LaBella Associates, P.C.

Engineering
Architecture
Environmental
Planning

Monitoring Well Installation Work Plan:

1769 Emerson Street Parcel
Former Emerson Street Landfill
NYSDEC Site #828023

Location:

1769 Emerson Street Parcel
Former Emerson Street Landfill
Rochester, New York

Prepared for:

City of Rochester
Division of Environmental Quality
Room 300-B
Rochester, New York 14614

LaBella Project No. 210173

October 2012

Relationships. Resources. Results.

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LaBella Associates, P.C.
300 State Street
Rochester, New York 14614

Table of Contents

1.0 Introduction and Purpose

This Monitoring Well Installation Work Plan (herein after referred to as the "Work Plan") presents a portion of the second phase of work for evaluating Soil Vapor Intrusion (SVI) within the Former Emerson Street Landfill (FESL) footprint (refer to Figure 1 for location). A portion (4 parcels) of the FESL is listed as New York State Department of Environmental Conservation (NYSDEC) Site #828023, while the remaining parcels within the FESL have been de-listed. The LaBella Associates Team ("LaBella") previously completed the initial phase of a Soil Vapor Intrusion Assessment (data review, site screening and prioritization) for 44 of the 45 parcels located within the FESL. A report entitled "Soil Vapor Intrusion Assessment Report Data Review, Site Screening & Site Prioritization" (SVI Report), that detailed the work completed, findings, conclusions, and recommendations, was submitted in June 2011 to NYSDEC on behalf of the City of Rochester (City). The SVI Report concluded that 9 buildings were "Tier 1" (Tier 1 was defined as 'higher risk of SVI due to FESL') and the remaining buildings were Tier 2 or 3 (Tier 2 – moderate to low risk of SVI due to FESL and Tier 3 – low to no risk of SVI due to FESL). The Tier 1 buildings were recommended for further work; however, based on the reduced risk of SVI due to FESL, the Tier 2 & 3 properties were not recommended for further work (with the exception of Edison Technical School which was Tier 2 and recommended for some potential further work to augment air handling equipment).

Two of the three buildings on the 1769 Emerson Street parcel were identified as Tier 1 buildings. Specifically, the SVI report recommended that further work for the Resource Recycling Facility (RRF) building and the Transfer Station (TS) building. The third building at the property, the Monroe County Recycling Center (MCRC) was considered a Tier 2 property and further work was not recommended. The additional recommended work for the RRF and TS buildings included:

1. Conduct a detailed preferential pathway evaluation and evaluate building pressurization
2. Install groundwater monitoring wells in close proximity to the north/northeast corner of the RRF building to evaluate groundwater quality in close proximity to the building.
3. Evaluate any dewatering being conducted as part of the foundation drain system (including the TS building as it may be influencing groundwater flow beneath RRF building).

This Work Plan is being submitted for only #2 above (monitoring well installations) in order to expedite the monitoring well installation work during the summer of 2012. It should be noted that a separate work plan will be submitted for the other recommended work at the 1769 Emerson Road property (and other Tier 1 properties).

2.0 Site Description and History

The "Site", for the purposes of this Work Plan, is limited to the 14.75-acre parcel located at 1769 Emerson Street, Rochester, New York. The Site is currently owned by Monroe County and operated by Metro Waste Paper Recovery (Cascade Recovery) as a municipal solid waste transfer station. The original 225,000 ft^2 structure on the property was built in 1978 and is comprised of a Transfer Station and Resource Recovery Facility ("RRF"). A 42,000 ft^2 addition was constructed in 1992 and has always been used and operated as the Monroe County Recycling Center (MCRC).

As documented in the SVI Report, the City operated the FESL from the early 1930s to 1971. The southern portion of the FESL (south of Emerson Street) was filled during the initial years of operation and predominantly contains ash derived from the incineration of municipal waste at the City's incinerators. The SVI Report documented landfilling up to the edge of W Street and possibly a small portion on to the 1769 Emerson Street parcel. However, a majority (if not all) of the parcel is free of landfill materials from the FESL. Figures 2 and 3 depict the limits of the landfill materials and their vertical cross section near the 1769 Emerson Street parcel, respectively.

Also as documented in the SVI Report, the P-1 Plume area is generally defined and significantly influenced by the storm sewer system that runs through McCrackanville Street, west down Emerson Street and then south parallel to (but west of) 'W' Street and eventually to an outfall into the Barge Canal (refer to Figure 4). This sewer was installed (reportedly by blasting) into the bedrock in order to obtain the proper drainage slope and the bedding and bedrock fracture network appears to be significantly influencing the direction of groundwater flow and thus a migration pathway for the chlorinated volatile organic compounds (CVOCs). Figure 4 also indicates the inferred extent of CVOCs in groundwater in this area; however, there is a lack of monitoring wells between the storm sewer and the building and thus actual groundwater impacts in this area are unknown.

The influence of the storm sewer and the potential for CVOCs in the groundwater in proximity to the sewer bedding and fracture network was an influencing factor for the RRF and TS buildings being identified as Tier 1 buildings. As such, this Work Plan is designed to further define groundwater conditions in close proximity to the building. This appears warranted based on testing of other monitoring wells that indicate groundwater conditions (i.e., contaminant concentrations) within the fractured bedrock can change significantly in proximity to the storm sewer (due to groundwater flow direction, significant reducing conditions documented in the saturated zone, etc.).

3.0 Objectives

The objective of the project is to install three (3) new shallow bedrock monitoring wells at strategic locations at the northeast corner of the Site to better characterize the extent of the P-1 plume on the Site, in relation to the RRF building, and to determine the influence of the existing sewer main on the P-1 plume. Specifically, the following well locations are proposed:

- One new well will be placed along the North face of the RRF.
- The second new well will be placed adjacent to the Northeast corner of the RRF, to the West of the existing sewer line.
- The third new well will be placed on the east side of the RRF building between the building and the existing sewer line.

Figure 4 identifies the locations of the proposed monitoring wells.

4.0 Work Tasks

Task 1: installation of monitoring wells

The proposed well locations will be reviewed and approved by the owner and will be subject to accessible locations based on underground utilities and site constraints. The wells will be installed via a rotary drill rig into bedrock (assumed 10-ft of coring). The well installation will take approximately 5 days to complete. Each well will be developed within one (1) week of installation, in preparation for subsequent groundwater sampling. Details of the well installation work are provided below:

Well Installation

The new monitoring wells will be completed in similar fashion to previously-installed wells in the FESL study area, as shallow bedrock (approximately the upper 12 ft.) wells with open-rock intervals, via HQ core barrel, approximately 3.75-inch core hole (unless saturated soil/fill is encountered above bedrock in which case overburden/bedrock interface wells would be installed with 2-inch ID well screen and riser). It is anticipated that these wells will range in total depth from approximately 20 to 30 ft. below existing grade. The open sampling intervals will be limited to approximately 10 to 12 feet in length.

At each monitoring well location, overburden soils will be collected using split-spoon samplers from the ground surface to competent bedrock conditions. Soil will be screened continuously in the field for visible impairment, olfactory indications of impairment, evidence of NAPLs, and/or indication of detectable VOCs with a photo-ionization detector (PID) equipped with a 10.6 eV lamp, collectively referred to as "evidence of impairment." At this time, soil samples are not proposed for laboratory analysis.

Soils from the split spoon samplers will also be continuously screened in the field with a Ludlum 2241 Digital Survey Meter with 44-9 Pancake Probe (or equivalent) to screen for the presence of alpha, beta, and gamma radiation. The soil will be screened with the radiation monitor by slowly sweeping (5-8 cm per second) the pancake probe about 1 cm above the soils being tested. Care will be taken to not touch the face of the probe to the soils. Field screening results will be recorded on a soil-boring log (or 'Radiation Log') and will be included in the Site Screening, Evaluation and Prioritization Report. This screening will be conducted as a precautionary measure. In the event that two times the background is encountered, the drilling will be temporarily ceased, the area secured and NYSDEC notified to discuss appropriate measures.

Once competent bedrock is encountered, the augers will be advanced until refusal. It is anticipated that a layer of weathered bedrock is present and the augers can be advanced approximately 2-feet into bedrock surface. A permanent steel casing extending from the ground surface into the two-foot bedrock boring will be placed to the bottom of the boring and grouted to the surface. This grout will set overnight for a minimum of 14-hours. Subsequently, drilling will continue using rock coring methods (HQ core barrel) until the bedrock boring is completed to a total depth of 10 to 12-feet into competent bedrock or 8 feet below the water table (based on water table in nearest existing wells). The rock coring will be facilitated by the addition of potable water and the amount of water added to the subsurface will be documented in order to remove this water during development, if possible, see below. Additional details on bedrock drilling are provided in the

Quality Control Plan included as Appendix 1 and a Typical Bedrock Well Design is included as Figure 5

All rock cores recovered will be logged by a geologist, labeled, photographed, and stored in wooden core boxes. The photographs will be submitted as part of the completed boring logs. The cores will be stored by the firm until the project is completed or for at least one year. Drilling logs will be prepared by an experienced geologist or geotechnical engineer, who will be present during all drilling operations. One copy of each field boring and well construction log, including color photographs of the rock core, if encountered, and groundwater data, will be submitted as part of the report. The Rock Quality Designation (RQD) value shall be calculated for each 5-foot section. Additional details on the installation and logging of bedrock cores can be found in Section 6 in the QCP included as Appendix 1.

The wells will be completed to intersect the top of the water table assumed to occur in the upper 10 feet of bedrock. Each well will be completed as a 10-ft. open hole well. Surface completions will be a stick-up well cover. Details on the installation of groundwater monitoring wells are included in Section 6 of the QCP included as Appendix 1.

Investigation Derived Waste

Soil and water generated during drilling activities will be containerized in 55-gallon drums, characterized, and disposed of off-Site in accordance with applicable regulations. The drums will be staged on a City-owned parcel after generation and until disposal. See Section 10 of the QCP for additional details regarding the management of investigation-derived wastes at the Site.

Task 2: monitoring well development and sampling

Well Development

Each well will be developed within one-week of installation. The development will be accomplished using a purge pump and/or bottom loading bailer. Well development will attempt to removal a quantity of water equal to all water lost during drilling operations in the well and up to 10 well volumes. Specific conductance, pH, and turbidity measurements will be obtained to assess redevelopment with a goal of achieving stable specific conductance and pH with turbidity values at or below 50 NTU, if possible. In the event that the well goes dry prior to purging the determined volume or if turbidity is not below 50 NTU, well development will cease if specific conductance and pH are stable or concurrence is obtained from the NYSDEC. All down-well equipment will be decontaminated (alconox wash with potable water rinse) between each well.

All development water will be staged at the 1655 Lexington Avenue parcel or another City-owned parcel for placing the redevelopment waters and sample purge waters into until laboratory results are received and the waters are disposed of (anticipated to be discharge to the sanitary sewer system). Section 10 of the Quality Control Plan, included as Appendix 1, identifies procedures for the handling of investigation derived waste.

Low Flow Sampling of Overburden and Bedrock Groundwater Monitoring Wells

At least 7 days after development, groundwater samples will be collected from each existing monitoring well via low-flow sampling techniques. Prior to sample purging, each well will be checked with an interface probe to evaluate for potential non-aqueous phase liquid (NAPL) in the wells (both floating and sinking NAPL). The interface probe will be slowly lowered into the water column and observed for variations in the audible tone, which indicates the presence of NAPL. Initially, light-NAPL (LNAPL) will be evaluated for, then the probe will be lowered to well bottom for a dense-NAPL (DNAPL) check. Care will be taken to minimize disturbance of the water column and the equipment will be decontaminated (alconox wash with potable water rinse) between each well.

Low flow sampling of the monitoring wells will be conducted in general accordance with American Society of Testing and Materials (ASTM) Standard Practice D6771-02 to minimize groundwater drawdown and to obtain a representative sample of groundwater conditions. In order to accomplish this task, the following steps will be taken:

1. The following low flow equipment (or equivalent) will be utilized to conduct low flow groundwater sampling. This equipment includes:

    - QED Sample Pro Bladder Pump
    - Horiba U-22 Water Quality Monitoring System (with flow thru cell)
    - Air Compressor
    - QED MP10 Low Flow Controller
    - ~100' of ¼" Polyethylene Tubing

2. Low flow purging of the monitoring wells will include collection of water quality indicator parameters. Water quality indicator parameters will be recorded at five (5)-minute intervals during the purging of the well. These water quality indicator parameters will include:

    - Water Level Drawdown
    - Temperature
    - pH
    - Dissolved Oxygen
    - Specific Conductance
    - Oxidation Reduction Potential
    - Turbidity

3. Groundwater sampling will commence once the groundwater quality indicator parameters have stabilized for at least three (3) consecutive readings for the following parameters:

    - Water Level Drawdown <0.3'
    - Temperature - +/- 3%
    - pH - +/- 0.1unit
    - Dissolved Oxygen - +/-10%
    - Specific Conductance - +/-3%
    - Oxidation Reduction Potential - +/-10 millivolts
    - Turbidity - +/-10% for values greater than 1 NTU

4. The purge waters will also be containerized and staged at 1655 Lexington Avenue. Section 10 of the Quality Control Plan (QCP) provides information the handling of investigation derived waste.

5. Groundwater samples will be collected for USEPA Target Compound List (TCL) VOCs using USEAP Method 8260. The samples will be submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory for the parameters tested.

Quality Assurance/Quality Control Sampling

Activities completed as part of this task of the work plan will be managed under LaBella's Quality Control Program, which is included in Appendix 1. Laboratory quality assurance/quality control (QA/QC) sampling will include analysis of sample blanks as follows: one trip blank, one field blank, and one method blank for each sampling methodology (e.g., split spoon sampling) and matrix type (i.e., soil and groundwater). Field blanks which consist of trip, routine field, and rinsate blanks will be provided at a rate of one per 20 samples collected for each parameter group, or one per shipment, whichever is greater. Additionally, one (1) Matrix Spike/Matrix Spike Duplicate (MS/MSD) will be collected and analyzed for each twenty samples collected for each parameter group, or one per shipment, whichever is greater. The MS/MSD will be analyzed for the same parameters as that of the field samples. The samples will be delivered under Chain of Custody procedures to a NYSDOH ELAP-certified laboratory.

The laboratory will provide a NYSDEC ASP Category B Deliverables data package for all samples. A Data Usability Study Report (DUSR) will be completed for all ASP-B laboratory data packages per DER-10. The DUSRs will include the laboratory data summary pages showing corrections made by the data validator and each page will be initialed by the data validator. The laboratory data summary pages will be included even if no changes were made.

Historic and new hydrogeologic data will be used to characterize the groundwater flow regime at the site, assess the nature and extent of VOCs in groundwater, and assess the P-1 plume migration. All pertinent geologic, hydrogeologic and water quality data will be incorporated into the site GIS database.

5.0 Health and Safety Plan

A Health and Safety Plan (HASP) has been developed for LaBella's work at the Site and is included in Appendix 2. Subcontractors and subconsultants will be responsible for their own HASP. In addition, due to the private parcels and various manufacturing operations, each site may have specific health and safety considerations or potentially health and safety training requirements prior to any on-site work.

6.0 Quality Control Program

As previously referred to, a Quality Control Program is included as Appendix 1 and this QCP includes details on implementation of field sampling programs.

7.0 Citizen Participation Activities

The following citizen participation activities are proposed for informing the properties owners, neighboring parcels and the public. The citizen participation activities include:

- Contact, meet with and discuss the work and access issues with the property owner.

- Provide analytical results or other information to the property owner upon request, or as required by applicable law.

8.0 Schedule

The City would like the complete the new monitoring well installations at 1769 Emerson Street during Summer 2012, and anticipates initiating the work immediately upon NYSDEC approval of this work plan.

Y:\ROCHESTER, CITY\210173 FESL\REPORTS\WORK PLAN\WORK PLANS - SVI & RI PHASE\MW INSTALLATION WP - 1769 EMERSON\WORK PLAN - NEW MW INSTALL - JJ (2012-09-19).DOC

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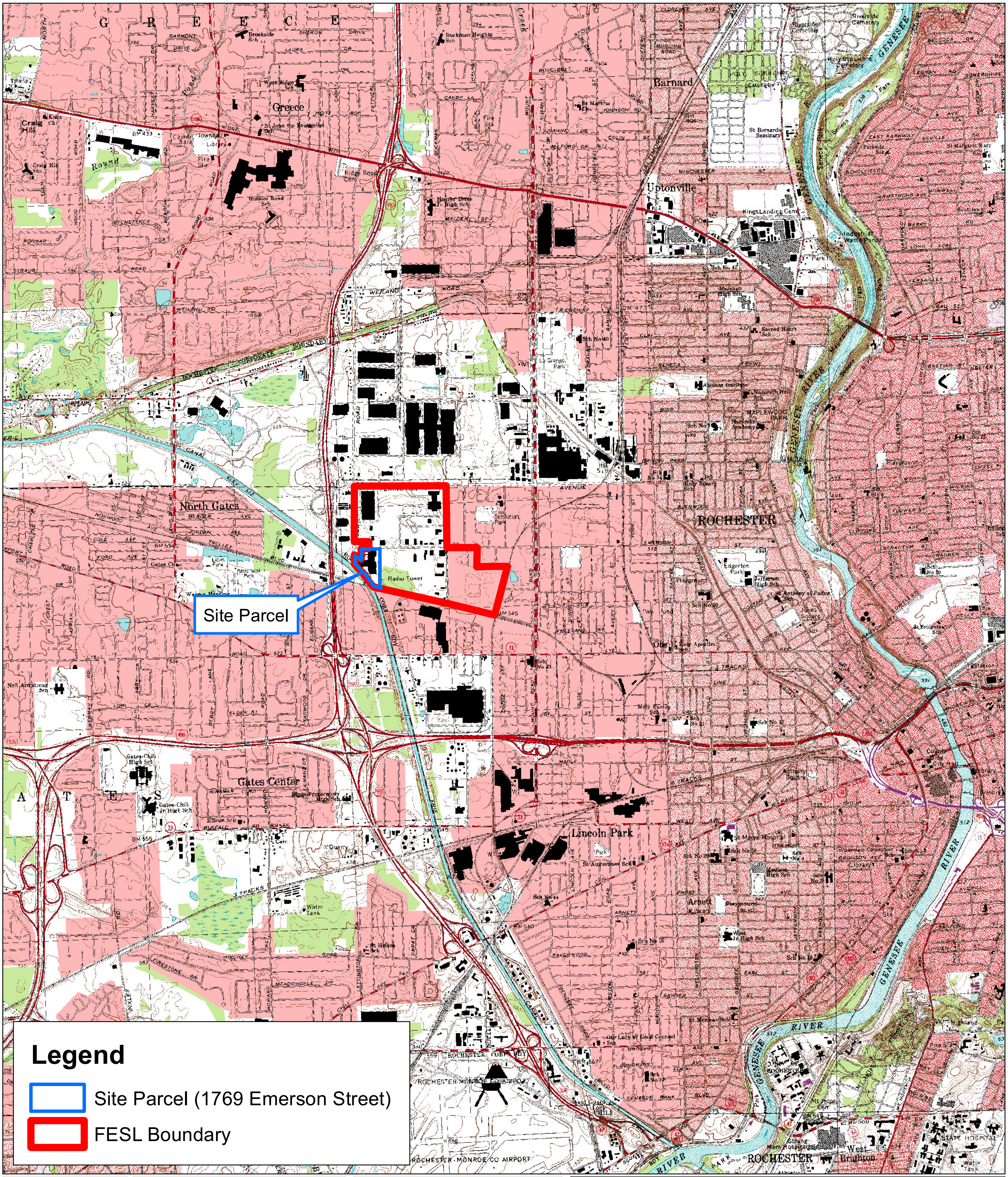
Figures



PROJECT/DRAWING NUMBER

210173

FIGURE 1

DRAWING TITLE

PROJECT LOCUS WITH USGS 7.5-MINUTE ROCHESTER QUADRANGLE

ISSUED FOR	DESIGNED BY:	IPJ
DRAFT	DRAWN BY:	IPJ
DATE: 6/28/2012	REVIEWED BY:	DPN

PROJECT/CLIENT

MONITORING WELL INSTALLATION WORK PLAN: 1769 EMERSON STREET PARCEL

CITY OF ROCHESTER

LABELLA Associates, P.C.
Engineering Architecture Environmental Planning
300 STATE STREET
ROCHESTER, NY 14614
P: (585) 454-6110
F: (585)454-3066
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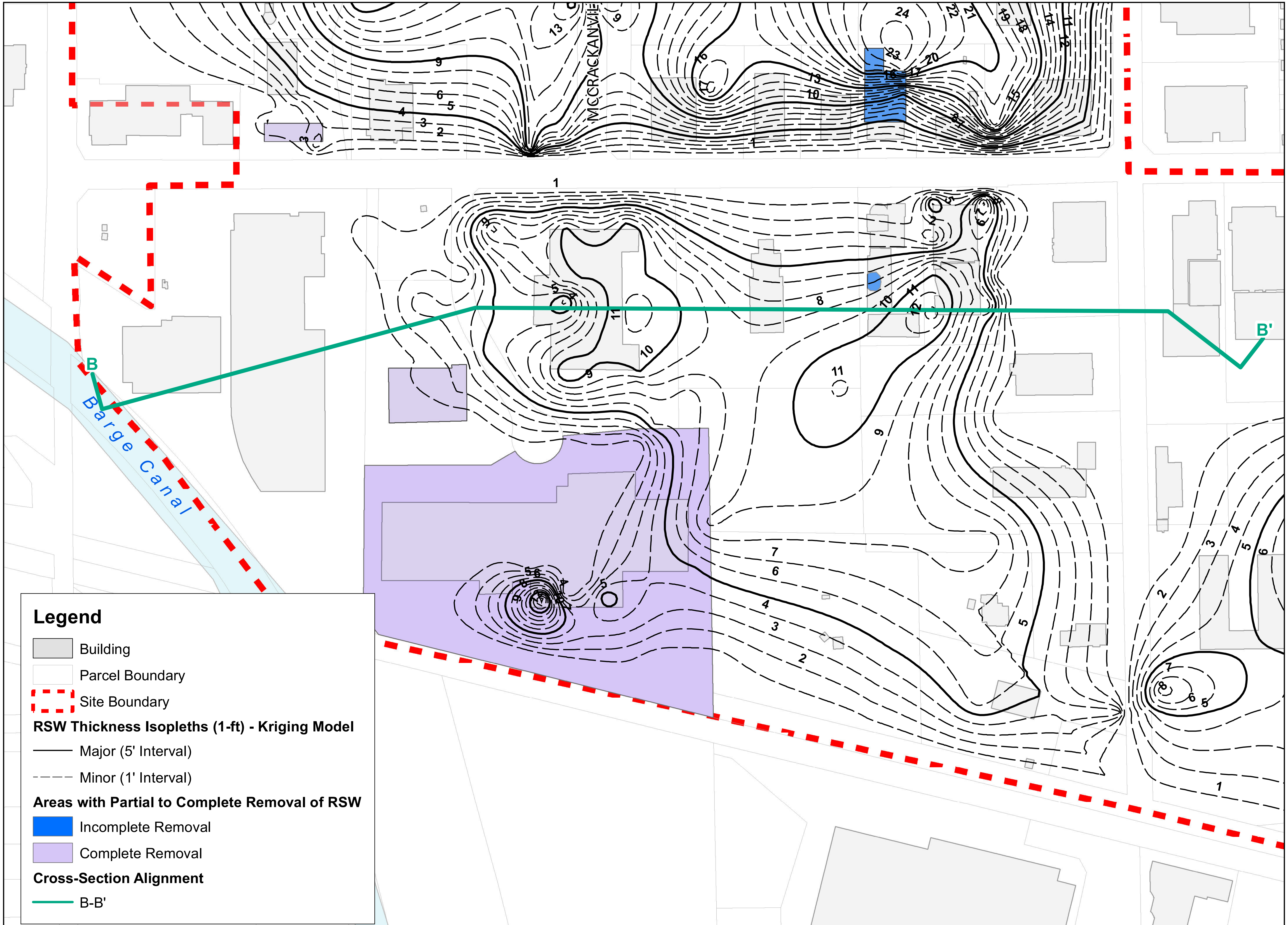
0 2,000 4,000 8,000 Feet

1 inch = 4,000 feet

N W E S

Path: Y:\Rochester, City\210173 FESL\Drawings\Report Figures\Monitoring Well Installatino Work Plan\Fig 1 - Locus - 1769 Emerson WP (IPJ 2012-06-28).mxd

User: jjaskowiak



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FORMER EMERSON STREET LANDFILL SOIL VAPOR INTRUSION INVESTIGATION

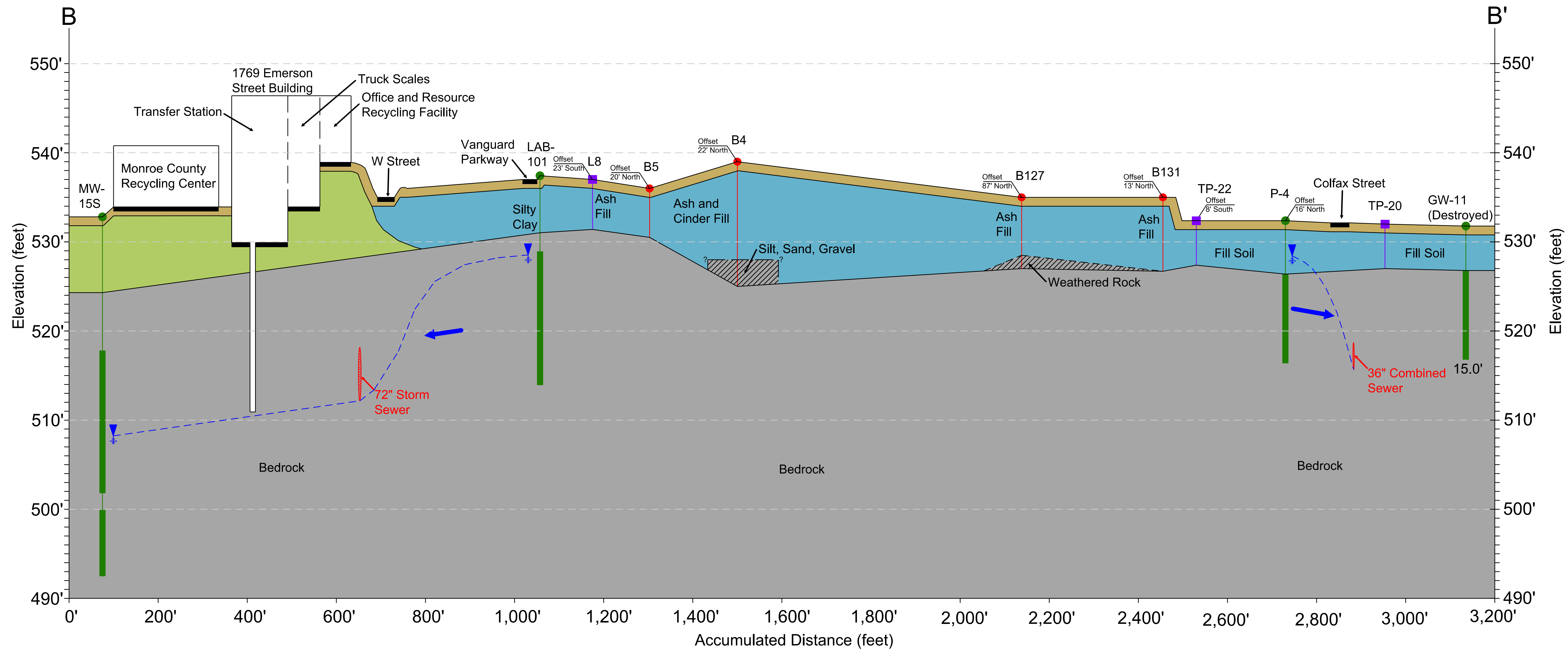
CITY OF ROCHESTER

Fill Limits

210173

FIGURE 2

Path: Y:\Rochester, City\210173 FESL\Drawings\Report Figures\Monitoring Well Installatino Work Plan\Figure FESL Thickness of Landfilling (JJ).mxd



NOTE:

1. Formations based on boring log notes.
2. Subsurface formations inferred in areas below the terminal depth of borings, beyond the first and last point, and areas between borings.
3. Water Levels measured on December 2010.
4. All elevations are in NGVD 29 vertical datum.
5. Ground surface elevations for all test borings and test pits are inferred, based upon field observation. These features were not surveyed.
6. All fill descriptors were interpreted from boring logs.
7. Sewer invert elevations were obtained from Monroe County Mile Square maps.

LEGEND

- Topsoil/Surface Treatment
- Fill
- Re-Worked or Native Soils (i.e. No Regulated Solid Waste)
- Bedrock
- 30.0' Depth to Well
- Groundwater Flow Path
- Groundwater Elevation
- Monitoring Well
- (Screened Interval)
- Test Boring
- Test Pit

Horizontal Scale in Feet

0 100 200 400

20:1 Vertical Exageration

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LABELLA Associates, P.C.

PROJECT/CLIENT

FINAL REPORT

FORMER EMERSON STREET LANDFILL

CITY OF ROCHESTER

DRAWING TITLE

CROSS SECTION B-B'

ISSUED FOR: FINAL

DESIGNED BY: EPD
DRAWN BY: IPJ
REVIEWED BY: DPN

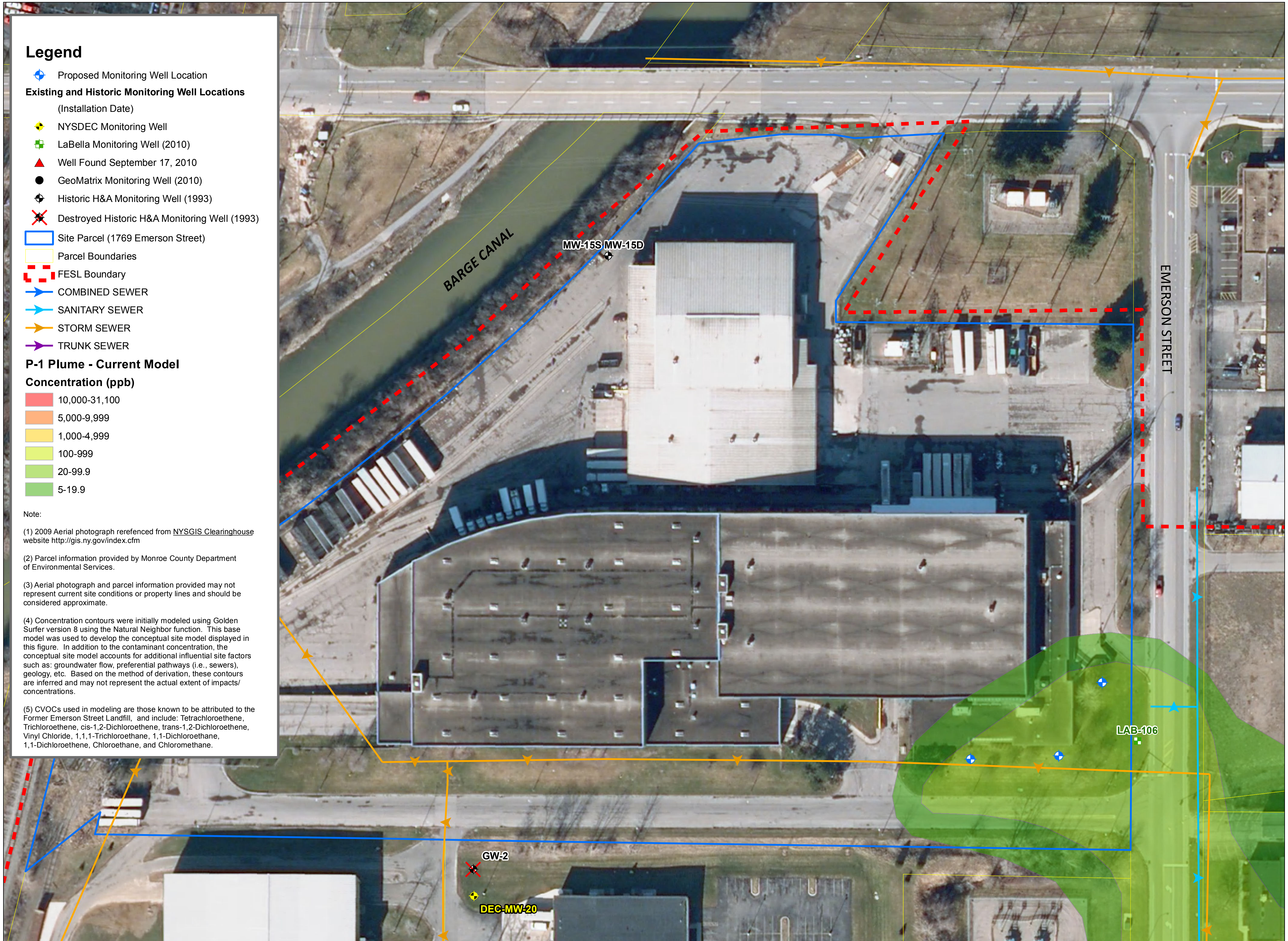
DATE: APRIL 2011

Y:\ROCHESTER,CITY\2082453\PORTP

PROJECT/DRAWING NUMBER

210173

FIGURE 3



LABELLA Associates, P.C.

PROJECT:
FESL P-1 Plume Remedial Investigation

CLIENT:
City of Rochester

TITLE:
Site Plan with Proposed Monitoring Well Locations

W S N E

0 100

1 inch = 100 feet

Issued For: **DRAFT**

Date: 07/06/2012

Drawn By: MFP

210173

FIGURE 4

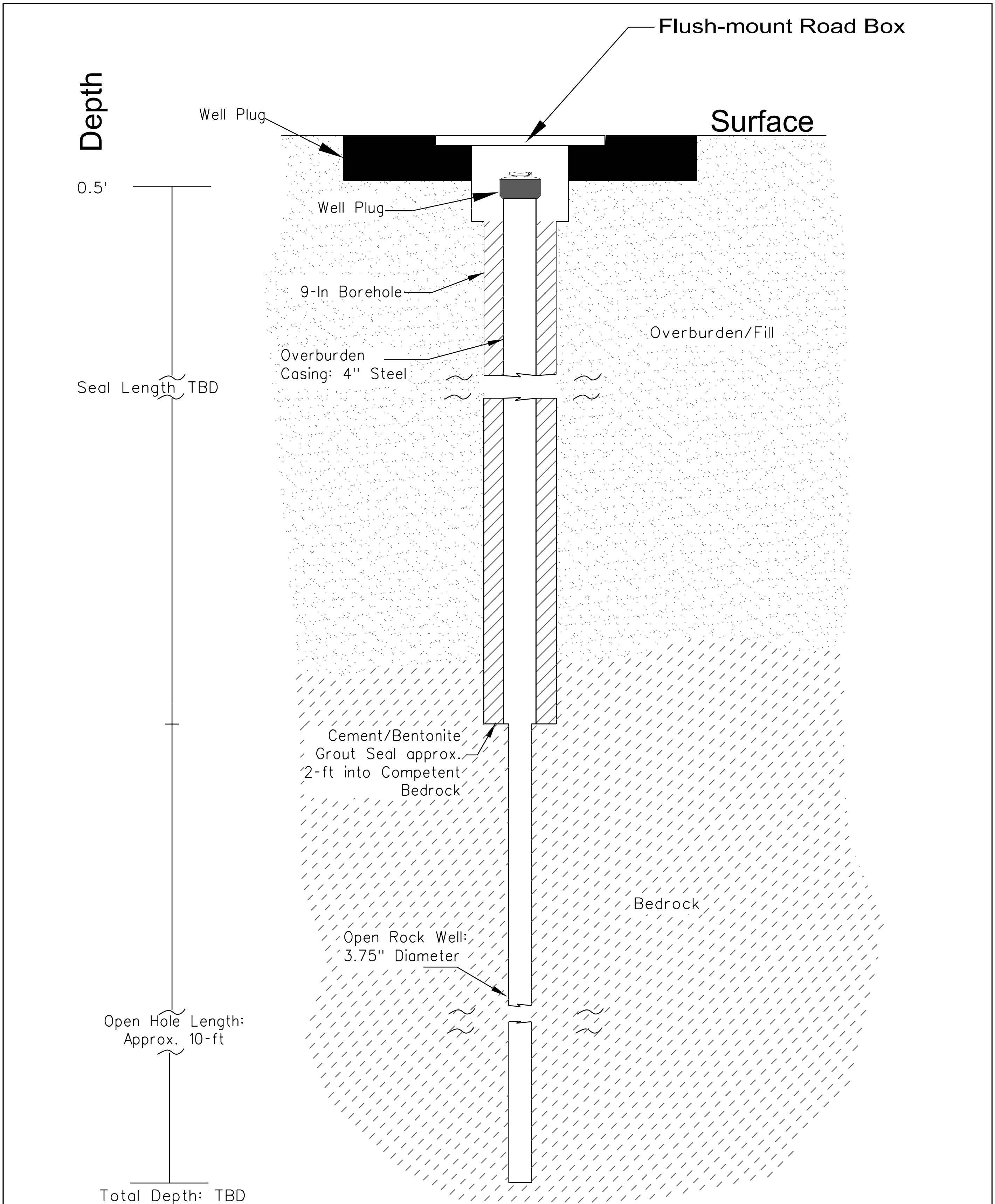


FIGURE 5

PROJECT #: 210173

CLIENT: CITY OF ROCHESTER

DRAWN BY: IPJ

MONITORING WELL INSTALLATION WORK PLAN

TYPICAL MONITORING WELL DESIGN DIAGRAM

FORMER EMERSON STREET LANDFILL
ROCHESTER, NY

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Y:\Rochester, CityÒ173 FESL\Drawings\Fig 8 WELL DETAILS.dgn

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Rochester, New York 14614

Appendix 1

Quality Control Program

LaBella Associates, P.C.

Engineering
Architecture
Environmental

Quality Control (QC) Program

Location:

Former Emerson Street Landfill
Rochester, New York

Prepared For:

City of Rochester
Division of Environmental Quality
Room 300-B
Rochester, New York 14614

LaBella Project No. 210173

March 2010
Revised June 2010

Quality Control (QC) Program

Location:

Former Emerson Street Landfill
Rochester, New York

Prepared For:

City of Rochester
Division of Environmental Quality
Room 300-B
Rochester, New York 14614

LaBella Project No. 210173

March 2010
Revised June 2010

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1. Introduction

LaBella's Quality Control (QC) Program is an integral part of its approach to environmental investigations. By maintaining a rigorous QC program, our firm is able to provide accurate and reliable data. QC also provides safe working conditions for all on-site workers.

The Quality Control program contains procedures, which provide for collected data to be properly evaluated, and which document that quality control procedures have been followed in the collection of samples. The quality control program represents the methodology and measurement procedures used in collecting quality field data. This methodology includes the proper use of equipment, documentation of sample collection, and sample handling practices.

Procedures used in the firm's Quality Control program are compatible with federal, state, and local regulations, as well as, appropriate professional and technical standards.

This QC program has been organized into the following areas:

- QC Objectives and Checks
- Field Equipment, Handling, and Calibration
- Sampling Techniques
- Sample Handling and Packaging

It should be noted that the Vapor Intrusion Assessment Work Plan(s) may have project specific details that will differ from the procedures in this QC program. In such cases, the SVI Work Plan should be followed (subsequent to regulatory approval). In addition, portions of this QC Program may not be applicable to the anticipated tasks associated with the Vapor Intrusion Assessment Work Plan(s); however, these items are included in the event such activities are warranted as the project progresses.

2. Quality Control Objectives

The United States Environmental Protection Agency (EPA) has identified five general levels of analytical data quality as being potentially applicable to site investigations conducted under CERCLA. These levels are summarized below:

- **Level I -** Field screening. This level is characterized by the use of portable instruments, which can provide real-time data to assist in the optimization of sampling point locations and for health and safety support. Data can be generated regarding the presence or absence of certain contaminants (especially volatiles) at sampling locations.
- **Level II -** Field analysis. This level is characterized by the use of portable analytical instruments, which can be used on site or in mobile laboratories stationed near a site (close-support labs). Depending upon the types of contaminants, sample matrix, and personnel skills, qualitative and quantitative data can be obtained.

- **Level III -** Laboratory analysis using methods other than the Contract Laboratory Program (CLP) Routine Analytical Services (RAS). This level is used primarily in support of engineering studies using standard EPA-approved procedures. Some procedures may be equivalent to CLP RAS, without the CLP requirements for documentation.
- **Level IV -** CLP Routine Analytical Services. This level is characterized by rigorous QC protocols and documentation and provides qualitative and quantitative analytical data. Some regions have obtained similar support via their own regional laboratories, university laboratories, or other commercial laboratories.
- **Level V -** Non-standard methods. Analyses, which may require method modification and/or development. CLP Special Analytical Services (SAS) are considered Level V.

Unless stated otherwise, all data will be generated in accordance with Level IV. When CLP methodology is not available, federal and state approved methods will be utilized. Level III will be utilized, as necessary, for non-CLP RAS work which may include ignitability, corrosivity, reactivity, EP toxicity, and other state approved parameters for characterization. Level I will be used throughout the SVI assessment and mitigation for health and safety monitoring activities.

All measurements will be made to provide that analytical results are representative of the media and conditions measured. Unless otherwise specified, all data will be calculated and reported in units consistent with other organizations reporting similar data to allow comparability of data bases among organizations. Data will be reported in µg/L and mg/L for aqueous samples, and µg/kg and mg/kg (dry weight) for soils, or otherwise as applicable.

The characteristics of major importance for the assessment of generated data are accuracy, precision, completeness, representativeness, and comparability. Application of these characteristics to specific projects is addressed later in this document. The characteristics are defined below.

2.1. Accuracy

Accuracy is the degree of agreement of a measurement or average of measurements with an accepted reference or "true" value and is a measure of bias in the system.

2.2. Precision

Precision is the degree of mutual agreement among individual measurements of a given parameter.

2.3. Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under correct normal conditions.

2.4. Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition

Careful choice and use of appropriate methods in the field will ensure that samples are representative.

This is relatively easy with water or air samples since these components are homogeneously dispersed. In soil and sediment, contaminants are unlikely to be evenly distributed, and thus it is important for the sampler and analyst to exercise good judgment when removing a sample.

2.5. Comparability

Comparability expresses the confidence with which one data set can be compared to another. The data sets may be inter- or intra- laboratory.

3. Measurement of Data Quality

3.1. Accuracy

Accuracy of a particular analysis is measured by assessing its performance with "known" samples. These "knowns" take the form of EPA standard reference materials, or laboratory prepared solutions of target analytes spiked into a pure water or sample matrix. In the case of GC or GC/MS analyses, solutions of surrogate compounds, which can be spiked into every sample and are designed to mimic the behavior of target analytes without interfering with their determination, are used.

In each case the recovery of the analyte is measured as a percentage, correcting for analytes known to be present in the original sample if necessary, as in the case of a matrix spike analysis. For EPA supplied known solutions, this recovery is compared to the published data that accompany the solution.

For the firm's prepared solutions, the recovery is compared to EPA-developed data or the firm’s historical data as available. For surrogate compounds, recoveries are compared to EPA CLP acceptable recovery tables.

If recoveries do not meet required criteria, then the analytical data for the batch (or, in the case of surrogate compounds, for the individual sample) are considered potentially inaccurate. The analyst or his supervisor must initiate an investigation of the cause of the problem and take corrective action. This can include recalibration of the instrument, reanalysis of the QC sample, reanalysis of the samples in the batch, or flagging the data as suspect if the problems cannot be resolved. For highly contaminated samples, recovery of the matrix spike may depend on sample homogeneity. As a rule, analyses are not corrected for recovery of matrix spike or surrogate compounds.

3.2. Precision

Precision of a particular analysis is measured by assessing its performance with duplicate or replicate samples. Duplicate samples are pairs of samples taken in the field and transported to the laboratory as distinct samples. Their identity as duplicates is sometimes not known to ASC and usually not known to bench analysts, so their usefulness for monitoring analytical precision at bench level is limited. For most purposes, precision is determined by the analysis of replicate pairs (i.e., two samples prepared at the laboratory from one original sample). Often in replicate analysis the sample chosen for replication does not contain target analytes so that quantitation of precision is impossible. For EPA CLP analyses, replicate pairs of spiked samples, known as matrix spike/matrix spike duplicate samples, are used for precision studies. This has the advantage that two real positive values for a target analyte can be compared.

Precision is calculated in terms of Relative Percent Difference (RPD).

- Where X_1 and X_2 represent the individual values found for the target analyte in the two replicate analyses or in the matrix spike/matrix spike duplicate analyses.
- RPDs must be compared to the method RPD for the analysis. The analyst or his supervisor must investigate the cause of RPDs outside stated acceptance limits. This may include a visual inspection of the sample for non homogeneity, analysis of check samples, etc. Follow-up action may include sample reanalysis or flagging of the data as suspect if problems cannot be resolved.
- During the data review and validation process (see Section 9), field duplicate RPDs are assessed as a measure of the total variability of both field sampling and laboratory analysis.

3.3. Completeness

Completeness for each parameter is calculated as follows:

- The firm's target value for completeness for all parameters is 100%. A completeness value of 95% will be considered acceptable. Incomplete results will be reported to the site managers. In planning the field sample collection, the site manager will plan to collect field duplicates from identified critical areas. This procedure should assure 100% completeness for these areas.

3.4. Representativeness

The characteristic of representativeness is not quantifiable. Subjective factors to be taken into account are as follows:

- The degree of homogeneity of a site;
- The degree of homogeneity of a sample taken from one point in a site; and
- The available information on which a sampling plan is based.

To maximize representativeness of results, sampling techniques and sample locations will be carefully chosen so that they provide laboratory samples representative of the site and the specific area. Within the laboratory, precautions are taken to extract from the sample bottle an aliquot representative of the whole sample. This includes premixing the sample and discarding pebbles from soil samples.

4. QC Targets

Target values for detection limit, percent spike recovery and percent "true" value of known check standards, and RPD of duplicates/replicates are included in the QCP, Analytical Procedures. Note that tabulated values are not always attainable. Instances may arise where high sample concentrations, non homogeneity of samples, or matrix interferences preclude achievement of target detection limits or other quality control criteria. In such instances, the firm will report reasons for deviations from these detection limits or noncompliance with quality control criteria.

5. Sampling Procedures

This section describes the sampling procedures to be utilized for each environmental medium that will be collected and analyzed in accordance with appropriate state and federal requirements. All procedures described are consistent with EPA sampling procedures as described in SW-846, third edition, September 1986. All samples will be delivered to the laboratory within 24 to 28 hours of collection.

5.1 Soil Vapor Intrusion Assessment

The installation and sampling of soil gas, sub-slab soil vapor and indoor air will be completed in general accordance with the procedures provided in the *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* dated October 2006. The applicable procedures to be implemented as part of this investigation are summarized below:

5.1.1 Sampling Point Installation

Soil Gas Points

Soil gas sampling points are defined herein as locations on the exterior of a building (whereas sub-slab vapor is from beneath a building). Soil gas sampling points will be installed using direct push technology to at least 5 feet in-depth, or to bedrock refusal or slightly above static groundwater levels, whichever is encountered first. A porous, inert backfill material (e.g., glass beads or coarse sand) will be used to create a sampling zone of 1 to 2 feet in length. The soil gas sampling points will be constructed of 1-inch PVC well screen connected to a riser pipe or inert tubing (e.g., polyethylene, stainless steel, or Teflon®) of the appropriate size (typically 1/8 inch to 1/4 inch diameter) and of laboratory or food grade quality to the surface. The soil vapor probes will be sealed above the sampling zone with a minimum 3-feet of bentonite slurry. The remainder of the borehole will be backfilled with glass beads or coarse sand. Soil gas sampling points will be finished with protective casings that are grouted in place to minimize infiltration of water or outdoor air and to prevent damage to the soil gas point.

Sub-Slab Vapor Points

Sub-slab vapor probe installations will be temporary. A vacuum will not be used to remove drilling debris from the sampling port. Sub-slab implants or probes will be constructed in the same manner at all sampling locations to minimize possible discrepancies. Temporary probes will be constructed with inert tubing (e.g., polyethylene stainless steel, nylon, Teflon®, etc.) of the appropriate size (typically 1/8 inch to 1/4inch diameter), and of laboratory or food grade quality. Tubing will not extend further than 2-inches into the sub-slab material. The implant will be sealed to the surface with non-VOC-containing and non-shrinking products for temporary installations (e.g., perma-gum grout, melted beeswax, putty, etc.).

5.1.2 Purging Procedures

After installation of the probes, one (1) to three (3) volumes (i.e., the volume of the sample probe and tube) will be purged prior to collecting the samples to ensure samples collected are representative. Flow rates for purging will not exceed 0.2 liters per minute to minimize the ambient air infiltration during sampling.

During purging of the sample point, a tracer gas evaluation will also be conducted to verify the integrity of the sub-slab soil vapor probe seal. An appropriate tracer gas will be used (e.g., sulfur hexafluoride (SF_7), helium, etc.). An enclosure will be constructed around the soil gas sampling point (e.g., plastic bag, plastic bucket, etc.) and sealed around the sample point casing. Subsequently, the enclosure will be enriched with the tracer gas. The purged soil gas will then be tested for the tracer gas by an appropriate meter. In the event that the tracer gas is measured at a concentration of 10% or greater, the sample point will be resealed and retested prior to sampling.

5.1.3 Sampling and Handling Procedures

Sub-slab vapor samples will be collected over the same general time period and in the same manner at all locations to minimize possible discrepancies. Sub-slab vapor samples will be collected using Summa Cannisters® that are equipped with pre-calibrated laboratory supplied flow regulators set for a sampling time of six (6) hours. The Summa Cannisters® will be certified clean by the laboratory. The Summa Cannisters® will be connected to the sub-slab soil vapor sampling point via inter tubing (e.g., polyethylene, stainless steel, or Teflon®).

The analytical testing may vary depending on the objectives of the work; however, for all samples that are tested for volatile organic compounds (VOCs) using USEPA Method TO-15, a minimum detection limit of 0.25 $\mu g/m^3$ will be used for trichloroethene and $1\mu g/m^3$ will be required for all other volatiles.

5.1.4 Additional Sampling Notes

At the time of sampling, the following information will be documented that could influence interpretation of the results:

- a sketch of the Site and sampling locations relative to area streets, neighboring properties and structures (with estimated distance to the Site), outdoor ambient air sample location(s), if applicable, and orientation (north arrow).
- weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction) will be noted for the past 24 to 48 hours.
- any pertinent observations should be recorded, such as odors and readings from field instrumentation.

In addition to the above information, a sample log sheet summarizing the following information for each sample will be documented:

- sample identification
- date and time of sample collection
- sampling depth
- identity of sampler(s)
- sampling methods and devices
- purge volumes
- volume of soil vapor extracted
- the vacuum before and after samples are collected
- apparent moisture content (dry, moist, saturated, etc.) of the sampling zone
- chain of custody protocols used to track samples from sampling point to analysis.

In general, a data usability study report (DUSR) will be prepared in accordance with DER-10 Appendix 2B for all soil gas, sub-slab vapor, indoor air and outdoor air sampling results.

The following actions will be documented and the NYSDOH Indoor Air Quality Questionnaire and Building Inventory form will be completed during sampling to aid in the interpretation of the sampling results:

- Historic and current storage and uses of volatile chemicals will be identified, especially if sampling within a commercial or industrial building (e.g., use of volatile chemicals in commercial or industrial processes and/or during building maintenance).
- The use of heating or air conditioning systems during sampling will be noted.
- Floor plan sketches will be drawn that include the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation(north), footings that create separate foundation sections, and any other pertinent information will be completed.
- Outdoor plot sketches will be drawn that include the building site, area streets, outdoor air sampling locations (if applicable), compass orientation (north), and paved areas.
- Weather conditions (e.g., precipitation and indoor and outdoor temperature) and ventilation conditions (e.g., heating system active and windows closed) will be reported.
- Any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, ppbRAE, etc.), will be recorded.
- Additional documentation that may be gathered to assist in the interpretation of the results includes information about air flow patterns and pressure relationships obtained by using smoke tubes or other devices (especially between floor levels and between suspected contaminant sources and other areas), the barometric pressure and photographs to accompany floor plan sketches.
- Apparent moisture content (dry, moist, saturated, etc.) of the sampling zone.
- Chain of custody protocols and records used to track samples from sampling point to analysis.

6. Soil & Groundwater Investigation

The groundwater sampling plan outlined in this subsection has been prepared in general accordance with RCRA Groundwater Monitoring Technical Enforcement Guidance Document 9950.1 (September 1986), Office of Solid Waste and Emergency Response.

Prior to drilling, all drill sites will be cleared with appropriate utility companies to avoid potential accidents relating to underground utilities.

6.1. Test Borings and Well Installation

6.1.1. Drilling Equipment

Direct Push "Geo-Probe" Soil Borings:

Borings will be advanced with a "geo-probe" direct push sampling system. The use of direct push technology allows for rapid sampling, observation, and characterization of relatively shallow overburden soils. The geo-probe utilizes a four-foot macro-core sampler, with disposable polyethylene sleeves. Soil cores will be retrieved in four-foot sections, and can be easily cut from the polyethylene sleeves for observation and sampling. The macro-core sampler will be decontaminated between samples and borings using an alconox and water solution.

Drill Rig Advanced Soil Borings:

The drilling and installation of monitoring wells will be performed using a rotary drill rig which will have sufficient capacity to perform 4 1/4-inch inside diameter (ID) hollow-stem auger drilling in the overburden, retrieve split-spoon samples, and perform necessary rock coring using an HQ core barrel. .

6.1.2. Drilling Techniques

Direct Push "Geo-Probe" Advanced Borings:

Prior to initiating drilling activities, the Geo-probe, macro cores, drive rods, pertinent equipment, well pipe and screens will be steam cleaned or washed with an alconox and water solution followed by a clean water rinse. This cleaning procedure will also be used between each boring. These activities will be performed in a designated on-site decontamination area. Throughout and after the cleaning processes, direct contact between the equipment and the ground surface will be avoided. Plastic sheeting and/or clean support structures (e.g., pallets, sawhorses) will be used. The drilling rig and all equipment will be steam cleaned upon completion of the investigation and prior to leaving the site.

Test borings will be advanced with 2-inch direct push macro-cores through overburden soils. Drilling fluids, other than water from a NYSDEC-approved source, will not be allowed without special consideration and agreement from NYSDEC. The use of lubricants is also not allowed unless approved by the NYSDEC representative.

It will be the responsibility of the consultant to arrange for the appropriate drilling equipment to be present at the site. Standby time to arrange for additional equipment or a water supply will not be allowed unless caused by unexpected site conditions.

During the drilling, a Photoionization detector (PID) will be used to monitor the gases exiting the hole. Macro-core cuttings will be contained if the PID meter readings are greater than 5 ppm above background or the cuttings show visible evidence of contamination, or as specified in the RI Work Plan.

Drill Rig Advanced Borings:

Prior to initiating drilling activities, the drilling rig, augers, rods, split spoons, pertinent equipment, well pipe and screens will be steam cleaned. This cleaning procedure will also be used between each boring. These activities will be performed in a designated on-site decontamination area. Throughout and after the cleaning processes, direct contact between the equipment and the ground surface will be avoided. Plastic sheeting and/or clean support structures (e.g., pallets, sawhorses) will be used. The drilling rig and all equipment will be steam cleaned upon completion of the investigation and prior to leaving the site.

Test borings will be advanced with 4 1/4-inch (ID) hollow stem augers through overburden, and HQ core barrels in competent rock, driven by truck-, track-, or trailer-mounted drilling equipment. Alternative methods of drilling or equipment may be allowed or requested for site-specific criteria, but must be approved by the NYSDEC. Drilling fluids, other than water from a NYSDEC-approved source, will not be allowed without special consideration and agreement from NYSDEC. The use of lubricants is also not allowed unless approved by the NYSDEC representative. One sample from each drilling water source may be analyzed for full TCL.

It will be the responsibility of the consultant to arrange for the appropriate drilling equipment to be present at the site. Standby time to arrange for additional equipment or a water supply will not be allowed unless caused by unexpected site conditions.

During the drilling, a photo-ionization detector (PID) will be used to monitor the gases exiting the hole. Auger cuttings will be contained if the PID meter readings are greater than 5 ppm above background or the cuttings show visible evidence of contamination, or as specified in the RI Work Plan.

Where bedrock wells are required, test borings shall be advanced into rock with HQ coring tools. Only water from an approved source shall be used in rock coring. The consultant shall monitor and record the petrology, core recovery, fractures, rate of advance, water levels, and water lost or produced in each test boring. The Rock Quality Designation (RQD) value shall be calculated for each 5-foot core, refer to RQD measuring procedure below.

RQD Procedure

RQD is a modified core recovery procedure which is based indirectly on the number of fractures and the amount of alternation in the rock mass as observed in the rock cores retrieved. Core recovery is the ratio of the length of core recovered to the length drilled (i.e., no recovery = 0 and full recovery = 100). This procedure is an indicator of the general quality of rock and provides a numerical value which is more sensitive and consistent than gross percentage core recovery.

Specifically, the total length of core recovered is summed by counting only those pieces of hard and sound core which are 4 inches (10 cm) or greater in length and divide that sum by the total length of that run. RQD is presented as a percentage.

It should be noted that RQD has the following limitations:

- RQD should not be applied to core less than 2 inches (5.4 cm) in diameter as a false RQD may be determined since smaller cores can frequently break during the coring operation.

- In the event a core is broken by handling or during drilling, the broken pieces should be fitted together and counted as one piece.
- A judgment based on experience may be required when thinly bedded sedimentary rock and foliated metamorphic rocks are encountered.
- RQD is most suitable for igneous rock, thick bedded limestone, sandstone, etc.
- This procedure can be applied to shales; however, the cores must be logged immediately upon removal before cracking can occur.

This procedure is less accurate where recovery is poor; however, the results will provide an indication of poor quality rock. Developing an accurate RQD relies on proper equipment, procedures and competent drilling supervision since poor drilling techniques and equipment will cause poor recovery and a false RQD.

Example RQD

Assumes an 84-inch long core barrel.

Core Recovery (in)	Modified Core Recovery (in)	Rock Quality Designation	Description of Rock Quality
25	25	0 – 25	Very Poor
12	12	25 – 50	Poor
5	0	50 – 75	Fair
8	0	75 – 90	Good
8	0	90 – 100	Excellent
8	0		
Total = 66	Total = 37		

Based on 84” total length with 66” recovery, Core Recovery = 79%
Based on 66” recovery with 37” of pieces greater than 4”, RQD = 56%, this equates to a Fair description.

6.1.3. Well Casing (Riser)

Direct Push Geo-Probe Groundwater Monitoring Wells:

Direct Push Geo-Probe advanced groundwater-monitoring wells utilized 1.25-inch threaded flush joint PVC pipe.

Drill Rig Advanced Groundwater Monitoring Wells:

The well riser shall consist of 2-inch or 4-inch diameter, threaded flush-joint PVC pipe. All well risers will conform to the requirements of ASTM-D 1785 Schedule 40 pipe, and shall bear markings that will identify the material as that which is specified. All materials used to construct the wells will be NSF/ASTM approved.

6.1.4. Well Screen

Direct Push Geo-Probe Groundwater Monitoring Wells:

Direct Push Geo-Probe advanced groundwater-monitoring wells utilized 1.25-inch diameter well screen. Groundwater-monitoring wells will set to intersect the top of the shallow overburden groundwater table. Each geo-probe advanced well will be equipped with 5 to 10 feet (based on anticipated groundwater level and bedrock depth) of .010 inch slotted PVC screen connected to an appropriate length of PVC riser to complete the well installation.

Drill Rig Advanced Groundwater Monitoring Wells:

Generally, wells will be constructed with 10-foot machine-slotted screens, unless otherwise specified or dictated by field conditions (i.e., screens of less than 10-feet in length may be used, depending on the characteristics of the well). The well screen slot size will be selected based on the filter pack grain size and the ability to hold back 85 percent or more of the filter pack materials. Screen and riser sections shall be joined by flush-threaded coupling to form watertight unions that retain 100% of the strength of the casing. Solvent PVC glue shall not be used at any time in the construction of the wells. The bottom of the screen shall be sealed with a treated cap or plug. No lead shot or lead wool is to be employed in sealing the bottom of the well or for sealant at any point in the well.

All risers and screens shall be set round, plumb, and true to line.

6.1.5. Artificial Sand Pack

Granular backfill will be chemically and texturally clean (as determined using a 10x hand lens), inert, siliceous, and of appropriate grain size for the screen slot size and the host environment. Sand pack grain size will be selected based on sieve analyses of formation samples. The sand pack will be installed using a tremie pipe and the casing will be equipped with centralizers (wells 15 ft. or deeper only) to minimize the tendency for particle separation and bridging. Prior to casing and screen insertion, a minimum of 1-foot of gravel-pack bedding will be placed in the bottom of the hole. The well screen and casing will be installed, and the sand pack placed around the screen and casing to a depth extending at least 25 percent of the screen length above the top of the screen.

6.1.6. Bentonite Seal

A minimum 2-foot thick seal of tamped bentonite pellets will be placed directly on top of the sand pack, and care will be taken to avoid bridging. The seal will be measured immediately after placement, without allowance for swelling.

6.1.7. Grout Mixture

Upon completion of the bentonite seal, the well will be grouted with a non-shrinking cement grout (e.g., Volclay[R]) mix to be placed from the top of the bentonite seal to the ground surface. The cement grout shall consist of a mixture of Portland cement (ASTM C 150) and water, in the proportion of not more than 7 gallons of clean water per bag of cement (1 cubic foot or 94 pounds). Additionally, 3% by weight of bentonite powder shall be added, if permitted.

6.1.8 Open-Hole Wells

Bedrock well installation will involve construction of a rock socket. The socket will be drilled into the top of rock at each bedrock well location to allow permanent 4-inch casing to be grouted securely in place prior to completion of the well. The purpose for this is to provide a seal at the overburden/bedrock interface and into the upper bedrock surface, to prevent the entrance of overburden water into the bedrock.

Once the 4-inch casing is in place, and after the grout and casing have set up for 24 hours, the remaining amount of bedrock can be HQ cored through the casing to a depth determined by the work plan. The holes will be left open.

6.1.9 Surface Protection

At all times during the progress of the work, precautions shall be used to prevent tampering with or the entrance of foreign material into the well. Upon completion of the well, a suitable lockable cap shall be installed to prevent material from entering the well. The PVC well riser shall be protected by a flush mounted road box set into a concrete pad. A concrete pad, sloped away from the well, shall be constructed around the flush mount road box at ground level.

Any well that is to be temporarily removed from service or left incomplete due to delay in construction shall be capped with a watertight cap and equipped with a "vandal-proof" cover, satisfying applicable NYSDEC regulations or recommendations.

6.1.10 Surveying

Coordinates and elevations will be established for each monitoring well and sampling location. Elevations to the closest 0.01 foot shall be used for the survey. These elevations shall be referenced to a regional, local, or project-specific datum. USGS benchmarks will be used whenever available. The location, identification, coordinates, and elevations of the wells will be plotted on maps with a scale large enough to show their location with reference to other structures at each site.

6.1.11 Well Development

After completion of the well, but not sooner than 24 hours after grouting is completed, development will be accomplished using pumping, bailing, or surge blocking. No dispersing agents, acids, disinfectants, or other additives will be used during development or introduced into the well at any other time. During development, water will be removed throughout the entire water column by periodically lowering and raising the pump intake (or bailer stopping point).

Well development will include washing the entire well cap and the interior of the well casing above the water table, using only water from the well itself. As a result of this operation, the well casing will be free of extraneous materials (grout, bentonite, and sand) inside the riser, well cap, and blank casing between top of the well casing and water table. This washing will be conducted before and/or during development; not after development. Development water will be either properly contained and treated as waste until the results of chemical analysis of samples are obtained or discharged on site as determined by the site-specific work plans and/or consultation with the NYSDEC representatives on site.

The development process will continue until a stabilization of pH, specific conductance, temperature, and clarity (goal of <50 NTU).

7. Geologic Logging and Sampling

At each investigative location, the boring will be advanced through overburden using either a drill rig and hollow-stem auger or direct push technology; soils will be visually inspected for stains and monitored with a PID to help determine potential for vertical migration of contaminants. Soil samples will be collected continuously in both the unsaturated soil zone and the saturated zone. Selected wells will be sampled continuously over the entire depth of the well. The sampling device will be decontaminated according to procedures outlined in the Decontamination section of this document. The split-spoon sampler will be driven into the soil using a 140-pound safety hammer and allowed to free-fall 30-inches, in accordance with ASTM-D 1586-84 specifications. The number of blows required to drive the sampler each 6-inches of penetration will be recorded. Soil samples will be screened in the field for volatile organic vapors using a PID, classified in accordance with Unified Soil Classification System (USCS) specifications, and logged. Samples will be stored in glass jars until they are needed for testing or the project is complete.

All samples will be screened with a PID during collection. The headspace of all samples taken in the field will be screened using USEPA method 3810.

Monitoring well borings will be advanced to maximum design depth below the ground surface, as indicated by the work plan for each site. If hard boulders or bedrock result in auger refusal, rock coring will be used to advance the hole to design depth. If hydrogeologic conditions are favorable for well installation at a depth less than design, the well will be installed at the boring or coring termination depth. In the event that maximum design depth is reached and hydrogeologic conditions are not suitable for well installation, the maximum drilling depth will be revised. Hydrogeologic suitability for well emplacement will be determined by the supervising geologist in consultation with NYSDEC, based on thickness and estimated hydraulic conductivity of the saturated zone encountered. If necessary, the borehole will be advanced to water or abandoned.

Bedrock encountered during well installation shall be cored by standard diamond-core drilling methods using a core barrel. All rock cores recovered will be logged by a geologist, labeled, photographed, and stored in wooden core boxes. The photographs will be submitted as part of the completed boring logs. The cores will be stored by the firm until the project is completed or for at least one year. Drilling logs will be prepared by an experienced geologist or geotechnical engineer, who will be present during all drilling operations. One copy of each field boring and well construction log, including color photographs of the rock core, if encountered, and groundwater data, will be submitted as part of the RI report. The

RQD value shall be calculated for each 5-foot section. Information provided in the logs shall include, but not be limited to, the following:

- Date, test hole identification, and project identification;
- Name of individual developing the log;
- Name of driller and assistant(s);
- Drill, make and model, auger size;
- Identification of alternative drilling methods used and justification thereof (e.g., rotary drilling with a specific bit type to remove material from within the hollow stem augers);
- Standard penetration test (ASTM D-1586) blow counts;
- Field diagram of each monitoring well installed with the depth to bottom of screen, top of screen, and pack, bentonite seal, etc.;
- Reference elevation for all depth measurements;
- Depth of each change of stratum;
- Thickness of each stratum;
- Identification of the material of which each stratum is composed, according to the USCS system or standard rock nomenclature, as appropriate;
- Depth interval from which each sample was taken;
- Depth at which hole diameters (bit sizes) change;
- Depth at which groundwater is encountered;
- Depth to static water level and changes in static water level with well depth;
- Total depth of completed well;
- Depth or location of any loss of tools or equipment;
- Location of any fractures, joints, faults, cavities, or weathered zones;
- Depth of any grouting or sealing;
- Nominal hole diameters;
- Amount of cement used for grouting or sealing;
- Depth and type of well casing;
- Description of well screen (to include depth, length, location, diameter, slot sizes, material, and manufacturer);
- Any sealing-off of water-bearing strata;
- Static water level upon completion of the well and after development;
- Drilling date or dates;
- Construction details of well; and
- An explanation of any variations from the work plan.

8. Hydraulic Conductivity Testing Procedures

If necessary, single-well, rising head tests will be performed in order to determine the in-place hydraulic conductivity of unconsolidated and/or consolidated geologic materials, which occur in the monitoring interval of newly, installed wells. The tests will be performed by a qualified hydrogeologist. These tests involve lowering the water level in the well and measuring the change in head with respect to time as the well is allowed to recover. In wells, which are slow to recover, the water level will be bailed down as described below. The measurements in these wells will be taken manually. Wells, which recover too quickly for this method, will be tested by removing one bailer of water and the recovery measured by means of a pressure transducer system.

The rising head tests for wells with rapid recovery rates will be conducted as follows:

- The static water level in the well to be tested is measured and recorded;
- The pressure transducer is placed in the well to a minimum depth of three feet below the static water level;
- Readings are made using the data logger until three consecutive readings are the same (equilibrium conditions);
- The data logger is then calibrated to read 0.00 feet at static conditions. A pre-cleaned bailer is then lowered into the well and placed just below the water surface;
- Water level measurements are made until the water level returns to static conditions following introduction of the bailer. If static conditions are not reached within 15 minutes following introduction of the bailer, the well will be tested using the procedures described below for slow recovery wells;
- Once static conditions are reestablished, the bailer is rapidly removed from the water column thereby creating an instantaneous decline of the water level in the well. Coincident with the withdrawal of the bailer, automatic logging of the water levels is initiated using the data logger. The primary goal in the recovery test is to "instantaneously" remove a volume of water that will result in a measurable head decline, the recovery of which (to static conditions) can be monitored over time. Such an instantaneous withdrawal results in recovery due to contributions of flow from the surrounding formation. This flow is controlled by its hydraulic conductivity and not by other factors such as storage effects;
- The water level measurements will continue until water levels recover to within a minimum of 10 percent of the original static water level (90 percent recovery), or an elapsed time of one hour. If the well has not recovered to static conditions after one hour at the discretion of the hydrogeologist, the transducer will be removed and the well will be tested at a later date using the procedures described below for slow recovery wells; and
- Data stored in the data loggers will be "dumped" to a hard copy printout using a field printer or to a magnetic disk using a portable computer. If field printouts are used, they will be dated and signed by the hydrogeologist.

For wells with slow recovery rates, the following procedures will be used:

- The static water level is measured and recorded;
- The well is bailed by hand until the depth to water appears to stabilize based on the depth of travel of the bailer rope or to the top of the open or screened interval in wells which are screened below the standing water level;
- The bailer is then removed and water level measurements are collected by hand (measuring tape or electronic water level indicator) at a frequency, which will provide approximately 15 to 20 data, points during recovery (to within 10 percent of the total drawdown), if feasible. Water level measurements are recorded on the hydraulic conductivity testing report;

- A pre-cleaned bailer (one for each well) will be used in the rising head testing. All equipment entering the well, such as the transducer and transducer cable, will be cleaned prior to reuse in accordance with the Decontamination section below. All well water and rinse water generated by the tests will be collected in appropriate containers and disposed of in accordance with the Investigation Derived Materials section below;
- The data from both types of rising head tests will be reduces and evaluated; and
- Appropriate equations for slug test analysis will be used to estimate hydraulic conductivity of the monitoring interval.

9. Groundwater Sampling Procedures

The groundwater in all new and existing monitoring wells will be allowed to stabilize for 7 days following development and permeability testing (if conducted). Water levels will be measured to within 0.01 foot prior to purging and sampling. A temporary staff gauge or other surface water elevation measuring device will be established on any nearby surface water body, which may significantly influence groundwater movement. The surface elevation of these water bodies will be checked whenever groundwater elevations are measured. Purging and sampling of each well will be accomplished as indicated in the project specific work plan. Below are accepted methods for groundwater sampling:

Groundwater Sampling via Bailers

Bailer purging/sampling will be accomplished using precleaned dedicated PVC bailers on new polypropylene line. Purging will be less aggressive than development to avoid turbidity problems (e.g., avoid "free-falling" bailers). In general, wells will be purged until the pH, conductivity, temperature, and turbidity of the water being pumped from the well have stabilized. All wells will be purged of at least three well-bore volumes or to dryness.

Groundwater Sampling via Low-Flow Sampling

Low flow sampling will be conducted in general accordance with American Society of Testing and Materials (ASTM) Standard Practice D6771-02 to minimize groundwater drawdown and to obtain a representative sample of groundwater conditions. The following steps will be implemented as part of low-flow sampling:

1. The following low flow equipment (or equivalent) will be utilized to conduct low flow groundwater sampling. This equipment includes:
    - QED Sample Pro Bladder Pump
    - Horiba U-22 Water Quality Monitoring System (with flow thru cell)
    - Air Compressor
    - QED MP10 Low Flow Controller
    - ~100’ of ¼” Polyethylene Tubing

2. Low flow purging of the monitoring wells will include collection of water quality indicator parameters. Water quality indicator parameters will be recorded at five (5)-minute intervals during the purging of the well. These water quality indicator parameters will include:
    - Water Level Drawdown

- Temperature
- pH
- Dissolved Oxygen
- Specific Conductance
- Oxidation Reduction Potential
- Turbidity

3. Groundwater sampling will commence once the groundwater quality indicator parameters have stabilized for at least three (3) consecutive readings for the following parameters:

- Water Level Drawdown <0.3'
- Temperature - +/- 3%
- pH - +/- 0.1unit
- Dissolved Oxygen - +/-10%
- Specific Conductance - +/-3%
- Oxidation Reduction Potential - +/-10 millivolts
- Turbidity - +/-10% for values greater than 1 NTU

Groundwater Sample Collection

Regardless of sampling methodology, groundwater samples will be collected according to the following procedures and in the volumes specified in Table 5-1:

- Water clarity will be quantified during sampling with a turbidity meter;
- When transferring water from the bailer or pump line to sample containers, care will be taken to avoid agitating the sample, since agitation promotes the loss of volatile constituents;
- Any observable physical characteristics of the groundwater (e.g., color, sheen, odor, turbidity) at the time of sampling will be recorded; and
- Weather conditions (i.e., air temperature, sky condition, recent heavy rainfall, drought conditions) at the time of sampling will be recorded.

10. Management of Investigative-Derived Waste

Purpose

The purposes of these guidelines are to ensure the proper holding, storage, transportation, and disposal of materials that may contain hazardous wastes. Investigation-derived waste (IDW) included the following:

- Drill cuttings, discarded soil samples, drilling mud solids, and used sample containers;
- Well development and purge waters and discarded groundwater samples;
- Decontamination waters and associated solids;
- Soiled disposable personal protective equipment (PPE);
- Used disposable sampling equipment;
- Used plastic sheeting and aluminum foil;

- Other equipment or materials that either contain or have been in contact with potentially-impacted environmental media; and
- Because these materials may contain regulated chemical constituents, they must be managed as a solid waste. This management may be terminated id characterization analytical results indicate the absence of these constituents.

<u>Procedure:</u>

1. Contain all investigation-derived wastes in Department of Transportation (DOT)-approved 55-gallon drums, roll-off boxes, or other containers suitable for the wastes.
2. Contain wastes from separate borings or wells in separate containers (i.e. do not combine wastes from several borings/wells in a single container, unless it is a container used specifically for transfer purposes, or unless specific permission to do so has been provided by the LaBella Project Manager. Unused samples from surface sample locations within a given area may be combined.
3. To the extent practicable, separate solids from drilling muds, decontamination waters, and similar liquids. Place solids within separate containers.
4. Transfer all waste containers to a staging area. Access to this area will be controlled. Waste containers must be transferred to the staging area as soon as practicable after the generating activity is complete.
5. Pending transfer, all containers will be covered and secured when not immediately attended.
6. Label all containers with regard to contents, origin, and date of generation. Use indelible ink for all labeling.
7. Collect samples for waste characterization purposes, use boring/well sample analytical data for characterization.
8. For wastes determined to be hazardous in character, be aware on accumulation time limitations. Coordinate the disposal of these wastes with the Owner and NYSDEC.
9. Dispose of investigation-derived wastes as follows:
    - Soil, water, and other environmental media for which analysis does not detect organic constituents, and for which inorganic constituents are at levels consistent with background, may be spread on-site or otherwise treated as a non-waste material.
    - Soils, water, and other environmental media in which organic compounds are detected or metals are present above background will be disposed as industrial waste. Alternate disposition must be consistent with applicable State and Federal laws.
    - Personal protective equipment, disposable bailers, and similar equipment may be disposed as municipal waste, unless waste characterization results mandate disposal as industrial wastes.

11. Decontamination

Sampling methods and equipment have been chosen to minimize decontamination requirements and to prevent the possibility of cross-contamination. Decontamination of equipment will be performed between discrete sampling locations. Equipment used to collect samples between composite sample locations will not require decontamination between collection of samples. All drilling equipment will be decontaminated prior to drilling, after drilling each monitoring well, and after the completion of all drilling. Special attention will be given to the drilling assembly, augers, and PVC casing and screens.

Drilling decontamination will consist of:

- Steam cleaning;
- Scrubbing with brushes, if soil remains on equipment; and
- Steam rinse.

Split spoons and other non-disposable equipment will be decontaminated between each sampling event. The sampler will be cleaned prior to each use, by one of the following procedures:

- Initially cleaned of all foreign matter;
- Sanitized with a steam cleaner;

OR

- Initially cleaned of all foreign matter;
- Scrubbed with brushes in trisodium phosphate or alconox solution;
- Rinsed with deionized water;
- Rinsed with pesticide grade methanol;
- Triple rinsed with deionized water; and
- Allowed to air dry.

12. Sample Containers

The volumes and containers required for the sampling activities are included in pre-washed sample containers will be ordered directly from a firm, which prepares the containers in accordance with EPA bottle washing procedures.

Table 1
Water Samples

Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Maximum Holding Time
Volatile Organics	40-ml glass vial with Teflon-backed septum	Two (2); fill completely, no air space	Cool to 4° C (ice in cooler), Hydrochloric acid to pH <2	7 days
Semivolatile Organics	1,000-ml amber glass jar	One (1); fill completely	Cool to 4° C (ice in cooler)	7/40 days
Pesticides	1,000-ml amber glass jar	One (1); fill completely	Cool to 4° C (ice in cooler)	7/40 days
PCBs	1,000-ml amber glass jar	One (1); fill completely	Cool to 4° C (ice in cooler)	7/40 days
Metals	500-ml polyethylene	One (1); fill completely	Cool to 4° C (Nitric acid to pH <2	6 months

* Holding time is based on verified time of sample receipt at laboratory.

Note: *All sample bottles will be prepared in accordance with USEPA bottle washing procedures. These procedures are incorporated in LaBella Associates Quality Control Procedures Manual, January, 1992*

TABLE 2
Soil Samples

Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Maximum Holding Time
Volatile Organics, Semivolatile Organics, PCBs, and Pesticides	8-oz, glass jar with Teflon-lined cap	Two (2), fill as completely as possible	Cool to 4° C (ice in cooler)	7 days
RCRA Characterization	8-oz. glass jar with Teflon-lined cap	One (1); fill completely	Cool to 4° C (ice in cooler)	Must be extracted within 10 days; analyzed with 30 days

* Holding time is based on the times from verified time of sample receipt at the laboratory.

Note: *All sample bottles will be prepared in accordance with USEPA bottle washing procedures. These procedures are incorporated in LaBella Associates Quality Control Procedures Manual, January, 1992.*

TABLE 3
List of Major Instruments for Sampling and Analysis

- MSA 360 0_2 /Explosimeter
- S.E. International Radiation Monitor Model 4C
- Bicron Micro-Rem Radiation Monitor
- Ludlum 2241 Digital Survey Meter with 44-9 Pancake Probe
- Photovac Micro Tip FID or PID
- Organic Vapor Analyzer Foxboro (128)
- Hollige Series 963 Nephlometer (turbidity meter)
- EM-31 Geomics Electromagnetic Induction Device
- pH/Temperature/Conductivity Meter - Portable
- Hewlett Packard (HP) 1000 computer with RTE-6 operating system; and HP 9144 computer with RTE-4 operating system equipped with Aquarius software for control and data acquisition from gas chromatograph/mass spectrometer (GC/MS) systems; combined wiley and National Bureau of Standards (NBS) mass spectral library; and data archiving on magnetic tape
- Viriam 6000 and 37000 gas chromatrographs equipped with flame ionization, electron capture, photoionization and wall detectors as appropriate for various analyses,, and interfaced to Variam DS604 or D5634 data systems for processing data.
- Spectra-Physics Model SP 4100 and SP 4270 and Variam 4270 cam puting integrators
- Perkin Eimer (PE) 3000% and 3030% fully Automated Atomic Absorption Spectrophotometers (AAS) with Furnace Atomizer and background correction system
- PE Plasma II Inductively Coupled Argon Plasma (ICAP) Spectre meter with PE7500 laboratory computer
- Dionex 20001 ion chromatograph with conductivity detector for anion analysis, with integrating recorder

13. Sample Custody

This section describes standard operating procedures for sample identification and chain-of-custody to be utilized for all Phase II field activities. The purpose of these procedures is to ensure that the quality of the samples is maintained during their collection, transportation, and storage through analysis. All chain-of-custody requirements comply with standard operating procedures indicated in EPA sample handling protocol.

Sample identification documents must be carefully prepared so that sample identification and chain-of-custody can be maintained and sample disposition controlled. Sample identification documents include:

- Field notebooks
- Sample label
- Custody seals
- Chain-of-custody records

14. Chain-of-Custody

The primary objective of the chain-of-custody procedures is to provide an accurate written or computerized record that can be used to trace the possession and handling of a sample from collection to completion of all required analyses. A sample is in custody if it is:

- In someone's physical possession
- In someone's view
- Locked up
- Kept in a secured area that is restricted to authorized personnel

14.1. Field Custody Procedures

- As few persons as possible should handle samples.
- Sample bottles will be obtained precleaned from a source such as I-Chem. Coolers or boxes containing cleaned bottles should be sealed with a custody tape seal during transport to the field or while in storage prior to use.
- The sample collector is personally responsible for the care and custody of samples collected until they are transferred to another person or dispatched properly under chain-of-custody rules.
- The sample collector will record sample data in the notebook.
- The site manager will determine whether proper custody procedures were followed during the fieldwork and decide if additional samples are required.

14.2. Sample Tags

Sample tags attached to or affixed around the sample container must be used to properly identify all samples collected in the field. The sample tags are to be placed on the bottles so as not to obscure any QC lot numbers on the bottles; sample information must be printed in a legible manner using waterproof ink. Field identification must be sufficient to enable cross-reference with the logbook. For chain-of-custody purposes, all QC samples are subject to exactly the same custodial procedures and documentation as "real" samples.

14.3. Transfer of Custody and Shipment

- The coolers in which the samples are packed must be accompanied by a chain-of-custody record. When transferring samples, the individuals relinquishing and receiving them must sign, date, and note the time on the chain-of-custody record. This record documents sample custody transfer
- Shipping containers must be sealed with custody seals for shipment to the laboratory. The method of shipment, name of courier, and other pertinent information are entered in the "Remarks" section of the chain-of-custody record and traffic reports.
- All shipments must be accompanied by the chain-of-custody record identifying their contents. The original record accompanies the shipment. The other copies are distributed appropriately to the site manage.
- If sent by mail, the package is registered with return receipt requested. If sent by common carrier, a bill of lading is used. Freight bills, Postal Service receipts, and bill of lading are retained as part of the permanent documentation.

14.4. Chain-of-Custody Record

The chain-of-custody record must be fully completed in duplicate, using black carbon paper where possible, by the field technician who has been designated by the project manager as responsible for sample shipment to the appropriate laboratory for analysis. In addition, if samples are known to require rapid turnaround in the laboratory because of project time constraints or analytical concerns (e.g., extraction time or sample retention period limitations, etc.), the person completing the chain-of-custody record should note these constraints in the "Remarks" section of the record.

14.5. Laboratory Custody Procedures

A designated sample custodian accepts custody of the shipped samples and verifies that the sample identification number matches that on the chain-of-custody record and traffic reports, if required. Pertinent information as to shipment, pickup, and courier is entered in the "Remarks" section.

14.6. Custody Seals

Custody seals are preprinted adhesive-backed seals with security slots designed to break if the seals are disturbed. Sample shipping containers (coolers, cardboard boxes, etc., as appropriate) are sealed in as many places as necessary to ensure security. Seals must be signed and dated before use. On receipt at the laboratory, the custodian must check (and certify, by completing the package receipt log and LABMIS entries) that seals on boxes and bottles are intact. Strapping tape should be placed over the seals to ensure that seals are not accidentally broken during shipment.

15. Documentation

15.1. Sample Identification

All containers of samples collected from the project will be identified using the following format on a label or tag fixed to the sample container (labels are to be covered with Mylar tape):

XX-YY-O/D

- XX This set of initials indicates the specific Phase II sampling project
- YY These initials identify the sample location. Actual sample locations will be recorded in the task log.
- O/D An "O" designates an original sample; "D" identifies it as a duplicate.

Each sample will be labeled, chemically preserved, if required and sealed immediately after collection. To minimize handling of sample containers, labels will be filled out prior to sample collection. The sample label will be filled out using waterproof ink and will be firmly affixed to the sample containers and protected with Mylar tape. The sample label will give the following information:

- Name of sampler,
- Date and time of collection,
- Sample number,
- Analysis required,
- pH, and
- Preservation.

15.2. Daily Logs

Daily logs and data forms are necessary to provide sufficient data and observations to enable participants to reconstruct event that occurred during the project and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. All daily logs will be kept in a bound waterproof notebook containing numbered pages. All entries will be made in waterproof ink, dated, and signed. No pages will be removed for any reason. Corrections will be made according to the procedures given at the end of this section. The daily logs will include a site log and task log.

The site log is the responsibility of the site manager and will include a complete summary of the day's activity at the site.

The **Task Log** will include:

- Name of person making entry (signature).
- Names of team members on-site.
- Levels of personnel protection:
  - Level of protection originally used;
  - Changes in protection, if required; and
  - Reasons for changes.

- Time spent collecting samples.
- Documentation on samples taken, including:
  - Sampling location and depth station numbers;
  - Sampling date and time, sampling personnel;
  - Type of sample (grab, composite, etc.); and
  - Sample matrix.
- On-site measurement data.
- Field observations and remarks.
- Weather conditions, wind direction, etc.
- Unusual circumstances or difficulties.
- Initials of person recording the information.

16. Corrections to Documentation

16.1. Notebook

As with any data logbooks, no pages will be removed for any reason. If corrections are necessary, these must be made by drawing a single line through the original entry (so that the original entry can still be read) and writing the corrected entry alongside. The correction must be initialed and dated. Most corrected errors will require a footnote explaining the correction.

16.2. Sampling Forms

As previously stated, all sample identification tags, chain-of-custody records, and other forms must be written in waterproof ink. None of these documents are to be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on a document assigned to one individual, that individual may make corrections simply by crossing a line through the error and entering the corrected information. The incorrect information should not be obliterated. Any subsequent error discovered on a document should be corrected by the person who made the entry. All corrections must be initialed and dated.

16.3. Photographs

Photographs will be taken as directed by the site manager. Documentation of a photograph is crucial to its validity as a representation of an existing situation. The following information will be noted in the task log concerning photographs:

- Date, time, location photograph was taken;
- Photographer (signature);
- Weather conditions;
- Description of photograph taken;
- Reasons why photograph was taken;
- Sequential number of the photograph and the film roll number; and
- Camera lens system used.

After the photographs have been developed, the information recorded in the field notebook should be transferred to the back of the photographs

17. Sample Handling, Packaging, and Shipping

The transportation and handling of samples must be accomplished in a manner that not only protects the integrity of the sample, but also prevents any detrimental effects due to the possible hazardous nature of samples. Regulations for packaging, marking, labeling, and shipping hazardous materials are promulgated by the United States Department of Transportation (DOT) in the Code of Federal Regulation, 49 CFR 171 through 177. All samples will be delivered to the laboratory with 24 to 48 hours from the day of collection.

All chain-of-custody requirements must comply with standard operating procedures in the EPA sample handling protocol. All sample control and chain-of-custody procedures applicable to the Consultant are presented in the Field Personnel Chain-of-Custody Documentation and Quality Control Procedures Manual, January 1992.

17.1. Sample Packaging

Samples must be packaged carefully to avoid breakage or contamination and must be shipped to the laboratory at proper temperatures. The following sample packaging requirements will be followed:

- Sample bottle lids must never be mixed. All sample lids must stay with the original containers.
- The sample volume level can be marked by placing the top of the label at the appropriate sample height, or with a grease pencil. This procedure will help the laboratory to determine if any leakage occurred during shipment. The label should not cover any bottle preparation QC lot numbers.
- All sample bottles are placed in a plastic bag to minimize the potential for vermiculite contamination.
- Shipping coolers must be partially filled with packing materials and ice when required, to prevent the bottles from moving during shipment.
- The sample bottles must be placed in the cooler in such a way as to ensure that they do not touch one another.
- The environmental samples are to be cooled. The use of "blue ice" or some other artificial icing material is preferred. If necessary, ice may be used, provided that it is placed in plastic bags. Ice is not to be used as a substitute for packing materials.
- Any remaining space in the cooler should be filled with inert packing material. Under no circumstances should material such as sawdust, sand, etc., be used.
- A duplicate custody record and traffic reports, if required must be placed in a plastic bag and taped to the bottom of the cooler lid. Custody seals are affixed to the sample cooler.

17.2. Shipping Containers

Shipping containers are to be custody-sealed for shipment as appropriate. The container custody seal will consist of filament tape wrapped around the package at least twice and custody seals affixed in such a way that access to the container can be gained only by cutting the filament tape and breaking a seal.

Field personnel will make arrangements for transportation of samples to the lab. When custody is relinquished to a shipper, field personnel will telephone the lab custodian to inform him of the expected time of arrival of the sample shipment and to advise him of any time constraints on sample analysis. The lab must be notified as early in the week as possible, and in no case later than 3 p.m. (EST) on Thursday, regarding samples intended for Saturday delivery.

17.3. Marking and Labeling

- Use abbreviations only where specified.
- The words "This End Up" or "This Side Up" must be clearly printed on the top of the outer package. Upward pointing arrows should be placed on the sides of the package. The words "Laboratory Samples" should also be printed on the top of the package.
- After a sample container has been sealed, two chain-of-custody seals are placed on the container, one on the front and one on the back. The seals are protected from accidental damage by placing strapping tape over then.
- If samples are designated as medium or high hazard, they must be sealed in metal paint cans, placed in the cooler with vermiculite and labeled and placarded in accordance with DOT regulations.
- In addition, the coolers must also be labeled and placarded in accordance with DOT regulations if shipping medium and high hazard samples.

18. Calibration Procedures and Frequency

All instruments and equipment used during sampling and analysis will be operated, calibrated, and maintained according to the manufacturer's guidelines and recommendations as well as criteria set forth in the applicable analytical methodology references. Operation, calibration, and maintenance will be performed by personnel properly trained in these procedures. Documentation of all routine and special maintenance and calibration information will be maintained in an appropriate logbook or reference file, and will be available on request. Table 7-1 lists the major instruments to be used for sampling and analysis. Brief descriptions of calibration procedures for major field and laboratory instruments follow.

19. Field Instrumentation

19.1. Photovac Micro Tip Flameionizer (FID)

Standard operating procedures for the FID require that routine maintenance and calibration be performed every six months. Field calibration will be performed on a daily basis. The packages used for calibration are non-toxic analyzed gas mixtures available in pressurized containers.

19.2. Photovac/MiniRea Photoionization Detector (PID)

Standard operating procedures for the PID require that routine maintenance and calibration be performed every six months. Field calibration will be performed on a daily basis. The packages used for calibration are non-toxic analyzed gas mixtures available in pressurized containers.

19.3. Organic Vapor Analyzer

Organic vapor analyzers (OVAs) are calibrated and routine maintenance performed every six months when the units are not in use. Calibration is performed and the major system checks are performed prior to the instrument being released for field use.

Calibration of the OVA 128 GC must be performed by a factory-authorized service representative. The instrument is removed from its protective case and the probe is connected to the base unit. After checking for an airtight seal in the sample line (plugging the sample inlet to stop the pump), the hydrogen supply is turned on and the pressure is set to 10 psi. The electronics are turned on and the instrument is allowed to warm up for at least 5 minutes. After warm up, the instrument is zeroed on the "X10" scale using the adjust knob. The flame is then lit and a gas-tight sample bag is filled with a mixture of 100 ppm methane in air. The sample bag is then attached to the probe inlet and the internal pump is allowed to draw in as much sample as is needed. R32 on the control board is adjusted to read 100 ppm on the "X10" scale and then the hydrogen supply is shut down. The pump can now be turned off and the sample bag removed. Using the adjust knob, the meter is set to read 4 ppm on the "X1" scale. Switching back to the "X10" scale the adjust knob is again used to set the meter to 40 ppm. The scale is then set to "X100" and R33 is adjusted until the meter reads 40 ppm on the "X100" scale.

The OVA has a detection limit of 0.1 ppm in methane equivalents and a working range of 0 to 1,000 ppm. During daily field use, system checks are performed which involve calibration and maintenance of the pump systems, gases, and filters. Care is taken to check for and prevent clogging or leaks. Quad rings and the burner chamber are examined on a weekly basis. Routine biannual maintenance includes a thorough cleaning as well as a re-examination of the pump system for leaks and wear. Parts are replaced as necessary. Instrument operation is verified by calibrating and running the OVA for 4 to 6 hours. An instrument specific logbook is maintained with the OVA to document its use and maintenance.

19.4. Conductance, Temperature, and pH Tester

Temperature and conductance instruments are factory calibrated. Temperature accuracy can be checked against an NBS certified thermometer prior to field use if necessary. Conductance accuracy may be checked with a solution of known conductance and recalibration can be instituted, if necessary.

To recalibrate conductance, remove the black plug revealing the adjustment potentiometer screw. Add standard solution to cup, discard and refill. Repeat procedure until the digital display indicates the same value twice in a row. Adjust the potentiometer until the digital display indicates the known value of conductance. To increase the digital display reading, turn the adjustment potentiometer screw counter-clockwise (clockwise to decrease).

To standardize the pH electrode and meter, place the pH electrode in the 7.0 buffer bottle. Adjust the "ZERO" potentiometer on the face of the tester so that the digital display indicates 7.00.

Then place the pH electrode in the 4.0 or 10.0 buffer bottle (depending on where you expect the actual measurement to be). Adjust the "SLOPE" potentiometer on the face of the tester so that the digital display indicates the value of the buffer chosen.

Note: There is interaction between the "ZERO" and "SLOPE" adjustments, so the procedure should be repeated several times.

Do not subject the pH electrode to freezing temperatures.

It is good practice to rinse the electrode in distilled water when going from one buffer to another. When not in use the cap should be kept on the electrode. Keeping the cotton in the cap moist will keep the electrode ready to use. Moisten the cotton frequently (once a week, usually).

19.5. 0_2/Explosimeter

The primary maintenance item of the Model 260 is the rechargeable 2.4 volt (V) nickel cadmium battery. The battery is recharged by removing the screw cap covering receptacle and connecting one end of the charging cable to the instrument and the other end to a 115V AC outlet.

The battery can also be recharged using a 12V DC source. An accessory battery charging cable is available, one end of which plugs into the Model 260 while the other end is fitted with an automobile cigarette lighter plug.

Recommended charging time is 16 hours.

Before the calibration of the combustible gas indicator can be checked, the Model 260 must be in operating condition. Calibration check-adjustment is made as follows:

1. Attach the flow control to the recommended calibration gas tank.
2. Connect the adapter-hose to the flow control.
3. Open flow control valve.
4. Connect the adapter-hose fitting to the inlet of the instrument; after about 15 seconds the LEL meter pointer should be stable and within the range specified on the calibration sheet accompanying the calibration equipment. If the meter pointer is not in the correct range, stop the flow; remove the right hand side cover. Turn on the flow and adjust the "S" control with a small screwdriver to obtain a reading as specified on the calibration sheet.
5. Disconnect the adapter-hose fitting from the instrument.

6. Close the flow control valve.
7. Remove the adapter-hose from the flow control.
8. Remove the flow control from the calibration gas tank.
9. Replace the side cover on the Model 260.

CAUTION: Calibration gas tank contents are under pressure. Use no oil, grease, or flammable solvents on the flow control or the calibration gas tank. Do not store calibration gas tank near heat or fire or in rooms used for habitation. Do not throw in fire, incinerate, or puncture. Keep out of reach of children. It is illegal and hazardous to refill this tank. Do not attach the calibration gas tank to any other apparatus than described above. Do not attach any gas tank other than MSA calibration tanks to the regulator.

19.6. Nephelometer (Turbidity Meter)

The Series 95 nephelometer is calibrated before each use. Allow the instrument to warm up for approximately 2 hours. Using turbidity-free deionized water, zero the meter. Set the scale to 100, fill with a 40 NTU standard (AEPA-1 turbidity standard from Advanced Polymer Systems, Inc.), and insert into the instrument. Adjust the standardize control to give a readout of 200. Re-zero the instrument and repeat these steps with the scale set at 10 and 1 using 4.0 and 0.4 NTU standards, respectively. These standards are prepared by diluting aliquots of the 40 NTU standard.

19.7. S.E. International Radiation Monitor Model 4EC

This radiation monitor detects alpha, beta, gamma, and X-rays. The analog meter is scaled in CPM (counts per minute) or mR/hr (milli-Roentgens per hour), and the X1, X10, X100 switch extends the effective measurement range. This handheld unit is powered by a single 9-volt battery that offers up to 2,000 hours of operation.

19.8. Bicron Micro-Rem Radiation Monitor

This radiation monitor detects gamma and X-rays. The meter has an accuracy within 10% of the reading for 137Cs between 20% and 100% of full scale on any range.

19.9. Ludlum 2241 Digital Survey Meter with 44-9 Pancake Probe

The Ludlum Model 2241 is a portable general-purpose survey meter equipped with a Geiger-Mueller detector for measurement of alpha, beta and gamma radiation. The Model 2241 operated in either Ratemeter Mode with a moving decimal point and six-digit in Scaler Mode. The unit has both visual and audible alarms. The 44-9 Pancake Probe has a detector that is energy dependent, over responding by a factor of six in the 60 keV to 100 keV range when normalized to 137Cs.

20. Internal Quality Control Checks

QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of field equipment. Field-based QC will comprise at least 10% of each data set generated and will consist of standards, replicates, spikes, and blanks. Field duplicates and field blanks will be analyzed by the laboratory as samples and will not necessarily be identified to the laboratory as duplicates or blanks. For each matrix, field duplicates will be provided at a rate of one per 10 samples collected or one per shipment, whichever is greater. Field blanks which consist of trip, routine field, and rinsate blanks will be provided at a rate of one per 20 samples collected for each parameter group, or one per shipment, whichever is greater.

Calculations will be performed for recoveries and standard deviations along with review of retention times, response factors, chromatograms, calibration, tuning, and all other QC information generated. All QC data, including split samples, will be documented in the site logbook. QC records will be retained and results reported with sample data.

20.1. Blank Samples

Blank samples are analyzed in order to assess possible contamination from the field and/or laboratory so that corrective measures may be taken, if necessary. Field samples are discussed in the following subsection:

20.2. Field Blanks

Various types of blanks are used to check the cleanliness of field handling methods. The following types of blanks may be used: the trip blank, the routine field blank, and the field equipment blank. They are analyzed in the laboratory as samples, and their purpose is to assess the sampling and transport procedures as possible sources of sample contamination. Field staff may add blanks if field circumstances are such that they consider normal procedures are not sufficient to prevent or control sample contamination, or at the direction of the project manager. Rigorous documentation of all blanks in the site logbooks is mandatory.

- **Routine Field Blanks** or bottle blanks are blank samples prepared in the field to access ambient field conditions. They will be prepared by filling empty sample containers with deionized water and any necessary preservatives. They will be handled like a sample and shipped to the laboratory for analysis.
- **Trip Blanks** are similar to routine field blanks with the exception that they are **<u>not</u>** exposed to field conditions. Their analytical results give the overall level of contamination from everything except ambient field conditions. For the RI/FS, one trip blank will be collected with every batch of water samples for volatile organic analysis. Each trip blank will be prepared by filling a 40-ml vial with deionized water prior to the sampling trip, transported to the site, handled like a sample, and returned to the laboratory for analysis without being opened in the field.

- **Field Equipment Blanks** are blank samples (sometimes called transfer blanks or rinsate blanks) designed to demonstrate that sampling equipment has been properly prepared and cleaned before field use, and that cleaning procedures between samples are sufficient to minimize cross contamination. If a sampling team is familiar with a particular site, they may be able to predict which areas or samples are likely to have the highest concentration of contaminants. Unless other constraints apply, these samples should be taken last to avoid excessive contamination of sampling equipment.

20.3. Field Duplicates

Field duplicate samples consist of a set of two samples collected independently at a sampling location during a single sampling event. In some instances the field duplicate can be a blind duplicate, i.e., indistinguishable from other analytical samples so that personnel performing the analyses are not able to determine which samples are field duplicates. Field duplicates are designed to assess the consistency of the overall sampling and analytical system.

20.4. Quality Control Check Samples

Inorganic and organic control check samples are available from EPA free of charge and are used as a means of evaluating analytical techniques of the analyst. Control check samples are subjected to the entire sample procedure, including extraction, digestion, etc., as appropriate for the analytical method utilized.

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Appendix 2

Health and Safety Plan

LABELLA
Associates, P.C.

Engineering
Architecture
Environmental

Site Health and Safety Plan

Location:

Former Emerson Street Landfill
Rochester, New York 14606

Prepared For:

City of Rochester
Division of Environmental Quality
Room 300-B
Rochester, New York 14614

LaBella Project No. 210173

March 2010
Revised June 2010

Site Health and Safety Plan

Location:

Former Emerson Street Landfill
Rochester, New York 14606

Prepared For:

City of Rochester
Division of Environmental Quality
Room 300-B
Rochester, New York 14614

LaBella Project No. 210173

March 2010
Revised June 2010

LaBella Associates, P.C.
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Project Title:	Former Emerson Street Landfill
Project Number:	210173
Project Location (Site):	Emerson Street, Rochester, New York
Environmental Director:	Gregory Senecal, CHMM
Project Manager:	Dan Noll, P.E.
Plan Review Date:	______________________
Plan Approval Date:	______________________
Plan Approved By:	______________________ Mr. Richard Rote, CIH
Site Safety Supervisor:	To Be Determined
Site Contact:	To Be Determined
Safety Director:	Rick Rote, CIH
Proposed Date(s) of Field Activities:	To Be Determined
Site Conditions:	Slightly sloping, encompassing approximately 250 acres
Site Environmental Information Provided By:	Prior Environmental Reports by LaBella Associates, P.C. and various other consultants (refer to Work Plan)
Air Monitoring Provided By:	To Be Determined
Site Control Provided By:	Individual Property Owners

EMERGENCY CONTACTS

	Name	Phone Number
Ambulance:	As Per Emergency Service	911
Hospital Emergency:	Unity Health Systems	585-723-7070
Poison Control Center:	Finger Lakes Poison Control	585-273-4621
Police (local, state):	Monroe County Sheriff	911
Fire Department:	Rochester Fire Department	911
Site Contact:	To Be Determined	
Agency Contact:	NYSDEC – Todd Caffoe, P.E. NYSDOH – Katie Comerford Finger Lakes Poison Control MCDOH – Joseph Albert	585-226-5357 585-423-8067 1-800-222-1222 585-753-5904
Environmental Director:	Greg Senecal, CHMM	Direct: 585-295-6243 Cell: 585-752-6480 Home: 585-323-2142
Project Manager:	Dan Noll, P.E.	Direct: 585-295-611 Cell: 585-301-8458
Site Safety Supervisor:	To Be Determined	
LaBella Safety Director	Rick Rote, CIH	Direct: 585-295-6241

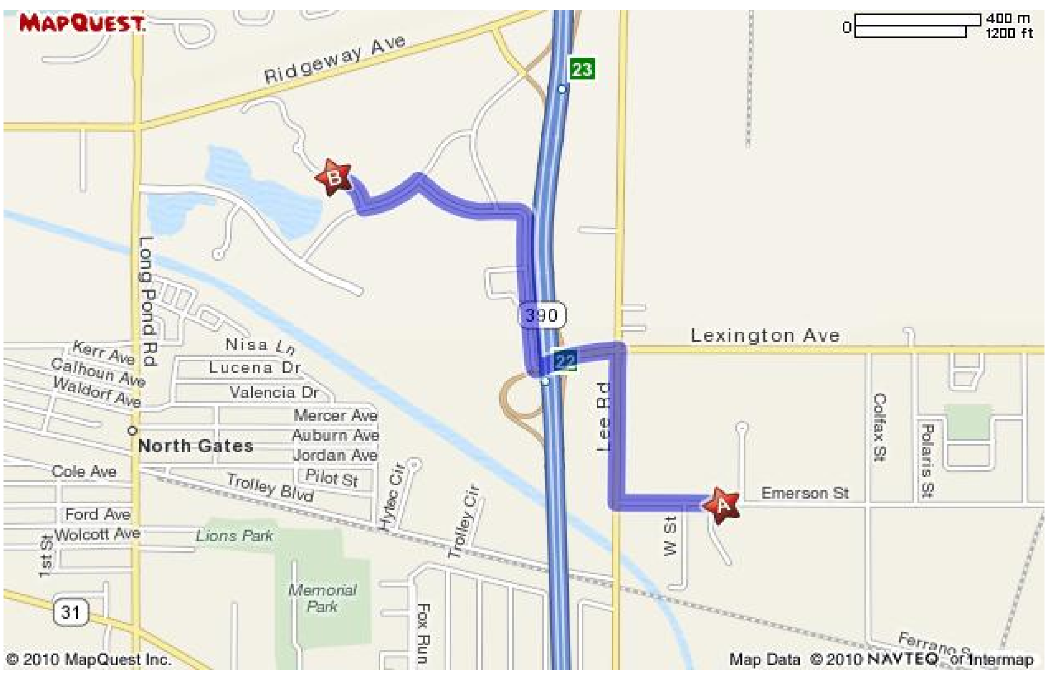
MAP AND DIRECTIONS TO THE MEDICAL FACILITY - UNITY HEALTH SYSTEMS

Total Time: 4 minutes
Total Distance: 1.67 miles

Start: 1740 Emerson St, Rochester, NY, 14606-3122

1. Start out going WEST on EMERSON ST toward VANGUARD PKWY.
2. Turn RIGHT onto LEE RD/CR-154.
3. Turn LEFT onto LEXINGTON AVE.
4. Turn RIGHT onto BELLWOOD DR.
5. Stay STRAIGHT to go onto PINEWILD DR.
6. Turn LEFT onto LONGLEAF BLVD.
7. Turn RIGHT onto INDIGO CREEK DR.
8. 125 INDIGO CREEK DR is on the LEFT.

End: 125 Indigo Creek Drive, Rochester, NY 14626



1.0 Introduction

The purpose of this Health and Safety Plan (HASP) it to provide guidelines for responding to potential health and safety issues that may be encountered during the Soil Vapor Intrusion (SVI) assessment and mitigation at the former Emerson Street Landfill (FESL) located on Emerson Street in the City of Rochester, Monroe County, New York. This HASP only reflects the policies of LaBella Associates P.C. HASPs specific to individual facilities located on the FESL may contain policies that differ from those contained herein, and should be referenced prior to responding to health and safety issues at those respective facilities. The requirements of this HASP are applicable to Labelle personnel at the work site. It is the responsibility of each sub-consultant and sub-contractor to follow their own companies HASP and to adhere to any requirements/policies of individual facilities. This document's project specifications should be consulted for guidance in preventing and quickly abating any threat to human safety or the environment. The provisions of the HASP were developed in general accordance with 29 CFR 1910 and 29 CFR 1926 and do not replace or supersede any regulatory requirements of the USEPA, NYSDEC, OSHA or and other regulatory body.

2.0 Responsibilities

This HASP presents guidelines to minimize the risk of injury to project personnel, and to provide rapid response in the event of injury. The HASP is applicable only to activities of approved LaBella personnel . It is the responsibility of LaBella employees to follow the requirements of this HASP, or HASPs specific to individual facilities, and all applicable company safety procedures.

3.0 Activities Covered

The activities covered under this HASP are limited to the following:

- ❑ Building Inventory Assessments
- ❑ Management of SVI assessments and mitigation activities
- ❑ Environmental Monitoring
- ❑ Collection of samples

4.0 Work Area Access and Site Control

Based on the nature of the project, site control will likely be the responsibility of the individual property owners; however, LaBella will have primary responsibility for maintaining a safe work area for all activities conducted by LaBella personnel. Such work area controls will consist of:

- Drilling (Geoprobe/Rotary) – Orange cones to establish at least a 10-foot by 10-foot work area
- Sub-slab soil vapor installations – cones or caution tape will be used to establish a minimum 5-foot by 5-foot work area during installations. If deemed necessary, additional precautions on sub-slab installations could include enclosures for venting vapors/methane.

5.0 Potential Health and Safety Hazards

This section lists some potential health and safety hazards that project personnel may encounter at the FESL and associated facilities, and some actions to be implemented by approved personnel to control and reduce the associated risk to health and safety. This is not intended to be a complete listing of any and all potential health and safety hazards. New or different hazards may be encountered as site environmental and site work conditions change. The suggested actions to be taken under this plan are not to be substituted for good judgment on the part of project personnel. In addition, each person entering a facility will be responsible for establishing contact with a facility representative and request any applicable safety training/orientation for that facility. In the event such training/orientation is not a requirement at that facility, the LaBella personnel will request information on specific hazards to be aware of at that facility.

5.1 Hazards Due to Heavy Machinery and Equipment

Potential Hazard:
Heavy machinery including trucks, excavators, backhoes, drill rigs, manufacturing equipment and processes, etc will be in operation at the site. The presence of such equipment presents the danger of being struck or crushed. Use caution when working near heavy machinery and manufacturing equipment.

Protective Action:
Make sure that operators are aware of your activities, and heed operator's instructions and warnings. Wear bright colored clothing and walk safe distances from heavy equipment. Do not wear loose clothing that could be caught by moving parts. A hard hat, safety glasses and steel toe shoes are required.

5.2 Excavation Hazards

Potential Hazard:
Excavations and trenches can collapse, causing injury or death. Edges of excavations can be unstable and collapse. Toxic and asphyxiant gases can accumulate in confined spaces and trenches. Excavations that require working within the excavation will require air monitoring in the breathing zone (refer to Section 9.0).

Excavations left open create a fall hazard which can cause injury or death.

Protective Action:
Personnel must receive approval from the Project Manager to enter an excavation for any reason. Subsequently, approved personnel are to receive authorization for entry from the Site Safety Officer. Approved personnel are not to enter excavations over 4 feet in depth unless excavations are adequately sloped. Additional personal protective equipment may be required based on the air monitoring.

Personnel should exercise caution near all excavations at the site as it is expected that excavation sidewalls will be unstable. All excavations will be backfilled by the end of each day. Additionally, no test pit will be left unattended during the day.

Fencing and/or barriers accompanied by "no trespassing" signs should be placed around all excavations when left open for any period of time when work is not being conducted.

5.3 Cuts, Punctures and Other Injuries

Potential Hazard:
In any excavation or construction work site there is the potential for the presence of sharp or jagged edges on rock, metal materials, and other sharp objects. Serious cuts and punctures can

result in loss of blood and infection.

Protective Action:

The Project Manager is responsible for making First Aid supplies available at the work site to treat minor injuries. The Site Safety Officer is responsible for arranging the transportation of authorized on-site personnel to medical facilities when First Aid treatment in not sufficient. Do not move seriously injured workers. All injuries requiring treatment are to be reported to the Project Manager. Serious injuries are to be reported immediately to the Site Safety Officer

5.4 Injury Due to Exposure of Chemical Hazards

Potential Hazards:

Volatile organic vapors from petroleum products, chlorinated solvents or other chemicals may be encountered during excavation and SVI activities at the project work site. Inhalation of high concentrations of organic vapors can cause headache, stupor, drowsiness, confusion and other health effects. Skin contact can cause irritation, chemical burn, or dermatitis.

Protective Action:

The presence of organic vapors may be detected by their odor and by monitoring instrumentation. Approved employees will not work in environments where hazardous concentrations of organic vapors are present. Air monitoring (refer to Section 9.0 and to the Modified CAMP in Appendix 7) of the work area will be performed at least every 60 minutes or more often using a Photoionization Detector (PID). Personnel are to leave the work area whenever PID measurements of ambient air exceed 25 ppm consistently for a 5 minute period. In the event that sustained total volatile organic compound (VOC) readings of 25 ppm is encountered personnel should upgrade personal protective equipment to Level C (refer to Section 8.0) and an Exclusion Zone should be established around the work area to limit and monitor access to this area (refer to Section 6.0).

5.5 Injuries Due to Extreme Hot or Cold Weather Conditions

Potential Hazards:

Extreme hot weather conditions can cause heat exhaustion, heat stress and heat stroke or extreme cold weather conditions can cause hypothermia.

Protective Action:

Precaution measures should be taken such as dress appropriately for the weather conditions and drink plenty of fluid. If personnel should suffer from any of the above conditions, proper techniques should be taken to cool down or heat up the body and taken to the nearest hospital if needed.

5.6 Potential Exposure to Asbestos

Potential Hazards:

During ground intrusive activities (e.g., test pitting or drilling) soil containing asbestos may be encountered. Asbestos is friable when dry and can be inhaled when exposed to air.

Protective Action:

The presence of asbestos can be identified through visual observation of a white magnesium silicate material. If encountered, work should be halted and a sample of the suspected asbestos should be collected and placed in a plastic sealable bag. This sample should be sent to the asbestos laboratory at LaBella Associates for analysis.

5.7 Potential Explosive Atmospheres

Potential Hazards:
During ground intrusive activities (e.g., drilling or sub-slab monitoring point installations), methane rich vapors within the explosive range could be encountered and pose an explosion risk once encountered.

Protective Action:
For all subsurface work that is conducted within an enclosed space (e.g., a building), the work area environment will be monitored for methane concentrations. In the event that methane levels are measured at 10% of the lower explosive limit (LEL), meaning methane levels of 0.5% (i.e., methane LEL is 5%) then the work should be ceased until levels decrease to below 0.5%. If methane levels do not decrease, the work shall be discontinued until appropriate engineering measures are put in place (e.g., enclosure with adequate venting).

5.8 Potential Exposure to Radiation

Potential Hazards:
During ground intrusive activities (e.g., test pitting or drilling), radioactive material could be encountered and pose an exposure risk to humans once encountered.

Protective Action:
Each test pit, soil sample, or other soil from the subsurface should initially be screened with the Ludlum meter to check the level of radiation on the soil as compared to the Site background level of radiation. Should the level of radiation on the soil sample exceed 2 times the Site background level, then work should be halted at the specified location and Mr. Rick Rote of LaBella Associates, P.C. should be contacted immediately (see page ii Emergency Contacts).

6.0 Work Zones

In the event that conditions warrant establishing various work zones (i.e., based on hazards - Section 5.4), the following work zones should be established:

Exclusion Zone (EZ):
The EZ will be established in the immediate vicinity and adjacent downwind direction of site activities that elevate breathing zone VOC concentrations to unacceptable levels based on field screening. These site activities include contaminated soil excavation and soil sampling activities. If access to the site is required to accommodate non-project related personnel then an EZ will be established by constructing a barrier around the work area (yellow caution tape and/or construction fencing). The EZ barrier shall encompass the work area and any equipment staging/soil staging areas necessary to perform the associated work. The contractor(s) will be responsible for establishing the EZ and limiting access to approved personnel. Depending on the condition for establishing the EZ, access to the EZ may require adequate PPE (e.g., Level C).

Contaminant Reduction Zone (CRZ):
The CRZ will be the area where personnel entering the EZ will don proper PPE prior to entering the EZ and the area where PPE may be removed. The CRZ will also be the area where decontamination of equipment and personnel will be conducted as necessary.

7.0 Decontamination Procedures

Upon leaving the work area, approved personnel shall decontaminate footwear as needed. Under normal work conditions, detailed personal decontamination procedures will not be necessary. Work clothing may become contaminated in the event of an unexpected splash or spill or contact with a contaminated substance. Minor splashes on clothing and footwear can be rinsed with clean water. Heavily contaminated clothing should be removed if it cannot be rinsed with water. Personnel assigned to this project should be prepared with a change of clothing whenever on site.

Personnel will use the contractor's disposal container for disposal of PPE.

8.0 Personal Protective Equipment

Generally, site conditions at this work site require level of protection of Level D or modified Level D. However, air monitoring will be conducted to determine if up-grading to Level C PPE is required (refer to Section 9.0). Descriptions of the typical safety equipment associated with Level D and Level C are provided below:

Level D:
Hard hat, safety glasses, rubber nitrile sampling gloves, steel toe construction grade boots, etc.

Level C:
Level D PPE and full or ½-face respirator and tyvek suit (if necessary). [*Note: Organic vapor cartridges are to be changed after each 8-hours of use or more frequently.*]

9.0 Air Monitoring

According to 29 CFR 1910.120(h), air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection required for personnel working onsite. Air monitoring will consist at a minimum of the procedures described in "NYSDOH Generic CAMP", included as Appendix 1A to the NYSDEC DER-10 *Technical Guidance for Site Investigation and Remediation* dated November 2009. Please refer to the NYSDOH Generic CAMP for further details on air monitoring at the Site.

The Air Monitor will utilize a photoionization Detector (PID) to screen the ambient air in the work areas for total Volatile Organic Compounds (VOCs) and a DustTrak tm Model 8520 aerosol monitor or equivalent for measuring particulates. Work area ambient air will generally be monitored in the work area and downwind of the work area. Air monitoring of the work areas and downwind of the work areas will be performed at least every 60 minutes or more often using a PID, and the DustTrak meter.

If sustained PID readings of greater than 25 ppm are recorded in the breathing zone, then either personnel are to leave the work area until satisfactory readings are obtained or approved personnel may re-enter the work areas wearing at a minimum a ½ face respirator with organic vapor cartridges for an 8-hour duration (i.e., upgrade to Level C PPE). Organic vapor cartridges are to be changed after each 8-hours of use or more frequently, if necessary. If PID readings are sustained, in the work area, at levels above 25 ppm for a 5 minute average, work will be stopped immediately until safe levels of VOCs are encountered or additional PPE will be required (i.e., Level B).

If dust concentrations exceed the upwind concentration by 150 $\mu g/m^3$ (0.15 mg/m^3) consistently for a 10 minute period within the work area or at the downwind location, then LaBella personnel may not re-enter the work area until dust concentrations in the work area decrease below 150 $\mu g/m^3$ (0.15 mg/m^3), which may be accomplished by the construction manager implementing dust control or suppression measures.

10.0 Emergency Action Plan

In the event of an emergency, employees are to turn off and shut down all powered equipment and leave the work areas immediately. Employees are to walk or drive out of the Site as quickly as possible and wait at the assigned 'safe area'. Follow the instructions of the Site Safety Officer.

Employees are not authorized or trained to provide rescue and medical efforts. Rescue and medical efforts will be provided by local authorities.

11.0 Medical Surveillance

Medical surveillance will be provided to all employees who are injured due to overexposure from an emergency incident involving hazardous substances at this site.

12.0 Employee Training

Personnel who are not familiar with this site plan will receive training on its entire content and organization before working at the Site.

Individuals involved with the fieldwork must be 40-hour OSHA HAZWOPER trained with current 8-hour refresher certification.

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Table 1
Exposure Limits and Recognition Qualities

Compound	PEL-TWA (ppm)(b)(d)	TLV-TWA (ppm)(c)(d)	STEL	LEL (%)(e)	UEL (%)(f)	IDLH (ppm)(g)(d)	Odor	Odor Threshold (ppm)	Ionization Potential
Acetone	750	500	NA	2.15	13.2	20,000	Sweet	4.58	9.69
Anthracene	0.2	0.2	NA	NA	NA	NA	Faint aromatic	NA	NA
Benzene	1	0.5	5	1.3	7.9	3000	Pleasant	8.65	9.24
Benzo (a) pyrene (coal tar pitch volatiles)	0.2	0.1	NA	NA	NA	700	NA	NA	NA
Benzo (a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (b) Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (k) Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	10.88
Carbon Disulfide	20	1	NA	1.3	50	500	Odorless or strong garlic type	0.096	10.07
Chlorobenzene	75	10	NA	1.3	9.6	2,400	Faint almond	0.741	9.07
Chloroform	50	2	NA	NA	NA	1,000	ethereal odor	11.7	11.42
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethylene	200	200	NA	9.7	12.8	400	Acrid	NA	9.65
1,2-Dichlorobenzene	50	25	NA	2.2	9.2		Pleasant		9.07
Ethylbenzene	100	100	NA	1	6.7	2,000	Ether	2.3	8.76
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	NA	NA	NA	5	15	NA	NA	NA	12.98
Methylene Chloride	500	50	NA	12	23	5,000	Chloroform-like	10.2	11.35
Naphthalene	10, Skin	10	NA	0.9	5.9	250	Moth Balls	0.3	8.12
n-propylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethane	NA	NA	NA	NA	NA	NA	Sweet	NA	NA
Toluene	100	100	NA	0.9	9.5	2,000	Sweet	2.1	8.82
Trichloroethylene	100	50	NA	8	12.5	1,000	Chloroform	1.36	9.45
1,2,4-Trimethylbenzene	NA	25	NA	0.9	6.4	NA	Distinct	2.4	NA
1,3,5-Trimethylbenzene	NA	25	NA	NA	NA	NA	Distinct	2.4	NA
Vinyl Chloride	1	1	NA	NA	NA	NA	NA	NA	NA
Xylenes (o,m,p)	100	100	NA	1	7	1,000	Sweet	1.1	8.56
Metals									
Arsenic	0.01	0.2	NA	NA	NA	100, Ca	Almond	NA	NA
Cadmium	0.2	0.5	NA	NA	NA	NA	NA	NA	NA
Chromium	1	0.5	NA	NA	NA	NA	NA	NA	NA
Lead	0.05	0.15	NA	NA	NA	700	NA	NA	NA
Mercury	0.05	0.05	NA	NA	NA	28	Odorless	NA	NA
Selenium	0.2	0.02	NA	NA	NA	Unknown	NA	NA	NA
Other									
Asbestos	0.1 (f/cc)	NA	1.0 (f/cc)	NA	NA	NA	NA	NA	NA

(a) Skin = Skin Absorption
(b) OSHA-PEL Permissible Exposure Limit (flame weighted average, 8-hour): NIOSH Guide, June 1990
(c) ACGIH – 8 hour time weighted average from Threshold Limit Values and Biological Exposure Indices for 2003
(d) Metal compounds in mg/m3
(e) Lower Exposure Limit (%)
(f) Upper Exposure Limit (%)
(g) mmediately Dangerous to Life or Health Level: NIOSH Guide, June 1990

Notes:
1. All values are given in parts per million (PPM) unless otherwise indicated
2. Ca = Possible Human Carcinogen, no IDLH information