect groundwater samples. No wells will be sampled until well development has been performed. During precipitation events, groundwater sampling will be discontinued until precipitation ceases. When one round of water levels is taken to generate water-elevation data, the water levels will be taken consecutively at one time prior to sampling or other activities.

The following materials, as required, shall be available during groundwater sampling:

- Sample pump
- Sample tubing

- Power source (i.e., generator, battery)
- PID
- Appropriate health and safety equipment as specified in the HASP
- Plastic sheeting (for each sampling location)
- Dedicated or disposable bailers
- New disposable polypropylene rope
- Buckets to measure purge water
- Water-level probe
- Six-foot rule with gradation in hundredths of a foot
- Conductivity/temperature meter
- pH meter
- Turbidity meter
- Appropriate water sample containers
- Appropriate blanks (trip blank supplied by the laboratory)
- Appropriate transport containers (coolers) with ice and appropriate labeling, packing, and shipping materials
- Groundwater sampling logs
- COC forms
- Indelible ink pens
- Site map with well locations and groundwater contours maps
- Keys to wells

The following 21 steps detail the monitoring well sampling procedures:

1. Review materials checklist (Part II) to ensure that the appropriate equipment has been acquired.
2. Identify site and well sampled on sampling log sheets, along with date, arrival time, and weather conditions. Identify the personnel and equipment used and other pertinent data requested on the logs (Attachment G-2).
3. Label all sample containers using an appropriate label.
4. Use safety equipment, as required in the HASP.
5. Place plastic sheeting adjacent to the well to use as a clean work area.
6. Establish the background reading with the PID and record the reading on the field log.
7. Remove lock from the well and if rusted or broken replace with a new brass keyed-alike lock.

8. Unlock and open the well cover while standing upwind of the well. Remove well cap and place on the plastic sheeting. Insert PID probe in the breathing zone above the well casing following instructions in the HASP.
9. Set out on plastic sheeting the dedicated or disposable sampling device and meters.
10. Prior to sampling, groundwater elevations will be measured at each monitoring well and the presence of light non-aqueous phase liquid (LNAPL) or DNAPL (if any) within the well will be evaluated. Obtain a water-level depth and bottom of well depth using an electric well probe and record on the sampling log sheet. Clean the well probe after each use with a soapy (Alconox) water wash and a tap water rinse. [Note: water levels will be measured at all wells prior to initiating a sampling event].
11. After groundwater elevations are measured and NAPLs are determined not to be present, groundwater will be purged from the wells. If NAPLs are determined present, then a groundwater sample will not be collected, rather a representative NAPL sample may be collected (if required) using a peristaltic pump or other method determined by the Field Manager/Site Supervisor.
12. Pump, safety cable, electrical lines, and/or tubing (for peristaltic pumps) will be lowered slowly into the well to a depth corresponding to the center of the saturated screen section of the well.
13. Measure the water level again with the pump in the well before starting the pump. Start pumping the well at 200 to 500 milliliters per minute. Ideally, the pump rate should cause little water-level drawdown in the well (less than 0.3 feet and the water level should stabilize). The water level should be monitored every three to five minutes (or as appropriate) during pumping. Care should be taken not to cause the pump suction to be broken or entrainment of air in the sample. Record pumping rate adjustments and depths to water. Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to avoid pumping the well dry and/or to ensure stabilization of indicator parameters. If the recharge rate of the well is very low, purging should be interrupted so as not to cause the drawdown within the well to advance below the pump. However, a steady flow rate should be maintained to the extent practicable. Sampling should commence as soon as the volume in the well has recovered sufficiently to permit sample collection.
14. During well purging, monitor the field indicator parameters (turbidity, temperature, specific conductance, pH, dissolved oxygen [DO], and oxidation-reduction potential [ORP]) every three to five minutes (or as appropriate). The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows (Puls and Barcelona, 1996):

    +0.1 for pH

    +3% for specific conductance (conductivity)

    +10 mV for ORP

    +10% for turbidity and DO

    Note that turbidity and DO usually require the longest time to achieve stabilization. As such, sampling may be allowed prior to stabilization of turbidity and/or DO if all other parameters have stabilized. The decision to sample under this scenario must be agreed to by the Project Manager.

The pump must not be removed from the well between purging and sampling. If the parameters have stabilized, but the turbidity is not in the range of the 50 NTU goal, the pump flow rate should be decreased to no more than 100 millimeters per minute. Measurement of the indicator parameters should continue every three to five minutes. Measurements for parameters may be taken using a flow-thru cell or in a clean container such as a glass beaker. Measurements of DO should be taken from a sample collected using an in-line tee fitting installed before the tubing outlet, prior to connection to the flow-through cell (if one is being used). DO measurements should be measured using a field test kit (e.g., colorimetric).

15. Fill in the sample label and cover the label with clear packing tape to secure the label onto the container.
16. After the groundwater quality parameters have stabilized as discussed above, obtain the groundwater sample needed for analysis directly from the sampling device in the appropriate container and tightly screw on the caps. Note that groundwater samples collected for analysis of VOCs cannot be collected using a peristaltic pump. If purging the well using a peristaltic pump, collect all other types of samples (e.g., SVOCs, inorganics, etc.) prior to collecting the sample for VOC analysis. Once other samples are collected, remove the peristaltic pump tubing and collect the VOC samples using a new disposable polyethylene bailer. The bailer should be gently lowered to the approximate depth that the pump intake was set, and then retrieved.
17. Secure with packing material and store at 4 degrees Celsius on wet ice in an insulated transport container provided by the laboratory.
18. After all sampling containers have been filled, remove one additional volume of groundwater. Check the calibration of the meters and then measure and record on the field log the physical appearance, pH, temperature, turbidity, and conductivity.
19. Record the time sampling procedures were completed on the field logs.
20. Place all disposable sampling materials (plastic sheeting, disposable bailers, and health and safety equipment) in appropriately labeled containers. Go to the next well and repeat Step 1 through Step 21 until all wells are sampled.
21. Complete the procedures for packaging, shipping, and handling with associated COC forms.

2.11 Geophysical Survey

A geophysical investigation will be performed to assist in the delineation of subsurface structures (e.g., utility locations, etc.) that may be present at the Site. The geophysical investigation will consist of ground penetrating radar (GPR) and electromagnetic (EM) surveys. These surveys will be performed following the general procedures provided below.

2.11.1 EM Survey

EM survey will be conducted on a 10-foot grid across the accessible areas of the Site. This survey is designed to identify subsurface anomalies. The EM survey will be performed using a Geonics EM-31 frequency-domain conductivity meter equipped with a digital data recorder. The EM survey data will be

collected using vertical dipole orientation with both quadrature (apparent conductivity) and inphase (metal sensitivity) modes. The EM-31 uses a fixed intercoil spacing of 12.1 feet to provide an exploration depth of approximately 16 feet. This exploration depth should be adequate for evaluating subsurface features of interest at the Site.

The EM data will be reduced, contoured and evaluated at the Site and compared with historic information to determine if any anomalies that are present are associated with past activities. Areas of decrease or elevated EM measurements will be further investigated using GPR. A contour map of the EM measurements will be generated for the geophysical letter report.

2.11.2 Ground Penetrating Radar Survey

Ground Penetrating Radar (GPR) survey may be performed to further investigate the EM anomalies and any additional locations of interest at the Site as identified from historical site information, to characterize subsurface structures. The GPR data will be used to help identify potential locations for soil borings and/or monitoring wells.

The GPR survey will be performed using Subsurface Interfacing Radar (SIR) System 3000, manufactured by Geophysical Survey Systems, Inc. (GSSI). The GPR system transmits high-frequency electromagnetic waves into the ground and detects the energy reflected to the surface. Energy is reflected along boundaries of subsurface interfaces that have different electrical properties. Reflections typically occur at lithologic contacts or at changes in subsurface material having high electrical contrasts, including metal objects, concrete structures, and utility pipes. These reflections are detected by an antenna and processed into an electrical signal that is used to create an image of the subsurface feature. The GPR data will be evaluated in the field to determine the location of subsurface features of interest. Subsurface features considered to be of significant interest will be located and marked in the field for potential investigation using intrusive methods (soil borings and/or monitoring wells).

2.12 Air Monitoring

Air monitoring will be conducted in accordance with the procedures detailed in the HASP. Air monitoring will be conducted with a PID and dust monitor during all intrusive land activities and only a PID during sampling activities. The PID will be used to monitor organic vapors in the breathing zone and borehole, and to screen samples for analysis and the dust monitor will be used to monitor particulate concentration in the breathing zone for particulates less than 10 microns in diameter.

The PID and dust monitor readings will be recorded in the field book during trenching and drilling activities. The instruments will be calibrated at least once each day, and more frequently if needed. A detailed procedure for the PID calibration is included as Attachment G-3.

2.13 Investigation Derived Waste and Storage

Investigation-derived wastes (IDW) will be generated during site activities, which include, but are not limited to drilling, trenching/excavation, monitoring well sampling, soil sampling, and decontamination. IDW may include soil, groundwater, drilling fluids, decontamination liquids, personal protective equipment (PPE), sorbent materials, construction and demolition debris, and disposable sampling materials that may

have come in contact with potentially impacted materials. IDW will be collected and staged at the point of generation. Quantities small enough to be containerized in 55-gallon drums will be taken to a designated temporary storage area onsite pending characterization and disposal. Waste materials will be analyzed for constituents of concern to evaluate proper disposal methods. PPE and disposable sampling equipment will be placed in DOT-approved drums prior to disposal and typically does not require laboratory analysis.

The procedures for handling IDW are based on the United States Environmental Protection Agency's Guide to Management of Investigation Derived Wastes (USEPA, 1992). IDW is assumed to be contaminated with the site constituents of concern (COCs) until analytical evidence indicates otherwise. IDW will be managed to ensure the protection of human health and the environment and will comply with all applicable or relevant and appropriate requirements (ARAR). The following Laws and Regulations on Hazardous Waste Management are possible ARAR for this site.

- Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 364 "Waste Transporter Permits" and Part 372 "Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities".
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 42 USC § 9601-9675
- Superfund Amendments and Reauthorization Act (SARA)
- Department of Transportation (DOT) Hazardous Materials Transportation

3 FIELD INSTRUMENTS

At a minimum, all field screening equipment will be calibrated immediately prior to each day's use. Additional calibration may be required if measurements appear erroneous. The calibration procedures will conform to the manufacturer's standard instructions. Records of all instrument calibration will be maintained by the field personnel. Copies of all of the instrument manuals will be maintained on site by the field personnel.

3.1 Portable Photoionization Analyzer

The photoionization analyzer will be a Photovac MicroTip (or equivalent), equipped with a 10.6 eV lamp or 11.7 eV lamp, depending on the requirements of the HASP. The Photovac is capable of ionizing and detecting compounds with an ionization potential of less than 10.6 eV. This accounts for up to 73% of the TCL VOCs. Calibration will be performed according to the procedures outlined in Attachment G-3.

3.2 Dust Monitor

The dust monitor will be a MIE DataRAM (or equivalent) and will be calibrated at the start of each day of use. Calibration and maintenance of the dust monitor will be conducted in accordance with the manufacturer’s specifications. The calibration data will be recorded in field notebooks.

3.3 pH Meter

The pH meter will be calibrated at the start of each day of use, and after very high or low readings as required by this plan. National Institute of Standards and Technology traceable standard buffer solutions that bracket the expected pH range will be used. The standards will most likely be a pH of 7.0 and 10.0 standard units. The pH calibration and slope knobs will be used to set the meter to display the value of the standard being checked. The calibration data will be recorded in field notebooks.

3.4 Conductivity Meter

Calibration checks using the appropriate conductivity standard for the meter will be performed at the start of each day of use, and after very high or low readings, as required by this plan. Readings must be within 5% to be acceptable.

3.5 Water-Level Meter

The water-level cable will be checked once to a standard to assess if the meter has been correctly calibrated by the manufacturer or vendor. If the markers are incorrect, the meter will be sent back to the manufacturer or vendor.

3.6 Turbidity Meter

The turbidity meter will be calibrated daily prior to use. Calibration and maintenance will be conducted in accordance with the manufacturer's specifications. Calibration and maintenance information will be recorded in the field notebook.

FIGURES

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CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Page ___ of ___

Lab Work Order #

Send Results to:

Contact & Company Name: | Telephone:

Address: | Fax:

City | State | Zip | E-mail Address:

Project Name/Location (City, State): | Project #:

Sampler's Printed Name: | Sampler's Signature:

Sample ID	Collection Date	Collection Time	Type (✓) Comp	Type (✓) Grab	Matrix	Preservative	Filtered (✓)	# of Containers	Container Information	PARAMETER ANALYSIS & METHOD	REMARKS

Keys

Preservation Key:
A. H_2SO_4
B. HCL
C. HNO_3
D. NaOH
E. None
F. Other: _____
G. Other: _____
H. Other: _____

Container Information Key:
1. 40 ml Vial
2. 1 L Amber
3. 250 ml Plastic
4. 500 ml Plastic
5. Encore
6. 2 oz. Glass
7. 4 oz. Glass
8. 8 oz. Glass
9. Other: _____
10. Other: _____

Matrix Key:
SO - Soil | SE - Sediment | NL - NAPL/Oil
W - Water | SL - Sludge | SW - Sample Wipe
T - Tissue | A - Air | Other: _____

Special Instructions/Comments:

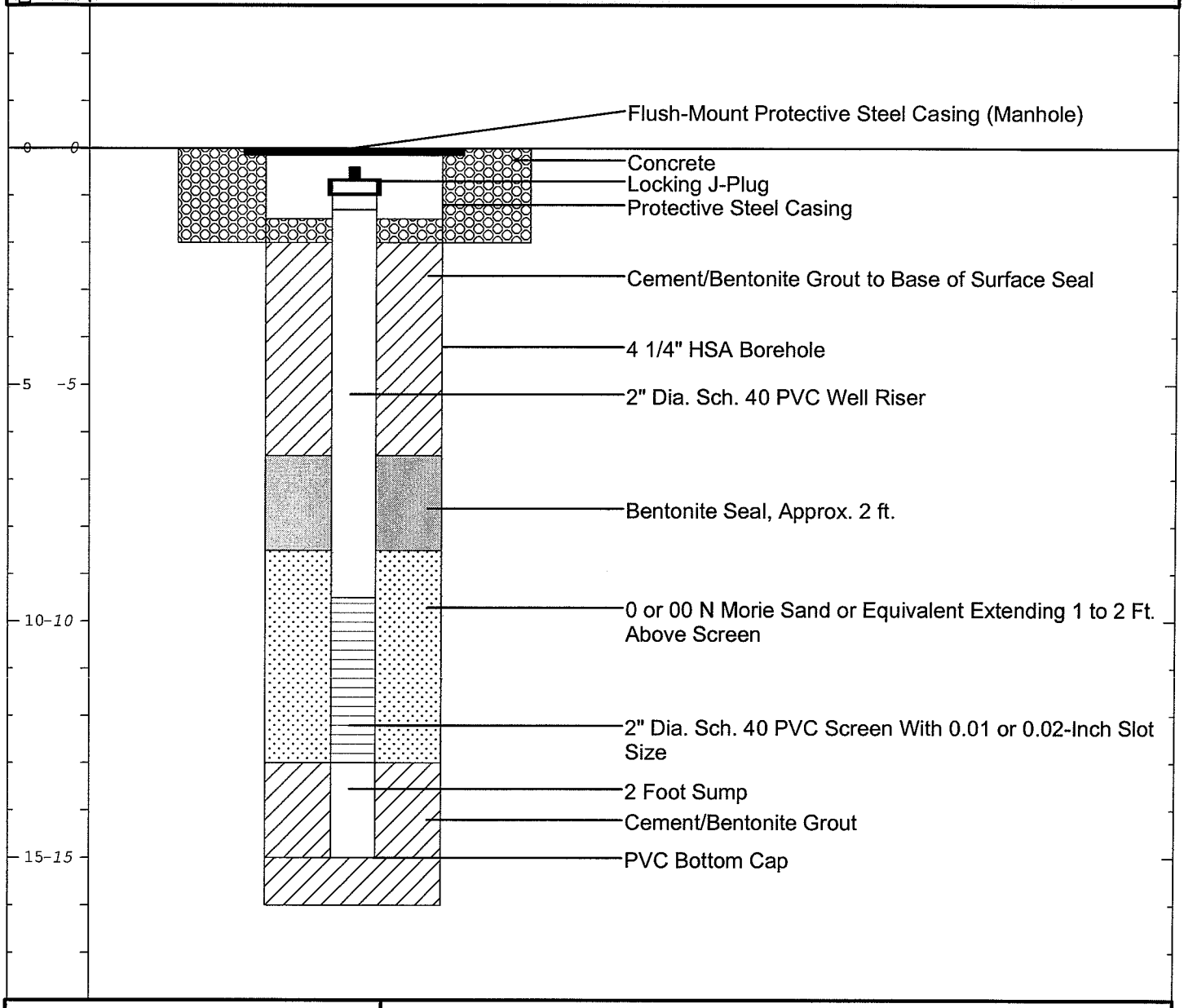
☐ **Special QA/QC Instructions(✓):**

Laboratory Information and Receipt		Relinquished By	Received By	Relinquished By	Laboratory Received By
Lab Name:	Cooler Custody Seal (✓)	Printed Name:	Printed Name:	Printed Name:	Printed Name:
☐ Cooler packed with ice (✓)	☐ Intact ☐ Not Intact	Signature:	Signature:	Signature:	Signature:
Specify Turnaround Requirements:	Sample Receipt:	Firm:	Firm/Courier:	Firm/Courier:	Firm:
Shipping Tracking #:	Condition/Cooler Temp: _____	Date/Time:	Date/Time:	Date/Time:	Date/Time:

Distribution: **WHITE – Laboratory returns with results** **YELLOW – Lab copy** **PINK – Retained by BBL**

Date Start/Finish: **Drilling Company:** **Driller's Name:** **Drilling Method:** **Bit Size:** **Auger Size:** **Rig Type:** **Sampling Method:**	**Northing:** NA **Easting:** NA **Casing Elevation:** NA **Borehole Depth:** **Surface Elevation:** **Descriptions By:**	**Well ID: EXAMPLE WELL 1** **Client:** **Location:**

Well Construction Details



Remarks:

ARCADIS BBL
Infrastructure, environment, facilities

ATTACHMENT G-1

Soil Description Procedures

ARCADIS
Infrastructure, environment, facilities

Imagine the result

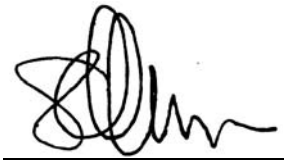
Soil Description

Rev. #: 0

Rev Date: May 20, 2008

Approval Signatures

Prepared by:  Date: 5/22/08

Reviewed by:  Date: 5/22/08

(Technical Expert)

Reviewed by  Date: 5/22/08

(Technical Expert)

I. Scope and Application

This ARCADIS standard operating procedure (SOP) describes proper soil description procedures. This SOP should be followed for all unconsolidated material unless there is an established client-required specific SOP or regulatory-required specific SOP. In cases where there is a required specific SOP, it should be followed and should be referenced and/or provided as an appendix to reports that include soil classifications and/or boring logs. When following a required non-ARCADIS SOP, additional information required by this SOP should be included in field notes with client approval.

This SOP has been developed to emphasize field observation and documentation of details required to:

- make hydrostratigraphic interpretations guided by depositional environment/geologic settings;
- provide information needed to understand the distribution of constituents of concern; properly design wells, piezometers, and/or additional field investigations; and develop appropriate remedial strategies.

This SOP incorporates elements from various standard systems such as ASTM D2488-06, Unified Soil Classification System, Burmister and Wentworth. However, none of these standard systems focus specifically on contaminant hydrogeology and remedial design. Therefore, although each of these systems contain valuable guidance and information related to correct descriptions, strict application of these systems can omit information critical to our clients and the projects that we perform.

This SOP does not address details of health and safety; drilling method selection; boring log preparation; sample collection; or laboratory analysis. Refer to other ARCADIS SOPS, the project work plans including the quality assurance project plan, sampling plan, and health and safety plan (HASP), as appropriate.

II. Personnel Qualifications

Soil descriptions will be completed only by persons who have been trained in ARCADIS soil description procedures. Field personnel will complete training on the ARCADIS soil description SOP in the office and/or in the field under the guidance of an experienced field geologist. For sites where soil descriptions have not previously been well documented, soil descriptions should be performed only by trained persons with a degree in geology or a geology-related discipline.

III. Equipment List

The following equipment should be taken to the field to facilitate soil descriptions:

- field book, field forms or PDA to record soil descriptions;
- field book for supplemental notes;
- this SOP for Soil Descriptions and any project-specific SOP (if required);
- field card showing Wentworth scale;
- Munsell® soil color chart;
- tape measure divided into tenths of a foot;
- stainless steel knife or spatula;
- hand lens;
- water squirt bottle;
- jar with lid;
- personal protective equipment (PPE), as required by the HASP; and
- digital camera.

IV. Cautions

Drilling and drilling-related hazards including subsurface utilities are discussed in other SOPs and site-specific HASPs and are not discussed herein.

Soil samples may contain hazardous substances that can result in exposure to persons describing soils. Routes for exposure may include dermal contact, inhalation and ingestion. Refer to the project specific HASP for guidance in these situations.

V. Health and Safety Considerations

Field activities associated with soil sampling and description will be performed in accordance with a site-specific HASP, a copy of which will be present on site during such activities. Know what hazardous substances may be present in the soil and understand their hazards. Always avoid the temptation to touch soils with bare hands, detect odors by placing soils close to your nose, or tasting soils.

VI. Procedure

1. Select the appropriate sampling method to obtain representative samples in accordance with the selected sub-surface exploration method, e.g. split-spoon or Shelby sample for hollow-stem drilling, Lexan or acetate sleeves for dual-tube direct push, etc.

2. Proceed with field activities in required sequence. Although completion of soil descriptions is often not the first activity after opening sampler, identification of stratigraphic changes is often necessary to select appropriate intervals for field screening and/or selection of laboratory samples.

3. Examine all of each individual soil sample (this is different than examining each sample selected for laboratory analysis), and record the following for each stratum:

- depth interval;
- principal component with descriptors, as appropriate;
- amount and identification of minor component(s) with descriptors as appropriate;
- moisture;
- consistency/density;
- color; and
- additional description or comments (recorded as notes).

The above is described more fully below.

DEPTH

To measure and record the depth below ground level (bgl) of top and bottom of each stratum, the following information should be recorded.

1. Measured depth to the top and bottom of sampled interval. Use starting depth of sample based upon measured tool length information and the length of sample interval.

2. Length of sample recovered, not including slough (material that has fallen into hole from previous interval), expressed as fraction with length of recovered sample as numerator over length of sampled interval as denominator (e.g. 14/24 for 14 inches recovered from 24-inch sampling interval that had 2 inches of slough discarded).

3. Thickness of each stratum measured sequentially from the top of recovery to the bottom of recovery.

4. Any observations of sample condition or drilling activity that would help identify whether there was loss from the top of the sampling interval, loss from the bottom of the sampling interval, or compression of the sampling interval. Examples: 14/24, gravel in nose of spoon; or 10/18 bottom 6 inches of spoon empty.

DETERMINATION OF COMPONENTS

Obtain a representative sample of soil from a single stratum. If multiple strata are present in a single sample interval, each stratum should be described separately. More specifically, if the sample is from a 2-foot long split-spoon where strata of coarse sand, fine sand and clay are present, then the resultant description should be of the three individual strata unless a combined description can clearly describe the interbedded nature of the three strata. Example: Fine Sand with interbedded lenses of Silt and Clay, ranging between 1 and 3 inches thick.

Identify principal component and express volume estimates for minor components on logs using the following standard modifiers.

Modifier	Percent of Total Sample (by volume)
and	36 - 50
some	21 - 35
little	10 - 20
trace	<10

Determination of components is based on using the Udden-Wentworth particle size classification (see below) and measurement of the average grain size diameter. Each size grade or class differs from the next larger grade or class by a constant ratio of ½. Due to visual limitations, the finer classifications of Wentworth's scale cannot be distinguished in the field and the subgroups are not included. Visual determinations in the field should be made carefully by comparing the sample to the field gauge card that shows Udden-Wentworth scale or by measuring with a ruler. Use of field sieves s

recommended to assist in estimating percentage of coarse grain sizes. Settling test or wash method (Appendix X4 of ASTM D2488) is recommended for determining presence and estimating percentage of clay and silt.

Udden-Wenworth Scale Modified ARCADIS, 2008			
Size Class	Millimeters	Inches	Standard Sieve #
Boulder	256 – 4096	10.08+	
Large cobble	128 - 256	5.04 -10.08	
Small cobble	64 - 128	2.52 – 5.04	
Very large pebble	32 – 64	0.16 - 2.52	
Large pebble	16 – 32	0.63 – 1.26	
Medium pebble	8 – 16	0.31 – 0.63	
Small pebble	4 – 8	0.16 – 0.31	No. 5 +
Granule	2 – 4	0.08 – 0.16	No.5 – No.10
Very coarse sand	1 -2	0.04 – 0.08	No.10 – No.18
Coarse sand	½ - 1	0.02 – 0.04	No.18 - No.35
Medium sand	¼ - ½	0.01 – 0.02	No.35 - No.60
Fine sand	1/8 -¼	0.005 – 0.1	No.60 - No.120
Very fine sand	1/16 – 1/8	0.002 – 0.005	No. 120 – No. 230
Silt (subgroups not included)	1/256 – 1/16	0.0002 – 0.002	Not applicable (analyze by pipette or hydrometer)
Clay (subgroups not included	1/2048 – 1/256	.00002 – 0.0002	

Identify components as follows. Remove particles greater than very large pebbles (64-mm diameter) from the soil sample. Record the volume estimate of the greater than very large pebbles. Examine the sample fraction of very large pebbles and smaller particles and estimate the volume percentage of the pebbles, granules, sand, silt and clay. Use the jar method, visual method, and/or wash method (Appendix X4 of ASTM D2488) to estimate the volume percentages of each category.

Determination of actual dry weight of each Udden-Wentworth fraction requires laboratory grain-size analysis using sieve sizes corresponding to Udden-Wentworth fractions and is highly recommended to determine grain-size distributions for each hydrostratigraphic unit.

Lab or field sieve analysis is advisable to characterize the variability and facies trends within each hydrostratigraphic unit. Field sieve-analysis can be performed on selected samples to estimate dry weight fraction of each category using ASTM D2488 Standard Practice for Classification of Soils for Engineering Purposes as guidance, but replace required sieve sizes with the following Udden-Wentworth set: U.S. Standard sieve mesh sizes 6; 12; 20; 40; 70; 140; and 270 to retain pebbles; granules; very coarse sand; coarse sand; medium sand; fine sand; and very fine sand, respectively.

PRINCIPAL COMPONENT

The principal component is the size fraction or range of size fractions containing the majority of the volume. Examples: the principal component in a sample that contained 55% pebbles would be “Pebbles”; or the principal component in a sample that was 20% fine sand, 30% medium sand and 25% coarse sand would be “Fine to coarse Sand” or for a sample that was 40% silt and 45% clay the principal component would be “Clay and Silt”.

Include appropriate descriptors with the principal component. These descriptors vary for different particle sizes as follows.

Angularity – Describe the angularity for very coarse sand and larger particles in accordance with the table below (ASTM D-2488-06). Figures showing examples of angularity are available in ASTM D-2488-06 and the ARCADIS Soil Description Field Guide.

Description	Criteria
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces.
Subangular	Particles are similar to angular description but have rounded edges.
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges.
Rounded	Particles have smoothly curved sides and no edges.

Plasticity – Describe the plasticity for silt and clay based on observations made during the following test method (ASTM D-2488-06).

- As in the dilatancy test below, select enough material to mold into a ball about ½ inch (12 mm) in diameter. Mold the material, adding water if necessary, until it has a soft, but not sticky, consistency.

- Shape the test specimen into an elongated pat and roll by hand on a smooth surface or between the palms into a thread about 1/8 inch (3 mm) in diameter. (If the sample is too wet to roll easily, it should be spread into a thin layer and allowed to lose some water by evaporation.) Fold the sample threads and reroll repeatedly until the thread crumbles at a diameter of about 1/8 inch. The thread will crumble when the soil is near the plastic limit.

Description	Criteria
Nonplastic	A $^{1}/_{8}$ inch (3 mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit

Dilatancy – Describe the dilatancy for silt and silt-sand mixtures using the following field test method (ASTM D-2488-06).

- From the specimen select enough material to mold into a ball about ½ inch (12 mm) in diameter. Mold the material adding water if necessary, until it has a soft, but not sticky, consistency.
- Smooth the ball in the palm of one hand with a small spatula.
- Shake horizontally, striking the side of the hand vigorously with the other hand several times.
- Note the reaction of water appearing on the surface of the soil.
- Squeeze the sample by closing the hand or pinching the soil between the fingers, and not the reaction as none, slow, or rapid in accordance with the table below. The reaction is the speed with which water appears while shaking and disappears while squeezing.

Description	Criteria
None	No visible change in the specimen.
Slow	Water appears slowly on the surface of the specimen during shaking and does not disappear or disappears slowly upon squeezing.
Rapid	Water appears quickly on the surface of the specimen during shaking and disappears quickly upon squeezing.

MINOR COMPONENT(S)

The minor component(s) are the size fraction(s) containing less than 50% volume. Example: the identified components are estimated to be 60% medium sand to granules, 25 % silt and clay; 15 % pebbles – there are two identified minor components: silt and clay; and pebbles.

Include a standard modifier to indicate percentage of minor components (see Table on Page 5) and the same descriptors that would be used for a principal component. Plasticity should be provided as a descriptor for the silt and clay. Dilatancy should be provided for silt and silt-sand mixtures. Angularity should be provided as a descriptor for pebbles and coarse sand. For the example above, the minor constituents with

modifiers could be: some silt and clay, low plasticity; little medium to large pebbles, sub-round.

SORTING

Sorting is the opposite of grading, which is a commonly used term in the USCS or ASTM methods to describe the uniformity of the particle size distribution in a sample. Well-sorted samples are poorly graded and poorly sorted samples are well graded. ARCADIS prefers the use of sorting for particle size distributions and grading to describe particle size distribution trends in the vertical profile of a sample or hydrostratigraphic unit because of the relationship between sorting and the energy of the depositional process. For soils with sand-sized or larger particles, sorting should be determined as follows:

- Well sorted – the range of particle sizes is limited (e.g. the sample is comprised of predominantly one or two grain sizes)
- Poorly sorted – a wide range of particle sizes are present

You can also use sieve analysis to estimate sorting from a sedimentological perspective; sorting is the statistical equivalent of standard deviation. Smaller standard deviations correspond to higher degree of sorting (see Remediation Hydraulics, 2008).

MOISTURE

Moisture content should be described for every sample since increases or decreases in water content is critical information. Moisture should be described in accordance with the table below (percentages should not be used unless determined in the laboratory).

Description	Criteria
Dry	Absence of moisture, dry to touch, dusty.
Moist	Damp but no visible water.
Wet (Saturated)	Visible free water, soil is usually below the water table.

CONSISTENCY or DENSITY

This can be determined by standard penetration test (SPT) blow counts (ASTM D-1586) or field tests in accordance with the tables below. For SPT blow counts the N-value is used. The N-value is the blows per foot for the 6" to 18" interval. Example: for 24-inch spoon, recorded blows per 6-inch interval are: 4/6/9/22. Since the second interval is 6" to12", the third interval is 12" to 18", the N value is 6+9, or 15. Fifty blow counts for less than 6 inches is considered refusal.

Fine-grained soil – Consistency

Description	Criteria
Very soft	N-value < 2 or easily penetrated several inches by thumb.
Soft	N-value 2-4 or easily penetrated one inch by thumb.
Medium stiff	N-value 9-15 or indented about ¼ inch by thumb with great effort.
Very stiff	N-value 16-30 or readily indented by thumb nail.
Hard	N-value > than 30 or indented by thumbnail with difficulty

Coarse-grained soil – Density

Description	Criteria
Very loose	N-value 1- 4
Loose	N-value 5-10
Medium dense	N-value 11-30
Dense	N-value 31- 50
Very dense	N-value >50

COLOR

Color should be described using simple basic terminology and modifiers based on the Munsell system. Munsell alpha-numeric codes are required for all samples. If the sample contains layers or patches of varying colors this should be noted and all representative colors should be described. The colors should be described for moist

samples. If the sample is dry it should be wetted prior to comparing the sample to the Munsell chart.

ADDITIONAL COMMENTS (NOTES)

Additional comments should be made where observed and should be presented as notes with reference to a specific depth interval(s) to which they apply. Some of the significant information that may be observed includes the following.

- **Odor** - You should not make an effort to smell samples by placing near your nose since this can result in unnecessary exposure to hazardous materials. However, odors should be noted if they are detected during the normal sampling procedures. Odors should be based upon descriptors such as those used in NIOSH "Pocket Guide to Chemical Hazards", e.g. "pungent" or "sweet" and should not indicate specific chemicals such as "phenol-like" odor or "BTEX" odor.
- Structure
- Bedding planes (laminated, banded, geologic contacts)
- Presence of roots, root holes, organic material, man-made materials, minerals, etc.
- Mineralogy
- Cementation
- NAPL presence/characteristics, including sheen (based on client-specific guidance)
- Reaction with HCl (typically used only for special soil conditions)
- Origin, if known (capital letters: LACUSTRINE; FILL; etc.)

EXAMPLE DESCRIPTIONS

51.4 to 54.0' Clay, some silt, medium to high plasticity; trace small to large pebbles, subround to subangular up to 2" diameter; moist; stiff; dark grayish brown (10YR 4/2) NOTE: Lacustrine; laminated 0.01 to 0.02 feet thick, laminations brownish yellow (10 YR 4/3).

32.5 to 38.0' Sand, medium to Pebbles, coarse; sub-round to sub-angular; trace silt; poorly sorted; wet; grayish brown (10YR5/2). NOTE: sedimentary, igneous and metamorphic particles.

Unlike the first example where a density of cohesive soils could be estimated, this rotosonic sand and pebble sample was disturbed during drilling (due to vibrations in a loose Sand and Pebble matrix) so no density description could be provided. Neither sample had noticeable odor so odor comments were not included.

The standard generic description order is presented below.

- Depth

- Principal Components
    - Angularity for very coarse sand and larger particles
    - Plasticity for silt and clay
    - Dilatancy for silt and silt-sand mixtures
- Minor Components
- Sorting
- Moisture
- Consistency or Density
- Color
- Additional Comments

VII. Waste Management

Project-specific requirements should be identified and followed. The following procedures, or similar waste management procedures are generally required.

Water generated during cleaning procedures will be collected and contained onsite in appropriate containers for future analysis and appropriate disposal. PPE (such as gloves, disposable clothing, and other disposable equipment) resulting from personnel cleaning procedures and soil sampling/handling activities will be placed in plastic bags. These bags will be transferred into appropriately labeled 55-gallon drums or a covered roll-off box for appropriate disposal.

Soil materials will be placed in sealed 55-gallon steel drums or covered roll-off boxes and stored in a secured area. Once full, the material will be analyzed to determine the appropriate disposal method.

VIII. Data Recording and Management

Upon collection of soil samples, the soil sample should be logged on a standard boring log and/or in the field log book depending on Data Quality Objectives (DQOs) for the task/project. Two examples of standard boring logs are presented below.

The general scheme for soil logging entries is presented above; however, depending on task/project DQOs, specific logging entries that are not applicable to task/project goals may be omitted at the project manager's discretion. In any case, use of a consistent logging procedure is required.

Completed logs and/or logbook will be maintained in the task/project field records file. Digital photographs of typical soil types observed at the site and any unusual features should be obtained whenever possible. All photographs should include a ruler or common object for scale. Photo location, depth and orientation must be recorded in the daily log or log book and a label showing this information in the photo is useful.

ARCADIS Page ____ of ____

Sample Log

Well/Boring _____ Project Name and No. _____

Site Location _____ Drilling Started _____ Drilling Completed _____

Total Depth Drilled _____ feet Hole Diameter _____ inches Sampling Interval _____ feet

Length and Diameter of Sampling Device _____ Type of Sampling Device _____

Drilling Method _____ Drilling Fluid Used _____

Drilling Contractor _____ Driller _____ Helper _____

Prepared By _____ Hammer Weight _____ Hammer Drop _____ Inches

Sample Depth (feet below land surface) From	To	Sample Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample Description	PID (ppm)

http://team/Sites/Offices/North/Northeast Area/Northeast Area Geoscience Forms/Sample Core Log XLS - Sheet1

IX. Quality Assurance

Soil descriptions should be completed only by appropriately trained personnel. Descriptions should be reviewed by an experienced field geologist for content, format and consistency. Edited boring logs should be reviewed by the original author to assure that content has not changed.

X. References

ARCADIS Soil Description Field Guide, 2008 (in progress)

Munsell® Color Chart – available from Forestry Suppliers, Inc.- Item 77341 "Munsell® Color Soil Color Charts

Field Gauge Card that Shows Udden-Wentworth scale – available from Forestry Suppliers, Inc. – Item 77332 "Sand Grain Sizing Folder"

ASTM D-1586, Test Method for Penetration Test and Split-Barrel Sampling of Soils

ASTM D-2488-00, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)

United States Bureau of Reclamation. Engineering Geology Field Manual. United States Department of Interior, Bureau of Reclamation. http://www.usbr.gov/pmts/geology/fieldmap.htm

Petrology of Sedimentary Rocks, Robert L. Folk, 1980, p. 1-48

NIOSH Pocket Guide to Chemical Hazards

Remediation Hydraulics, Fred C. Payne, Joseph A. Quinnan, and Scott T. Potter, 2008, p 59-63

ATTACHMENT G-2

Field Sampling Log

Site | Event

GROUND-WATER SAMPLING LOG

Sampling Personnel: | Well ID:
Client / Job Number: | Date:
Weather: | Time In: | Time Out:

Well Information

Depth to Water:	(feet)	(from MP)
Total Depth:	(feet)	(from MP)
Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Three Well Volumes:	(gal)	

Well Type:	Flushmount		Stick-Up
Well Material:	Stainless Steel		PVC
Well Locked:	Yes		No
Measuring Point Marked:	Yes		No
Well Diameter:	1"	2"	Other:

Purging Information

Purging Method:	Bailer	Peristaltic	Grundfos	Other:
Tubing/Bailer Material:	St. Steel	Polyethylene	Teflon	Other:
Sampling Method:	Bailer	Peristaltic	Grundfos	Other:

Duration of Pumping: (min)
Average Pumping Rate: (ml/min) Water-Quality Meter Type:
Total Volume Removed: (gal) Did well go dry: Yes No

Conversion Factors				
gal / ft. of water	1" ID	2" ID	4" ID	6" ID
	0.041	0.163	0.653	1.468
1 gal = 3.785 L =3875 ml = 0.1337 cubic feet				

Unit Stability			
pH	DO	Cond.	ORP
± 0.1	± 10%±	3.0%	± 10 mV

Parameter:	1	2	3	4	5	6	7	8	9
Volume Purged (gal)									
Rate (mL/min)									
Depth to Water (ft.)									
pH									
Temp. (C)									
Conductivity (mS/cm)									
Dissolved Oxygen									
ORP (mV)									
Turbidity (NTU)									
Notes:									

Sampling Information

Analyses	#	Laboratory

Sample ID: Sample Time:
MS/MSD: Yes No
Duplicate: Yes No
Duplicate ID Dup. Time:
Chain of Custody Signed By:

Problems / Observations

ATTACHMENT G-3

MicroTIP Photoionization Detector Calibration, Operation, and Maintenance Procedures

Attachment G-3. Photovac MicroTIP Photoionization Detector Calibration, Operation & Maintenance Procedures

I. Introduction

The MicroTIP measures relative total concentrations of organic and inorganic vapors in the field and will be calibrated daily prior to use. The MicroTIP does not carry an Intrinsic Safety Rating and will be used in a controlled environment only. The MicroTIP will be used to screen soil samples, the head space of soil/water samples, and to monitor the breathing and work zones as specified in the Health and Safety Plan.

II. Materials

- Photovac MicroTIP (PID)
- Isobutylene calibration gas tank with pressure regulator and up to four other selected span gases
- zero span gas (clean outdoor air or zero grade gas)
- gas sampling bag with plastic tubing to connect PID probe to calibration gas
- flow regulator
- PID calibration and maintenance log

III. Calibration Procedures

1. Turn on the MicroTIP and monitor the ambient air. If there is any doubt of the air quality, then zero grade gas will be obtained.
2. Connect the regulator to the span gas cylinder. Hand-tighten the fittings.
3. Open the valve on the gas bag by turning the valve stem fully counterclockwise.
4. Attach the gas bag to the regulator. Hand-tighten the fittings.
5. Turn the regulator knob counterclockwise half a turn to start the gas flow.

6. Fill the gas bag half full and then close the regulator fully clockwise to turn off the flow of gas.

7. Fill the gas bag, and then turn the valve clockwise.

8. Press "CAL" and expose MicroTIP to zero gas. Press "ENTER", and MicroTIP sets its zero point.

9. MicroTIP then asks for the Span Gas concentration. Enter the known Span Gas concentration and then expose the MicroTIP to the Span Gas.

10. Press "ENTER" and MicroTIP sets its response factor.

11. When MicroTIP's display reverts to normal, the MicroTIP is calibrated and ready to use. Remove the Span Gas from the inlet.

12. After seven hours of use, recharge the battery pack. Record the time the battery pack was charged on the MicroTIP Calibration and Maintenance Log.

13. Record the date, time, your initials, calibration gas, and concentration on the Micro TIP Calibration and Maintenance Log.

IV. Operation Procedures

1. Use the health and safety equipment as required by the Health and Safety Plan.

2. Calibrate the instrument as described in subsection III of this Appendix.

3. Measure and record the background PID reading.

4. If the PID will be used for more than seven hours during optimal weather conditions (50º or greater), or during extreme cold or precipitation, have a fully charged battery available for use.

5. In the event of precipitation, fully cover the instrument, leaving the probe accessible for measurements.

6. Measure and record PID reading.

V. Maintenance Procedures

1. At the end of each day or when the battery is fully discharged, recharge batteries overnight.

2. Store the instrument in the protective case when not in use.

3. Keep records of operation, maintenance, calibration problems, and repairs.

4. A replacement instrument will be available on site or ready for overnight shipment, if necessary.

5. The MicroTIP will be sent back to the manufacturer for service if needed.

APPENDIX H

Quality Assurance Sampling and Analysis Project Plan

ARCADIS Design & Consultancy for natural and built assets

National Fuel Gas Distribution Corporation

APPENDIX H – QUALITY ASSURANCE SAMPLING AND ANALYSIS PROJECT PLAN

Former Buffalo Service Station – Off-Site
Site #C915194A
Buffalo, Erie County, New York

May 2016; Revised May 2021

APPENDIX H – QUALITY ASSURANCE SAMPLING AND ANALYSIS PROJECT PLAN

Former Buffalo Service Station – Off-Site
Site #C915194A
Buffalo, Erie County, New York

Prepared for:

National Fuel Gas Distribution Corporation
6363 Main Street
Williamsville, New York 14221-5887

Prepared by:

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Fax 315 449 0017

Our Ref.:

30075637

Date:

May 2016; Revised May 2021

CONTENTS

TABLES

ATTACHMENTS

ACRONYMS

ASP	Analytical Services Protocol
CLP	Contract Laboratory Program
COC	chain-of-custody
CSV	comma separated value
DQOs	data quality objectives
DUSR	Data Usability Summary Report
EDD	electronic data deliverable
EM	electromagnetic
FSP	Field Sampling Plan
GC/MS	gas chromatography/mass spectrometry
GIS	geographic information system
GPR	ground penetrating radar
GPS	global positioning system
HASP	Health and Safety Plan
LCS	laboratory control sample
MDL	method detection limit
MGP	manufactured gas plant
MS	matrix spike
MSD	matrix spike duplicate
National Fuel	National Fuel Gas Distribution Corporation
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSTA	New York State Thruway Authority
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
QA	quality assurance
QAM	Quality Assurance Manager
QASAPP	Quality Assurance Sampling and Analysis Project Plan
QC	quality control

RL	reporting limit
RPD	relative percent difference
SDG	sample delivery group
SMP	Site Management Plan
SOP	standard operating procedure
SVOC	semivolatile organic compound
TAL	target analyte list
TBD	to be determined
TCL	target compound list
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WPA	Work Progress Authority

PREFACE

This Quality Assurance Sampling and Analysis Project Plan (QASAPP) presents the sampling and analytical methods and procedures that will be used to during implementation of the Site Management Plan (SMP) at the Former Buffalo Service Station (BSS) Off-Site site located in Buffalo, New York ("Site"). The QASAPP should be used in conjunction with the SMP, the Field Sampling Plan (FSP), and the Health and Safety Plan (HASP). The SMP presents the site background and defines the field sampling program. The FSP contains field procedures and sample collection methods to be used during implementation of the SMP. The HASP provides a mechanism for establishing safe working conditions at the site. The HASP and FSP are provided in Appendix E and Appendix G, respectively, of the SMP.

This QASAPP was prepared in a manner consistent with the following reference and guidance documents:

- New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation *Technical Guidance for Site Investigation and Remediation,* DER-10 (NYSDEC, 2010);
- United States Environmental Protection Agency (USEPA) *Test Methods for Evaluating Solid Waste, SW-846* (USEPA, 1996);
- USEPA *EPA Requirements for Quality Assurance Project Plans*, EPA-QA/R-5 (USEPA, 2001) (http://epa.gov/quality/qs-docs/r5-final.pdf);
- USEPA *Guidance for Quality Assurance Project Plans,* EPA-QA/G-5 (USEPA, 2002) (http://epa.gov/quality/qs-docs/g5-final.pdf); and
- USEPA *Guidance on Systematic Planning Using the Data Quality Objectives Process,* EPA-QA/G-4 (USEPA, 2006) (http://www.epa.gov/QUALITY/qs-docs/g4-final.pdf).

Information contained in this QASAPP has been organized into the following sections:

Section	Content
Project Management	
1	Project Organization and Responsibilities
2	Project Background
3	Project Description
4	Data Quality Objectives and Criteria for Measurement Data
5	Special Training Requirements/Certification
6	Documentation and Records
Measurement/Data Acquisition	
7	Sampling Process Design
8	Sampling Method Requirements
9	Sample Handling and Custody Requirements
10	Analytical Procedures
11	Quality Control Requirements
12	Instrument/Equipment Testing, Inspection and Maintenance Requirements
13	Instrument Calibration and Frequency

Section	Content
14	Inspection/Acceptance Requirements for Supplies and Consumables
15	Data Acquisition Requirements for Non-Direct Measurements
16	Data Management
Assessment/Oversight	
17	Assessment and Response Actions
18	Reports to Management
Data Validation and Usability	
19	Data Review, Validation, and Verification
20	Validation and Verification Methods
21	Reconciliation with User Requirements
22	References

1 PROJECT ORGANIZATION AND RESPONSIBILITIES

1.1 Project Organization

The activities to be completed under the SMP will require integration of personnel from the organizations identified below, collectively referred to as the project team. A detailed description of the responsibilities of each member of the project team is presented below.

1.1.1 Overall Project Management

The contractor has overall technical responsibility for the site activities. Contractor personnel will perform the tasks and subtasks presented in Section 3 and will be responsible for evaluating resultant data, and preparing the required deliverables.

1.1.2 Analytical Laboratory Services and Subcontractors

Subcontractors for the analytical and drilling work will be contacted in the event that investigation/monitoring is required at the site. The laboratory subcontractors will be New York State Department of Health (NYSDOH) certified for the applicable methods, and drilling subcontractor will be licensed in New York State.

1.1.3 Quality Assurance Staff

The quality assurance (QA) aspects of the SMP will be conducted by the contractor.

1.2 Team Member Responsibilities

This section of the QASAPP discusses the responsibilities and duties of the project team members.

1.2.1 Contractor

Principal in Charge

- Oversight of the SMP work products
- Provide approval for major project deliverables

Project Manager

- Management and coordination of all aspects of the project as defined in the SMP with an emphasis on adhering to the project objectives
- Reviews all documents prepared by the contractor
- Assures corrective actions are taken for deficiencies cited during audits of the SMP activities

Field Activities Task Manager

- Oversight of field investigation and monitoring activities
- Oversight of field analysis and collection of QA samples
- Reduction of field data calibration and maintenance
- Review of the field instrumentation, maintenance, and calibration to maintain quality data
- Preparation of draft reports and other key documents
- Maintenance of field files of notebooks and logs, and calculations
- Instruction of field staff
- Coordination of field and laboratory schedules

Field Personnel

- Perform field procedures associated with field investigation and monitoring activities
- Perform field analyses and collect QA samples
- Calibrate, operate, and maintain field equipment
- Reduce field data
- Maintain sample custody
- Prepare field records and logs

Quality Assurance Manager (QAM)

- Review laboratory data packages
- Oversee and interface with the analytical laboratories
- Coordinate field QA and quality control (QC) activities with task managers, including audits of SMP activities, concentrating on field analytical measurements and practices to meet the project data quality objectives (DQOs)
- Review field reports
- Review audit reports
- Prepare QA/QC report which includes an evaluation of field and laboratory data and data validation reports

1.2.2 Laboratory Subcontractor

General responsibilities and duties include:

- Perform sample analyses
- Supply sample containers and shipping cartons

- Maintain laboratory custody of samples
- Strictly adhere to laboratory protocols

Laboratory Project Manager

- Serve as primary communication link between contractor and laboratory staff
- Monitor workloads and ensure availability of resources
- Oversee preparation of analytical reports
- Supervise in-house chain-of-custody

Quality Assurance Officer

- Supervise technical staff in QA/QC procedures
- Conduct audits of all laboratory activities

1.2.3 Drilling Subcontractor

General responsibilities and duties include:

- Performance of groundwater monitoring well installations and soil borings in accordance with the SMP protocols
- Decontamination of drilling and sampling equipment

2 PROJECT BACKGROUND

Site background information, including a summary of the Site Characterization results, are included in the SMP.

3 PROJECT DESCRIPTION

This section presents a description of future activities that may be conducted during the SMP. Sampling activities associated with the SMP may be conducted under the following tasks:

- Soil Investigation/Monitoring
- Groundwater Investigation/Monitoring
- Geophysical Survey

Sampling protocols to be followed during the investigation and monitoring activities are detailed in the FSP. Samples collected during the investigation will be analyzed in accordance with USEPA's SW-846, Test Methods for Evaluating Solid Waste. Table H-2 presents a list of the constituents that will be analyzed for samples collected as part of the SMP. Health and Safety protocols to be followed by field personnel during completion of the investigation activities are discussed in the HASP.

A brief description of the objectives for each task associated with the SMP is presented below. A more detailed description can be found in the associated SMP.

3.1 Soil Investigation

The objectives of the soil investigation/monitoring are to:

- Determine the presence/absence of manufactured gas plant (MGP)-related constituents in soil and, if present, whether they are at a concentration in excess of applicable NYSDEC Soil Cleanup Objectives. This may be done through the advancement of soul borings or test pit excavations.

3.2 Groundwater Investigation

The objectives of the groundwater investigation/monitoring are to:

- Determine the presence/absence of MGP-related constituents dissolved in groundwater and, if present, whether they are at a concentration in excess of NYSDEC Class GA Standards.
- Characterize the shape of the water table and assess groundwater flow patterns through the collection of groundwater level measurements.
- Install and develop addition groundwater monitoring wells to further characterize the presence/absence of MGP-related constituents in groundwater.

3.3 Geophysical Survey

The objectives of the geophysical surveys [using electromagnetic (EM) and/or ground penetrating radar (GPR)] are to:

- Locate sub-grade structures, possible unknown utilities, and fine-tune the locations of soil borings, test pits, and monitoring wells.

4 DATA QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

The DQO process, as described in EPA-QA/G-4 (USEPA, 2006), is used to establish performance or acceptance criteria, which serves as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of the study. The following sections address each of the seven sequential steps in the USEPA DQO process.

DQOs are qualitative and quantitative statements that specify the quality of the data required to support decisions made during site-related activities and are based on the end uses of the data to be collected. Preliminary DQOs were identified to ensure that the data generated during field investigations will be of adequate quality and sufficient quantity to form a sound basis for decision making relative to the above objectives. Data quality objectives have been specified for each data collection activity or investigation. The DQOs presented herein address investigation efforts only and do not cover health and safety issues, which are addressed in detail in the HASP for this project.

Step 1: State the Problem

Investigation and monitoring activities will be conducted at the site in support of the SMP to evaluate the presence and extent of MGP and/or non-MGP constituents of concern at the site.

Step 2: Identify the Goal of the Study

The goal of site investigation and monitoring activities is to obtain sufficient data to enable characterization of chemical substances that may be present in soil and groundwater at the site and to determine whether such substances pose a significant threat to the public and the environment.

Step 3: Identify Information Inputs

Decision inputs incorporate both concentration and distribution of constitutes of concern in site media. A fundamental basis for decision making is that a sufficient number of data points of acceptable quality are available from the investigation to support the decision. Thus, the necessary inputs for the decision are: 1) the proportion of non-rejected (usable) data points and 2) the quantity of data needed to evaluate whether there are unacceptable risks to human health and the environment at the site.

The data will be evaluated for completeness, general conformance with requirements of this QASAPP and consistency among data sets, and with historical data, as appropriate.

Step 4: Define the Boundaries of the Study

The site is approximately 120 feet by 180 feet and extends from the eastern edge of Fourth Street, under and to the west edge of the New York State (NYS) Interstate I-190 overpass. The portion of the Site that lies beneath Fourth Street is owned by the City of Buffalo, while the portion beneath the I-190 overpass is owned by the New York State Thruway Authority (NYSTA) and/or the State of New York.

Step 5: Develop the Analytical Approach

The decision on whether data can be used will be based on the validation results. Following validation, the data will be flagged, as appropriate, and any use restrictions noted. The media-specific sampling plans have been devised so that the loss of any single data point will not hinder description of the

distribution of constitutes of concern or the development of a risk assessment. Given this, a reasonable decision rule would be that 90 percent of the data points not be rejected and deemed unusable for exposure evaluation purposes. Applicable actions would be evaluated, if needed, based on the results of the exposure evaluation.

Step 6: Specify Performance or Acceptance Criteria

Specifications for this step call for: 1) giving forethought to corrective actions to improve data usability and 2) understanding the representative nature of the sampling design. This QASAPP has been designed to meet both specifications for this step. The sampling and analysis program has been developed based on a review of previous site data and knowledge of present site conditions. Corrective actions are described elsewhere in this QASAPP and in the appended documents. The representative nature of the sampling design has been determined by discussions among professionals familiar with the site and the appropriate government agencies.

Step 7: Develop the Plan for Obtaining Data

The overall QA objective is to develop and implement procedures for field sampling, COC, laboratory analysis, and reporting that will provide results to support the evaluation of site data. Specific procedures for sampling, chain of custody (COC), laboratory instrument calibration, laboratory analysis, data reporting, internal QC, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this QASAPP. Field sampling procedures are outlined in the SMP and FSP.

4.1 Data Categories

Three data categories have been defined to address various analytical data uses and the associated QA/QC effort and methods required to achieve the desired levels of quality. These categories are:

Screening Data: Screening data affords a quick assessment of site characteristics or conditions. This objective for data quality is applicable to data collection activities that involve rapid, non-rigorous methods of analysis and quality assurance. This objective is generally applied to physical and/or chemical properties of samples, degree of contamination relative to concentration differences, and preliminary health and safety assessment.

Screening Data with Definitive Confirmation: Screening data allows rapid identification and quantitation, although the quantitation can be relatively imprecise. This objective for data quality is available for data collection activities that require qualitative and/or quantitative verification of a select portion of sample findings (10% or more). This objective can also be used to verify less rigorous laboratory-based methods.

Definitive Data: Definitive data are generated using analytical methods, such as approved USEPA reference methods. Data are analyte-specific, with confirmation of analyte identity and concentration. Methods produce raw data (e.g., chromatograms, spectra, digital values) in the form of paper printouts or computer-generated electronic files.

It is anticipated that both the screening and definitive data categories will be used during the investigation. Field parameters (i.e., turbidity, conductivity, temperature, pH, dissolved oxygen, and oxidation-reduction potential) that will be obtained during groundwater sampling for use in qualitatively interpreting other site data will be determined using screening techniques. All remaining parameters will be determined using definitive techniques.

For this project, three levels of data reporting have been defined. They are as follows:

Level 1 – Minimal Reporting: Minimal or "results only" reporting is used for analyses that, either due to their nature (i.e., field monitoring) or the intended data use (i.e., preliminary screening), do not generate or require extensive supporting documentation.

Level 2 – Modified Reporting: Modified reporting is used for analyses that are performed following standard USEPA-approved methods and QA/QC protocols and that, based on the intended data use, require some supporting documentation but not, however, full "contract laboratory program (CLP)-type" reporting.

Level 2 Laboratory data report required elements:

- Chain of custody
- Case narrative
- Final parameter concentration for all samples
- Preparation or extraction and analysis dates/times
- Method blanks
- Surrogate recoveries
- Matrix spike (MS) and matrix spike duplicate (MSD) recoveries and relative percent difference (RPD)
- Laboratory duplicate RPD
- Laboratory control sample (LCS) recoveries

Level 3 – Full Reporting: Full "CLP-type" reporting is used for those analyses that, based on intended data use, require full documentation. This reporting level would include Analytical Services Protocol (ASP) Superfund and Category B reporting which also includes the elements for Level 2 listed above and the following:

- Calibrations (initial and continuing)
- Instrument blanks
- Gas chromatograph/mass spectrometer (GC/MS) instrument tuning
- Internal standard areas
- Serial dilution
- Raw data output for all field samples and associated QA/QC samples

The analytical methods to be used during the investigation and monitoring activities will be USEPA SW-846 methods for soil and groundwater sample analyses. Analytical results will be reported by the laboratory in both electronic data deliverable (EDD) and digital (i.e., PDF) format.

4.2 Field Activities

To obtain information necessary to meet the project objectives, the following tasks and subtasks will be performed. Note: Only subtasks that require collection and analysis of environmental samples or collecting field measurements are listed below. Refer to the SMP for a description of the tasks and subtasks.

4.2.1 Soil Investigation and Monitoring

Soil borings will be drilled and/or test pits may be excavated in order to investigate the site and the nature of the native and fill materials. Surface and subsurface soil samples will be collected and submitted for laboratory analysis for the following:

- Method 8260 for target compound list (TCL) volatile organic compounds (VOCs)
- Method 8270 for TCL semivolatile organic compounds (SVOCs)
- Method 6010 for metals
- Method 7470/7471 for mercury
- Method 9012 for cyanide
- Method 9016 for free cyanide

The number of soil samples that will be collected, including QA/QC samples, is summarized in Table H-1. Table H-2 presents the parameters to be analyzed under each of the methods described above with representative laboratory quantitation limits.

4.2.2 Groundwater Investigation and Monitoring

Groundwater samples will be collected from monitoring wells; if deemed necessary, additional groundwater monitoring wells may be installed. The resulting groundwater-quality data will be used to determine the presence and level of potentially MGP-related constituents dissolved in groundwater. The number of samples that will be collected, including QA/QC samples, is summarized in Table H-1. Table H-2 presents the parameters to be analyzed under each of the methods described above with representative laboratory quantitation limits.

Groundwater quality data will consist of field parameters, including pH, turbidity, temperature, conductivity, dissolved oxygen, and oxidation-reduction potential, as well as the laboratory parameters described below.

The groundwater level measurement procedures, the field parameter measurement procedures, and the groundwater sampling methods are provided in the FSP and SMP.

Groundwater samples will be analyzed according to the following methods:

- Method 8260 for TCL VOCs
- Method 8270 for TCL SVOCs
- Method 6010 for metals

- Method 7470/7471 for mercury
- Method 9012 for cyanide
- Method 9016 for free cyanide

5 SPECIAL TRAINING REQUIREMENTS/CERTIFICATION

Compliant with the Occupational Safety and Health Administration's (OSHA's) final rule, "Hazardous Waste Operations and Emergency Response," 29 CFR§1910.120(e), all personnel performing remedial activities at the site will have completed the requirements for OSHA 40-hour Hazardous Waste Operations and Emergency Response training. Persons in field supervisory positions will have also completed the additional OSHA 8-hour Supervisory Training.

6 DOCUMENTATION AND RECORDS

6.1 General

Samples of the various media will be collected as described in the FSP and SMP. Detailed descriptions of the documentation and reporting requirements are presented below.

6.2 Field Documentation

Field personnel will provide comprehensive documentation covering all aspects of field sampling, field analysis, and sample chain-of-custody. This documentation constitutes of a record that allows reconstruction of all field events to aid in the data review and interpretation process. All documents, records, and information relating to the performance of the field work will be retained in the project file.

The various forms of documentation to be maintained throughout the action include:

- Daily Production Documentation – A field notebook consisting of a waterproof, bound notebook that will contain a record of all activities performed at the site.
- Sampling Information – Detailed notes will be made as to the exact site of sampling, physical observations, and weather conditions (as appropriate).
- Sample Chain-of-Custody –COC forms will provide the record of responsibility for sample collection, transport, and submittal to the laboratory. COC forms will be filled out at each sampling site, at a group of sampling sites, or at the end of each day of sampling by field personnel designated to be responsible for sample custody. In the event that the samples are relinquished by the designated sampling person to other sampling or field personnel, the COC form will be signed and dated by the appropriate personnel to document the sample transfer. The original COC form will accompany the samples to the laboratory, and copies will be forwarded to the project files. A sample COC form is included in Attachment H-1.

  Persons will have custody of samples when the samples are in their physical possession, in their view after being in their possession, or in their physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel.
- Field Equipment, Calibration, and Maintenance Logs – To document the calibration and maintenance of field instrumentation, calibration and maintenance logs will be maintained for each piece of field equipment that is not factory-calibrated.

6.3 Laboratory Documentation

6.3.1 Laboratory Project Files

The laboratory will establish a file for all pertinent data. The file will include all correspondence (including emails), faxed information, phone logs, and COC forms. The laboratory will retain all project files and data packages for a period of 5 years.

6.3.2 Laboratory Logbooks

Workbooks, bench sheets, instrument logbooks, and instrument printouts will be used to trace the history of samples through the analytical process and document and relate important aspects of the work, including the associated quality controls. As such, all logbooks, bench sheets, instrument logs, and instrument printouts will be part of the permanent record of the laboratory.

Each page or entry will be dated and initialed by the analyst at the time of entry. Errors in entry will be crossed out in indelible ink with a single stroke, corrected without the use of whiteout or by obliterating or writing directly over the erroneous entry, and initialed and dated by the individual making the correction. Pages of logbooks that are not used will be completed by lining out unused portions.

Information regarding the sample, analytical procedures performed, and the results of the testing will be recorded on laboratory forms or personal notebook pages by the analyst. These notes will be dated and will also identify the analyst, the instrument used, and the instrument conditions.

Laboratory notebooks will be periodically reviewed by the laboratory group leaders for accuracy, completeness, and compliance to this QASAPP. All entries and calculations will be verified by the laboratory group leader. If all entries on the pages are correct, then the laboratory group leader will initial and date the pages. Corrective action will be taken for incorrect entries before the laboratory group leader signs.

6.3.3 Computer Tape and Hard Copy Storage

All electronic files will be maintained on magnetic tape or diskette for 5 years; hard copy data packages will be maintained in files for 5 years.

6.4 Data Reporting Requirements

6.4.1 Field Data Reporting

Information collected in the field through visual observation, manual measurement, and/or field instrumentation will be recorded in field notebooks or data sheets and/or on forms. Such data will be reviewed by the appropriate Task Manager for adherence to the FSP and SMP and for consistency. Concerns identified as a result of this review will be discussed with the field personnel, corrected if possible, and, as necessary, incorporated into the data evaluation process.

Where appropriate, field data forms and calculations will be processed and included in appendices to a Site Action Report (when generated). The original field logs, documents, and data reductions will be kept in the project files.

6.4.2 Laboratory Data Reporting

The laboratory is responsible for preparing ASP Category B data packages for all VOC, SVOC, and target analyte list (TAL) inorganics (including metals, mercury, cyanide, and free cyanide) analyses.

All data reports will include, at a minimum, the following items:

Narrative: Summary of activities that took place during the course of sample analysis, including the following information:

- Laboratory name and address
- Date of sample receipt
- Cross reference of laboratory identification number to contractor sample identification
- Analytical methods used
- Deviations from specified protocol
- Corrective actions taken

Included with the narrative will be any sample handling documents, including field and internal COC forms, air bills, and shipping tags.

Analytical Results: Reported according to analysis type and including the following information, as acceptable:

- Sample ID
- Laboratory ID
- Date of collection
- Date of receipt
- Date of extraction
- Date of analysis
- Detection limits

Sample results on the report forms will be collected for dilutions. Soil samples will be reported on a dry weight basis. Unless otherwise specified, results will be reported uncorrected for blank contamination.

The laboratory analytical reports will include all supporting documentation necessary to provide a Category B package. This additional documentation will include, but is not limited to, all raw data required to recalculate any result, including printouts, chromatograms, and quantitation reports. The report also will include: standards used in calibration and calculation of analytical results; sample extraction; digestion; and other preparation logs; standard preparation logs, instrument run logs; and moisture content calculations.

6.5 Project File

Project documentation will be placed in a single project file. This file will consist of the following components:

1. Agreements (file chronologically)
2. Correspondence (filed chronologically)

3. Memos (file chronologically)
4. Notes and Data (filed by topic)

Analytical laboratory documentation and field data will be filed with notes and data. Filed materials may be removed and signed out by authorized personnel on a temporary basis only.

7 SAMPLING PROCESS DESIGN

Information regarding the sampling design and rationale and associated sampling locations can be found in the FSP and SMP.

8 SAMPLING METHOD REQUIREMENTS

Surface and subsurface soil samples and groundwater samples will be collected as described in the SMP and the FSP. The FSP also contains the procedures that will be followed to perform geophysical surveys; advance soil boring; perform test pit excavation; install and develop monitoring wells; measure water levels; perform field measurements; perform equipment decontamination; and handle, package, and ship collected samples.

9 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

9.1 Sample Containers and Preservation

Appropriate sample containers, preservation methods, and laboratory holding times for the samples are shown in Table H-3.

The analytical laboratory will supply appropriate sample containers and preservatives, as necessary. The bottles will be purchased pre-cleaned to USEPA Office of Solid Waste and Emergency Response (OSWER) Directive 9240.05A requirements. The field personnel will be responsible for properly labeling containers and preserving samples (as appropriate).

9.2 Packing, Handling, and Shipping Requirements

Sample packaging and shipment procedures are designed to insure that the samples will arrive at the laboratory, with the COC, intact. It is imperative that that all samples are submitted to the laboratory with ample time for the analysis to be completed within the method-specified holding time. It should be noted that the laboratory needs to be aware that missing a holding time is unacceptable and may result in unusable data if the holding time is missed

Samples will be packaged for shipment as outlined below:

- Ensure that all sample containers have the sample labels securely affixed to the container with clear packing tape.
- Check the caps on the sample containers to ensure that they are properly sealed.
- Wrap the sample container cap with clear packing tape to prevent it from becoming loose.
- Complete the COC form with the required sampling information and ensure the recorded information matches the sample labels. NOTE: If the designated sampler relinquishes the samples to other sampling or field personnel for packing or other purposes, the sampler will complete the COC prior to this transfer. The appropriate personnel will sign and date the COC form to document the sample custody transfer.
- Using duct tape, secure the outside drain plug at the bottom of the cooler.
- Wrap sample containers in bubble wrap or other cushioning material.
- Place 1 to 2 inches of cushioning material at the bottom of the cooler.
- Ice layer.
- Place the sealed sample containers into the cooler.
- Place ice in plastic bags and seal. Place loosely in the cooler.
- Fill the remaining space in the cooler with cushioning material.
- Place COC forms in a plastic bag and seal. Tape the forms to the inside of the cooler lid.
- Close the lid of the cooler, lock, and secure with duct tape.

- Wrap strapping tape around both ends of the cooler at least twice.
- Mark the cooler on the outside with the following information: shipping address, return address, “Fragile” labels, and arrows indicating “this side up.” Cover the labels with clear plastic tape. Place a signed custody seal over the cooler lid.

All samples will be packaged by the field personnel and transported as low-concentration environmental samples. The samples will be hand-delivered or delivered by an express carrier within 48 hours of the time of collection. All shipments will be accompanied by the COC form identifying the contents. The original form will accompany the shipment; copies will be retained by the sampler for the sampling office records. If the samples are sent by common carrier, a bill of lading should be used. Receipts or bills of lading will be retained as part of the permanent project documentation. Commercial carriers are not required to sign off on the COC form, as long as the forms are sealed inside the sample cooler and the custody seals remain intact.

Sample custody seals and packing materials for filled sample containers will be provided by the analytical laboratory. The filled, labeled, and sealed containers will be placed in a cooler on ice and carefully packed to eliminate the possibility of container breakage. Trip blank(s) of analyte-free water will be provided by the laboratory and included in each cooler containing aqueous samples to be analyzed for VOCs.

Procedures for packing, handling, and shipping environmental samples are included in the FSP.

9.3 Field Custody Procedures

The objective of field sample custody is to assure that samples are not tampered with from the time of sample collection through the time of transport to the analytical laboratory. Persons will have “custody of samples” when the samples are in their physical possession, in their view after being in their possession, or in the physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel.

Field custody documentation consists of both field logbooks and field COC forms.

9.3.1 Field Logbooks

Field logbooks will provide the means of recording data collecting activities performed. As such, entries will be described in as much detail as possible so that persons going to the site could reconstruct a particular situation without reliance on memory.

Field logbooks will be bound field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in a secure location when not in use. Each logbook will be identified by the project-specific document number. The title page of each logbook will contain the following:

- Person to whom the logbook is assigned
- Logbook number
- Project name

- Project start date
- End date

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the site, field sampling or investigation team personnel, and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. All entries will be made in ink, and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark. Whenever a sample is collected or a measurement is made, a detailed description of the location of the station shall be recorded. The number of the photographs taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, along with the date of calibration.

Samples will be collected following the sampling procedures documented in the FSP. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume, and number of containers. Sample identification numbers will be assigned prior to sample collection. Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under sample description.

9.3.2 Sample Labelling

Preprinted sample labels will be affixed to sample bottles prior to delivery at the sampling site. The following information is required in each sample label.

- Project
- Date collected
- Time collected
- Location
- Sampler
- Analysis to be performed
- Preservative
- Sample number

9.3.3 Field Chain-of-Custody Forms

Completed COC forms will be required for all samples to be analyzed. COC forms will be initiated by the sampling crew in the field. The COC forms will contain the sample's unique identification number, sample date and time, sample description, sample type, preservation (if any), and analyses required. The original COC form will accompany the samples to the laboratory. Copies of the COC will be made prior to shipment (or multiple copy forms used) for field documentation. The COC forms will remain with the samples at all times. The samples and signed COC forms will remain in the possession of the sampling

crew until the samples are delivered to the express carrier (e.g., Federal Express) or hand delivered to a mobile or permanent laboratory, or placed in secure storage.

Sample labels will be completed for each sample using waterproof ink, unless prohibited by weather conditions. The labels will include sample information, such as: sample number and location, type of sample, date and time of sampling, sampler's name or initials, preservation, and analyses to be performed. The completed sample labels will be affixed to each sample bottle and covered with clear tape.

Whenever samples are co-located with a source or government agency, a separate Sample Receipt will be prepared for those samples and marked to indicate with whom the samples are being co-located. The person relinquishing the samples to the facility or agency should request the representative's signature, acknowledging sample receipt. If the representative is unavailable or refuses, this is noted in the "Received By" space.

9.4 Management of Investigation-Derived Materials and Wastes

Disposable equipment, debris, and decontamination rinseate (e.g., tap and distilled water containing small amounts of solvent) will be containerized during the sampling events and labeled for appropriate disposal.

9.5 Laboratory Procedures

9.5.1 General

Upon sample receipt, laboratory personnel will be responsible for sample custody. A field chain-of-custody form will accompany all samples requiring laboratory analysis. Samples will be kept secured in the laboratory until all stages of analysis are complete. All laboratory personnel having samples in their custody will be responsible for maintaining sample integrity.

9.5.2 Sample Receipt and Storage

Upon sample receipt, the laboratory sample custodian will verify the package seal, open the package, verify the sample integrity, and compare the contents against the field chain-of-custody. If a sample container is broken, the sample is in an inappropriate container, has not been preserved by appropriate means, or if there is a discrepancy between the chain-of-custody and the sample shipment, the contractor will be notified. The laboratory sample custodian will then log the samples in, assign a unique laboratory identification number to each, and label the sample bottle with the laboratory identification number. The project name, field sample code, date sampled, date received, analysis required, storage location and date, and action for final disposition will be recorded in the laboratory information management system. If the sample container is broken, the sample is in an inappropriate container, or has not been preserved by appropriate means, the contractor will be notified.

9.5.3 Sample Chain-of-Custody and Documentation

Laboratory chain-of-custody and documentation will follow procedures consistent with Exhibit F of the NYSDEC ASP 2005.

9.5.4 Sample Analysis

Analysis of an acceptable sample will be initiated by worksheets that contain all pertinent information for analysis. The analyst will sign and date the laboratory COC form when removing the samples from storage.

Samples will be organized into sample delivery groups (SDGs) by the laboratory. An SDG may contain up to 20 field samples (field duplicates, trip blanks, and rinse blanks are considered field samples for the purposes of SDG assignment). All field samples assigned to a single SDG shall be received by the laboratory over a maximum of 7 calendar days, and must be processed through the laboratory (preparation, analysis, and reporting) as a group. Every SDG must include a minimum of one site-specific MS/MSD pair, which shall be received by the laboratory at the start of the SDG assignment.

Each SDG will be self-contained for all of the required quality control samples. All parameters within an SDG will be extracted and analyzed together in the laboratory. At no time will the laboratory be allowed to run any sample (including QC samples) at an earlier or later time than the rest of the SDG. These rules for analysis will ensure that the QC samples for an SDG are applicable to the field samples of the same SDG and that the best possible comparisons can be made.

9.5.5 Sample Storage Following Analysis

The remaining samples will be maintained by the laboratory for 1 month after the final report is delivered. After this period, the samples will be disposed of in accordance with applicable rules and regulations.

10 ANALYTICAL PROCEDURES

10.1 Field Analytical Procedures

Field analytical procedures will include the measurement of dissolved oxygen, pH, turbidity, temperature, oxidation-reduction potential and conductivity, and groundwater levels. Specific field measurement protocols are provided in the FSP.

10.2 Laboratory Analytical Procedures

Laboratory analytical requirements presented in the sub-sections below include a general summary of requirements, specifics related to each sample medium to be analyzed, and details of the methods to be used for this project. SW-846 methods with NYSDEC, ASP, 2005 Revision, QA/QC and reporting deliverables requirements will be used for all analytes.

10.2.1 General

The following tables summarize general analytical requirements:

Table	Title
Table H-1	Environmental and Quality Control Sample Analyses
Table H-2	Parameters, Methods, and Quantitation Limits
Table H-3	Sample Containers, Preservation Methods, and Holding Times Requirements

10.2.2 Sample Matrices

10.2.2.1 Surface/Subsurface Soil

Analyses in this category will relate to soil samples. Analyses will be performed following the methods listed in Table H-1. Results will be reported as dry weight, in units presented in Table H-2. Moisture content will be reported separately.

10.2.2.2 Groundwater

Analyses will be performed following the methods listed in Table H-1. Analytical results for all analyses will be reported in units identified in Table H-2.

10.2.3 Analytical Requirements

The primary sources to describe the analytical methods to be used during the investigation are provided in USEPA SW-846 Test Methods for Evaluating Solid Waste, Third Edition. Detailed information regarding quality control procedures is provided in NYSDEC, ASP 2005 Revision, Exhibit E.

11 QUALITY CONTROL REQUIREMENTS

11.1 Quality Assurance Indicators

The overall quality assurance objective for this QASAPP is to develop and implement procedures for sampling, chain-of-custody, laboratory analysis, instrument calibration, data reduction and reporting, internal quality control, audits, preventive maintenance, and corrective action such that valid data will be generated. These procedures are presented or referenced in the following sections of the QASAPP. Specific QC checks are discussed in Section 11.2.

Quality assurance indicators are generally defined in terms of six parameters:

1. Representativeness
2. Comparability
3. Completeness
4. Precision
5. Accuracy
6. Sensitivity

Each parameter is defined below. Specific objectives for the site actions are set forth in other sections of this QASAPP, as referenced below.

11.1.1 Representativeness

Representativeness is the degree to which sample data accurately and precisely represent site conditions, and is dependent on sampling and analytical variability. The investigation activities have been designed to assess the presence of the constituents at the time of sampling. The SMP, FSP, and this QASAPP present field sampling methodologies and laboratory analytical methodologies. The use of the prescribed field and laboratory analytical methods with associated holding times and preservation requirements are intended to provide representative data.

11.1.2 Comparability

Comparability is the degree of confidence with which one data set can be compared to another. Comparability between this investigation, and to the extent possible, with existing data will be maintained through consistent sampling and analytical methodology set forth in the SMP, FSP, and this QASAPP, SW-846 analytical methods with NYSDEC ASP Revision 2005 QA/QC requirements and Category B reporting deliverables, and through use of QA/QC procedures and appropriately trained personnel.

11.1.3 Completeness

Completeness is defined as a measure of the amount of valid data obtained from an event and/or investigation compared to the amount that was expected to be obtained under normal conditions. This will be determined upon assessment of the analytical results, as discussed in Section 11.6.

11.1.4 Precision

Precision is the measure of reproducibility of sample results. The goal is to maintain a level of analytical precision consistent with the project objectives. To maximize precision, sampling and analytical procedures will be followed. All work for this investigation will adhere to established protocols presented in the SMP, FSP, and this QASAPP. Checks for analytical precision will include the analysis of matrix spike duplicates, laboratory duplicates and field duplicates. Checks for field measurement precision will include obtaining duplicate field measurements. Further discussion of precision QC checks is provided in Section 11.4.

11.1.5 Accuracy

Accuracy is the deviation of a measurement from the true value of a known standard. Both field and analytical accuracy will be monitored through initial and continuing calibration of instruments. In addition, internal standards, matrix spikes, blank spikes, and surrogates (system monitoring compounds) will be used to assess the accuracy of the laboratory analytical data. Further discussion of these QC samples is provided in Section 11.5.

11.1.6 Sensitivity

Sensitivity is defined as the ability of the method or instrument to detect the constituent of concern and other target compounds at the level of interest. Method detection limit (MDL) is defined as the minimum concentration of a substance that can be identified, measured, and reported with a 99 percent confidence that the analyte concentration is greater than zero and is determined from repeated analysis of a sample in a given matrix containing the analyte. MDLs have been determined as required in Title 40 of the Code of Federal Regulation Part 136B. The reporting limit (RL) is greater than or equal to the lowest standard used to establish the calibration curve. The RLs for this investigation are generally at least 3 times greater than the MDL. Results greater than the MDL and less than the RL will be qualified estimated (J) by the laboratory. Representative laboratory MDLs and RLs for the constituents of concern are provided in Table H-2.

Note that since a laboratory has not been subcontracted for this project, the MDLs and RLs presented in Table H-2 were obtained from a representative NYSDOH-certified laboratory for the required analyses. Prior to initiating investigation and monitoring activities at the site, the subcontracted laboratory's MDLs and RLs should be obtained and compared to the project action limits to confirm that they are low enough to evaluate the results.

11.2 Field Quality Control Checks

11.2.1 Field Measurements

To verify the quality of data using field instrumentation, duplicate measurements will be obtained and reported for all field analytical measurements. A duplicate measurement will involve obtaining measurements a second time at the same sampling location.

11.2.2 Sample Containers

Certified-clean sample containers in accordance with Exhibit I of the NYSDEC ASP Revision 2005 (Eagle Picher pre-cleaned containers or equivalent) will be supplied by the laboratory.

11.2.3 Field Duplicates

Field duplicates will be collected for groundwater and source materials/soil samples to check reproducibility of the sampling methods. Field duplicates will be prepared as discussed in the FSP. In general, soil and groundwater sample field duplicates will be analyzed at a 5 percent frequency (every 20 samples). Table H-1 provides an estimated number of field duplicates for each applicable parameter and matrix.

11.2.4 Rinse Blanks

Rinse blanks are used to monitor the cleanliness of the sampling equipment and the effectiveness of the cleaning procedures. Rinse blanks will be prepared and submitted for analysis at a frequency of one per day (when sample equipment cleaning occurs) or once for every 20 samples collected, whichever is less. Rinse blanks will be prepared by filling sample containers with analyte-free water (supplied by the laboratory) which has been routed through a cleaned sampling device. When dedicated sampling devices are used or sample containers are used to collect the samples, rinse blanks will not be necessary. Table H-1 provides an estimated number of rinse blanks for each applicable parameter and matrix.

11.2.5 Trip Blanks

Trip blanks will be used to assess whether site samples have been exposed to non-site-related volatile constituents during storage and transport. Trip blanks will be analyzed at a frequency of once per day, per cooler containing groundwater samples to be analyzed for volatile organic constituents. A trip blank will consist of a container filled with analyte-free water (supplied by the laboratory) which remains unopened with field samples throughout the sampling event. Trip blanks will only be analyzed for aqueous volatile organic constituents. Table H-1 provides an estimated number of trip blanks for each applicable matrix.

11.3 Analytical Laboratory Quality Control Checks

Internal quality control procedures are specified in the analytical methods. These specifications include the types of QC checks required (method blanks, reagent/preparation blanks, MS/MSD, calibration standards, internal standards, surrogate standards, the specific calibration check standards, laboratory duplicate/replicate analysis), compounds and concentrations to be used, and the QC acceptance criteria.

11.3.1 Method Blanks

Sources of contamination in the analytical process, whether specific analyses or interferences, need to be identified, isolated, and corrected. The method blank is useful in identifying possible sources of contamination within the analytical process. For this reason, it is necessary that the method blank is initiated at the beginning of the analytical process and encompasses all aspects of the analytical work. As such, the method blank would assist in accounting for any potential contamination attributable to

glassware, reagents, instrumentation, or other sources that could affect sample analysis. One method blank will be analyzed with each analytical series associated with no more than 20 samples.

11.3.2 Matrix Spike/Matrix Spike Duplicates

MS/MSDs will be used to measure the accuracy of analyte recovery from the sample matrices and will be site-specific. MS/MSD pairs will be analyzed at a 5% frequency.

When MS recoveries are outside quality control limits, associated LCS and surrogate spike recoveries will be evaluated, as applicable, to attempt to verify the reason for the deviation and determine the effect on the reported sample results. Table H-1 presents an estimated number of MS and MSD analyses for each applicable parameter and matrix.

11.3.3 Surrogate Spikes

Surrogates are compounds that are unlikely to occur under natural conditions but that have properties similar to the analytes of interest. This type of control is primarily used for organic samples and is added to the samples prior to purging or extraction. The surrogate spike is utilized to provide broader insight into the proficiency and efficiency of an analytical method on a sample-specific basis. This control reflects analytical conditions that may not be attributable to sample matrix.

If surrogate spike recoveries exceed specified quality control limits, the analytical results need to be evaluated thoroughly in conjunction with other control measures. In the absence of other control measures, the integrity of the data may not be verifiable, and reanalysis of the samples with additional control may be necessary.

Surrogate spike compounds will be selected utilizing the guidance provided in the analytical methods.

11.3.4 Laboratory Duplicates

For inorganic methods, laboratory duplicates will be analyzed to assess laboratory precision. Laboratory duplicates are defined as a separate aliquot of an individual sample that is analyzed as a separate sample. Table H-1 presents an estimated number of laboratory duplicates for each applicable parameter and matrix.

11.3.5 Calibration Standards

Calibration check standards analyzed within a particular analytical series provide insight regarding the instruments' stability. A calibration check standard will be analyzed at the beginning and end of an analytical series, or periodically throughout a series containing a large number of samples.

In general, calibration check standards will be analyzed after every 12 hours, or more frequently, as specified in the applicable analytical method. In analyses where internal standards are used, a calibration check standard will only be analyzed in the beginning of an analytical series. If results of the calibration check standard exceed specified tolerances, then all samples analyzed since the last acceptable calibration check standard will be reanalyzed.

Laboratory instrument calibration standards will be selected utilizing the guidance provided in the analytical methods, as summarized in Section 13.

11.3.6 Internal Standards

Internal standard areas and retention times will be monitored for organic analyses performed by GC/MS methods. Method-specified internal standard compounds will be spiked into all field samples, calibration standards, and QC samples after preparation and prior to analysis. If internal standard areas in one or more samples exceed the specified tolerances, then cause will be investigated, the instrument will be recalibrated if necessary, and all affected samples will be reanalyzed.

The acceptability of internal standard performance will be determined using the guidance provided within the analytical methods.

11.3.7 Laboratory Control Samples

LCS are standards of known concentration and are independent in origin from the calibration standards. The intent of LCS analysis is to provide insight into the analytical proficiency within an analytical series. This includes the preparation of calibration standards, the validity of calibration, sample preparation, instrument set-up, and the premises inherent in quantitation. One LCS will be analyzed with each analytical series associated with not more than 20 samples.

11.4 Data Precision Assessment Procedures

Field precision is difficult to measure because of temporal variations in field parameters. However, precision will be controlled through the use of experienced field personnel, properly calibrated meters, and duplicate field measurements. Field duplicates will be used to assess precision for the entire measurement system including sampling, handling, shipping, storage, preparation, and analysis.

Laboratory data precision for organic analyses will be monitored through the use of MSD, laboratory duplicate, and field duplicates as identified in Table H-1.

The precision of data will be measured by calculation of the RPDs of duplicate sample sets. The RPD can be calculated by the following equation:

$$RPD = \{(abs [D1 - D2]) / ((D1 + D2)/2)\}*100$$

Where:

abs = absolute value
RPD = relative percent difference
D1 = sample value
D2 = duplicate sample value

Precision objectives for matrix spike duplicate and laboratory duplicate analyses are identified in the NYSDEC ASP Revision 2005.

11.5 Data Accuracy Assessment Procedures

The accuracy of field measurements will be controlled by experienced field personnel, properly calibrated field meters, and adherence to established protocols. The accuracy of field meters will be assessed by review of calibration and maintenance logs.

Laboratory accuracy will be assessed via the use of matrix spikes, surrogate spikes, and internal standards. Where available and appropriate, QA performance standards will be analyzed periodically to assess laboratory accuracy. Accuracy will be calculated as a percent recovery as follows:

$$REC = \frac{A - X}{B} \times 100$$

Where:

A = value measured in spiked sample or standard
X = value measured in original sample
B = amount added to sample or true value of the standard

This formula is derived under the assumption of constant accuracy over the original and spiked measurements. If any accuracy calculated by this formula is outside of the acceptable levels, data will be evaluated to determine whether the deviation represents unacceptable accuracy, or variable, but acceptable accuracy. Accuracy objectives for matrix spike recoveries and surrogate recovery objectives are identified in the NYSDEC ASP, 2005 Revision.

11.6 Data Completeness Assessment Procedures

Completeness of a field or laboratory data set will be calculated by comparing the number of samples collected or analyzed to the proposed number.

Completeness = (usable data points obtained / total data points planned) * 100

As general guidelines, overall project completeness is expected to be at least 90 percent. The assessment of completeness will require professional judgment to determine data usability for intended purposes.

12 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

Preventive maintenance schedules have been developed for both field and laboratory instruments. A summary of the maintenance activities to be performed is presented below.

12.1 Field Instruments and Equipment

Prior to any field sampling, each piece of field equipment will be inspected to assure it is operational. If the equipment is not operational, it must be serviced prior to use. All meters which require charging or batteries will be fully charged or have fresh batteries. If instrument servicing is required, it is the responsibility of the Field Activities Task Manager to follow the maintenance schedule and arrange for prompt service.

Field instrumentation to be used in this study includes meters to measure turbidity, conductivity, temperature, pH, dissolved oxygen, and oxidation-reduction potential and groundwater levels. Field equipment also includes sampling devices for groundwater. A logbook will be kept for each field instrument. Each logbook contains records of operation, maintenance, calibration, and any problems and repairs. The Field Activities Task Manager will review calibration and maintenance logs.

Field equipment returned from a site will be inspected to confirm it is in working order. This inspection will be recorded in the logbook or field notebooks as appropriate. It will also be the obligation of the last user to record any equipment problems in the logbook.

Non-operational field equipment will be either repaired or replaced. Appropriate spare parts will be made available for field meters. A summary of preventive maintenance requirements for field instruments, and details regarding field equipment maintenance, operation, and calibration, are provided in the FSP.

12.2 Laboratory Instruments and Equipment

12.2.1 General

Only qualified personnel will service instruments and equipment. Repairs, adjustments, and calibrations are documented in the appropriate logbook or data sheet.

12.2.2 Instrument Maintenance

Preventive maintenance of laboratory equipment will follow the guidelines recommended by the manufacturer. A malfunctioning instrument will be repaired by in-house staff or through a service call by the manufacturer as appropriate.

The laboratory will maintain a sufficient supply of spare parts for its instruments to minimize downtime. Whenever possible, backup instrumentation will be retained.

Whenever practical, analytical equipment will be maintained under a service contract. The contract allows for preventative system maintenance and repair on an “as-needed” basis. The laboratory has sufficiently trained staff to allow for the day-to-day maintenance of equipment.

12.2.3 Equipment Monitoring

On a daily basis, the operation of balances, incubators, ovens, refrigerators, and water purification systems will be checked and documented. Any discrepancies will be immediately reported to the appropriate laboratory personnel for resolution.

13 INSTRUMENT CALIBRATION AND FREQUENCY

13.1 Field Equipment Calibration Procedures and Frequency

Specific procedures for performing and documenting calibration and maintenance for the equipment measuring turbidity, conductivity, temperature, pH, dissolved oxygen, and oxidation-reduction potential, and groundwater levels are provided in the FSP. Calibration checks will be performed daily when measuring turbidity, conductivity, temperature, pH, dissolved oxygen, and oxidation-reduction potential. Field equipment operation, calibration, and maintenance procedures are provided in the FSP.

13.2 Laboratory Equipment Calibration Procedures and Frequency

Instrument calibration will follow the specifications provided by the instrument manufacturer or specific analytical method used.

When analyses are conducted according to USEPA methods, the calibration procedures and frequencies specified in the applicable method will be followed. Records of calibrations will be filed and maintained by the laboratory. These records will be subject to QA audit. For all instruments, the laboratory will maintain trained repair staff with in-house spare parts or will maintain service contracts with vendors.

All standards used to calibrate equipment are traceable, directly or indirectly, to the National Institute of Standards and Technology. All standards received will be logged into standard receipt logs maintained by the individual analytical groups. Each group will maintain a standards log that tracks the preparation of standards used for calibration and QC purposes.

14 INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

All supplies to be used in the field and laboratory will be available when needed. They will be free of target chemicals and interferences. All reagents will be tested prior to use in the laboratory. All standards will be verified against a second source standard. The laboratory will follow a “first in/first out” procedure for the storage and use of all consumables to minimize the risk of contamination and degradation.

15 DATA ACQUISITION REQUIREMENTS FOR NONDIRECT MEASUREMENTS

Historical data will be used as guidance in determining sampling locations.

Prior to their use, historic data sets will be reviewed according to the procedures identified in subsequent sections of this QASAPP to determine the appropriate uses of such data. The extent to which these data can be validated will be determined by the analytical level and QC data available. The evaluation of historic data requires the following:

- Identification of analytical levels
- Evaluation of QC data, when available
- Development of conclusions regarding the acceptability of the data for intended uses

Acceptability of historic data for intended uses will be determined by application of these procedures and professional judgment. If the historic data quality cannot be determined, its use will be limited to general trend evaluations.

16 DATA MANAGEMENT

The purpose of the data management is to ensure that all of the necessary data are accurate and readily accessible to meet the analytical and reporting objectives of the project. The field investigations will encompass a large number of samples and a variety of sample matrices and analytes from a large geographic area. From the large amount of resulting data, the need arises for a structured, comprehensive, and efficient program for management of data.

The data management program established for the project includes field documentation and sample QA/QC procedures, methods for tracking and managing the data, and a system for filing all site-related information. More specifically, data management procedures will be employed to efficiently process the information collected such that the data are readily accessible and accurate. These procedures are described in detail in the following section.

The data management plan has five elements:

1. Sample designation system
2. Field activities
3. Sample tracking and management
4. Data management system
5. Document control and inventory

16.1 Sample Designation System

A concise and easily understandable sample designation system is an important part of the project sampling activities. It provides a unique sample number that will facilitate both sample tracking and easy re-sampling of select locations to evaluate data gaps, if necessary. The sample designation system to be employed during the sampling activities will be consistent, yet flexible enough to accommodate unforeseen sampling events or conditions. A combination of letters and numbers will be used to yield a unique sample number for each field sample collected.

16.2 Field Activities

Field activities designed to gather the information necessary to make decisions regarding the off-site areas require consistent documentation and accurate record keeping. During site activities, standardized procedures will be used for documentation of field activities, data security, and QA. These procedures are described in further detail in the following subsections.

16.2.1 Field Documentation

Complete and accurate record keeping is a critical component of the field investigation activities. When interpreting analytical results and identifying data trends, investigators realize that field notes are an important part of the review and validation process. To ensure that all aspects of the field investigation are thoroughly documented, several different information records, each with its own specific reporting requirements, will be maintained, including:

- Field logs
- Instrument calibration records
- Chain-of-custody forms

A description of each of these types of field documentation is provided below.

Field Logs

The personnel performing the field activities will keep field logs that detail all observations and measurements made during field activities. Data will be recorded directly into site-dedicated, bound notebooks, with each entry dated and signed. To ensure at any future date that notebook pages are not missing, each page will be sequentially numbered. Erroneous entries will be corrected by crossing out the original entry, initialing it, and then documenting the proper information. In addition, certain media sampling locations will be surveyed to accurately record their locations. The survey crew will use their own field logs and will supply the sampling location coordinates to the File Custodian.

Instrument Calibration Records

As part of data quality assurance procedures, field monitoring and detection equipment will be routinely calibrated. Instrument calibration ensures that equipment used is of the proper type, range, accuracy, and precision to provide data compatible with the specified requirements and desired results. Calibration procedures for the various types of field instrumentation are described in Section 13.1. In order to demonstrate that established calibration procedures have been followed, calibration records will be prepared and maintained to include, as appropriate, the following:

- Calibration date and time
- Type and identification number of equipment
- Calibration frequency and acceptable tolerances
- Identification of individual(s) performing calibration
- Reference standards used
- Calibration data
- Information on calibration success or failure

The calibration record will serve as a written account of monitoring or detection equipment QA. All erratic behavior or failures of field equipment will be subsequently recorded in the calibration log.

Chain-of-Custody Forms

COC forms are used as a means of documenting and tracking sample possession from time of collection to the time of disposal. A COC form will accompany each field sample collected, and one copy of the form will be filed in the field office. All field personnel will be briefed on the proper use of the COC procedure. A more thorough description of the COC forms is located in the FSP.

16.2.2 Data Security

Measures will be taken during the field investigation to ensure that samples and records are not lost, damaged, or altered. When not in use, all field notebooks will be stored at the field office in a locked cabinet. Access to these files will be limited to the field personnel who utilize them.

16.3 Sample Management and Tracking

A record of all field documentation, as well as analytical and QA/QC results, will be maintained to ensure the validity of data used in the site analysis. To effectively execute such documentation, carefully constructed sample tracking and data management procedures will be used throughout the sampling program.

Sample tracking will begin with the completion of COC forms, as described in Section 9.3.3. On a daily basis, the completed COC forms associated with samples collected that day will be faxed or emailed from the project office to the QAM. Copies of all completed COC forms will be maintained in the field office. On the following day, the laboratory will verify receipt of samples.

When analytical data are received from the laboratory, the QAM will review the incoming analytical data packages against the information on the COCs to confirm that the correct analyses were performed for each sample and that results for all samples submitted for analysis were received. Any discrepancies noted will be promptly followed-up by the QAM.

16.4 Data Management System

In addition to the sample tracking system, a data management system may be implemented. The central focus of the data management system will be the development of a personal computer-based project database. The project database, to be maintained by the Database Administrator, will combine pertinent geographical, field, and analytical data. Information that will be used to populate the database will be derived from three primary sources: surveying of sampling locations, field observations, and analytical results. Each of these sources is discussed in the following sections.

16.4.1 Computer Hardware

The database will be constructed on personal computer work stations connected through a network server.

16.4.2 Computer Software

If required, the database will be written in Microsoft Access, running in a Windows operating system. Tables and other database reports will be generated through Microsoft Access in conjunction with Microsoft Excel and/or Microsoft Word. These software products will be upgraded to current industrial standards, as necessary.

16.4.3 Surveying Information

In general, each location sampled will be surveyed to ensure accurate documentation of sample locations for mapping and geographic information system (GIS) purposes (if appropriate), to facilitate the re-sampling of select sample locations during future monitoring programs, if needed, and for any potential remediation activities. The surveying activities that will occur in the field will consist of the collection of information that will be used to compute a northing and easting in state plane coordinates for each sample location and the collection of information to compute elevations relative to the National Geodetic Vertical Datum of 1988 for select sample locations, as appropriate. All field books associated with the surveying activities will be stored as a record of the project activities.

Conventional surveying techniques will be used to gather information such as the angle and distance between the sample location and the control monument, as well as point attributes. This information will be digitally stored in a data logger attached to the total station. On a weekly basis, the information on each data logger will be downloaded into a personal computer for processing with surveying software. Control monuments will be established using global positioning system (GPS) techniques. The surveying software allows the rapid computation of a location's state plane coordinates.

Differential leveling techniques will be used to gather information to be used to compute a sample location's (or top-of-casing for groundwater monitoring wells) elevation. During the differential leveling process, which includes at least one benchmark of known elevation, detailed field notes will be kept in a field book. On a weekly basis, the relevant information will be manually keyed into surveying software package for further processing. The surveying software reduces the field notes and calculates a location's elevation relative to the project datum.

Following computation of a location's state plane coordinates and, at select locations, elevations, the computer information will undergo a QA/QC review by a licensed land surveyor. Following the approval of the computed information, the coordinates and elevations will be transferred in a digital and a hard copy format.

16.4.4 Analytical Results

Analytical results provided by the laboratory will generally be available in both a digital and a hard copy format. Upon receipt of each analytical package, the original COC form will be placed in the project files. The data packages will be examined to ensure that the correct analyses were performed for each sample submitted and that all of the analyses requested on the COC form were performed. If discrepancies are noted, the QAM will be notified and will promptly follow up with the laboratory to resolve any issues.

Where appropriate, the data packages will be validated in accordance with the procedures presented in Section 20. Any data that does not meet the specified standards will be flagged pending resolution of the issue. The flag will not be removed from the data until the issue associated with the sample results is resolved. Although flags may remain for certain data, the use of that data may not necessarily be restricted.

Following completion of the data validation, the digital files will be used to populate the appropriate database tables. Specific fields may include:

- sample identification number
- date sampled
- date analyzed
- parameter name
- analytical result
- units
- detection limit
- qualifier(s)

The individual EDDs, supplied by the laboratory in either an ASCII comma separated value (CSV) format or in a Microsoft Excel 97 worksheet, will be loaded into the appropriate database table. Any analytical data that cannot be provided by the laboratory in electronic format will be entered manually.

After entry into the database, the EDD data will be compared to the field information previously entered into the database to confirm that all requested analytical data have been received.

16.4.5 Data Analysis and Reporting

The database management system will have several functions to facilitate the review and analysis of the data. Data entry screens will be developed to assist in the keypunching of field observations. Routines will also be developed to permit the user to scan analytical data from a given site for a given media.

A valuable function of the data management system will be the generation of tables of analytical results from the project databases. The capability of the data management system to directly produce tables reduces the redundant manual entry of analytical results during report preparation and precludes transcription errors that may occur otherwise. This data management system function creates a digital comma-delimited ASCII file of analytical results and qualifiers for a given media. The ASCII file is then processed through a spreadsheet, which transforms the comma-delimited file into a table of rows and columns. Tables of analytical data will be produced as part of data interpretation tasks, the reporting of data, and the generation of the SC Report.

Another function of the data management system will be to create digital files of analytical results and qualifiers suitable for transfer to mapping/presentation software. The use of a data management system greatly reduces the redundant keypunching of analytical results and facilitates the efficient production of interpretative and presentation graphics.

The data management system also has the capability of producing a digital file of select parameters that exists in one or more of the databases. This type of custom function is accomplished on an interactive basis and is best used for transferring select information into a number of analysis tools, such as statistical or graphing programs.

16.5 Document Control and Inventory

The contractor will be responsible to maintain the project files. Originals, when possible, are placed in the files. These are the central files and will serve as the site-specific files for the all project activities.

17 ASSESSMENT AND RESPONSE ACTIONS

Performance and systems audits will be completed in the field and the laboratory as described below.

17.1 Field Audits

The following field performance and systems audits will be completed during this project.

17.1.1 Performance Audits

The Project Manager will monitor field performance. Field performance audit summaries will contain an evaluation of field measurements and field meter calibrations to verify that measurements are taken according to established protocols. The Quality Assurance Manager will review all field reports and communicate concerns to the contractor, as appropriate. In addition, the Quality Assurance Manager will review the rinse and trip blank data to identify potential deficiencies in field sampling and cleaning procedures.

17.1.2 Internal Systems Audits

A field internal systems audit is a qualitative evaluation of all components of field QA/QC. The systems audit compares scheduled QA/QC activities from this document with actual QA/QC activities completed. The Project Manager will periodically confirm that work is being performed consistent with the SMP, the FSP, and the HASP.

17.2 Laboratory Audits

The laboratory will perform internal audits consistent with NYSDEC ASP, 2005 Revision, Exhibit E.

In addition to the laboratory's internal audits and participation in state and federal certification programs, the laboratory sections at the laboratory are audited by representatives of the regulatory agency issuing certification. Audits are usually conducted on an annual basis and focus on laboratory conformance to the specific program protocols for which the laboratory is seeking certification. The auditor reviews sample handling and tracking documentation, analytical methodologies, analytical supportive documentation, and final reports. The audit findings are formally documented and submitted to the laboratory for corrective action, if necessary.

The contractor reserves the right to conduct an on-site audit of the laboratory prior to the start of analyses for the project. Additional audits may be performed during the course of the project, as deemed necessary.

17.3 Corrective Action

Corrective actions are required when field or analytical data are not within the objectives specified in this QASAPP, the FSP, or the SMP. Corrective actions include procedures to promptly investigate, document, evaluate, and correct data collection and/or analytical procedures. Field and laboratory corrective action procedures are described below.

17.3.1 Field Procedures

When conducting field work, if a condition is noted that would have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and corrective action implemented will be documented on a Corrective Action Report Form and reported to the contractor.

Examples of situations that would require corrective actions are provided below:

1. Protocols as defined by this QASAPP, the FSP, or the SMP have not been followed.
2. Equipment is not in proper working order or properly calibrated.
3. QC requirements have not been met.
4. Issues resulting from performance or systems audits.

Project personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities.

17.3.2 Laboratory Procedures

In the laboratory, when a condition is noted to have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and corrective action to be taken will be documented, and reported to the Project Manager.

Corrective action may be initiated, at a minimum, under the following conditions:

1. Specific laboratory analytical protocols have not been followed.
2. Predetermined data acceptance standards are not obtained.
3. Equipment is not in proper working order or calibrated.
4. Sample and test results are not completely traceable.
5. QC requirements have not been met.
6. Issues resulting from performance or systems audits.

Laboratory personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities.

18 REPORTS TO MANAGEMENT

The analytical laboratory will submit analytical reports to the contractor for review. If required, the laboratory reports will be submitted to the data validator for review. Supporting data (i.e., historic data, related field or laboratory data) will also be reviewed to evaluate data quality, as appropriate. The QAM will incorporate results of the data validation reports (if required) and assessments of data usability into a summary report (if required) that will be submitted to the Project Manager. If required, this report will be filed in the project file and will include the following:

1. Assessment of data accuracy, precision, and completeness for both field and laboratory data
2. Results of the performance and systems audits
3. Significant QA/QC problems, solutions, corrections, and potential consequences
4. Analytical data validation report

The analytical data package will also be incorporated into the Site Action Report.

19 DATA REVIEW, VALIDATION, AND VERIFICATION

After field and laboratory data are obtained, these data will be subject to:

1. Validation of the data
2. Reduction or manipulation of the data mathematically or otherwise into meaningful and useful forms
3. Organization, interpretation, and reporting of the data

19.1 Field Data Reduction, Validation, and Reporting

19.1.1 Field Data Reduction

Information that is collected in the field through visual observation, manual measurement and/or field instrumentation will be recorded in field notebooks, log sheets, and/or other appropriate forms. Such data will be reviewed by the Project Manager for adherence to the SMP, FSP, and this QASAPP and consistency of data. Any concerns identified as a result of this review will be discussed with the field personnel, corrected if possible, and as necessary incorporated into the data evaluation process.

Examples of data reduction activities that may be performed during site investigations and monitoring include:

1. Mapping of areas impacted with potential MGP-related constituents based on findings of the soil-boring program
2. Calculation of water elevations by subtracting the depth-to-water data from the surveyed elevation of the measuring point
3. Production of hydrogeologic contour maps by contouring lines of equal water elevations using known elevation points

19.1.2 Field Data Validation

Field data calculations, transfers, and interpretations will be conducted by the field personnel and reviewed for accuracy by the Project Manager and the QAM. The Project Manager will recalculate at least five percent of all data reductions. Field documentation and data reduction prepared by field personnel will be reviewed by the Project Manager and QAM. All logs and documents will be checked for:

1. General completeness
2. Readability
3. Usage of appropriate procedures
4. Appropriate instrument calibration and maintenance
5. Reasonableness in comparison to present and past data collected
6. Correct sample locations
7. Correct calculations and interpretations

19.1.3 Field Data Reporting

Where appropriate, field data forms and calculations will be processed and included in appendices to the Site Action Report. The original field logs, documents, and data reductions will be kept in the project files.

19.2 Laboratory Data Reduction, Review, and Reporting

19.2.1 Laboratory Data Reduction

Laboratory analytical data will be directly transferred from the instrument to the computer or the data reporting form (as applicable). Calculation of sample concentrations will be performed using the appropriate regression analysis program, response factors, and dilution factors (where applicable).

19.2.2 Laboratory Data Review

All data will be subject to multi-level review by the laboratory. The group leader will review all data reports prior to release for final data report generation, and the laboratory director will review a cross section of the final data reports. All final data reports are reviewed by the laboratory QAM prior to shipment to the contractor.

If discrepancies or deficiencies exist in the analytical results, then corrective action will be taken, as discussed in Section 17. Deficiencies discovered as a result of internal data review, as well as the corrective actions to be used to rectify the situation, will be documented on a Corrective Action Form. This form will be submitted to the contractor.

20 VALIDATION AND VERIFICATION METHODS

Data validation entails a review of the QC data and the raw data to verify that the laboratory was operating within required limits, the analytical results are correctly transcribed from the instrument, and which, if any, environmental samples are related to any out-of-control QC samples. The objective of data validation is to identify any questionable or invalid laboratory measurements.

If required, data validation will consist of data screening, checking, reviewing, editing, and interpreting to document analytical data quality and determine if the quality is sufficient to meet the DQOs. The data validation will also include a review of completeness and compliance, including the elements provided in Table H-4.

As required, data generated during site activities will be validated and a NYSDEC data usability summary report (DUSR) will be generated for each individual SDG using the USEPA Function Guidelines (*Contract Laboratory Program National Functional Guidelines for Organic Data Review*. EPA-540/R-99-008. October 1999; *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. EPA-540-R-04-004. October 2004) and USEPA Region II standard operating procedures (SOPs) for data validation available at the time of project initiation, where appropriate. These procedures and criteria may be modified as necessary to address project-specific and method-specific criteria, control limits, and procedures. Data validation will consist of data screening, checking, reviewing, editing, and interpretation to document analytical data quality and to determine whether the quality is sufficient to meet the DQOs.

The data validator will verify that reduction of laboratory measurements and laboratory reporting of analytical parameters is in accordance with the procedures specified for each analytical method and/or as specified in this QASAPP. Any deviations from the analytical method or any special reporting requirements apart from that specified in this QASAPP will be detailed on COC forms.

Upon receipt of laboratory data, the following procedures will be executed by the data validator:

- Evaluate completeness of data package.
- Verify that field COC forms were completed and that samples were handled properly.
- Verify that holding times were met for each parameter. Holding time exceedances, should they occur, will be documented. Data for all samples exceeding holding time requirements will be flagged as either estimated or rejected. The decision as to which qualifier is more appropriate will be made on a case-by-case basis.
- Verify that parameters were analyzed according to the methods specified.
- Review QA/QC data (i.e., make sure duplicates, blanks, and spikes were analyzed on the required number of samples, as specified in the method; verify that duplicate and MS recoveries are acceptable).
- Investigate anomalies identified during review. When anomalies are identified, they will be discussed with the Project Manager and/or Laboratory Manager, as appropriate.
- If data appears suspect, investigate the specific data of concern. Calculations will be traced back to raw data; if calculations do not agree, the cause will be determined and corrected.

Deficiencies discovered as a result of the data review, as well as the corrective actions implemented in response, will be documented and submitted in the form of a written report addressing the following topics as applicable to each method:

- Assessment of the data package
- Description of any protocol deviations
- Failures to reconcile reported and/or raw data
- Assessment of any compromised data
- Overall appraisal of the analytical data
- Table of site name, sample quantities, matrix, and fractions analyzed

It should be noted that qualified results do not necessarily invalidate data. The goal to produce the best possible data does not necessarily mean producing data without quality control qualifiers. Qualified data can provide useful information.

Resolution of any issues regarding laboratory performance or deliverables will be handled between the laboratory and the data validator. Suggestions for reanalysis may be made by the QAM at this point.

DUSRs will be kept in the project files.

21 RECONCILIATION WITH USER REQUIREMENTS

The data results will be examined to determine the performance that was achieved for each data usability criteria. The performance will then be compared with the project objectives. Of particular note will be samples at or near action levels. All deviations from objectives will be noted. Additional action may be warranted when performance does not meet performance objectives for critical data. Action options may include any or all of the following:

- Retrieval of missing information
- Request for additional explanation or clarification
- Reanalysis of sample from extract (when appropriate)
- Recalculation or reinterpretation of results by the laboratory

These actions may improve the data quality, reduce uncertainty, and may eliminate the need to qualify or reject data.

If these actions do not improve the data quality to an acceptable level, the following actions may be taken:

- Extrapolation of missing data from existing data points
- Use of historical data
- Evaluation of the critical/non-critical nature of the sample

If the data gap cannot be resolved by these actions, an evaluation of the data bias and potential for false negatives and positives can be performed. If the resultant uncertainty level is unacceptable, then the following action must be taken:

- Additional sample collection and analysis

22 REFERENCES

New York State Department of Environmental Conservation. *Technical Guidance for Site Investigation and Remediation*. DER-10. May 2010.

United States Environmental Protection Agency. *Test Methods for Evaluating Solid Waste*. SW-846 3rd Edition, Update 3. Office of Solid Waste. December 1996.

United States Environmental Protection Agency. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. EPA-540/R-04-004. October 2004.

United States Environmental Protection Agency. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*. EPA-540/R-99-008 October 1999.

United States Environmental Protection Agency. *EPA Requirements for Quality Assurance Project Plans for Environmental Operations*. EPA-QA/R-5. Quality Assurance Division. March 2001.

United States Environmental Protection Agency. *Guidance for Quality Assurance Project Plans*. EPA-QA/G-5. Office of Environmental Information. December 2002.

United States Environmental Protection Agency. *Guidance on Systematic Planning Using the Data Quality Objectives Process*. EPA-QA/G-4. Office of Environmental Information. February 2006.

TABLES

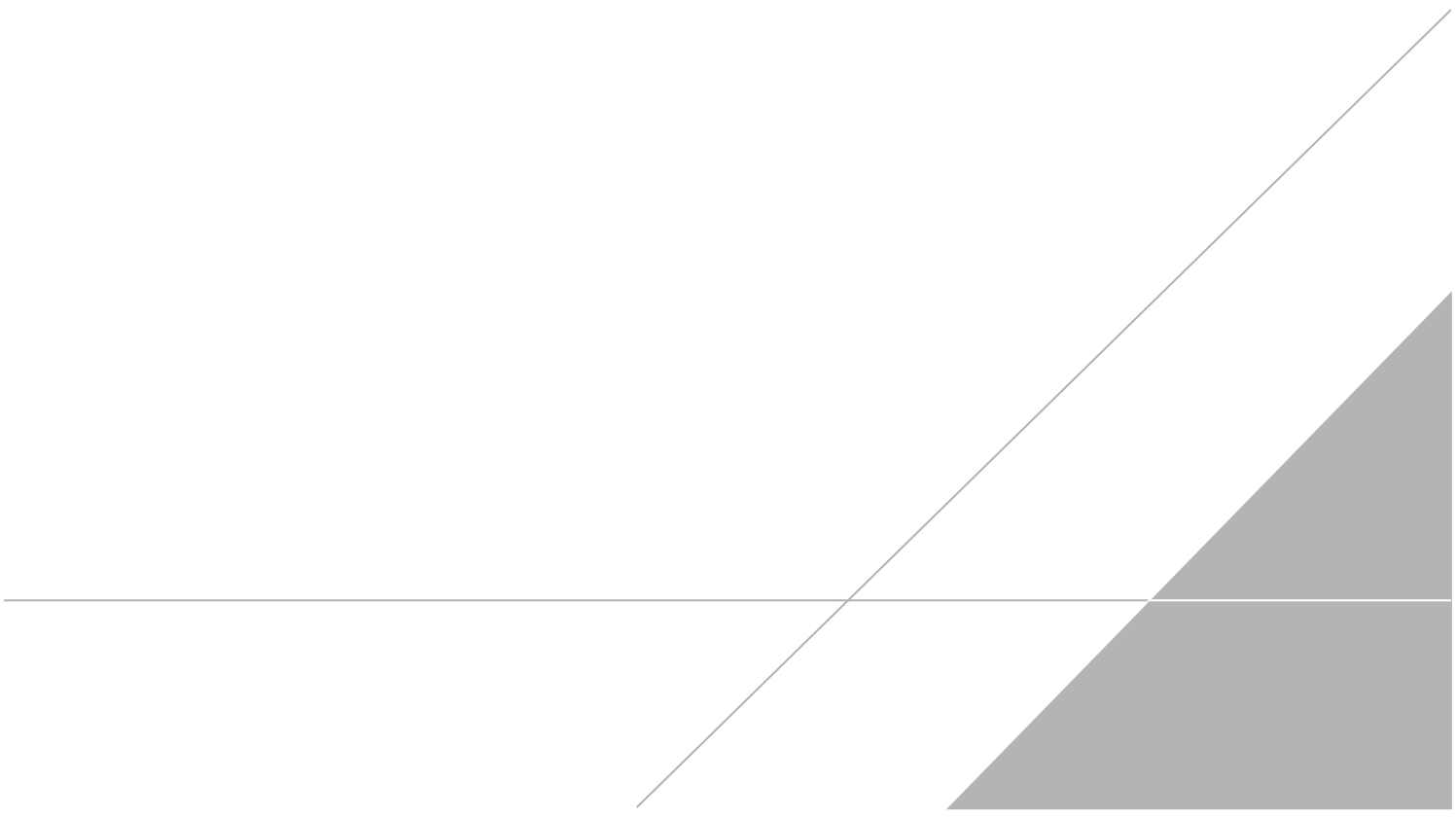


Table H-1
Environmental and Quality Control Analyses

Former Wilkeson Slip/Canal Area
Buffalo, New York

Environmental Sample Matrix/ Laboratory Parameters	Estimated Environmental Sample Quantity	Field QC Analyses							Laboratory QC Analyses[1,2]						Estimated Overall Total
		Trip Blank		Field Duplicate		Rinse Blank[3]		Est. Matrix Total	MS		MSD		Lab Duplicate		
		Freq	No.	Freq	No.	Freq	No.		Freq	No.	Freq	No.	Freq	No.	
Soils															
Volatile Organics Method 8260	TBD	1/day	TBD	1/20	TBD	1/20	TBD	TBD	1/20	TBD	1/20	TBD	--	--	TBD
Semivolatile Organics Method 8270	TBD	--	--	1/20	TBD	1/20	TBD	TBD	1/20	TBD	1/20	TBD	--	--	TBD
Metals Method 6010	TBD	--	--	1/20	TBD	1/20	TBD	TBD	1/20	TBD	--	--	1/20	TBD	TBD
Mercury Method 7471	TBD	--	--	1/20	TBD	1/20	TBD	TBD	1/20	TBD	--	--	1/20	TBD	TBD
Cyanide Method 9010	TBD	--	--	1/20	TBD	1/20	TBD	TBD	1/20	TBD	--	--	1/20	TBD	TBD
Free Cyanide Method 9016	TBD	--	--	1/20	TBD	1/20	TBD	TBD	1/20	TBD	--	--	1/20	TBD	TBD
Groundwater															
Volatile Organics Method 8260	TBD	1/day	TBD	1/20	TBD	--	--	TBD	1/20	TBD	1/20	TBD	--	--	TBD
Semivolatile Organics Method 8270	TBD	--	--	1/20	TBD	--	--	TBD	1/20	TBD	1/20	TBD	--	--	TBD
TAL Metals Method 6010	TBD	--	--	1/20	TBD	--	--	TBD	1/20	TBD	--	--	1/20	TBD	TBD
Mercury Method 7470	TBD	--	--	1/20	TBD	--	--	TBD	1/20	TBD	--	--	1/20	TBD	TBD
Cyanide Method 9010	TBD	--	--	1/20	TBD	--	--	TBD	1/20	TBD	--	--	1/20	TBD	TBD
Free Cyanide Method 9016	TBD	--	--	1/20	TBD	--	--	TBD	1/20	TBD	--	--	1/20	TBD	TBD

Notes:

[1] The number of laboratory QC analyses is based on the frequencies given for the number of environmental samples estimated, not including field QC analyses (i.e., rinse and trip blanks).

[2] Laboratory QC analyses are listed only for those parameters that must be performed on site samples. The laboratory is required to analyze QC samples for the remaining parameters at the frequency listed in the associated analytical method.

[3] Rinse blank samples will be collected only when non-dedicated sampling devices are used. Rinse blanks will be collected at a frequency of one per day of use or one per 20 samples, whichever is less.

MS = matrix spike
MSD = matrix spike duplicate
TBD = to be determined

Table H-2
Method Reporting Limits and Action Limits

Former Wilkeson Slip/Canal Area
Buffalo, New York

Analyte	Water (ug/L)[1]			Soil (ug/kg)[1,2]				
	New York State Class GA Limit[3]	Laboratory MDL	Laboratory RL	New York State Restricted Use Soil Cleanup Objectives[4]			Laboratory MDL	Laboratory RL
				Residential	Commercial	Industrial		
Volatile Organic Compounds 8260 [5]								
1,1,1,2-Tetrachloroethane	5	0.35	1.0	NS	NS	NS	0.5	5
1,1,1-Trichloroethane	5	0.82	1.0	100,000	500,000	1,000,000	0.363	5
1,1,2,2-Tetrachloroethane	5	0.21	1.0	NS	NS	NS	0.811	5
1,1,2-Trichloroethane	1	0.23	1.0	NS	NS	NS	0.65	5
1,1-Dichloroethane	5	0.38	1.0	19,000	240,000	480,000	0.61	5
1,1-Dichloroethene	5	0.29	1.0	100,000	500,000	1,000,000	0.612	5
1,2 Dichloroethane	0.6	0.21	1.0	2,300	30,000	60,000	0.21	5
1,2,3-Trichloropropane	0.04	0.89	1.0	NS	NS	NS	0.51	5
1,2-Dibromo-3-chloropropane (DBCP)	0.04	.39	1.0	NS	NS	NS	2.5	5
1,2-Dibromoethane (EDB)	0.0006	0.73	1.0	NS	NS	NS	0.642	5
1,2-Dichlorobenzene	3	0.79	1.0	100,000	500,000	1,000,000	0.391	5
1,2-Dichloropropane	1	0.72	1.0	NS	NS	NS	2.5	5
1,3-Dichlorobenzene	3	0.78	1.0	17,000	280,000	560,000	0.257	5
1,4-Dichlorobenzene	3	0.84	1.0	9,800	130,000	250,000	0.7	5
2-Butanone (MEK)	50	1.32	5.0	100,000	500,000	1,000,000	1.83	25
2-Chloroethyl vinyl ether	NS	0.96	1.0	NS	NS	NS	2.5	25
2-Hexanone	50	1.24	5.0	NS	NS	NS	2.5	25
4-Methyl-2-pentanone (MIBK)	NS	2.1	5.0	NS	NS	NS	1.64	25
Acetone	50	3.0	5.0	100,000	500,000	1,000,000	4.21	5
Acrylonitile	5	0.83	5.0	NS	NS	NS	2.06	25
Benzene	1	0.41	1.0	2,900	44,000	89,000	0.245	5
Bromochloromethane	5	0.87	1.0	NS	NS	NS	0.361	5
Bromoform	50	0.26	1.0	NS	NS	NS	2.5	5
Bromomethane	5	0.69	1.0	NS	NS	NS	0.45	5
Carbon Disulfide	NS	0.19	1.0	NS	NS	NS	2.5	5
Carbon Tetrachloride	5	0.27	1.0	1,400	22,000	44,000	0.484	5
Chlorobenzene	5	0.75	1.0	100,000	500,000	1,000,000	0.66	5
Chloroethane	5	0.32	1.0	NS	NS	NS	1.13	5
Chloroform	7	0.34	1.0	10,000	350,000	700,000	0.309	5
cis-1,2-Dichloroethene	5	0.81	1.0	59,000	500,000	1,000,000	0.64	5
cis-1,3-Dichloropropene	0.4	0.36	1.0	NS	NS	NS	0.72	5
Dibromochloromethane	50	0.32	1.0	NS	NS	NS	0.64	5
Dichlorobromomethane	50	0.39	1.0	NS	NS	NS	0.67	5
Ethylbenzene	5	0.74	1.0	30,000	390,000	780,000	0.345	5
Iodomethane	5	0.30	1.0	NS	NS	NS	0.243	5
Methyl Chloride	5	0.35	1.0	NS	NS	NS	0.302	5
Methylene Chloride	5	0.44	1.0	51,000	500,000	1,000,000	2.3	5
Styrene	930	0.73	1.0	NS	NS	NS	0.25	5
Tetrachloroethene	5	0.36	1.0	5,500	150,000	300,000	0.671	5
Toluene	5	0.51	1.0	100,000	500,000	1,000,000	0.378	5
Total Xylenes	5	0.66	1.0	100,000	500,000	1,000,000	0.84	15
trans-1,2-Dichloroethene	5	0.90	1.0	100,000	500,000	1,000,000	0.516	5
trans-1,3-Dichloropropene	0.4	0.37	1.0	NS	NS	NS	2.2	5
trans-1,4-Dichloro-2-butene	5	2.11	5.0	NS	NS	NS	2.5	25
Trichloroethene	5	0.46	1.0	10,000	200,000	400,000	1.1	5
Trichlorofluoromethane	5	0.88	1.0	NS	NS	NS	0.472	5
Vinyl Acetate	NS	0.85	5.0	NS	NS	NS	11.7	25
Vinyl Chloride	2	0.90	1.0	210	13,000	270,000	0.61	5

See Notes on Page 4.

Table H-2
Method Reporting Limits and Action Limits

Former Wilkeson Slip/Canal Area
Buffalo, New York

Analyte	Water (ug/L)[1]			Soil (ug/kg)[1,2]				
	New York State Class GA Limit[3]	Laboratory MDL	Laboratory RL	New York State Restricted Use Soil Cleanup Objectives[4]			Laboratory MDL	Laboratory RL
				Residential	Commercial	Industrial		
Semivolatile Organic Compounds 8270 [5]								
1,2,4-Trichlorobenzene	5	0.44	10	NS	NS	NS	4.83	330
2,4,5-Trichlorophenol	NS	0.48	10	NS	NS	NS	37	330
2,4,6 Trichlorophenol	NS	0.61	10	NS	NS	NS	11	330
2,4-Dichlorophenol	2[6]	0.51	10	NS	NS	NS	8.8	330
2,4-Dimethylphenol	2[6]	0.50	10	NS	NS	NS	46	330
2,4-Dinitrophenol	2[6]	2.2	10	NS	NS	NS	59	830
2,4-Dinitrotoluene	5	0.45	10	NS	NS	NS	26	330
2,6 Dinitrotoluene	5	0.40	10	NS	NS	NS	41	330
2-Chloronaphthalene	10	0.46	10	NS	NS	NS	11	330
2-Chlorophenol	NS	0.53	10	NS	NS	NS	8.6	330
2-Methylnaphthalene	NS	0.60	10	NS	NS	NS	2	330
2-Methylphenol	NS	0.40	10	100,000	500,000	1,000,000	5.1	330
2-Nitroaniline	5	0.42	10	NS	NS	NS	54	830
2-Nitrophenol	NS	0.48	10	NS	NS	NS	7.7	330
3,3'-Dichlorobenzidine	5	0.40	10	NS	NS	NS	148	330
3-Nitroaniline	5	0.48	10	NS	NS	NS	39	830
4-Bromophenyl-phenylether	NS	0.45	10	NS	NS	NS	54	330
4-Chloro-3-Methylphenol	NS	0.45	10	NS	NS	NS	6.9	330
4-Chloroaniline	5	0.59	10	NS	NS	NS	50	330
4-Chlorophenyl-phenylether	NS	0.35	10	NS	NS	NS	3.6	330
4,6-Dinitro-2-methylphenol	NS	2.2	10	NS	NS	NS	58	830
4-Methylphenol	NS	0.36	10	34,000	500,000	1,000,000	9.4	330
4-Nitroaniline	5	0.25	10	NS	NS	NS	19	830
4-Nitrophenol	NS	1.5	10	NS	NS	NS	41	830
Acenaphthene	20	0.41	10	100,000	500,000	1,000,000	2	330
Acenaphthylene	NS	0.38	10	100,000	500,000	1,000,000	1.4	330
Anthracene	50	0.28	10	100,000	500,000	1,000,000	4.3	330
Benzo(a)anthracene	0.002	0.36	10	1,000	5,600	11,000	2.9	330
Benzo(b)fluoranthene	0.002	0.34	10	1,000	5,600	11,000	3.3	330
Benzo(k)fluoranthene	0.002	0.73	10	1,000	56,000	110,000	1.9	330
Benzo (g,h,i,) Perylene	NS	0.35	10	100,000	500,000	1,000,000	2	330
Benzo(a)pyrene	ND	0.47	10	1,000	1,000	1,100	4.1	330
Benzyl alcohol	NS	0.44	10	NS	NS	NS	8.06	330
bis(2-Chloroethoxy)methane	5	0.35	10	NS	NS	NS	9.2	330
bis(2-chloroethyl)ether	1	0.40	10	NS	NS	NS	15	330
bis(2-chloroisopropyl)ether	NS	0.52	10	NS	NS	NS	17.6	330
bis(2-Ethylhexyl) phthalate	5	1.8	10	NS	NS	NS	54	330
Butyl benzyl phthalate	50	0.42	10	NS	NS	NS	45	330
Chrysene	0.002	0.33	10	1,000	56,000	110,000	1.7	330
Di-n-butyl phthalate	50	0.31	10	NS	NS	NS	58	330
Di-n-octyl phthalate	50	0.47	10	NS	NS	NS	3.9	330
Dibenzo(a,h)anthracene	NS	0.42	10	330	560	1,100	2	330
Dibenzofuran	NS	0.51	10	NS	NS	NS	1.8	330
Diethyl phthalate	50	0.22	10	NS	NS	NS	5.1	330
Dimethylphthalate	50	0.36	10	NS	NS	NS	4.4	330
Fluoranthene	50	0.40	10	100,000	500,000	1,000,000	2.4	330
Fluorene	50	0.36	10	100,000	500,000	1,000,000	2.4	330
Hexachlorobenzene	0.04	0.51	10	330	6,000	12,000	8.4	330

See Notes on Page 4.

Table H-2
Method Reporting Limits and Action Limits

Former Wilkeson Slip/Canal Area
Buffalo, New York

Analyte	Water (ug/L)[1]			Soil (ug/kg)[1,2]				
	New York State Class GA Limit[3]	Laboratory MDL	Laboratory RL	New York State Restricted Use Soil Cleanup Objectives[4]			Laboratory MDL	Laboratory RL
				Residential	Commercial	Industrial		
Semivolatile Organic Compounds 8270 [5] (Cont.)								
Hexachlorobutadiene	0.5	0.68	10	NS	NS	NS	8.6	330
Hexachlorocyclopentadiene	5	0.59	10	NS	NS	NS	51	330
Hexachloroethane	5	0.59	10	NS	NS	NS	13	330
Indeno(1,2,3-cd)pyrene	0.002	0.47	10	500	5,600	11,000	4.7	330
Isophorone	50	0.43	10	NS	NS	NS	8.4	330
N-Nitrosodimethylamine	NS	2.2	10	NS	NS	NS	12	330
N-Nitroso-di-n-propylamine	NS	0.54	10	NS	NS	NS	13	330
N-Nitrosodiphenylamine	50	0.51	10	NS	NS	NS	9.2	330
Naphthalene	10	0.76	10	100,000	500,000	1,000,000	2.8	330
Nitrobenzene	0.4	0.29	10	NS	NS	NS	7.5	330
Pentachlorophenol	2[6]	2.2	10	2,400	6,700	55,000	58	830
Phenanthrene	50	0.44	10	100,000	500,000	1,000,000	3.5	330
Phenol	2[6]	0.39	10	100,000	500,000	1,000,000	18	330
Pyrene	50	0.34	10	100,000	500,000	1,000,000	1.1	330
Metals - 6010B[5]								
Aluminum	2000	0.045	0.200	NS	NS	NS	4.4	10
Antimony	6	0.0068	0.020	NS	NS	NS	0.54	15
Arsenic	50	0.0056	0.010	16,000	16,000	16,000	0.4	2
Barium	2000	0.00007	0.002	NS	NS	NS	0.11	0.5
Beryllium	3	0.0003	0.002	14,000	590,000	2,700,000	0.028	0.2
Cadmium	10	0.00033	0.001	2,500	9,300	60,000	0.03	0.2
Calcium	NS	0.10	0.500	NS	NS	NS	3.3	50
Chromium	100	0.00087	0.004	22,000	400,000	800,000	0.2	0.5
Cobalt	NS	0.00063	0.004	NS	NS	NS	0.05	0.5
Copper	1000	0.0015	0.010	270,000	270,000	10,000,000	0.21	1
Iron	600	0.0193	0.050	NS	NS	NS	1.1	10
Lead	50	0.003	0.005	400,000	1,000,000	3,900,000	0.24	1
Magnesium	35000	0.0434	0.200	NS	NS	NS	0.927	20
Manganese	600	0.0004	0.003	2,000,000	10,000,000	10,000,000	0.032	0.2
Nickel	200	0.0013	0.010	140,000	310,000	10,000,000	0.23	5
Potassium	NS	0.20	0.500	NS	NS	NS	20	30
Selenium	20	0.0087	0.015	36,000	1,500,000	6,800,000	0.57	4
Silver	100	0.0012	0.003	36,000	1,500,000	6,800,000	0.2	0.5
Sodium	NS	0.324	1.000	NS	NS	NS	13	140
Thallium	0.5	0.0102	0.020	NS	NS	NS	0.3	6
Vanadium	NS	0.0011	0.005	NS	NS	NS	0.11	0.5
Zinc	5000	0.0017	0.010	2,200,000	10,000,000	10,000,000	0.153	2
Mercury - 7470/7471[5]								
Mercury	1.4	0.00012	0.000	810	2,800	5,700	0.0081	0.02
Cyanide - 9012A/9016[5]								
Cyanide, Total (9012A)	400	0.005	0.01	27,000	27,000	10,000,000	0.483	1
Cyanide, Free (9016)	NS	0.0011	0.005				0.62	2.3

See Notes on Page 4.

Table H-2
Method Reporting Limits and Action Limits

Former Wilkeson Slip/Canal Area
Buffalo, New York

Notes:

1. Since a laboratory has not been subcontracted for the site, the MDLs and RLs are provided for a representative NYSDOH-approved laboratory. Once a laboratory is subcontracted, the MDLs and RLs should be compared to the project action limits to make sure they are low enough to support project decision making.
2. The target reporting limits are based on wet weight. The actual reporting limits will vary based on sample weight and moisture content.
3. New York State Groundwater Effluent Limitations, Class GA, June 1998. NS indicates that there is no criteria listed for the analyte.
4. New York State Restricted Use Soil Cleanup Objectives, 6 NYCRR Part 375, December 2006. NS indicates that there is no criteria listed for the analyte.
5. USEPA. Office of Solid Waste and Emergency Response. *Test Methods for Evaluating Solid Waste SW-846 3rd ed. Washington, D.C. 1996.*
6. Criteria of 2 for phenolic compounds applies to the sum of the analytes.

Table H-3
Sample Containers, Preservation, and Holding Time Requirements

Former Wilkeson Slip/Canal Area
Buffalo, New York

Parameter/Method	Container	Preservation	Maximum Holding Time from Sample Collection
Groundwater Samples			
Volatile Organics (8260[1])	(2) 40-ml Teflon-lined septa (glass)	Cool to <6ºC HCl to pH <2	7 days (unpreserved) 14 days (preserved)
Semivolatile Organics (8270[1])	(2) 1-liter containers (glass)	Cool to <6ºC	7 days extraction; 40 days analysis
Metals (6010[1])	(1) 500-ml container (plastic)	HNO3 to pH<2, Cool to <6°C	180 days analysis
Mercury (7470[1])			28 days analysis
Cyanide (9012[1])	(1) 500-ml container (plastic)	NaOH to pH >12, Cool to <6ºC	17 days
Cyanide, Free (9016[1])	(1) 250-ml container (plastic)	NaOH to pH >12, Cool to <6ºC	14 days
Soil Samples			
Volatile Organics (8260[1])	(3) EnCores or TerraCores	Cool to <6ºC	EnCores: 48 hours to preservation EnCores or TerraCores: 14 days analysis
Semivolatile Organics (8270[1])	(1) 4-oz container (glass)	Cool to <6ºC	7 days extraction; 40 days analysis
Metals (6010[1])	1 x 8-oz glass jar with Teflon®-lined lid	Cool to <6°C	180 days to analysis
Mercury (7471[1])			28 days to analysis
Cyanide (9012[1])	(1) 4-oz container (glass)	Cool to <6ºC	14 days
Cyanide, Free (9016[1])	(1) 4-oz container (amber glass)	Cool to <6ºC	14 days

Note:
1. USEPA. Office of Solid Waste and Emergency Response. Test Methods for Evaluating Solid Waste SW-846.3rd ed. Washington, DC. 1996.

Table H-4
Data Validation Checklist - Laboratory Analytical Data

Former Wilkeson Slip/Canal Area
Buffalo, New York

REVIEW FOR COMPLETENESS	
1.	Chain-of-custody forms included.
2.	Sample preparation and analysis summary tables included.
3.	QA/QC summaries of analytical data included.
4.	Relevant calibration data included with analytical data.
5.	Instrument and method performance data included.
6.	Method detection limits documented.
7.	Data report forms of examples for calculations of concentrations.
8.	Raw data used in identification and quantification of the analysis required.
REVIEW OF COMPLIANCE	
1.	Data package completed.
2.	QAPP requirements for data met.
3.	QA/QC criteria met.
4.	Instrument type and calibration procedures met.
5.	Initial and continuing calibration met.
6.	Data reporting forms completed.
7.	Problems and corrective actions documented.

ATTACHMENT H-1

Sample Chain of Custody Form

ARCADIS
Infrastructure, environment, facilities

ID#:

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Page ___ of ___

Lab Work Order #

Send Results to:

Contact & Company Name:	Telephone:
Address:	Fax:
City State Zip	E-mail Address:
Project Name/Location (City, State):	Project #:
Sampler's Printed Name:	Sampler's Signature:

Preservative								
Filtered (✓)								
# of Containers								
Container Information								

PARAMETER ANALYSIS & METHOD

Keys

Preservation Key:
A. H_2SO_4
B. HCL
C. HNO_3
D. NaOH
E. None
F. Other: _____
G. Other: _____
H. Other: _____

Container Information Key:
1. 40 ml Vial
2. 1 L Amber
3. 250 ml Plastic
4. 500 ml Plastic
5. Encore
6. 2 oz. Glass
7. 4 oz. Glass
8. 8 oz. Glass
9. Other: _____
10. Other: _____

Matrix Key:
SO - Soil
W - Water
T - Tissue
SE - Sediment
SL - Sludge
A - Air
NL - NAPL/Oil
SW - Sample Wipe
Other: _____

Sample ID	Collection Date	Collection Time	Type (✓) Comp	Type (✓) Grab	Matrix								**REMARKS**

Special Instructions/Comments:

☐ **Special QA/QC Instructions(✓):**

Laboratory Information and Receipt		**Relinquished By**	**Received By**	**Relinquished By**	**Laboratory Received By**
Lab Name:	Cooler Custody Seal (✓)	Printed Name:	Printed Name:	Printed Name:	Printed Name:
☐ Cooler packed with ice (✓)	☐ Intact ☐ Not Intact	Signature:	Signature:	Signature:	Signature:
Specify Turnaround Requirements:	Sample Receipt:	Firm:	Firm/Courier:	Firm/Courier:	Firm:
Shipping Tracking #:	Condition/Cooler Temp: _____	Date/Time:	Date/Time:	Date/Time:	Date/Time:

Distribution: **WHITE – Laboratory returns with results** **YELLOW – Lab copy** **PINK – Retained by BBL**

APPENDIX I

Site Inspection Form

Site Inspection Form
Former Buffalo Service Station - Off-Site Area - Buffalo, New York

Date/Time: _____ Weather: _____

Personnel: _____ Temperature: _____

General Requirements

Photographs will be attached to document the condition of each inspection item identified below. A written description of any item(s) that is considered to be in poor condition is required.

1. Fourth Street Conditions:

Pavement condition	☐ Good	☐ Poor*
Signs of intrusive activities	☐ No	☐ Yes*
Evidence of saw-cut asphalt	☐ No	☐ Yes*
Evidence of trenching or excavation	☐ No	☐ Yes*
Evidence of Settlement	☐ No	☐ Yes*

2. Site Security Fencing Around NYSTA Property:

Condition	☐ Good	☐ Poor/Damaged*
Gate Locked Upon Arrival	☐ No	☐ Yes*

3. NYSTA Property Conditions:

Standing Water	☐ No	☐ Yes*
Missing Stone/Vegetation	☐ No	☐ Yes*
Signs of intrusive activities	☐ No	☐ Yes*
Evidence of Settlement	☐ No	☐ Yes*
Damage/failure of existing structures	☐ No	☐ Yes*

4. Notes:

* Indicates condition should be reported to OM&M Coordinator and NYSDEC.

APPENDIX J

Environmental Easement

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 13th day of January, 2017, between Owner(s) City of Buffalo, having an office at 65 Niagara Square, County of Erie, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of off-site to 249 West Genesee Street in the City of Buffalo, County of Erie and State of New York, known and designated on the tax map of the County Clerk of Erie as tax map parcel numbers: Section N/A Block N/A Lot N/A, being a portion of that property dedicated by Common Council Proceeding Resolution No. 268 on July 27, 1982. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately .127 +/- acres, and is hereinafter more fully described in the Land Title Survey dated September 22, 2014, revised May 7, 2015, and revised again on June 10, 2016, prepared by John E. McIntosh, III, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the remedial action at the Site has been undertaken at the site by National Fuel Gas Distribution Corporation having an office at 6363 Main Street, Williamsville, New York 14221 County of Erie, State of New York ("National Fuel");

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Order on Consent Index #B9-0695-05-06A, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement")

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls, to the extent that Engineering Controls exist on the Site, must be operated and maintained as specified in the Site Management Plan (SMP);

(i) Grantor and subsequent Site owners shall ensure that the Environmental Easement remains in place and effect.

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(i) Grantor shall adhere to the institutional controls required by the Environmental Easement, including but not limited to the prohibition of the use of groundwater underlying the property without treatment rendering it safe for intended use and the prohibition of vegetable gardens and

(5) Grantor shall provide access to the Department and National Fuel in order to collect data and information pertinent to Site Management of the Controlled Property at the frequency and in a manner defined in the SMP;

(6) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(i) To the extent that Grantor is responsible for any controls in the SMP, Grantor and subsequent Site owners shall submit a written statement certifying that the controls at the property are unchanged from the previous certification;

(ii) Grantor and subsequent Site owners shall notify the Department of changes of Site use and/or ownership; and

(iii) Grantor and subsequent Site owners shall report emergencies to the Department and other appropriate authorities.

(7) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(i) National Fuel shall prepare periodic review reports evaluating institutional and engineering controls, as applicable; and

(ii) National Fuel shall prepare and implement a corrective measures plan, if necessary.

(8) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(i) physical components of the remedy; and

(ii) National Fuel shall decommission Site monitoring wells, if any, at an appropriate time to be determined by the Department.

(9) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for raising livestock or producing animal products for human consumption, and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor assumes the obligations identified in Paragraphs 2(A)(1), 2(A)(2), 2(A)(4)(i), 2(A)(5), 2(A)(6) and 2(A)(9) above. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP as identified in Paragraphs 2(A)(1), 2(A)(2), 2(A)(4)(i), 2(A)(5), 2(A)(6) and 2(A)(9) above and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall annually, or at such time as NYSDEC may require, submit to NYSDEC a written statement certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the

NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(2) the owner will continue to allow the Department and National Fuel access to such real property to evaluate such controls;

(3) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(4) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement.

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions

granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: C915194A
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or

counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

City of Buffalo:

By: Byron W. Brown

Print Name: BYRON W. BROWN

Title: MAYOR Date: OCTOBER 19, 2016

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ERIE)

On the 19 day of OCTOBER, in the year 2016, before me, the undersigned, personally appeared BYRON W. BROWN, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

John Vincent Heffron
Notary Public - State of New York

JOHN VINCENT HEFFRON
Notary Public, State of New York
No. 02HE4860576
Qualified in Erie County
My Commission Expires May 5, ~~2018~~ 2018 J.H.

APPROVED
AS TO FORM ONLY

Corporation Counsel

By John Heffron 10.11.16

IN WITNESS WHEREOF, _____ hereby acknowledges this instrument and the terms and conditions hereof.

National Fuel Gas Distribution Corporation:

By: _____

Print Name: LEE E. HARTZ

Title: Attorney-in-Fact Date: 6-28-14

National Fuel's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ERIE)

On the 20th day of JUNE, in the year 2014, before me, the undersigned, personally appeared LEE E. HARTZ, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Notary Public - State of New York

MARK R. MESSINA
Notary Public, State of New York
Qualified in Erie County
My Commission Expires
June 22, 1994
2018

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Robert W. Schick, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 17th day of January, in the year 2017, before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2018

SCHEDULE "A" PROPERTY DESCRIPTION

ENVIRONMENTAL EASEMENT AREA DESCRIPTION
NYSDEC SITE NO. C915194A

ALL THAT TRACT OR PARCEL OF LAND situate in the City of Buffalo, County of Erie, State of New York. and being part of Lot 2, South Village of Black Rock, bounded and described as follows:

BEGINNING AT A POINT on the northeast line of Parcel No. 192 as shown on Map No. 192 of lands acquired by the People of the State of New York for New York State Thruway, the Niagara Section, Subdivision N4, said point also being on the southwest line of Fourth Street as dedicated by the City of Buffalo Common Council Proceeding No. 268 dated July 27, 1982, said point being further identified as N 1,051,607.52, E 1,067,464.11 according to New York State Plane Coordinate System – West Zone;

RUNNING THENCE: N-54°-07′-09″-E, a distance of 46.34 feet to a point;
RUNNING THENCE: S-35°-51′-44″-E, a distance of 120.0 feet to a point;
RUNNING THENCE: S-54°-07′-09″-W, a distance of 46.30 feet to a point on the southwest line of said Fourth Street;
RUNNING THENCE: N-35°-52′-51″-W, along the southwest line of said Fourth Street, a distance of 120.0 feet to the POINT OF PLACE OF BEGINNING, containing 0.128 Acre, be the same, more or less.
SUBJECT to easements, rights-of-way and restrictions of record.
SUBJECT to the rights of the public in and to that portion of the above described land which lays within the bounds of Fourth Street.
Bearing System based on the New York State Plane Coordinate System – West Zone.

Doc #01-2859861.1

APPENDIX K

Environmental Notice

ENVIRONMENTAL NOTICE

To be issued in lieu of Environmental Easement/Deed Restriction as referenced in DER-33

THIS ENVIRONMENTAL NOTICE is made the 24th day of April 2024, by the New York State Department of Environmental Conservation (Department), having an office for the transaction of business at 625 Broadway, Albany, New York 12233.

WHEREAS, a parcel of real property identified as Former Buffalo Service Station-Off-Site (Site # C915194A), located on 249 West Genesee Street in the City of Buffalo , County of Erie, State of New York, which is part of lands acquired by the People of the State of New York for the New York State Thruway, the Niagara Section, Subdivision N4 and being more particularly described in Appendix "A", attached to this notice and made a part hereof, and hereinafter referred to as " the Property" is the subject of an Order on Consent executed by National Fuel Gas Distribution Corporation as part of the Department's State Superfund Program; and

WHEREAS, the Department approved a cleanup to address contamination disposed at the Property and such cleanup was conditioned upon certain limitations.

NOW, THEREFORE, the Department provides notice that:

FIRST, the Property subject to this Environmental Notice is as shown on a map attached to this Notice as Appendix "B" and made a part hereof.

SECOND, unless prior written approval by the Department or, if the Department shall no longer exist, any New York State agency or agencies subsequently created to protect the environment of the Sate and the health of the State's citizens, hereinafter referred to as "the Relevant Agency," is first obtained, where contamination remains at the Property subject to the provisions of the Site Management Plan (SMP), there shall be no disturbance or excavation of the Property which threatens the integrity of the engineering controls or which results or may result in a significantly increased threat of harm or damage at any site as a result of exposure to soils. A violation of this provision is a violation of 6 NYCRR 375-1.11(b)(2).

THIRD, no person shall disturb, remove, or otherwise interfere with the installation, use, operations, and maintenance of engineering controls required for the Remedy, including but not limited to those engineering controls described in the SMP and listed below, unless in each instance they first obtain a written waiver of such prohibition from the Department or Relevant Agency.

FOURTH, the remedy was designed to be protective for the following uses: **Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv) .** Therefore, any use for purposes other than Commercial and Industrial without the express written waiver of such prohibition by the Relevant Agency may result in a significantly increased threat of harm or damage at any site.

FIFTH, no person shall use the groundwater underlying the Property without treatment rendering it safe for drinking water or industrial purposes, as appropriate, unless the user first obtains permission to do so from the Department or Relevant Agency. Use of the groundwater without appropriate treatment may result in a significantly increased threat of harm or damage at any site.

SIXTH, it is a violation of 6 NYCRR 375-1.11(b) to use the Property in a manner inconsistent with this environmental notice.

IN WITNESS WHEREOF, the undersigned, acting by and though the Department of Environmental Conservation as Designee of the Commissioner, has executed this instrument the day written below.

By: Andrew Guglielmi
Andrew O. Guglielmi,
Director
Division of Environmental
Remediation

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 26th day of April, in the year 2024, before me, the undersigned, personally appeared Andrew O. Guglielmi, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his signature on the instrument, the individual, or the person upon behalf of which individual acted, executed the instrument.

Cheryl A Salem
Notary Public – State of New York

Cheryl A. Salem
Notary Public State of New York
Registration No. 01SA0002177
Qualified in Albany County
My Commission Expires March 3, 2027

APPENDIX "A"

ENVIRONMENTAL NOTICE AREA DESCRIPTION
NYSDEC SITE NO. C915194A

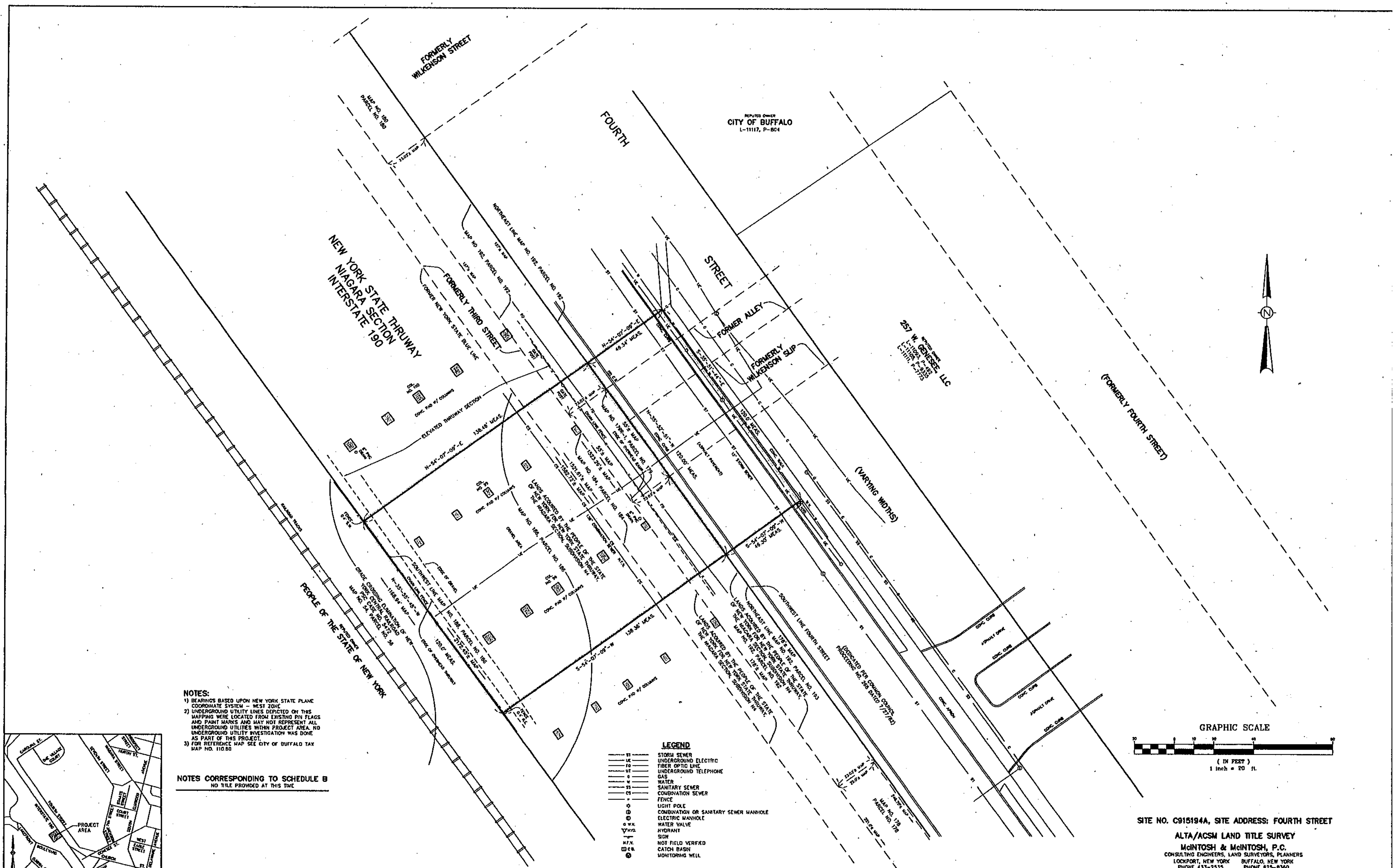
ALL THAT TRACT OR PARCEL OF LAND situate in the City of Buffalo, County of Erie, State of New York, and being part of Lot 2, South Village of Black Rock, bounded and described as follows:

BEGINNING AT A POINT on the northeast line of Parcel No. 192 as shown on Map No. 192 of lands acquired by the People of the State of New York for New York State Thruway, the Niagara Section, Subdivision N4, said point also being on the southwest line of Fourth Avenue as dedicated by the City of Buffalo Common Council Proceeding No 268 dated July 27, 1982, said point being further identified as N 1,051,607.52, E 1,067,464.11 according to New York State Plane Coordinate System – West Zone;
RUNNING THENCE: S – 35° – 52' – 51"– E, along the southwest line of said Fourth Avenue, a distance of 120.00 feet to a point;
RUNNING THENCE: S – 54° – 07' – 09" – W, a distance of 138.36 feet to a point on the southwest line of Parcel No. 186 as shown on Map No. 186 of lands acquired by the People of the State of New York for New York State Thruway, The Niagara Section Subdivision N4;
RUNNING THENCE: N – 35° – 55' – 48"– W, along the southwest line of said Parcel No. 186, a distance of 120.0 feet to a point;
RUNNING THENCE: N – 54° – 07' – 09"– E, a distance of 138.46 feet to the POINT OR PLACE OF BEGINNING, containing 0.381 Acre, be the same, more or less.
SUBJECT to easements, rights-of-way and restrictions of record.
SUBJECT to the rights of the public in and to that portion of the above described land which lays within the bounds of the New York State Thruway, the Niagara Section.

Bearing System based on the New York State Plane Coordinate System - West Zone.

APPENDIX B

Site Survey



NOTES:

1) BEARINGS BASED UPON NEW YORK STATE PLANE COORDINATE SYSTEM – WEST ZONE
2) UNDERGROUND UTILITY LINES DEPICTED ON THIS MAPPING WERE LOCATED FROM EXISTING PIN FLAGS AND PAINT MARKS AND MAY NOT REPRESENT ALL UNDERGROUND UTILITIES WITHIN PROJECT AREA. NO UNDERGROUND UTILITY INVESTIGATION WAS DONE AS PART OF THIS PROJECT.
3) FOR REFERENCE MAP SEE CITY OF BUFFALO TAX MAP NO. 110.80

NOTES CORRESPONDING TO SCHEDULE B

NO TITLE PROVIDED AT THIS TIME

LEGEND

Symbol	Description
— ST —	STORM SEWER
— UE —	UNDERGROUND ELECTRIC
— FO —	FIBER OPTIC LINE
— UT —	UNDERGROUND TELEPHONE
— G —	GAS
— W —	WATER
— SS —	SANITARY SEWER
— CS —	COMBINATION SEWER
— x —	FENCE
○	LIGHT POLE
⊙	COMBINATION OR SANITARY SEWER MANHOLE
⊕	ELECTRIC MANHOLE
o W.V.	WATER VALVE
HYD.	HYDRANT
—	SIGN
N.F.V.	NOT FIELD VERIFIED
C.B.	CATCH BASIN
⊗	MONITORING WELL

SITE NO. C915194A, SITE ADDRESS: FOURTH STREET

ALTA/ACSM LAND TITLE SURVEY

McINTOSH & McINTOSH, P.C.
CONSULTING ENGINEERS, LAND SURVEYORS, PLANNERS
LOCKPORT, NEW YORK PHONE 433-2535
BUFFALO, NEW YORK PHONE 825-8360

NOTE: THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF AN ABSTRACT OF TITLE AND IS SUBJECT TO ANY STATE OF FACTS THAT MAY BE REVEALED BY AN EXAMINATION OF SUCH.

NOTE: UNAUTHORIZED ALTERATION OR ADDITION TO THIS MAP IS A VIOLATION OF SECTION 7209, PROVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

REVISION	REVISION
REVISE EASEMENT AREAS & AND NOTES MAY 7, 2015	AMENDED STREET NAME JUNE 10, 2016
	NYSDEC REVISIONS MAY 10, 2017
	ADDED TO LEGEND & 156' CS SEWER, JULY 11, 2017
	REVISED SITE DESIGNATION AUGUST 8, 2017

SURVEY OF PART OF LOT-2, SOUTH VILLAGE OF BLACK ROCK

LOCATION: CITY OF BUFFALO, ERIE COUNTY, NEW YORK

JOB No. 7987-A | SCALE: 1" = 20' | DATE: SEPTEMBER 22, 2014

DRAWN MAS | COMP. JEM, M | DESC. CAD\7987A.DWG

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