Remedial Investigation/ Interim Remedial Measures Work Plan

348 Langner Road Site
West Seneca, New York

Revised January 2012 0123-005-102

Prepared For:

Delta Sonic Car Wash Systems, Inc.

Prepared By:

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REMEDIAL INVESTIGATION/INTERIM REMEDIAL MEASURES WORK PLAN

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WEST SENECA, NEW YORK

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Prepared for:

Delta Sonic Car Wash Systems, Inc.
570 Delaware Avenue
Buffalo, New York 14202

Table of Contents

Table of Contents

Table of Contents

RI/IRM WORK PLAN

348 Langner Road Site
West Seneca, New York

Table of Contents

LIST OF TABLES

LIST OF FIGURES

Table of Contents

LIST OF APPENDICES

1.0 INTRODUCTION

This document presents the proposed scope of work and implementation procedures for completion of a Remedial Investigation (RI) and Interim Remedial Measures (IRM) at the 348 Langner Road Site (Site), located at 348 Langner Road, West Seneca, New York (see Figures 1 and 2).

The Applicant, Delta Sonic Car Wash Systems, Inc. (Delta Sonic) acting as a Participant, has elected to pursue cleanup and redevelopment of the Site under the New York State Brownfield Cleanup Program (BCP), and has executed a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC).

The RI/IRM will be completed by TurnKey Environmental Restoration, LLC (TurnKey), in association with Benchmark Environmental Engineering & Science, PLLC (Benchmark), on behalf of Delta Sonic. The work will be completed in general accordance with NYSDEC DER-10 guidelines (Ref. 1).

1.1 Background

The Site is an approximately 2.6-acre parcel located at the corner of Langner Road and Ridge Road in the Town of West Seneca, New York (see Figures 1 and 2). The parcel is currently improved with one convenience store building, one car wash building, four product dispenser islands and two underground storage tank (UST) areas containing a total of eight petroleum USTs. The Site is bound by Langner Road to the east, Ridge Road to the north, vacant land and a rail line to the west, and commercial buildings to the south.

The Site has been a gas station since the 1950s. Prior to the current location of the product dispensers and buildings, the gas station and fuel assets were located in the northeastern portion of the property where the current carwash building sits.

During the completion of soil borings during a 2010 Phase II Investigation (see Appendix B), contaminated soils, and petroleum-like odors were observed at various locations. Several locations exhibited petroleum-like odors and elevated photoionization detector (PID) readings (as high as 777 ppm). Based on the findings of previous investigations, the NYSDEC opened a spill file for the Site (No. 0910758). The spill file for the Site was administratively closed by the Department upon acceptance into the BCP, and further remediation will be directed under the guidance of the BCP. Details of the previous investigations are presented in Section 2.8 below.

1.2 Project Objectives

For sites entering the BCP at the point of investigation, NYSDEC requires completion of a RI/AAR. The primary objectives of the RI/AAR are to:

- Collect additional soil/fill and groundwater samples, under appropriate quality assurance/quality control criteria, to better delineate the nature and extent of contamination;
- Collect sufficient data to evaluate the actual and potential threats to the public health and the environment; and,
- Collect the data necessary to evaluate the remedial action alternatives.

As part of the RI/IRM/AAR process, sampling data will be used to evaluate whether remedial alternatives can meet the objectives. The intended uses of these data dictate the confidence levels. Two data confidence levels will be employed in the RI: screening level data and definitive level data. In general, screening level confidence will apply to field measurements, including PID measurements, groundwater elevation measurements, and field analyses (i.e., pH, temperature, specific conductivity, and turbidity). Definitive level confidence will apply to samples for chemical analysis. The applicability of these levels of data will be further specified in the Quality Assurance Project Plan (QAPP) in Section 5.0. Sampling and analytical acceptance and performance criteria such as precision, accuracy, representativeness, comparability, completeness, and sensitivity, are defined in the QAPP.

As part of the RI, IRMs will be completed to address known environmental impacts related to past use of the Site. An IRM will quickly mitigate risks to public health and the environment. Planned IRM activities include: removal of underground storage tanks (USTs); excavation of petroleum-impacted soil and either off-Site disposal or treatment; and, implementation of a Soil/Fill Management Plan (SFMP) during redevelopment activities. This Work Plan includes planned IRM activities based on current information and may be modified, subject to NYSDEC approval, immediately after the RI fieldwork is completed.

The Applicant's intent is for the IRMs to substantially or completely constitute the final NYSDEC-approved remedy for the Site. The cleanup objectives employed will be 6NYCRR Part 375 Commercial Soil Cleanup Objectives (SCOs) (Track 2); however, the applicant may choose to remediate to a higher level of cleanup (e.g., Restricted-Residential) during the course of remedial work. Details of anticipated IRM activities are included in Section 4.0

1.3 Project Organization and Responsibilities

The Applicant, Delta Sonic Car Wash Systems, Inc., has applied and been accepted into the New York State BCP as a Participant per ECL§27-1405. TurnKey, in association with Benchmark, will manage the brownfield cleanup on behalf of the Applicant. The NYSDEC Division of Environmental Remediation (Region 9), in consultation with the New York State Department of Health (NYSDOH), will monitor the remedial actions to verify that the work is performed in accordance with the Brownfield Cleanup Agreement, the approved RI/IRM/AAR Work Plan, and NYSDEC DER-10 guidance (May 2010).

TurnKey personnel and key subcontractors for this project have not been determined at this time. Once pricing is secured, subcontract agreements are in place, and a field schedule determined, resumes for the selected project team will be provided to the Department, if requested. TurnKey's Project Manager's résumé, however, has been included in Appendix A. The table below presents the planned project team.

Company	Role	Name	Contact Information
TurnKey	Project Manager	Mike Lesakowski	(716) 856-0635
TurnKey	Field Personnel	TBD	(716) 856-0635
Delta Sonic	Facility Contact	Mike DePriest	(716) 878-9404
TBD	Analytical Testing	TBD	TBD
TBD	Geoprobe Drilling Services	TBD	TBD
TBD	Drilling Services	TBD	TBD
TBD	Excavation Services	TBD	TBD
TBD	Data Usability Summary Report	TBD	TBD

2.0 SITE DESCRIPTION

2.1 General

The Site is an approximately 2.6-acre parcel located at the corner of Langner Road and Ridge Road in the Town of West Seneca, Erie County, New York. The Site is bound by Langner Road to the east, Ridge Road to the north, vacant land and a rail line to the west, and commercial buildings to the south. The Site is improved with two buildings, a product dispenser canopy, and associated gravel/asphalt parking areas (see Figure 2). Building #1 refers to the convenience store located along the north border of the Site; and Building #2 refers to the car wash facility along the east boarder of the Site.

2.2 Site Topography and Drainage

The Site is generally flat lying with limited topographic features. The surface of the Site is covered with buildings, asphalt, and gravel. Precipitation (i.e., rain or melting snow) moves to the storm drains in the roadways via overland flow. Surface and shallow groundwater flow are likely impacted by various cycles of development and filling, as well as utility lines and foundations.

2.3 Geology and Hydrogeology

2.3.1 Overburden

The U.S. Department of Agriculture Soil Conservation Service soil survey map of Erie County (Ref. 2) describes the general soil type at the Site as a combination of Urban Land (Ud) and Niagara Silt Loam (NfA), with 0-3 percent slopes. This is indicative of the level to gently sloping land with at least 40 percent of the soil surface covered by asphalt, concrete, buildings, or other impervious structures typical of an urban environment. The geology of the Site will be investigated as part of the RI activities.

2.3.2 Bedrock

Based on the bedrock geologic map of Erie County (Ref. 2), the Site is situated over the Hamilton Group Formation of the Middle Devonian Series. The Hamilton Group, Skaneateles Formation is comprised of Levanna Shale, and Stratford Limestone. The unit has an approximate thickness of 200 to 500 feet. Structurally, the bedrock formations strike in an east-west direction and exhibit a regional dip that approximates 50 feet per mile (3 to 5 degrees) toward the south and southwest. As a result of this dip, the older Onondaga limestone outcrops or subcrops north of the Hamilton Group. An intersecting, orthogonal patter of fractures and joint sets are common throughout the bedrock strata. The surficial geomorphology of the bedrock strata was modified by period sub-aerial erosion and continental glaciation. Depth to and type of bedrock below the Site has not been determined by drilling.

2.3.3 Hydrogeology

The Site is located in the Erie-Niagara River Basin. In the Erie-Niagara Basin, the major areas of groundwater are within coarser overburden deposits and limestone and shale bedrock. Regional groundwater appears to flow west – southwest towards Lake Erie. Localized on-Site groundwater flow will be confirmed during the RI.

2.4 Climate

Western New York has a cold continental climate, with moisture from Lake Erie causing increased precipitation. Average annual precipitation is reportedly 40.5 inches and snowfall is 93.6 inches (Ref. 3) to the northern part of the watershed with over 150 inches per year falling on the southern portion of the watershed. Average monthly temperatures range from 24.5 degrees Fahrenheit in January to 70.8 degrees Fahrenheit in July (Ref. 3). The ground and lakes typically remain frozen from December to March. Winds are generally from the southwest (240 degrees) with a mean velocity of 10 miles per hour (Buffalo Airport, 1999).

2.5 Population and Land Use

The Town of West Seneca, encompassing 21.4 square miles, has a population of 43,935 (2005-2009 American Community Survey), The Site is located in Census Tract 120.01, in the Town of West Seneca an area zoned for commercial and residential property use.

The Site is located in a highly developed commercial retail area of the Town of West Seneca. Properties adjacent to the Site are used commercially. The surrounding land is utilized for commercial applications and residential homes. Residential areas surrounding the Site are located approximately 0.5-miles to the south.

2.6 Utilities and Groundwater Use

The subject property has access to all major public and private utilities, including potable water (Erie County Water Authority), sanitary and storm sewers (Town of West Seneca), electric (National Grid), and natural gas (National Fuel Gas).

Groundwater at the Site is assigned Class "GA" by 6NYCRR Part 701.15. Currently, there are no known deed restrictions on the use of groundwater at the Site; however, there are no groundwater supply wells on the property. Regionally, groundwater in the area has not been developed for industrial, agriculture, or public supply purposes. Municipal potable water service is provided on-site and off-site.

2.7 Wetlands and Floodplains

There are no State or Federal wetlands or floodplains located on the Site. Per the Erie County GIS On-Line Mapping System, Lake Erie and the Niagara River are located approximately 4.0-miles to the west of the site, A NYSDEC regulated freshwater wetland (BU-16) is located approximately 0.25-mile to the south of the site. Referenced wetlands and floodplains are shown on Figure 3.

2.8 Previous Investigations

A summary of the investigations that have occurred at the Site are presented below. These reports are attached in Appendix B.

2.8.1 January 2010 – Limited Phase II Site Investigation Report

Benchmark Environmental Engineering and Science, PLLC (Benchmark) conducted an environmental site investigation of the subject property, and the findings are described below:

- Visual and olfactory evidence of impacted soil/fill was noted in multiple soil boring locations by field personnel. Elevated PID readings for volatile organic compounds (VOCs) were detected in multiple locations across the site, with readings as high as 777 ppm being detected.
- Petroleum-impacted soil with elevated VOCs and semi-volatile organic compounds (SVOCs) were detected at multiple soil boring locations across the site.

- VOCs were detected in groundwater exceeding NYSDEC groundwater quality standards (GWQS) (i.e., up to 42,879 ug/L total VOCs) in several temporary monitoring wells across the Site.
- Based on the data collected during the site investigation, the NYSDEC was contacted and Spill No. 09-10758 was opened for the Site.

It should be noted that multiple VOCs were detected in subsurface soil at levels that exceed Part 375 Unrestricted SCOs, with several constituents detected at levels exceeding Restricted Residential SCOs, including 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene, and xylene, As stated above, the NYSDEC Spills file (9-10758) was administratively closed upon acceptance in the BCP, and associated remedial measures are discussed in Section 5.

2.9 Primary Constituents of Potential Concern (COPCs)

Based on findings to date, the Constituents of Potential Concern (COPCs) are presented by media below:

- ***Soil:*** VOCs and SVOCs
- ***Groundwater:*** VOCs

3.0 REMEDIAL INVESTIGATION SCOPE OF WORK

The Remedial Investigation scope of work is focused on defining the nature and extent of contamination on-Site, identifying the source of contamination, defining chemical constituent migration pathways, qualitatively assessing human health and ecological risks (if necessary), and obtaining data of sufficient quantity and quality to perform the alternatives analysis report.

Field team personnel will collect environmental samples in accordance with the rationale and protocols described in the QAPP in Section 5. USEPA and NYSDEC-approved sample collection and handling techniques will be used. Samples for chemical analysis will be analyzed in accordance with USEPA SW-846 methodology with an equivalent Category B deliverable package to meet the definitive-level data requirements. Analytical results will be evaluated by a third-party data validation expert in accordance with provisions described in the QAPP.

During intrusive RI activities, a Community Air Monitoring Plan (CAMP) will be followed. The CAMP is consistent with the requirements for community air monitoring at remediation sites as established by the New York State Department of Health (NYSDOH) and NYSDEC. Accordingly, it follows procedures and practices outlined within the NYSDEC's DER-10 (May 2010) Appendix 1A (NYSDOH's Generic Community Air Monitoring Plan) and Appendix 1B (Fugitive Dust and Particulate Monitoring).

3.1 Field Investigation Activities

3.1.1 Soil/Fill Investigation

A soil/fill investigation will be completed to evaluate whether additional impacts exist beyond the limits of the planned IRM activities (see Section 4.0 below). The soil/fill investigation will include the advancement and characterization of twenty (20) soil borings. No surface soil samples will be collected as part of the RI, as the Site is predominantly covered by buildings and asphalt/gravel parking areas. The proposed RI sample locations are presented on Figure 4.

The sampling plan includes analysis of VOCs and SVOCs in all planned soil borings. As a requirement of the BCP, the soil/fill investigation will also include limited sampling for polychlorinated biphenyls (PCBs), pesticides, herbicides and metals to assess whether other potential contaminants exist within on-Site soil/fill at concentrations of concern.

The soil/fill investigation will employ direct-push drilling techniques. Each soil boring will be advanced to approximately 15-16 feet below ground surface (fbgs), or refusal. All soil samples will be field screened for the presence of VOCs using a field PID equipped with a 10.6 eV bulb, as a procedure for ensuring the health and safety of personnel at the Site, and to identify potentially impacted soil samples for laboratory analysis. Upon reaching the completion depth of each boring, PID and visual/olfactory results will be reviewed. The sample interval identified as the most impacted (i.e., greatest PID scan result and/or evidence of visual/olfactory impact) will be selected for analysis. In the event that either the impacts are ubiquitous from grade to final depth or no impacts were identified, the native soils directly above water table will be selected for analysis. If the impacts are ubiquitous from grade to final depth or no impacts were identified and water is not encountered at a particular sample location, the sample interval will be selected based on the discretion of the field personnel and in consultation with the NYSDEC. If clearly differentiable impacts are noted across separate soil horizons, additional samples will be collected and analyzed to characterize the noted impacts.

Soil samples will be collected using dedicated stainless steel sampling tools. Representative soil samples will be placed in pre-cleaned laboratory provided sample bottles, cooled to 4ºC in the field, and transported under chain-of-custody command to TestAmerica, , a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified analytical laboratory. Each of the subsurface soil samples will be analyzed for Target Compound List (TCL) plus NYSDEC STARS List VOCs and TCL SVOCs, and three of the soil samples will be also be analyzed for Target Analyte List (TAL) metals, polychlorinated biphenyls (PCBs), pesticides and herbicides. However, samples will not be analyzed for VOCs in the absence of elevated PID readings above 5 ppm and visual/olfactory evidence of impacts.

3.1.2 Groundwater Investigation

Nine (9) of the planned soil boring locations will be converted into groundwater monitoring wells, as shown on Figure 4. The monitoring wells will provide groundwater flow direction and groundwater quality data. Monitoring well installation, well development, and groundwater sample collection details are discussed in the following sections.

3.1.2.1 Monitoring Well Installation

After completion of the soil borings advancement, nine (9) boring locations will be converted into groundwater-monitoring wells. Proposed groundwater monitoring well locations are shown on Figure 4. A direct-push drill rig capable of advancing hollow-stem augers will be employed to install 2-inch inside diameter (ID) monitoring wells. Each boring location will be advanced to approximately 14-16 fbgs, or refusal, with a target minimum of 5 feet below the first encountered groundwater. All non-dedicated drilling tools and equipment will be decontaminated between boring locations using potable tap water and a phosphate-free detergent (e.g., Alconox).

Subsequent to boring completion, a 2-inch ID diameter flush-joint Schedule 40 PVC monitoring well will be installed at the boring locations. Each well will be constructed with a minimum 5-foot flush-joint Schedule 40 PVC, 0.010-inch machine slotted well screen. Each well screen and attached riser will be placed at the bottom of each borehole and a silica sand filter pack (size #0) will be installed from the base of the well to a maximum of 2 feet above the top of the screen. A bentonite chip seal will then be installed and allowed to hydrate sufficiently to mitigate the potential for downhole grout contamination. The newly installed monitoring wells will be completed with keyed-alike locks, a lockable J-plug, and a steel flush mounted road box.

3.1.2.2 Well Development

After installation, but not within 24 hours, newly installed monitoring wells will be developed in accordance with TurnKey and NYSDEC protocols. Development of the monitoring wells will be accomplished with dedicated disposable polyethylene bailers via surge and purge methodology. Field parameters including pH, temperature, turbidity, dissolved oxygen and specific conductance will be measured periodically (i.e., every well volume or as necessary) during development. Field measurements will continue until they became relatively stable. Stability will be defined as variation between measurements of approximately 10 percent or less with no overall upward or downward trend in the measurements. A minimum of three well volumes will be evacuated from each monitoring well. Development water will be containerized and sampled to determine proper discharge requirements. Based on the analytical results, containerized water may be discharged to the ground surface, passed through a granular activated carbon unit or other on-Site treatment system, prior to discharge to ground surface, or taken off-site for disposal.

3.1.2.3 Groundwater Sample Collection

Prior to sample collection, static water levels will be measured and recorded from all on-Site monitoring wells. Following water level measurement, TurnKey personnel will purge and sample monitoring wells using either a peristaltic pump with dedicated pump tubing following low-flow/minimal drawdown purge and sample collection procedures; or using a dedicated polyethylene bailer. Prior to sample collection, groundwater will be evacuated from each well at a low-flow rate (typically less than 0.1 L/min). Field measurements for pH, temperature, turbidity, dissolved oxygen, specific conductance and water level, as well as visual and olfactory field observations, will be periodically recorded and monitored for stabilization. Purging will be considered complete when pH, specific conductivity, dissolved oxygen and temperature stabilize and when turbidity measurements fall below 50 Nephelometric Turbidity Units (NTU), or become stable above 50 NTU. Stability is defined as variation between field measurements of 10 percent or less and no overall upward or downward trend in the measurements. Upon stabilization of field parameters, groundwater samples will be collected and analyzed as discussed below.

Sample collection methods that may be implemented during the RI include:

- **<u>Peristaltic Pump with Dedicated Pump Tubing</u>**

  Wells less than 20 fbgs will be purged and sampled using a peristaltic pump and dedicated pump tubing following low-flow (minimal drawdown) purge and sample collection procedure, as described above. However, the pump will not require decontamination because all components are dedicated to each monitoring well. In addition, groundwater samples collected for VOC analysis will not be sampled directly through the peristaltic pump due to potential degassing (i.e., loss of VOCs) of the groundwater sample. Instead, prior to collection of VOC samples, the pump will be turned off and the pressure on the flexible walled tubing within the pump head will be maintained in order to prevent water within the collection tubing from escaping. The tubing will be removed from the well and coiled to prevent any contact with the ground surface. Upon removal of the tubing and prior to re-activating the pump, the pump flow direction will be reversed. Upon pump re-activation, the pumping rate will be slowly increased; positively displacing groundwater within the tubing allowing it to flow, without disturbance and degassing, into the appropriate VOC sample vials.

- **<u>Polyethylene Disposable Bailer</u>**

> Wells of any depth (up to 100 fbgs) may be purged and sampled using a polyethylene disposable bailer via direct grab. In general, a bottom filling dedicated polyethylene bailer is attached to a length of dedicated hollow-braid polypropylene rope and lowered into the well smoothly and slowly as not to agitate the groundwater or damage the well. Purging continues until a predetermined volume of water has been removed (typically three well volumes) or to dryness. Measurements for pH, temperature, specific conductance, dissolved oxygen and turbidity are recorded following removal of each well volume. The well is purged until the readings for indicator parameters stabilize or the well is purged to dryness.

Prior to, and immediately following collection of groundwater samples, field measurements for pH, specific conductance, temperature, dissolved oxygen, turbidity and water level, as well as visual and olfactory field observations will be recorded. All collected groundwater samples will be placed in pre-cleaned, pre-preserved laboratory provided sample bottles, cooled to 4°C in the field, and transported under chain-of-custody command to TestAmerica for analysis.

3.1.2.4 Groundwater Sample Analyses

The nine (9) groundwater samples will be collected and analyzed for TCL plus NYSDEC STARS list VOCs, TCL SVOCs, TAL Metals, pesticides, herbicides, and PCBs in accordance with USEPA SW-846 methodology with equivalent NYSDEC Category B deliverables to allow for independent third-party data usability assessment.

3.1.2.5 Groundwater Flow Evaluation

Groundwater elevation data will be collected during the RI. Two rounds of water level data from within the newly installed monitoring wells will be collected, and used to develop an on-Site groundwater isopotential map. A table which describes the well construction and water level will be prepared.

3.1.3 Building #2 Interior Assessment

Building #2 is an automatic carwash building, including automobile conveyor, subgrade piping, trenches and drains. An assessment of the floor drains and trenches will be undertaken to evaluate potential areas of concern and will be utilized to direct additional investigation activities, if deemed necessary. Upon visual inspection and in consideration of the RI data collected in the vicinity of Building #2, the planned approach will be discussed with NYSDEC.

3.1.4 Soil Vapor Assessment

If initial RI subsurface soil and groundwater data indicates that VOCs may cause a soil vapor concern, TurnKey will discuss with NYSDEC whether a soil vapor assessment is necessary in the vicinity of the planned new building.

3.1.5 Field Specific Quality Assurance/Quality Control Sampling

In addition to the soil/fill, and groundwater samples described above, field-specific quality assurance/quality control (QA/QC) samples will be collected and analyzed to ensure the reliability of the generated data as described in the QAPP (see Section 5.0) and to support the required third-party data usability assessment effort. Site-specific QA/QC samples will include matrix spikes, matrix spike duplicates, blind duplicates, and trip blanks.

3.2 Investigation-Derived Waste Management

During installation of the monitoring wells, excess soil cuttings will be containerized (e.g. 55-gallon drums), and sampled to determine if they can be utilized on-Site or require treatment or off-Site disposal. Groundwater from well development and purging will be passed through a mobile granular-carbon treatment vessel and discharged to the ground.

Drums will be labeled with regard to contents, origin, and date of generation using a paint stick marker on two sides and the top of each drum. The drums will be staged on-site pending soil analyses and remedial measures assessment.

3.3 Site Mapping

A Site map will be developed during the field investigation. All sample points and relevant Site features will be located on the map. TurnKey will employ a Trimble GeoXT handheld GPS unit to identify the locations of all soil borings and newly installed wells relative to State planar grid coordinates. Monitoring well elevations will be measured by TurnKey's surveyor. An isopotential map showing the general direction of groundwater flow will be prepared based on water level measurements relative to USGS vertical datum. Site maps will be provided with the RI report.

4.0 INTERIM REMEDIAL MEASURES

Following completion of the RI, an IRM will be completed to address environmental concerns and to expedite the remedial and overall project schedule. This Work Plan includes planned IRM activities based on current information and may be modified, subject to NYSDEC approval, after the RI fieldwork is completed. The planned IRM includes the following tasks:

- Demolition and removal of existing Building #1 convenience store and existing dispenser island canopy;
- Removal of four gasoline USTs and one diesel UST and associated piping and product dispensers from UST Area #1 beneath the western portion of the dispenser island canopy;
- Removal of three gasoline USTs from UST Area #2 located west of the carwash building and associated piping and product dispensers;
- Excavation and off-Site disposal or treatment of known petroleum-impacted soil proximate UST Area #2;
- Excavation and off-Site disposal or treatment of petroleum-impacted soil (if encountered) in the area of UST Area #1 and/or beneath product dispensers and/or piping;
- Implementation of a Soil/Fill Management Plan (SFMP) during remedial and redevelopment activities.

4.1 Utility Clearance

Prior to any intrusive activities, Dig Safely New York (Call 811) will be contacted by the site contractor a minimum of three business days in advance of the work and informed of the intent to perform excavation work at the Site. If underground utilities are present on the property and are anticipated to interfere with intrusive activities, the Applicant and the NYSDEC will be contacted to discuss mitigating measures.

4.2 Site Preparation

Prior to implementing IRM activities, pre-demolition surveys, removal and proper disposal of miscellaneous debris located within Building #1, and appropriate permits, if required will be completed prior to work activities. Structures will then be demolished to grade.

4.3 Waste Characterization

Waste characterization samples will be collected and analyzed prior to initiating excavation work. Composite waste characterization samples will be collected from soil/fill in the planned IRM excavation of UST Areas #1 and #2. Pre-characterization of the soil will allow for direct loading and off-site transportation at the time of the UST system removal.

Waste characterization samples will be analyzed for TCL VOCs, TCL SVOCs, Resource Conservation and Recovery Act (RCRA) metals, PCBs, pesticides, herbicides, toxicity characteristic leaching procedure (TCLP) VOCs, TCLP SVOCs, TCLP metals, ignitability, corrosivity and reactivity. Based on the results of the waste characterization sampling, impacted soil will be managed according to all federal, State and local waste disposal regulations.

4.4 UST System Removal

The following USTs and their associated piping and product dispensers will be removed in accordance with applicable NYSDEC guidelines:

- Four 4,000-gallon steel gasoline USTs and one 4,000-gallon steel diesel UST in UST Area #1; and,
- Three fiberglass-reinforced plastic gasoline USTs (i.e., 1-6,000-gallon, 1-8,000-gallon and 1- 10,000 gallon) in UST Area #2.

Figure 5 shows the location of the UST system components relative to key Site features. The NYSDEC will be notified at least 10 days prior to UST system removal activities.

4.5 Removal of Impacted Soils

Following removal of the USTs in UST Area #2 impacted soil/fill will be excavated and transported off-site for disposal at a commercial solid waste landfill or biotreatment facility. If impacted materials are encountered in the UST Area #1 and/or beneath piping or product dispensers, they will be handled in a similar manner to the areas of known petroleum impacts.

A PID and visual/olfactory observations will be used to screen soil/fill materials and assist in verifying removal of impacted soil/fill. All excavation work will be directed by an experienced TurnKey professional to remove impacted material. Lateral and vertical excavation will continue until suspected source area soils and visually impacted soil/fill is removed, Part 375 Commercial SCOs are met, excavation has reached physical barriers (physical barriers may include underground utilities, subgrade piping, and/or concrete structures such as building foundations that are not planned for removal), or NYSDEC agrees that no further excavation is required or feasible. Based on the findings of the RI and field observations, an evaluation to clean up the Site to a less restrictive level (e.g., Restricted-Residential SCOs) may be conducted.

If non-impacted soil (i.e. overburden soil) is identified, the material will be segregated from impacted soil/fill and characterized for potential reuse in accordance withDER-10, as outlined in the SFMP (see Appendix E).

4.6 Excavation Confirmation Sampling

Post excavation confirmatory samples will be collected in accordance with DER-10 from the excavated areas. Sample locations from excavated areas will include samples from excavation sidewalls and bottom. A minimum of one sample per 30 linear feet of sidewall and one sample for each 900 square feet of excavation bottom will be collected. In areas of product piping (i.e., between the canopy and UST Area #2, one sample per 20 linear feet of piping will be collected If discolored soils remain in an excavation sidewall that are differentiable from the impacts being removed from the excavation area, the visually-impacted areas will be sampled; the number of samples and parameter list will be discussed with NYSDEC prior to sampling.

Samples from the UST Area #1 and dispenser island canopy excavations will be analyzed for TCL plus NYSDEC STARS List VOCs and NYSDEC STARS List SVOCs as both gasoline and diesel USTs and dispensers are located in those areas. Samples from UST Area #2 and piping between the dispenser island canopy and UST Area #2 will be sampled for TCL plus NYSDEC STARS List VOCs only as that area has gasoline USTs. Based on the results of the investigation, additional confirmatory sampling parameters may be required if contaminants identified during the RI include contaminants other than VOCs and SVOCs that exceed Part 375 Commercial SCOs.

Samples will be analyzed in accordance with USEPA SW-846 Methodology with an equivalent Category B deliverables package to facilitate data evaluation by a third-party validation expert. Expedited turnaround times will be requested for the analytical results to minimize the time that the excavation(s) remains open.

4.7 Groundwater Management/Treatment

Water removed from excavations and surface water run-in to excavations during the impacted soil removal will be handled on-Site prior to discharge to the municipal sewer. In general, water removed from excavations will be stored/settled in a portable 20,000-gallon storage tank, and if deemed necessary, will be pumped through a bag or cartridge filter prior to treatment using granular activated carbon (GAC). Following completion of excavation work, settled solids remaining in the tank and spent filter bags will be disposed of off-site.

If the accumulated waters required treatment, the spent GAC will be characterized (TCLP VOC testing) and regenerated off-site, or disposed at a permitted disposal facility in accordance with applicable federal and state regulations. The storage tank will be decontaminated via pressure washing. TurnKey or the Site owner will coordinate with the local sewer authority to obtain any necessary temporary sewer discharge permits, and a copy of the temporary discharge permit will be provided to the NYSDEC.

4.8 Excavation Backfill

Following NYSDEC concurrence that the remedial excavation is complete, the excavation will be backfilled with approved backfill material. The backfill material will be placed into the excavation and compacted with the excavator/backhoe bucket in 1 to 2-foot lifts to match the existing grade of the Site and minimize settling. Alternatively, Delta Sonic's redevelopment plans may require that select backfill be placed in accordance with certain geotechnical requirements (e.g., 95% of a modified Proctor test). Specific details regarding acceptable backfill materials, test requirements and handling is presented in the Soil-Fill Management Plan, included in Appendix E. Table 2 includes the chemical criteria for import of backfill material to the Site in accordance with Appendix 5 of DER-10 (May 2010).

5.0 QUALITY ASSURANCE PROJECT PLAN

A QAPP has been prepared in support of the RI/IRM activities. The QAPP dictates implementation of the investigation tasks delineated in this Work Plan. A Sampling and Analysis Plan (SAP) identifying methods for sample collection, decontamination, handling, and shipping, is provided as below.

The QAPP will assure the accuracy and precision of data collection during the Site characterization and data interpretation periods. The QAPP identifies procedures for sample collection to mitigate the potential for cross-contamination, as well as analytical requirements necessary to allow for independent data validation. The QAPP has been prepared in accordance with USEPA's Requirements for Quality Assurance Project Plans for Environmental Data Operations; the EPA Region II CERCLA Quality Assurance Manual, and NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (May 2010).

5.1 Scope of the QAPP

This QAPP was prepared to provide quality assurance (QA) guidelines to be implemented during the RI/IRM activities. This document may be modified for subsequent phases of investigative work, as necessary. The QAPP provides:

- A means to communicate to the persons executing the various activities exactly what is to be done, by whom, and when.
- A culmination to the planning process that ensures that the program includes provisions for obtaining quality data (e.g., suitable methods of field operations).
- A historical record that documents the investigation in terms of the methods used, calibration standards and frequencies planned, and auditing planned.
- A document that can be used by the Project Manager's and QA Officer to assess if the activities planned are being implemented and their importance for accomplishing the goal of quality data.
- A plan to document and track project data and results.

- Detailed descriptions of the data documentation materials and procedures, project files, and tabular and graphical reports.

The QAPP is primarily concerned with the quality assurance and quality control aspects of the procedures involved in the collection, preservation, packaging, and transportation of samples; field testing; record keeping; data management; chain-of-custody procedures; laboratory analyses; and other necessary matters to assure that the investigation activities, once completed, will yield data whose integrity can be defended.

QA refers to the conduct of all planned and systematic actions necessary to perform satisfactorily all task-specific activities and to provide information and data confidence as a result of such activities. The QA for task-specific activities includes the development of procedures, auditing, monitoring and surveillance of the performance.

QC refers to the activity performed to determine if the work activities conform to the requirements. This includes activities such as inspections of the work activities in the field (e.g., verification that the items and materials installed conform to applicable codes and design specifications). QA is an overview monitoring of the performance of QC activities through audits rather than first time inspections.

5.2 QAPP Organization and Responsibility

The principal organizations involved in verifying achievement of data collection goals for the 348 Langner Road Site include: the NYSDEC, NYSDOH, Delta Sonic (Applicant), TurnKey Environmental Restoration, LLC (Consultant), the drilling subcontractor(s), the independent environmental laboratory, and the independent third party data validator. Roles, responsibilities, and required qualifications of these organizations are discussed in the following subsections. Resumes are included in Appendix A.

5.2.1 NYSDEC and NYSDOH

It is the responsibility of the NYSDEC, in conjunction with NYSDOH, to review the RI/IRM Work Plan and supporting documents, for completeness and conformance with the site-specific cleanup objectives and to make a decision to accept or reject these documents based on this review. The NYSDEC also has the responsibility and authority to review and approve all QA documentation collected during brownfield cleanup construction and to confirm that the QA Plan was followed.

5.2.2 Applicant

Delta Sonic ("Applicant") will be responsible for complying with the QA requirements as specified herein and for monitoring and controlling the quality of the Brownfield cleanup construction either directly or through their designated environmental consultant and/or legal counsel. The Applicant will also have the authority to select Remedial Action Contractor(s) to assist them in fulfilling these responsibilities. The designated Project Manager is responsible for implementing the project, and has the authority to commit the resources necessary to meet project objectives and requirements.

5.2.3 TurnKey Environmental Restoration, LLC

TurnKey Environmental Restoration, LLC (TurnKey) is the prime consultant on this project and is responsible for the performance of all services required to implement each phase of the RI/IRM Work Plan, including, but not limited to, field operations, laboratory testing, data management, data analysis and reporting. Any one member of TurnKey's staff may fill more than one of the identified project positions (e.g., field team leader and site safety and health officer). The various quality assurances, field, laboratory and management responsibilities of key project personnel are defined below.

- *TurnKey Project Manager (PM):* *Michael Lesakowski*

  The TurnKey PM has the responsibility for ensuring that the project meets the Work Plan objectives. The PM will report directly to the Delta Sonic Project Coordinator and the NYSDEC/NYSDOH Project Coordinators and is responsible for technical and project oversight. The PM will:

  - Define project objectives and develop a detailed work plan schedule.
  - Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task.
  - Acquire and apply technical and corporate resources as needed to assure performance within budget and schedule constraints.
  - Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
  - Review the work performed on each task to assure its quality, responsiveness, and timeliness.

- o Review and analyze overall task performance with respect to planned requirements and authorizations.
- o Review and approve all deliverables before their submission to NYSDEC.
- o Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
- o Ultimately be responsible for the preparation and quality of interim and final reports.
- o Represent the project team at meetings.

- *TurnKey FTL/SSHO:* *Bryan Hann*

  The Field Team Leader (FTL) has the responsibility for implementation of specific project tasks identified at the Site, and is responsible for the supervision of project field personnel, subconsultants, and subcontractors. The FTL reports directly to the Project Manager. The FTL will:

  - o Define daily work activities.
  - o Orient field staff concerning the project's special considerations.
  - o Monitor and direct subcontractor personnel.
  - o Review the work performed on each task to ensure its quality, responsiveness, and timeliness.
  - o Assure that field activities, including sample collection and handling, are carried out in accordance with this QAPP.

  For this project the FTL will also serve as the Site Safety and Health Officer (SSHO). As such, he is responsible for implementing the procedures and required components of the Site Health and Safety Plan (HASP), determining levels of protection needed during field tasks, controlling site entry/exit, briefing the field team and subcontractors on site-specific health and safety issues, and all other responsibilities as identified in the HASP.

5.3 Quality Assurance (QA) Responsibilities

The QA Officer will have direct access to corporate executive staff as necessary, to resolve any QA dispute, and is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations and TurnKey policies, and NYSDEC requirements. The QA Officer has sufficient authority to stop work on the investigation as deemed necessary in the event of serious QA issues.

- *Project QA Officer:* *Lori E. Riker*

  Specific function and duties include:
  - Performing QA audits on various phases of the field operations
  - Reviewing and approving QA plans and procedures
  - Providing QA technical assistance to project staff
  - Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the Project Manager for technical operations
  - Responsible for assuring third party data review of all sample results from the analytical laboratory

5.4 Field Responsibilities

TurnKey field staff for this project is drawn from a pool of qualified resources. The Project Manager will use staff to gather and analyze data, and to prepare various task reports and support materials. All of the designated technical team members are experienced professionals who possess the degree of specialization and technical competence required to effectively and efficiently perform the required work.

5.5 Quality Assurance Objectives for Measurement Data

The overall objectives and criteria for assuring quality for this effort are discussed below. This QAPP addresses how the acquisition and handling of samples and the review and reporting of data will be documented. The objectives of this QAPP are to address the following:

- The procedures to be used to collect, preserve, package, and transport groundwater samples.
- Field data collection.
- Record keeping.

- Data management.

- Chain-of-custody procedures.

- Precision, accuracy, completeness, representativeness, decision rules, comparability and level of quality control effort conformance for sample analysis and data management by TestAmerica under EPA analytical methods.

5.6 Level of QC Effort for Sample Parameters

Field blank, method blank, trip blank, field duplicate, laboratory duplicate, laboratory control, standard reference materials (SRM) and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs. QC samples are discussed below.

- Field and trip blanks consisting of distilled water will be submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field-sampling program. Field (equipment) blank samples are analyzed to check for procedural chemical constituents at the facility that may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage.

- Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures.

- Duplicate samples are analyzed to check for sampling and analytical reproducibility.

- MS/MSD and MS/Duplicate samples provide information about the effect of the sample matrix on the digestion and measurement methodology. Depending on site-specific circumstances, one MS/MSD or MS/Duplicate should be collected for every 20 or fewer investigative samples to be analyzed for organic and inorganic chemicals of a given matrix (see Table 1).

The general level of QC effort will be one field (blind) duplicate and one field blank (when non-dedicated equipment is used) for every 20 or fewer investigative samples of a given matrix. Additional sample volume will also be provided to the laboratory to allow one site-specific MS/MSD or MS/Duplicate for every 20 or fewer investigative samples of a given matrix. One trip blank consisting of distilled, deionized water will be included along with each sample delivery group of aqueous VOC samples.

5.7 Sampling and Analysis Plan

The selection and rationale for the RI/IRM sampling program is discussed in the RI/IRM Work Plan. Methods and protocol to be used to collect environmental samples (i.e., soil, and groundwater) for this investigation are described in the TurnKey Field Operating Procedures (FOPs) presented in Appendix F.

The number and types of environmental samples to be collected is summarized on Table 1. Sample parameter lists, holding times and sample container requirements are summarized on Table 3. The sampling program and related site activities are discussed below. To the extent allowed by existing physical conditions at the facility, sample collection efforts will adhere to the specific methods presented herein. If alternative sampling locations or procedures are implemented in response to facility specific constraints, each will be selected on the basis of meeting data objectives. Such alternatives will be approved by NYSDEC before implementation and subsequently documented for inclusion in the project file.

5.7.1 Custody Procedures

Sample custody is controlled and maintained through the chain-of-custody procedures. Chain of custody is the means by which the possession and handling of samples will be tracked from the source (field) to their final disposition, the laboratory. A sample is considered to be in a person’s custody if it is in the person’s possession or it is in the person's view after being in his or her possession or it was in that person's possession and that person has locked it in a vehicle or room. Sample containers will be cleaned and preserved at the laboratory before shipment to the Site. The following section and FOPs for Sampling, Labeling, Storage, and Shipment, located in Appendix F, describe procedures for maintaining sample custody from the time samples are collected to the time they are received by the analytical laboratory.

5.7.2 Sample Storage

Samples are stored in secure limited-access areas. Walk-in coolers or refrigerators are maintained at 4°C, ± 2°C, or as required by the applicable regulatory program. The temperatures of all refrigerated storage areas are monitored and recorded a minimum of once per day. Deviations of temperature from the applicable range require corrective action, including moving samples to another storage location if necessary.

5.7.3 Sample Custody

Sample custody is defined by this document as when any of the following occur:

- It is in someone's actual possession.
- It is in someone's view after being in his or her physical possession.
- It was in someone's possession and then locked, sealed, or secured in a manner that prevents unsuspected tampering.
- It is placed in a designated and secured area.

Samples are removed from storage areas by the sample custodian or analysts and transported to secure laboratory areas for analysis. Access to the laboratory and sample storage areas is restricted to laboratory personnel and escorted visitors only; all areas of the laboratory are therefore considered secure. If required by the applicable regulatory program, internal chain-of-custody is documented in a log by the person moving the samples between laboratory and storage areas.

Laboratory documentation used to establish COC and sample identification may include the following:

- Field COC forms or other paperwork that arrives with the sample.
- The laboratory COC.
- Sample labels or tags are attached to each sample container.
- Sample custody seals.

- Sample preparation logs (i.e., extraction and digestion information) recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist.

- Sample analysis logs (e.g., metals, GC/MS, etc.) information recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist.

- Sample storage log (same as the laboratory COC).

- Sample disposition log, which documents sample disposal by a contracted waste disposal company.

5.7.4 Sample Tracking

All samples are maintained in the appropriate coolers prior to and after analysis. The analysts remove and return their samples as needed. Samples that require internal COC are relinquished to the analysts by the sample custodians. The analyst and sample custodian must sign the original COC relinquishing custody of the samples from the sample custodian to the analyst. When the samples are returned, the analyst will sign the original COC returning sample custody to the sample custodian. Sample extracts are relinquished to the instrumentation analysts by the preparatory analysts. Each preparation department tracks internal COC through their logbooks/spreadsheets.

Any change in the sample during the time of custody will be noted on the COC (e.g., sample breakage or depletion).

5.8 Calibration Procedures and Frequency

This section describes the calibration procedures and the frequency at which these procedures will be performed for both field and laboratory instruments.

5.8.1 Field Instrument Calibration

Quantitative field data to be obtained during groundwater sampling include pH, turbidity, specific conductance, temperature, dissolved oxygen and depth to groundwater. Quantitative water level measurements will be obtained with an electronic sounder or steel tape, which require no calibration. Quantitative field data to be obtained during soil sampling include screening for the presence of volatile organic constituents using a photoionization detector (PID).

FOPs located in Appendix F describe the field instruments used to monitor for these parameters and the calibration methods, standards, and frequency requirements for each instrument. Calibration results will be recorded on the appropriate field forms and in the Project Field Book.

5.9 Analytical Procedures

Samples collected during this investigation field sampling activities will be analyzed by TestAmerica Analytical Testing Corporation (TestAmerica), 10 Hazelwood Drive, Amherst, New York 14228, (716) 691-2600.

5.9.1 Field Analytical Procedures

Field procedures for collecting and preserving groundwater and soil samples are described in FOPs located in Appendix F. A summary of the FOPs is presented on Table 4.

5.10 Data Usability Evaluation

Data usability evaluation procedures shall be performed for both field and laboratory operations as described below.

5.10.1 Procedures Used to Evaluate Field Data Usability

Procedures to validate field data for this project will be facilitated by adherence to the FOPs identified in Appendix F. The performance of all field activities, calibration checks on all field instruments at the beginning of each day of use, manual checks of field calculations, checking for transcription errors and review of field log books is the responsibility of the Field Team Leader.

5.10.2 Procedures Used to Evaluate Laboratory Data Usability

Data evaluation will be performed by the third party data validator using the most current methods and quality control criteria from the USEPA's Contract Laboratory Program (CLP) *National Functional Guidelines for Organic Data Review*, and Contract Laboratory Program, *National Functional Guidelines for Inorganic Data Review*. The data review guidance will be used only to the extent that it is applicable to the SW-846 methods; SW-846 methodologies will be followed primarily and given preference over CLP when differences occur. Also, results of blanks, surrogate spikes, MS/MSDs, and laboratory control samples will be reviewed/evaluated by the data validator. All sample analytical data for each sample matrix shall be evaluated. The third party data validation expert will also evaluate the overall completeness of the data package. Completeness checks will be administered on all data to determine whether deliverables specified in this QAPP are present. The reviewer will determine whether all required items are present and request copies of missing deliverables.

6.0 INVESTIGATION SUPPORT DOCUMENTS

6.1 Health and Safety Protocols

TurnKey Environmental Restoration has prepared a Site-Specific Health and Safety Plan (HASP) for use by our employees in accordance with 40 CFR 300.150 of the NCP and 29 CFR 1910.120. The HASP, provided in Appendix C, includes the following site-specific information:

- A hazard assessment.
- Training requirements.
- Definition of exclusion, contaminant reduction, and other work zones.
- Monitoring procedures for site operations.
- Safety procedures.
- Personal protective clothing and equipment requirements for various field operations.
- Disposal and decontamination procedures.

The HASP also includes a contingency plan that addresses potential site-specific emergencies, and a Community Air Monitoring Plan that describes required particulate and vapor monitoring to protect the neighboring community during intrusive site investigation and remediation activities.

Health and safety activities will be monitored throughout the field investigation and IRM. A member of the field team will be designated to serve as the on-site Health and Safety Officer throughout the field program. This person will report directly to the Project Manager and the Corporate Health and Safety Coordinator. The HASP will be subject to revision as necessary, based on new information that is discovered during the field investigation and/or remedial activities.

6.1.1 Community Air Monitoring

Real-time community air monitoring will be performed during IRM activities at the Site. A CAMP is included with TurnKey's HASP. Particulate and VOC monitoring will be performed along the downwind perimeter of the work area during subgrade excavation, grading and soil/fill handling activities in accordance with this plan. The CAMP is consistent with the requirements for community air monitoring at remediation sites as established by the New York State Department of Health (NYSDOH) and NYSDEC. Accordingly, it follows procedures and practices outlined under NYSDEC's DER-10 (May 2010) Appendix 1A (NYSDOH's Generic Community Air Monitoring Plan) and Appendix 1B (Fugitive Dust and Particulate Monitoring).

6.2 Soil/Fill Management Plan (SFMP)

The purpose of the SFMP is to protect both the environment and human health during redevelopment and post-development maintenance activities of the Site, subsequent to completion of Brownfield cleanup activities. The SFMP will be modified/expanded as appropriate based on the results of the RI. The SFMP is included in Appendix E.

While an assessment of surface and subsurface soil/fill and groundwater at the Site will be performed during the RI, subsurface information is never 100 percent complete or accurate. As such, it is not unreasonable to anticipate the possibility that some quantity of subsurface soil/fill contamination may be encountered after completion of the Brownfield cleanup. In particular, soil/fill contamination may be encountered during post-development activities such as utility installation or maintenance.

Compliance with the SFMP is required to properly manage subsurface soil contamination. The SFMP was developed and incorporated into this Work Plan with the express purpose of addressing unknown subsurface contamination if and when encountered. This SFMP provides protocols for the proper handling of Site soil/fill during development activities, including:

- Excavation, grading, sampling and handling of site soils.
- Acceptability of soils/fill from off-site sources for backfill or subgrade fill.
- Erosion and dust control measures.
- Access controls.
- Health and safety procedures for subsurface construction work and the protection of the surrounding community.

6.3 Citizen Participation Activities

NYSDEC will coordinate and lead community relations throughout the course of the project. TurnKey will support NYSDEC's community relations activities, as necessary. A Citizen Participation Plan will be prepared by TurnKey and submitted to NYSDEC under separate cover. The Citizen Participation Plan will follow NYSDEC's Citizen Participation

Plans template for Brownfield Cleanup Program sites entering the BCP at the point of site investigation.

7.0 REPORTING AND SCHEDULE

Upon completion of the RI and IRM fieldwork, a comprehensive RI/IRM/AAR report will be completed summarizing the RI and IRM tasks completed as described below.

7.1 Remedial Investigation Reporting

The RI section of the RI/IRM/AAR report will include the following information and documentation, consistent with the NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (May 2010).

- Introduction and background;
- A description of the site and the investigation areas;
- A description of the field procedures and methods used during the RI;
- A discussion of the nature and rationale for any significant variances from the scope of work described in this RI Work Plan;
- The data obtained during the RI and historical data considered by TurnKey to be of useable quality. This will include geochemical data, field measurements, etc;
- Comparative criteria that may be used to calculate cleanup levels during the alternatives analysis report (AAR) process, such as NYSDEC Soil Cleanup Objectives and other pertinent regulatory standards or criteria;
- A discussion of contaminant fate and transport. This will provide a description of the hydrologic parameters of the Site, and an evaluation of the lateral and vertical movement of groundwater;
- Conclusions regarding the extent and character of environmental impact in the media being investigated;
- The conclusions of the qualitative human health and environmental risk assessments, including any recommendations for more detailed assessments, if applicable; and
- Supporting materials for RI data. These will include boring logs, monitoring well construction diagrams, laboratory analytical reports, and similar information.

In addition, TurnKey will require third-party data review by a qualified, independent data validation expert. Specifically, a Data Usability Summary Report (DUSR) will be prepared, with appropriate data qualifiers added to the results. The DUSR will follow NYSDEC format per the NYSDEC's September 1997 DUSR guidelines and May 2010 DER-10 guidance. The DUSR and any necessary qualifications to the data will be appended to the RI report.

7.2 IRM Reporting

A TurnKey scientist or engineer will be on-site on a full-time basis to document IRM activities. Such documentation will include, at minimum, daily reports of IRM activities, community air monitoring results, photographs and sketches.

7.2.1 Construction Monitoring

Standard daily reporting procedures will include preparation of a daily report and, when appropriate, problem identification and corrective measures reports. Appendix D contains sample project documentation forms. Information that may be included on the daily report form includes:

- Processes and locations of construction under way;
- Equipment and personnel working in the area, including subcontractors;
- Number and type of truckloads of soil/fill removed from the site;
- A description of off-site materials received;
- Approximate verification sampling locations (sketches) and sample designations.

The NYSDEC will be promptly notified of problems requiring modifications to this Work Plan prior to proceeding or completion of the construction item. Photo documentation of the IRM activities will be prepared by TurnKey throughout the duration of the project as necessary to convey typical work activities and whenever changed conditions or special circumstances arise.

7.2.2 IRM Construction Closeout

A summary of the IRM construction will be included in the RI/IRM/AAR report submitted to the NYSDEC, with full details of the IRM activities included in the Final Engineering Report. At a minimum, the IRM section of the report will include:

- A Site or area planimetric map showing the parcel(s) remediated;
- A map showing the lateral limits of excavation;
- Summaries of unit quantities, including: volume of soil/fill excavated; disposition of excavated soil/fill and collected ground/surface water; volume/type/source of backfill; and volume of ground/surface water pumped and treated;
- Planimetric map showing location of all verification and other sampling locations with sample identification labels/codes;
- Tabular comparison of verification and other sample analytical results to SCOs. An explanation shall be provided for all results exceeding acceptance criteria; and
- Text describing that the excavation activities were performed in accordance with this Work Plan.

7.3 Alternatives Analysis Report

An alternatives analysis report (AAR) is typically developed to provide a forum for evaluating and selecting a recommended remedial approach. However, the planned IRM may effectively remove contaminants from the Site. If additional contamination is discovered during RI site characterization activities, the AAR may need to evaluate additional remedial measures beyond the IRM activities. If the IRM effectively removes site contaminants, the AAR will evaluate the IRM as the final remedy.

A list of remedial action objectives will be developed based on findings of the RI and IRM and the requirement for the selected remedial measures to be protective of human health and the environment under the proposed future use scenario. Proposed soil cleanup objectives (SCOs) for the property will also be presented based on the proposed future use of the Site. SCOs will be based on published standards, criteria, and guidance (SCGs) and other NYSDEC and NYSDOH-accepted values.

Based on the remedial action objectives and SCOs, volumes and areas of media potentially requiring additional remediation will be calculated. General response actions will then be delineated to address each of the site problem areas. These response actions will form the foundation for the development and screening of applicable remedial alternatives against the following criteria as described in 6NYCRR 375-1.10:

- Overall Protection of Human Health and the Environment
- Compliance with Standards, Criteria, & Guidance (SCGs)
- Long-term Effectiveness & Permanence
- Reduction of Toxicity, Mobility, or Volume
- Short-term Effectiveness
- Implementability
- Cost

In addition, the criteria of community acceptance will be considered based on public comments on the AAR and proposed remedial action. Following the screening of alternatives, a comparative analysis will be performed against the above criteria. The comparative analysis will allow for better understanding of the relative advantages and disadvantages of each of the alternatives, and will facilitate identification of a recommended remedial approach.

8.0 PROJECT SCHEDULE

A tentative project schedule for the major tasks to be performed in support of the RI/IRM/AAR is presented as Figure 6.

9.0 REFERENCES

1. New York State Department of Environmental Conservation. *DER-10; Technical Guidance for Site Investigation and Remediation.* May 2010.

2. United States Department of Agriculture (USDA), Soil Conservation Service. *Soil Survey of Erie County, New York*. December 1986.

3. National Oceanic & Atmospheric Administration (NOAA) Satellites and Information. Data Tables through 2000.

4. Benchmark Environmental Engineering & Science, PLLC. *Limited Phase II Site Investigation Report, 348 Langner Road Parcel [348 Langner Road Site], West Seneca, New York*. January 2010.

5. U.S. Environmental Protection Agency. *Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA QA/R-5).* October 1998.

6. U.S. Environmental Protection Agency, Region II. *CERCLA Quality Assurance Manual, Revision I.* October 1989.

7. U.S. Environmental Protection Agency, *Methods for Chemical Analysis of Water and Wastes*, EPA 600/4-70-020. 1983b.

8. U.S. Environmental Protection Agency. National Functional Guidelines for Organic Data Review (EPA-540/R-94-012), 1994a.

9. U.S. Environmental Protection Agency. National Functional Guidelines for Inorganic Data Review (EPA-540/R-94-013), 1994b.

TABLES

TurnKey Environmental Restoration, LLC

TABLE 1

SAMPLING AND ANALYSIS PLAN

RI / IRM WORK PLAN

348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

Matrix	Parameter	No. Samples	Estimated Number of QC Samples				Total[4]
			Trip Blank[2]	Matrix Spike[3]	MS Duplicate[3]	Blind Duplicate[3]	
Remedial Investigation[1]							
Subsurface Soil/Fill	TCL + STARS VOCs	20		1	1	1	23
	TCL SVOCs	20		1	1	1	23
	TAL Metals	3		1	1	1	6
	PCBs	3		1	1	1	6
	Pesticides	3		1	1	1	6
	Herbicides	3		1	1	1	6
Groundwater	TCL + STARS VOCs	9	1	1	1	1	13
	TCL SVOCs	9	1	1	1	1	13
	TAL Metals	9	1	1	1	1	13
	PCBs	9	1	1	1	1	13
	Pesticides	9	1	1	1	1	13
	Herbicides	9	1	1	1	1	13
	Field Parameters: DO, pH, Turbidity, Conductance, Temperature	9					9
Interim Remedial Measures[1]							
Post-Excavation Samples	TCL + STARS VOCs	40		2	2	2	46
	TCL SVOCs	TBD					
Soil Characterization Sampling							
Soil Characterization Sampling	TCLP VOCs	2					2
	TCLP SVOCs	2					2
	TCLP Metals	2					2
	TCL + STARS VOCs	2					2
	TCL SVOCs	2					2
	TAL Metals	2					2
	Total PCBs/ Pest. / Herb.	2					2
	Hazardous Characterisitcs						
	Ignitability	2					2
	Reactivity	2					2
	Corrosivity	2					2

Notes:
1. Analyses will be performed via USEPA SW-846 methodology w/ equivalent Category B deliverables package.
2. Trip blanks will be submitted to the laboratory each day aqueous volatile organic samples are collected.
3. Blind duplicate and MS/MSD samples will be collected at a frequency of 1 per 20 samples collected.
4. Dedicated sampling equipment will be used for groundwater and soil/fill sample collection; therefore, an equipment blank is not required.

TBD = to be determined

TurnKey Environmental Restoration, LLC

TABLE 2

RI/IRM/AAR Work Plan

CRITERIA FOR IMPORTED SOIL-FILL

348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

Parameter	Allowable Concentration of Imported Soil/Fill
Volatile Organic Compounds (mg/Kg)	
1,1,1-Trichloroethane	0.68
1,1-Dichloroethane	0.27
1,1-Dichloroethene	0.33
1,2-Dichlorobenzene	1.1
1,2-Dichloroethane	0.02
1,2-Dichloroethene(cis)	0.25
1,2-Dichloroethene(trans)	0.19
1,3-Dichlorobenzene	2.4
1,4-Dichlorobenzene	1.8
1,4-Dioxane	0.1
Acetone	0.05
Benzene	0.06
Butylbenzene	12
Carbon tetrachloride	0.76
Chlorobenzene	1.1
Chloroform	0.37
Ethylbenzene	1
Hexachlorobenzene	1.2
Methyl ethyl ketone	0.12
Methyl tert-butyl ether	0.93
Methylene chloride	0.05
Propylbenzene-n	3.9
Sec-Butylbenzene	11
Tert-Butylbenzene	5.9
Tetrachloroethene	1.3
Toluene	0.7
Trichloroethene	0.47

TABLE 2

RI/IRM/AAR Work Plan

CRITERIA FOR IMPORTED SOIL-FILL

348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

Parameter	Allowable Concentration of Imported Soil/Fill
Volatile Organic Compounds (mg/Kg)	
Trimethylbenzene-1,2,4	3.6
Trimethylbenzene-1,3,5	8.4
Vinyl chloride	0.02
Xylene (mixed)	1.6
Semi-Volatile Organic Compounds (mg/Kg)	
Acenaphthene	98
Acenaphthylene	107
Anthracene	500
Benzo(a)anthracene	1
Benzo(a)pyrene	1
Benzo(b)fluoranthene	1.7
Benzo(g,h,i)perylene	500
Benzo(k)fluoranthene	1.7
Chrysene	1
Dibenz(a,h)anthracene	0.56
Fluoranthene	500
Fluorene	386
Indeno(1,2,3-cd)pyrene	5.6
m-Cresol(s)	0.33
Naphthalene	12
o-Cresol(s)	0.33
p-Cresol(s)	0.33
Pentachlorophenol	0.8
Phenanthrene	500
Phenol	0.33
Pyrene	500

TABLE 2

RI/IRM/AAR Work Plan

CRITERIA FOR IMPORTED SOIL-FILL

348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

Parameter	Allowable Concentration of Imported Soil/Fill
Metals (mg/Kg)	
Arsenic	16
Barium	400
Beryllium	47
Cadmium	7.5
Chromium, Hexavalent[1]	19
Chromium, Trivalent[1]	1500
Copper	270
Cyanide	27
Lead	450
Manganese	2000
Mercury (total)	0.73
Nickel	130
Selenium	4
Silver	8.3
Zinc	2480
PCBs/Pesticides (mg/Kg)	
2,4,5-TP Acid (Silvex)	3.8
4,4'-DDE	17
4,4'-DDT	47
4,4'-DDD	14
Aldrin	0.19
Alpha-BHC	0.02
Beta-BHC	0.09
Chlordane (alpha)	2.9
Delta-BHC	0.25
Dibenzofuran	210
Dieldrin	0.1
Endosulfan I	102

TABLE 2

RI/IRM/AAR Work Plan

CRITERIA FOR IMPORTED SOIL-FILL

348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

Parameter	Allowable Concentration of Imported Soil/Fill
PCBs/Pesticides (mg/Kg)	
Endosulfan II	102
Endosulfan sulfate	200
Endrin	0.06
Heptachlor	0.38
Lindane	0.1
Polychlorinated biphenyls	1

Notes:

1. The SCO for Hexavalent or Trivalent Chromium is considered to be met if the analysis for the total species of this contaminant is below the specific SCO for Hexavalent Chromium.
2. Values per Appendix 5 of DER-10 (May 2010)

TABLE 3

SAMPLE CONTAINER, VOLUME, PRESERVATION &
HOLDING TIME REQUIREMENTS

348 Langner Road Site

West Seneca, New York

Matrix	Parameter [1]	Method [1]	Container Type	Minimum Volume	Preservation (Cool to 2-4 °C for all samples)	Holding Time from Sample Date
Soil/Sediment	TCL + STARS VOCs + MTBE	8260B	WMG	16 oz.	Cool to 2-4 °C, Zero Headspace	14 days
	TCL SVOCs & Tetraethyl Lead	8270C	WMG	16 oz.	Cool to 2-4 °C	14 days extrac./40 days
	TAL Metals & Total Lead	6010B	WMG	4 oz.	Cool to 2-4 °C	6 months/Hg 28 days
	Pesticides	8081	WMG	8oz	Cool to 2-4 °C	14 days extrac./40 days
	Herbicides	8151	WMG	8oz	Cool to 2-4 °C	14 days extrac./40 days
	PCBs	8082	WMG	4 oz.	Cool to 2-4 °C	14 days extrac./40 days
Groundwater	TCL + STARS VOCs + MTBE	8260B	glass vial	3 - 4 oz.	HCl to pH<2, Zero Headspace, Cool to 2-4 °C	14 days
	TCL SVOCs & Tetraethyl Lead	8270C	amber glass	1000 ml	Cool to 2-4 °C	7 days extrac/40 days
	TAL Metals & total Lead	6010B	plastic	600 ml	HNO_3 to pH<2, Cool to 2-4 °C	6 months/Hg 28 days
	PCBs	8082	amber glass	1000 ml	Cool to 2-4 °C	7 days extrac/40 days

References:
1. Test Methods for Evaluating Solid Wastes, USEPA SW-846, Update III, 1991.

Notes:
1. EPA-approved methods published in Reference 1 above may be used. The list of analytes, laboratory method and the method detection limit for each parameter are included in Tables 1 and 2 of the QAPP.

Acronyms:
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
TCL = Target Compound List
TAL = Target Analyte List
WMG = Wide Mouth Glass

TurnKey Environmental Restoration, LLC

TABLE 4

SUMMARY OF FIELD OPERATING PROCEDURES

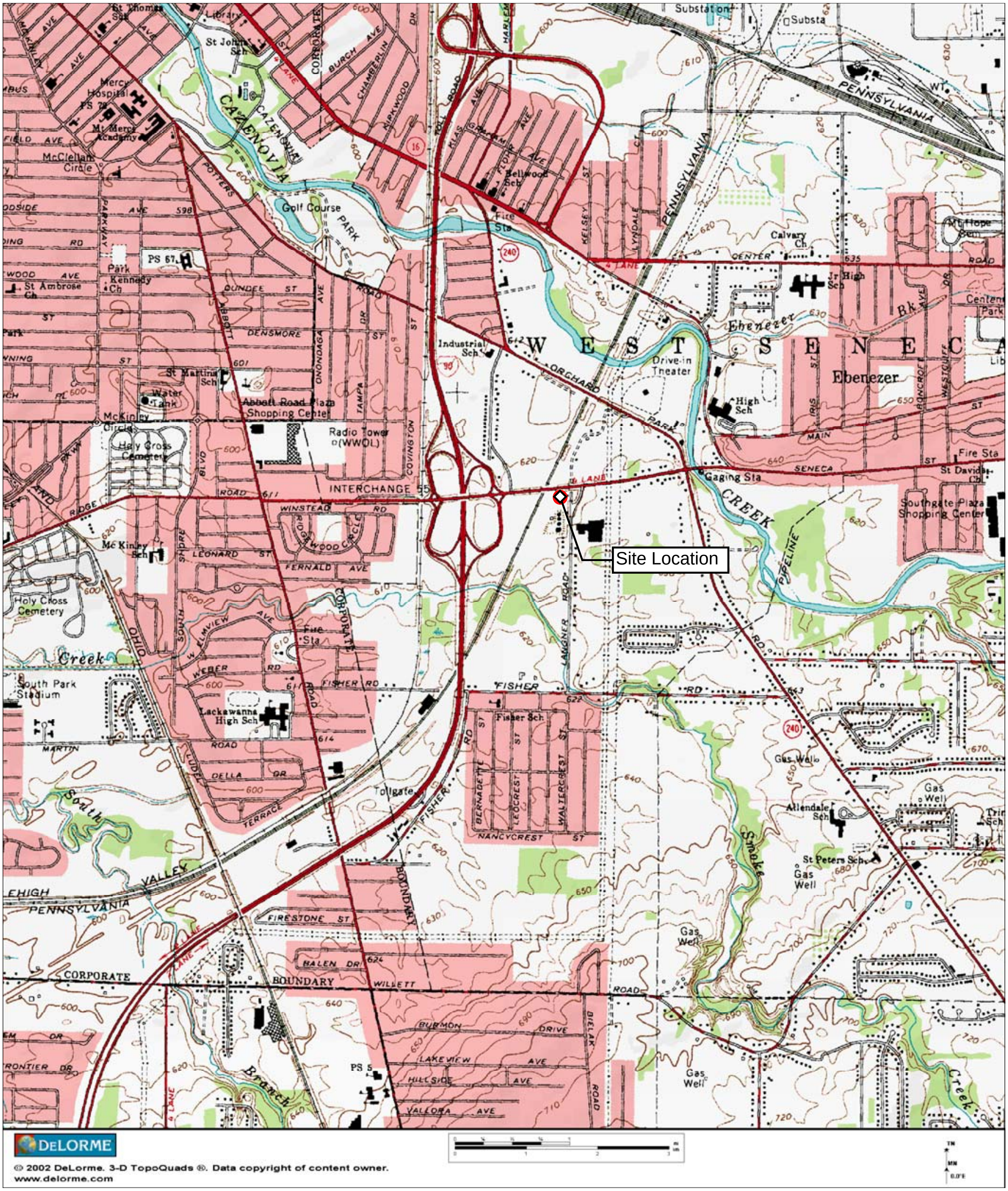
348 Langner Road Site

West Seneca, New York

TurnKey FOP No.	Procedure
001.1	Abandonment of Borehole Procedures
007.0	Calibration and Maintenance of Portable Dissolved Oxygen Meter
008.0	Calibration and Maintenance of Portable Field pH/Eh Meter
009.0	Calibration and Maintenance of Portable Field Turbidity Meter
011.0	Calibration and Maintenance of Portable Photoionization Detector
012.0	Calibration and Maintenance of Portable Specific Conductance Meter
015.0	Documentation Requirements for Drilling and Well Installation
017.0	Drill Site Selection Procedure
018.0	Drilling and Excavation Equipment Decontamination Procedures
021.0	Establishing Horizontal and Vertical Control
022.0	Groundwater Level Measurement
024.0	Groundwater Sample Collection Procedures
026.1	Hollow Stem Auger (HSA) Drilling Procedures
031.1	Low Flow (Minimal Drawdown) Groundwater Purging & Sampling Procedure
032.1	Management of Investigation-Derived Waste (IDW)
033.0	Monitoring Well Construction for Hollow Stem Auger Boreholes
036.0	Monitoring Well Development Procedures
046.0	Sample Labeling, Storage and Shipment Procedures
047.0	Screening of Soil Samples for Organic Vapors During Drilling Activities
054.0	Soil Description Procedures Using The USCS
063.2	Surface and Subsurface Soil Sampling Procedures
073.1	Real-Time Air Monitoring During Intrusive Activities
076.0	"Before Going Into the Field" Procedure
078.0	Geoprobe Drilling Procedure
084.0	Calibration and Maintenance of Portable Particulate Meter

FIGURES

FIGURE 1



SITE LOCATION AND VICINITY MAP

RI/IRM/AAR WORK PLAN

348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

PREPARED FOR

DELTA SONIC

TurnKey Environmental Restoration, LLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

PROJECT NO.: 0123-005-102

DATE: SEPTEMBER 2011

DRAFTED BY: JGT

Base Image per Erie Co. GIS — Parcel Information per Town of West Seneca Assessor Office — Not to Scale

N

TurnKey Environmental Restoration, LLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

PROJECT NO.: 0123-005-102

DATE: SEPTEMBER 2011

DRAFTED BY: JGT

SITE PLAN (AERIAL)

RI/IRM/AAR WORK PLAN

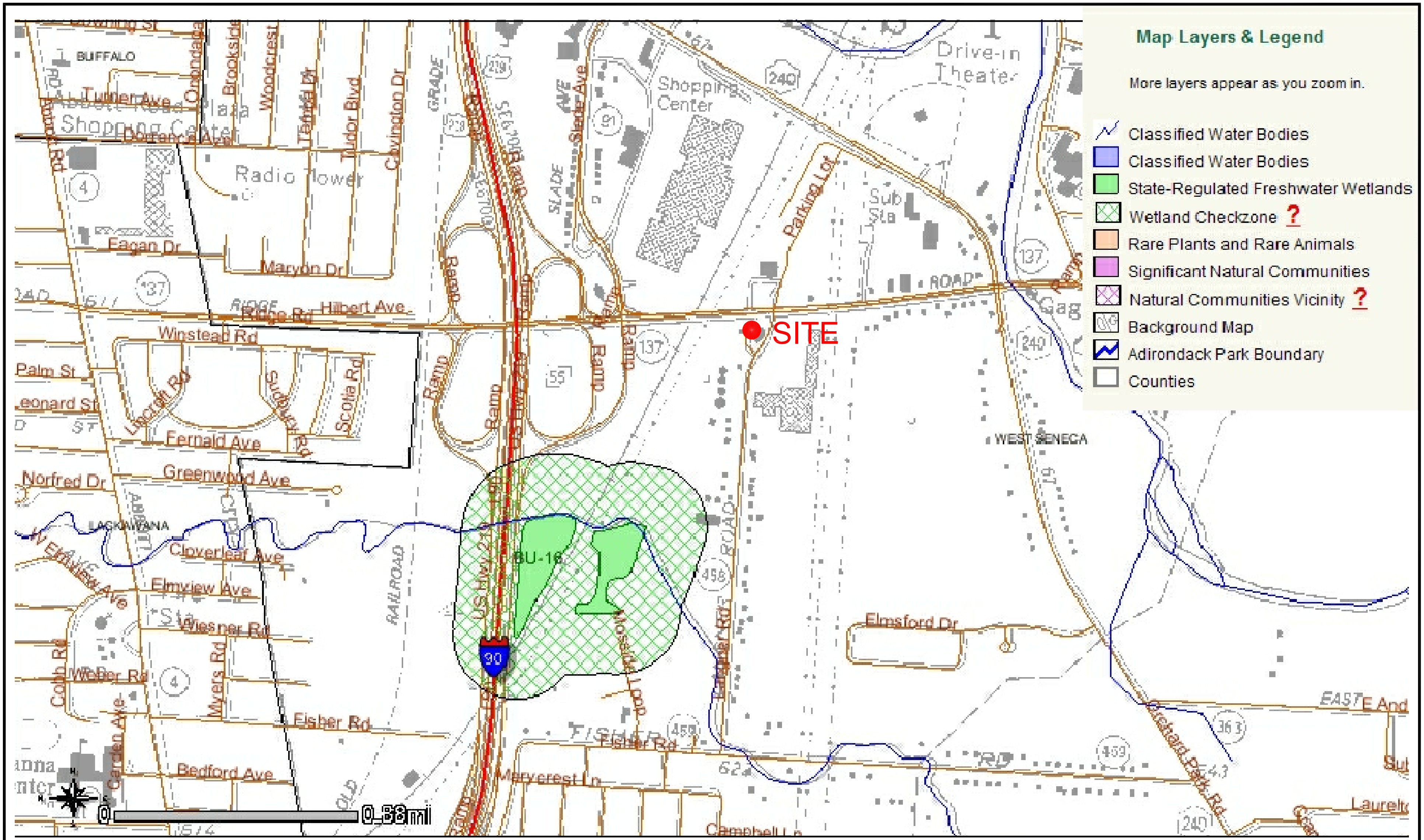
348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

PREPARED FOR

DELTA SONIC

FIGURE 2



TurnKey Environmental Restoration, LLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

PROJECT NO.: 0123-005-102

DATE: SEPTEMBER 2011

DRAFTED BY: JGT

REGIONAL WETLANDS AND FLOODPLAINS

RI/IRM/AAR WORK PLAN

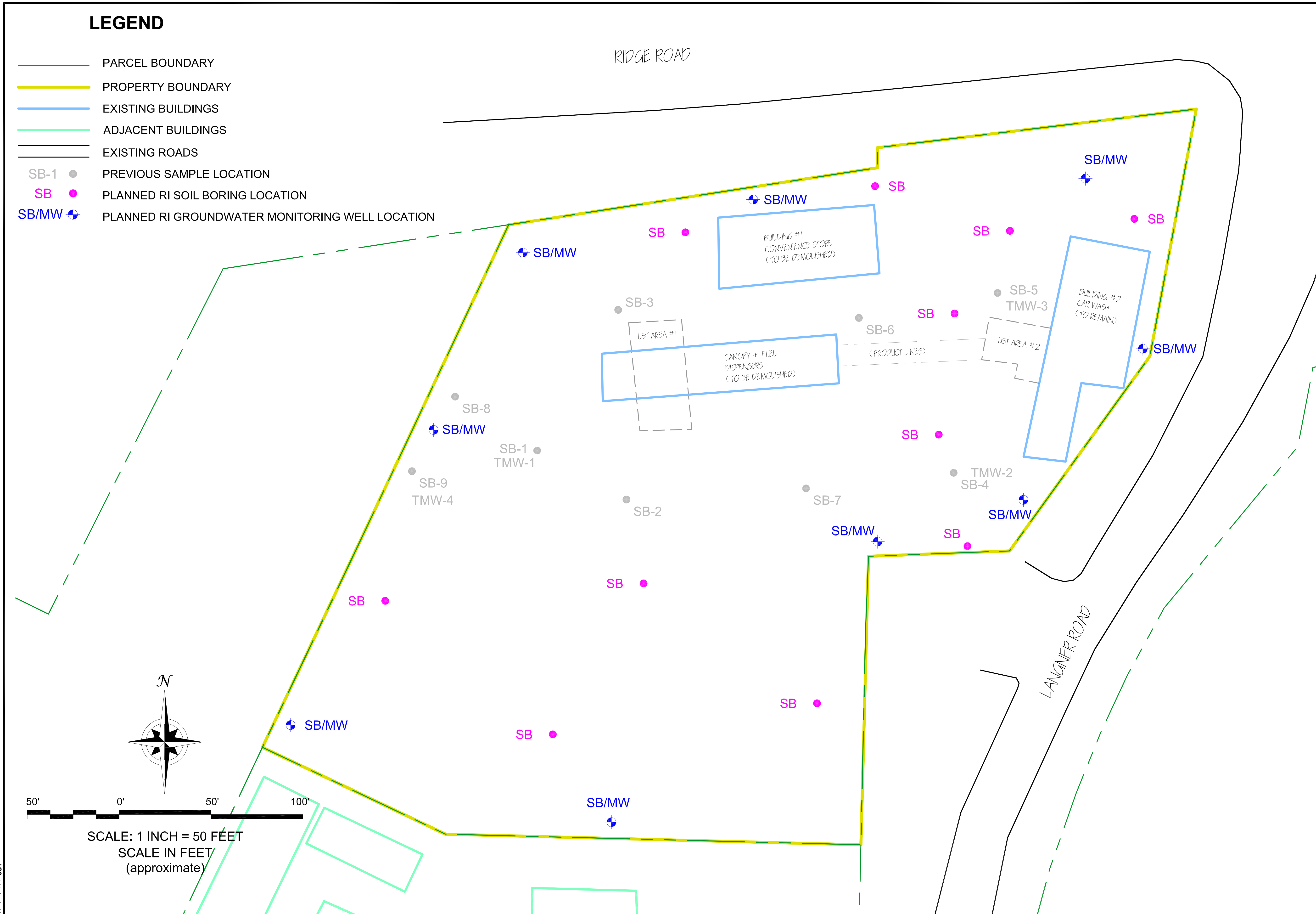
348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

PREPARED FOR

DELTA SONIC

FIGURE 3



2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

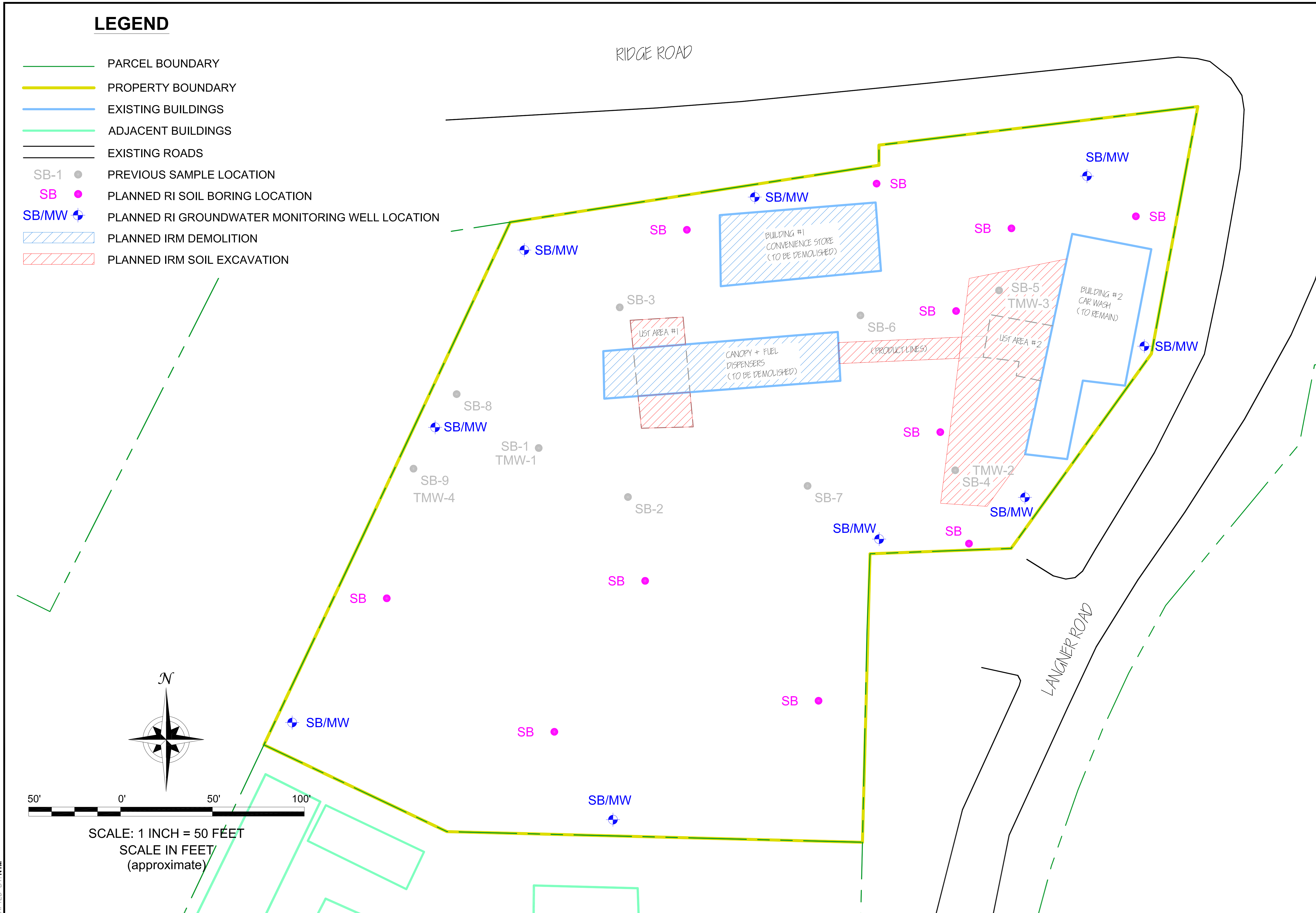
TurnKey Environmental Restoration, LLC

JOB NO.: 0123-005-102

PROPOSED RI SAMPLE LOCATIONS

RI/IRM/AAR WORK PLAN
348 LANGNER ROAD SITE
WEST SENECA, NEW YORK
PREPARED FOR
DELTA-SONIC CARE WASH SYSTEMS, INC.

FIGURE 4



2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

TurnKey Environmental Restoration, LLC

JOB NO.: 0123-005-102

PROPOSED IRM ACTIVITIES

RI/IRM/AAR WORK PLAN

348 LANGNER ROAD SITE

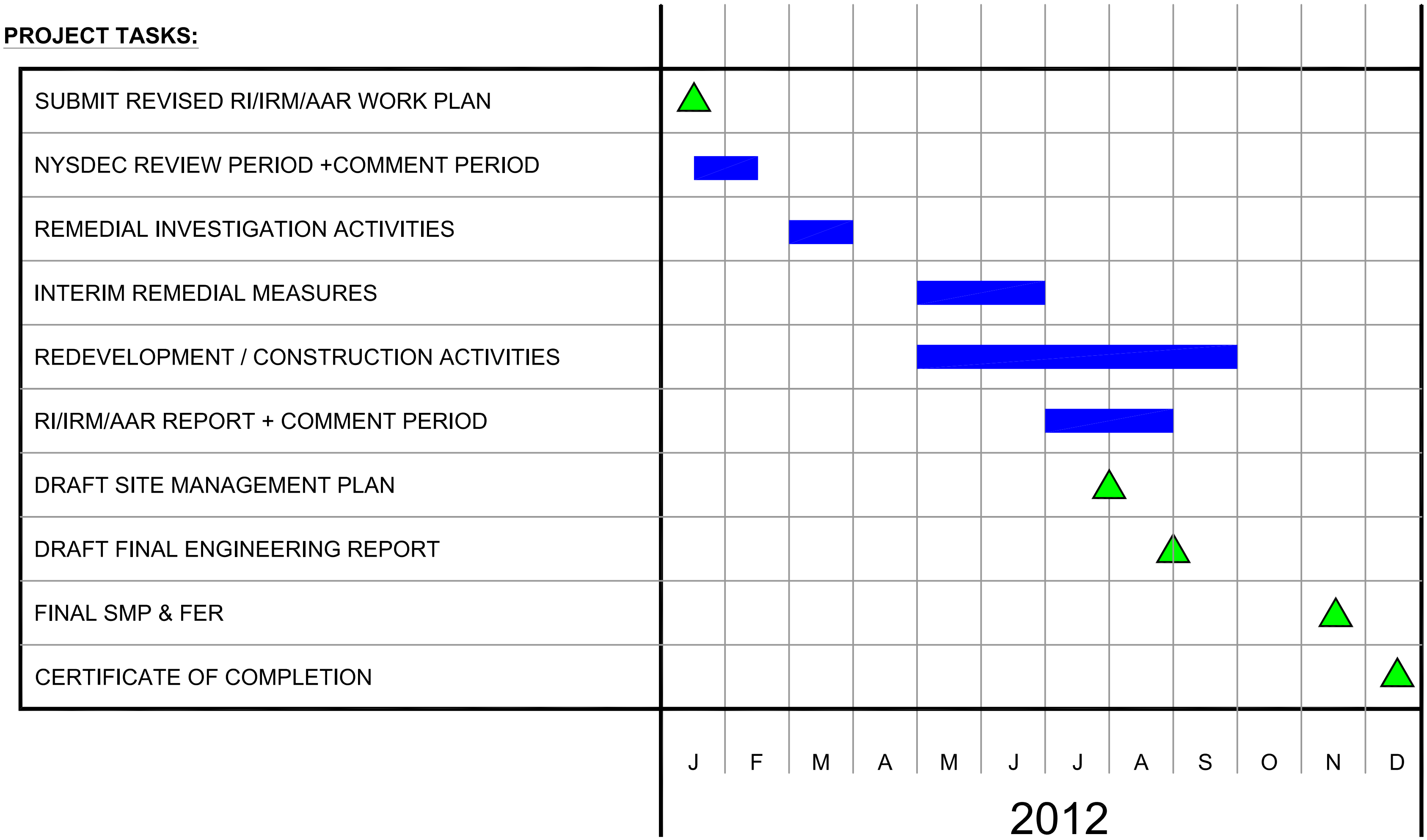
WEST SENCA, NEW YORK

PREPARED FOR

DELTA-SONIC CAR WASH SYSTEMS, INC.

FIGURE 5

DATE: rev JANUARY 2012
DRAFTED BY: NTM



TurnKey Environmental Restoration, LLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

PROJECT NO.: 0123-005-102

DATE: rev JANUARY 2012

DRAFTED BY: NTM

PROJECT SCHEDULE

RI/IRM/AAR WORK PLAN

348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

PREPARED FOR

DELTA-SONIC CAR WASH SYSTMES, INC.

FIGURE 6

APPENDIX A

RESUMES

MICHAEL LESAKOWSKI
PROJECT MANAGER

EDUCATION

Master of Science (Environmental Engineering Science), University of Buffalo, 2008
Bachelor of Science (Biology), State University of New York at Fredonia, 1994

REGISTRATION

40-Hour OSHA Health and Safety Training
Annual 8 Hour OSHA Refreshers
ASTM Training for Commercial Property Transaction Due Diligence

SUMMARY OF EXPERIENCE

Mr. Lesakowski has over 12 years experience in the environmental consulting field at numerous industrial, commercial and hazardous waste sites throughout the northeast United States. A summary of projects Mr. Lesakowski has been involved with include all aspects of New York Brownfield Cleanup Program projects, New York State Superfund Program projects, New York Petroleum Spills Department projects, over 1,000 Phase I Environmental Site Assessments and more than 200 Phase II Site Investigations associated with property acquisition and divestiture and numerous remediation projects ranging from simple underground storage tank (UST) removals to complex groundwater remediation programs. Mr. Lesakowski is proficient in vapor intrusion modeling of chlorinated solvent and petroleum volatile organic compound (VOC) impacted sites. Mr. Lesakowski also has project management and technical consulting experience on several multi-site portfolio environmental due diligence assignments, working with purchasers and lenders to facilitate multi-million dollar real estate transactions. Prior to joining Benchmark, Mr. Lesakowski was a principal in an environmental consulting firm with offices in New York, Pennsylvania, Ohio and Maryland. Mr. Lesakowski is currently managing ten New York Brownfield Cleanup Program sites and several New York Spill Sites. He has managed assessments, investigations and remediation projects on properties with a multitude of historic uses (e.g., petroleum storage terminals, gas stations, automobile dealerships, rail yards, foundries, drycleaners, steel manufacturing, metallurgical plants, metal plating operations, junk yards), media types (surface and subsurface soil, groundwater, sediments, soil vapor, indoor air, building materials) and contaminants (e.g, VOCs, semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), heavy metals).

NEW YORK BROWNFIELD CLEANUP PROGRAM EXPERIENCE

301 Franklin Street Site, Olean, New York

- Recently completed a Remedial Investigation and Interim Remedial Measures for a property located within the ExxonMobil Legacy Site (EMSL) area, which was formerly developed as a petroleum refinery. Contaminants of concern include petroleum VOCs, SVOCs and metals in soil and VOCs and SVOCs and non-aqueous phase liquid (NAPL) in groundwater. The IRM included removal of approximately 3,000-tons of metals- and petroleum-impacted soil and removal of 5,800 linear feet of abandoned subsurface piping. A Remedial Action Work Plan has been prepared that includes: additional limited soil excavation and disposal; removal of subsurface piping and infrastructure; soil vapor extraction; an active subslab depressurization (ASD) system for the planned building; and, a soil cover system. Remedial work is planned for Summer/Fall 2011.

Homer Street Redevelopment Site, Olean, New York

- Recently completed a Remedial Investigation for a property located within the ExxonMobil Legacy Site (EMSL) Works #3 area, which was formerly developed as a petroleum refinery. Contaminants of concern include petroleum VOCs, SVOCs and metals in soil and VOCs and SVOCs in groundwater. Remedial Investigation work completed Spring/Summer 2011 included test pit excavations, soil borings/monitoring wells, surface soil, subsurface soil, sediment, surface water and groundwater sampling and delineation of surficial petroleum contamination.

NOCO S-41 Site, Buffalo, NY and Niagara Street and Pennsylvania Avenue Site, Buffalo, NY

- Recently completed a Remedial Investigation (RI), Interim Remedial Measures (IRM) and Remedial Alternatives Analysis under the NYSDEC Brownfield Cleanup Program for two former gasoline station and automotive repair facilities with significant soil and groundwater petroleum VOC impact. The remediation approach for both sites involves removal of abandoned underground storage tanks, product dispensers and piping, removal of in-ground hydraulic lifts, soil excavation, and extraction and treatment of impacted groundwater. Final Engineering Reports and Site Management Plans were approved by the NYSDEC in December 2009 and Certificates of Completion were also issued in December 2009.

3807 Highland Avenue Site, Niagara Falls, New York

- Completed a Remedial Investigation (RI), Interim Remedial Measures (IRM) and Remedial Alternatives Analysis under the NYSDEC Brownfield Cleanup Program sites at a historic metallurgical facility and steel factory in Niagara Falls, NY. The Remedial Investigation involved collecting over 100 surface and subsurface soil and sediment samples and installing and sampling groundwater monitoring wells on an approximate 25-acre parcel slated for future mixed used commercial and industrial development. IRMs include excavation of chromium-impacted, arsenic-impacted and SVOC-impacted soil in several areas of the Site, drum and tank removal, catch basin and sump cleaning, smoke stack deposits remediation, and chemical waste removal. A Certificate of Completion was issued in June 2010.

1501 College Avenue Site, Niagara Falls, New York

- Currently managing a Remedial Investigation (RI), Interim Remedial Measures (IRM) and Remedial Alternatives Analysis under the NYSDEC Brownfield Cleanup Program sites at a historic heavy industrial facility in Niagara Falls, NY. The Remedial Investigation involved collecting surface and subsurface soil and sediment samples and installing and sampling groundwater monitoring wells on an approximate 15-acre parcel. IRMs include excavation of petroleum-impacted, PCB-impacted and SVOC-impacted soil in several areas of the Site, removal of galbestos PCB-impacted building materials, abandoned/damaged drum removal, chemical waste removal and a soil cover system. A Certificate of Completion is anticipated in summer 2011.

275 Franklin Street Site

- Currently managing a NYSDEC Brownfield Cleanup Program site formerly used as drycleaner in western New York with significant soil and groundwater chlorinated VOC impact. Soil was successfully remediated using soil vapor extraction (SVE) to unrestricted soil cleanup objectives (SCOs) and groundwater remediation involves in-situ treatment of impacted groundwater. An active sub-slab depressurization system design and installation is planned in the new building during construction.

330 Maple Road Site, Amherst, New York

- Managed a Remedial Investigation (RI) and Remedial Alternatives Analysis under the NYSDEC Brownfield Cleanup Program for a small-arms shooting range with significant lead and semi-volatile organic compound (SVOC) impact. The RI involved collecting over 1,000 soil samples on 26-acre parcel slated for future mixed-use commercial and residential development. Bench-scale testing was completed to select a substrate to treat the characteristic hazardous soil to below toxicity characteristic leaching procedure (TCLP) thresholds. A Remedial Action Work Plan, which called for in-situ stabilization of characteristic hazardous soil and off-site disposal was prepared and approved by the NYSDEC. The remediation is planned for Summer 2011.

Seneca Market I, LLC Site, Watkins Glen, New York

- Managed Site Remediation at a former drycleaner, bus garage and asphalt plant under the NYSDEC Brownfield Cleanup Program with significant chlorinated volatile organic compound (cVOC) impact. The remediation approach involved underground tank removal, in-ground hydraulic lift removal, hazardous soil excavation and enhanced biodegradation of groundwater. The Site received its certificate of completion in December 2008. The Property is currently developed with an up-scale hotel. The project is highlighted on NYSDEC website as a Brownfield Success Story.

GLR Holdings Site, Niagara Falls, New York

- Managed a Remedial Investigation (RI), Interim Remedial Measure (IRM) and Remedial Alternatives Analysis under the NYSDEC Brownfield Cleanup Program for a former automotive repair facilty with significant soil and groundwater chlorinated VOC impact. The remediation approach involved negotiated soil and groundwater cleanup objectives, limited soil excavation and enhanced biodegradation of groundwater. The Site received its certificate of completion in February 2008.

2250 Factory Outlet Boulevard Site, Niagara Falls, New York

- Managed Remedial Investigation (RI), Interim Remedial Measure (IRM) and Remedial Alternatives Analysis under the NYSDEC Brownfield Cleanup Program at a former lumber yard with chromium impact in Niagara Falls, NY. The remediation approach involved excavation and off-Site disposal of hazardous and non-hazardous soil. The Site received its certificate of completion in December 2007.

New Seventh Street Site, Buffalo, New York

- Managed the investigation of a former gasoline station and adjacent manufactured gas plant (MGP) as part of one of the largest Brownfield redevelopment projects in western New York. The project involves site redevelopment from a historic MGP site and adjacent gasoline station to a multi-million dollar commercial office complex. Acting on behalf of the developer (Duke Realty) and future tenant (HealthNow New York), preliminary investigations were completed to evaluate the nature and location of contaminants. Subsequent site investigation and remediation was completed via a Remedial Investigation (RI) and Interim Remedial Measures (IRM) under the New York State Brownfield Cleanup Program, saving months and significant cost. As a concurrent assignment, acted as a technical consultant to the developer and future tenant on negotiations and advisement on development of an environmental liability transfer arrangement between the purchaser/tenant (client), seller and a national remediation contractor.

ENVIRONMENTAL LIABILITY TRANSFER EXPERIENCE

- Starting in 2010 through present, took the lead role in developing a liability transfer arrangement of a former refinery in New York State. Major tasks included technical review of historic Remedial Investigation data, remedial alternative selection and cost estimating, preparation of technical and liability transfer program proposal and negotiation with Fortune 100 company technical and business representatives. The deal involves a multi-million dollar remedial cleanup that is planned to be completed under the New York Brownfield Cleanup Program.

- Managed environmental consulting and due diligence activities for a purchaser of 182 gasoline service stations in Maryland, Virginia and Washington, DC. Tasks included Phase I ESAs, remediation cost estimating for sites with known impacts and/or on-going remediation and interfacing with the client’s lenders to facilitate a $110 million dollar real estate transaction. An Environmental Liability Transfer arrangement funded by the seller facilitated the additional environmental investigation and remediation of impacted sites.

- Played a key role in developing a liability transfer agreement for the transfer of a 48-site portfolio of gasoline stations with known petroleum impacts. Tasks included Phase I/Phase scoping, technical report review, oversight of remediation cost estimates and interfacing with the attorneys, insurance brokers, client and property sellers to develop and present the liability transfer arrangement.

- Provided technical consulting on behalf of HealthNow New York and Duke Realty for developing a liability transfer agreement for the transfer of a former manufactured gas plant site and gasoline station with significant soil, groundwater and soil vapor petroleum impacts. Tasks included technical report review, remediation cost estimating and interfacing with the attorneys, insurance brokers, client and property sellers to develop the liability transfer arrangement. Benchmark/TurnKey completed the remediation of the former gasoline station portion of the Site.

APPENDIX B

PREVIOUS INVESTIGATION

(PROVIDED ELECTRONICALLY)

Limited Phase II Site Investigation Report

348 Langner Road
West Seneca, New York

January 2010 0123-005-100

Prepared For:

Delta Sonic Car Wash Systems, Inc.

Prepared By:

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

2558 Hamburg Turnpike, Buffalo, New York | phone: (716) 856-0599 | fax: (716) 856-0583

LIMITED PHASE II ENVIRONMENTAL INVESTIGATION REPORT

January 2010 0123-005-100

Prepared for:

Delta Sonic
570 Delaware Avenue
Buffalo, New York 14202

LIMITED PHASE II ENVIRONMENTAL INVESTIGATION REPORT

348 Langner Road Site

West Seneca, New York

Table of Contents

LIMITED PHASE II ENVIRONMENTAL INVESTIGATION REPORT

348 Langner Road Site

West Seneca, New York

Table of Contents

LIST OF TABLES

LIST OF FIGURES

ATTACHMENT

1.0 BACKGROUND AND SITE DESCRIPTION

Benchmark Environmental Engineering and Science, PLLC (Benchmark) performed a Limited Phase II Environmental Site Investigation at 348 Langner Road, West Seneca, New York (Site; see Figure 1) on behalf of Delta Sonic.

The Site is an approximate 1.87-acre property owned and operated by Delta Sonic, which is currently utilized as a gasoline station, convenience store and car wash. The Site is improved with one convenience store building, one car wash building, four product dispenser islands and two underground storage tank (UST) areas containing a total of eight petroleum USTs (see Figure 2). Based on our review of historical site information and maps, the Site has been a gas station since the 1950s. Prior to the current location of the product dispensers and buildings, the gas station and fuel assets were located in the northeastern portion of the property where the current carwash building sits.

This investigation included: soil borings, installation of four temporary monitoring wells; subsurface soil sampling; and, groundwater sampling.

2.0 METHODS OF INVESTIGATION

2.1 Soil Investigation

On December 9, 2009, Benchmark personnel conducted a subsurface soil investigation at the Site. The subsurface investigation included advancing 9 soil borings and 4 temporary wells in the locations shown on Figure 2.

2.1.1 Soil Borings

Nine soil borings (SB-1 through SB-9) were advanced using a track-mounted direct-push drill rig equipped with an approximate 1.5-inch diameter, 48-inch long macro-core sampler. Soil samples were generally collected within each borehole continuously from the ground surface until approximately 8 to 16 feet below the ground surface (fbgs) (i.e., the target depth), or until equipment refusal was encountered. Any down-hole equipment was decontaminated between boreholes.

The physical characteristics of all soil boring samples were classified using the Unified Soil Classification System (USCS). Benchmark personnel noted any visual and/or olfactory observations, and scanned soils for total volatile organic vapors with a Mini Rae 2000 Photoionization Detector (PID) equipped with a 10.6 eV lamp. Boring logs are presented in Attachment 1.

2.1.2 Soil Sampling

Eight (8) soil samples were collected from the boring macro-cores using dedicated stainless steel sampling tools. Representative soil samples were placed in pre-cleaned sample bottles and submitted under chain-of-custody to Test America Laboratories Inc., for analysis for NYSDEC STARS List Volatile Organic Compounds (VOCs) and STARS List Semi-Volatile Organic Compounds (SVOCs) by Methods 8260B and 8270C, respectively. Analytical soil data is summarized on Table 1.

2.1.3 Temporary Monitoring Wells

Following borehole advancement as described above, one-inch diameter temporary monitoring wells were installed within soil borings SB-1/TMW-1, SB-4/TMW-2, SB-

5/TMW-3 and SB-9/TMW-4. TMW-1 and TWM-2 were installed to an approximate depth of 16 fbgs. TMW-3 was installed to a depth 12 fbgs and TMW-4 was installed to a depth of approximately 8 fbgs.

Groundwater samples were collected using dedicated disposable polyethylene bailers. The samples were transferred into laboratory-provided pre-preserved sample vials for analysis of Target Compound List (TCL) plus NYSDEC STARS List volatile organic compounds (VOCs) via USEPA Method 8260. The samples were cooled to 4 °C in the field, and transported under chain-of-custody to Test America Laboratories, Inc. Analytical groundwater data is summarized on Table 2.

3.0 INVESTIGATION FINDINGS

A summary of the soil sample results from the soil boring are presented in Table 1. For comparison purposes, Table 1 soil analytical results are compared against NYSDEC TAGM #4046 recommended soil cleanup objectives (RSCOs). Table 2 groundwater analytical results are compared to NYSDEC groundwater quality standard (GWQS) per Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. A copy of the laboratory analytical data package is included in Appendix A.

3.1 Field Observations

General

The portion of the property where the car wash building is located is historically where the previous gas station was located on the property. There are two separate tank fields, designated Tank Field 1 and Tank Field 2, which service four pump islands. Tank Field 1 is located in-between the car wash and the pump islands and Tank Field 2 is located on the western side of the pump island underneath the canopy. A storm water drain located south of the pump islands runs the length of the property in an east-west direction.

The Site itself is generally flat; however, a steep embankment is located on the north property boundary to accommodate an elevated portion of Ridge Road that crosses nearby railroad tracks and Interstate Route 90. A utility corridor for power lines and rail road tracks borders the western portion of the Site; this area is flat and low lying with high grassy areas.

Qualitative Soil Screening

Visual and olfactory evidence of impacts as well as elevated PID readings were noted during the investigation. At sample location SB-1/TMW-1, sheening was noted on perched groundwater encountered at the fill/clayey silt interface. At borings SB-4, SB-5 and SB-9, elevated PID readings were noted.

In TurnKey's experience, the visual/olfactory observations and PID measurements are indicative of petroleum impacts in the Tank Field 1 area on the eastern portion of the property, west of the Tank Field 2 area, and on the western portion of the property. Refer to the attached soil boring/monitoring well logs for soil classification for each sample interval, field observations, and PID measurements.

3.2 Geology

The geology encountered at the Site includes four general units, noted in order from the ground surface with increasing depth: asphalt and sub-base (~0 to 0.5 fbgs); non-native fill materials, including fine to coarse sands and fine to coarse gravels with pieces of slag, cinders and brick (~0.5 to 4 fbgs); native soil consisting of grey to brown, moist to wet, silty clay (~4-11 fbgs); and, grey, wet till (~11-16 fbgs). Groundwater was encountered at approximately 8.5 fbgs. Perched groundwater was also noted at sample locations SB-1 and SB-2 at the fill/silty clay interface.

3.3 Soil Analytical Results

Soil analytical results show elevated concentrations of VOCs, and slightly elevated SVOC in subsurface soils on-Site (see Table 1). VOCs were detected above TAGM #4046 RSCOs in SB-4 (2-4) and SB-5 (2-4), and SVOC were detected above TAGM #4046 RSCOs in SB-7 (2-4).

3.4 Groundwater Analytical Results

Elevated concentrations of petroleum-related VOCs above NYSDEC GWQS were detected in temporary monitoring wells TMW-2, TMW-3 and TMW-4. Total VOCs were detected in TMW-2 at a concentration of approximately 13,825 ug/L, in TMW-3 at concentration of approximately 42,879 ug/L and in TMW-4 at a concentration of approximately 50 ug/L.

4.0 CONCLUSIONS

Based on the results of this soil and groundwater investigation, Benchmark offers the following conclusions and recommendations:

- The Site is currently utilized as a gasoline station and carwash. The Site has historically been a gasoline station since the 1950's.
- During the completion of soil borings, stained soils, petroleum-like odors and/or elevated PID readings were noted at sample locations SB-1, SB-4, SB-5 and SB-9. SB-1 and SB-9 are located on the western portion of the Site west of Tank Field 1 and the product dispensers and SB-4 and SB-5 are located on the eastern portion of the Site in the area of the former gasoline station.
- Based on the soil analytical results, petroleum-related compounds were detected above TAGM #4046 RSCOs at concentrations that typically require remediation. The former gasoline station area appears to the most impacted area. Additional investigation is required to delineate the extent of soil impacts.
- Based on the groundwater analytical results, elevated concentrations of petroleum VOCs were detected above NYSDEC GWQS (i.e., up to 42,879 ug/L total VOCs) in the groundwater samples collected from the area of the former gasoline station and west of Tank Field 2. Additional investigation is required to delineate the extent of groundwater impacts.
- Based on the results of this investigation, the NYSDEC was notified and NY Spill No. 09-10758 was assigned to the Site. This report should be forwarded to the NYSDEC for review.
- Benchmark understands that the Site may be redeveloped with a new commercial facility. Consideration should be given to applying for the New York Brownfield Cleanup Program (BCP) prior to Site redevelopment.

5.0 LIMITATIONS

This report has been prepared for the exclusive use of Delta Sonic. The contents of this report are limited to information available at the time of the site investigation activities and to data referenced herein, and assume all referenced information sources to be true and accurate. The findings herein may be relied upon only at the discretion of Delta Sonic. Use of or reliance upon this report or its findings by any other person or entity is prohibited without written permission of Benchmark Environmental Engineering & Science, PLLC.

TABLES

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 1

SUMMARY OF SOIL ANALYTICAL DATA
348 Langner Road, West Seneca, NY
Delta Sonic

PARAMETER	Sample Location								TAGM RSCOs[2]
	SB-01 (2-4)	SB-02 (2-4)	SB-03 (2-4)	SB-04 (2-4)	SB-05 (2-4)	SB-06 (4-6)	SB-07 (2-4)	SB-09 (2-4)	
NYSDEC STARS List VOCs (mg/kg)									
Benzene	ND	ND	ND	0.11	0.078 W1,J	ND	ND	ND	0.06
n-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	0.0027 J	10
sec-Butylbenzene	ND	ND	ND	0.034	0.65 W1	ND	ND	ND	10
Ethylbenzene	ND	ND	ND	21 D08, W1	25 W1,D08	ND	ND	ND	5.5
Isopropylbenzene	ND	ND	ND	0.19	1.6 W1	ND	ND	0.0014 J	2.3
p-Cymene	ND	ND	ND	0.016	0.45 W1	ND	ND	0.0021 J	"--"
n-Propylbenzene	ND	ND	ND	12 D08, W1	7.8 W1	ND	ND	0.0024 J	3.7
Toluene	0.0023 J	0.0033 J	ND	0.24	21 W1,D08	0.0014 J	ND	0.0012 J	1.5
o-Xylene	0.0011 J	ND	ND	43 D08, W1	42 W1,D08	ND	ND	ND	1.2
m-Xylene & p-Xylene	0.0033 J,B	0.0036 J,B	ND	120 D08, W1	110 W1,D08	0.0019 J,B	0.0017 J,B	0.002 J,B	2.4
Methyl tert butyl ether (MTBE)	ND	0.0038 J	ND	ND	ND	ND	ND	ND	0.12
1,2,4-Trimethylbenzene	0.0014 J	ND	ND	35 D08, W1	92 W1,D08	ND	0.0019 J	0.016	10
1,3,5-Trimethylbenzene	ND	ND	ND	120 D08, W1	31 W1,D08	ND	ND	ND	3.3
NYSDEC STARS LIST SVOCs (mg/kg)									
Acenaphthene	ND	ND	ND	ND	ND	ND	0.49 D12,J	ND	50
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	0.25 D12,J	ND	0.224
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	0.34 D12,J	ND	0.22
Chrysene	ND	ND	ND	ND	ND	ND	0.45 D12,J	ND	0.4
Fluoranthene	ND	ND	ND	ND	0.031 J	ND	ND	ND	50
Fluorene	ND	ND	ND	0.25 D10,J	ND	ND	0.98 D12,J	ND	50
Naphthalene	ND	ND	ND	11 D10	0.33	ND	ND	ND	13
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	50
Phenanthrene	ND	ND	ND	0.63 D10,J	0.039 J	ND	2.9 D12,J	0.58 D12,J	50
Pyrene	ND	ND	ND	0.35 D10,J	0.029 J	ND	ND	ND	50

Notes:
1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Values per TAGM 4046 RSCOs.
3. Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparison to RSCOs.

Definitions:
ND = Parameter not detected above laboratory detection limit.
"--" = No RSCO available.
J = Estimated value; result is less than the sample quantization limit but greater than zero.
B = Analyte was detected in the associated method blank.
D08 = Dillution required due to high concentration of target analyte(s).
D10 = Dilution Due to sample color.
D12 = Dilution required due to sample viscosity.
W1 = Sample was prepared and analyzed utilizing the medium level extraction.

Exceeds RSCO

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TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL DATA

348 Langner Road, West Seneca, NY
Delta Sonic

PARAMETER	Sample Location				Class GA Groundwater Quality Standards
	TMW-1	TMW-2	TMW-3	TMW-4	
TCL plus STARS LIST VOCs (ug/L)					
1,2,4-Trimethylbenzene	ND	2200 D08	3600 D08,P11	8.3	5
1,3,5-Trimethylbenzene	ND	690 D08	1100 D08,P11	2.8	5
1,2-Dichloroethane	ND	1.8 P11	ND	ND	5
2-Butanone	ND	12 P11	100	ND	50
Acetone	4.9 J	43 P11	200	6.7	50
Benzene	ND	150 D08	1000 D08,P11	0.52 J	1
Cyclohexane	ND	ND	1500 D08,P11	6.2	--
Ethylbenzene	ND	1300 D08	3200 D08,P11	3	5
Isopropylbenzene	ND	56 P11	76	ND	5
Methylcyclohexane	ND	33 P11	470 D08,P11	2.7	--
n-Propylbenzene	ND	210 D08	420 D08,P11	1.2	5
o-Xylene	ND	2800 D08	5200 D08,P11	4	5
p-Cymene	ND	3.3 P11	5.4	ND	5
m-Xylene & p-Xylene	ND	6100 D08	13000 D08,P11	11	10
sec-Butylbenzene	ND	6.3 P11	8	ND	5
Toluene	ND	220 D08	13000 D08,P11	3.5	5
Total VOCs (mg/L)	4.9	13825.4	42879.4	49.92	

Notes:

1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Values per NYSDEC Class GA groundwater Quality Standards (GWQS).

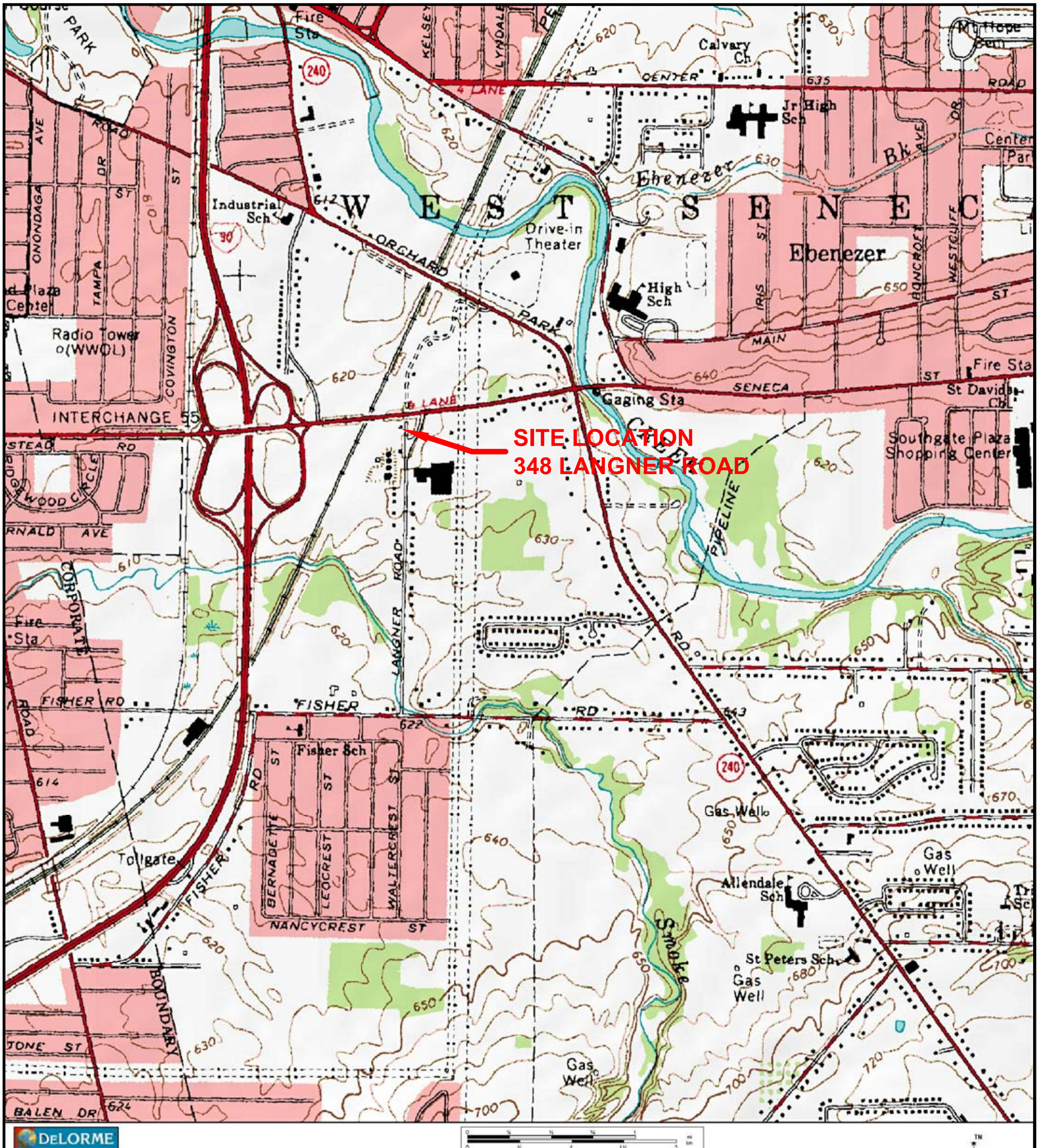
Definitions:

ND = Parameter not detected above laboratory detection limit.
"--" = No GWQS available.
J = Estimated value; result is less than the sample quantization limit but greater than zero.
P11= Sample was not sufficiently preserved at time of collection.
D08 = Dillution required due to high concentration of target analyte(s).

Exceeds RSCO

FIGURES

FIGURE 1



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SITE LOCATION AND VICINITY MAP

348 LANGNER ROAD

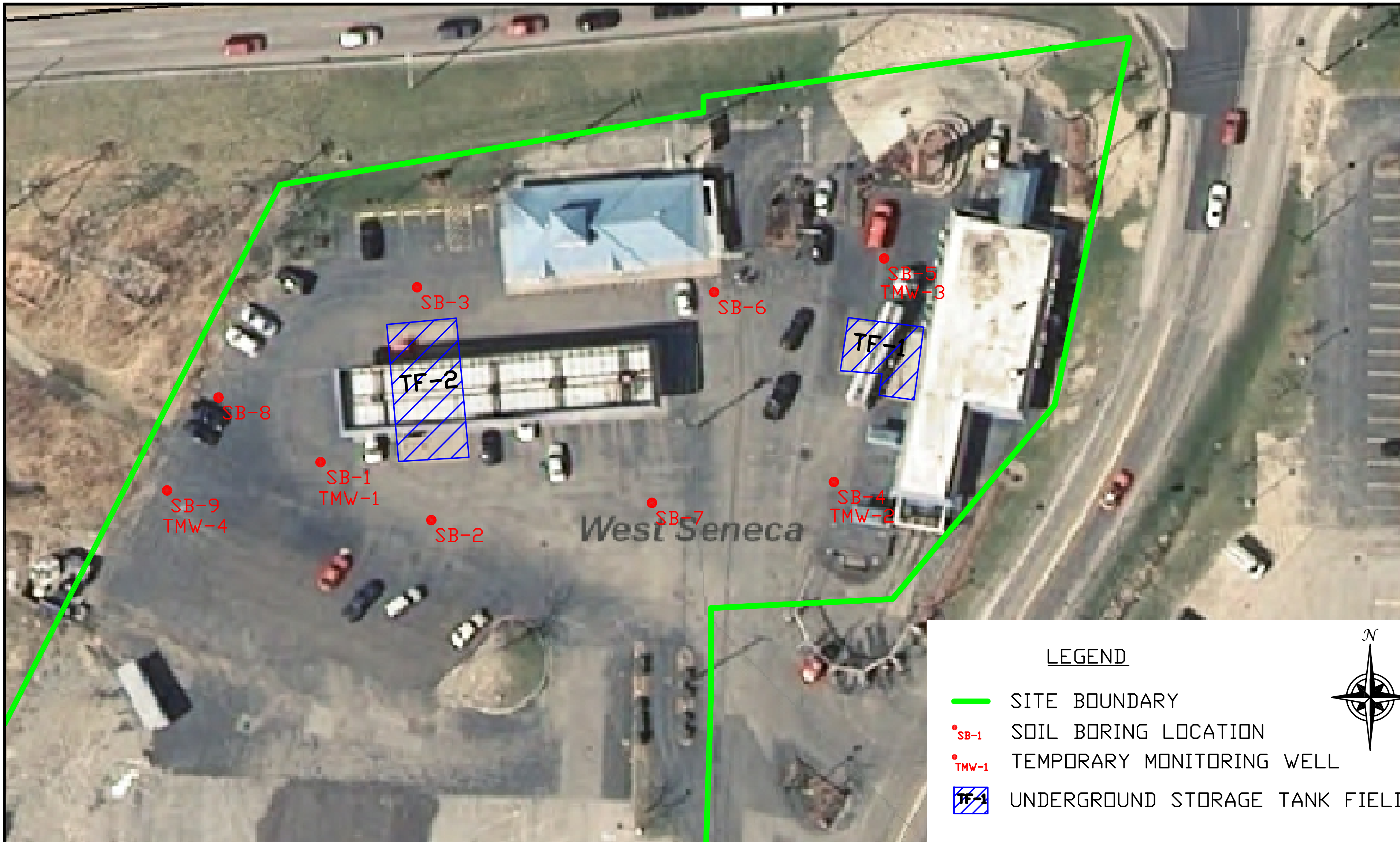
348 LANGNER ROAD
WEST SENECA, NEW YORK

PREPARED FOR
DELTA SONIC

PROJECT NO.: 0123-005-100

DATE: DECEMBER 2009

DRAFTED BY: JCT



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PROJECT NO.: 0123-005-100

DATE: DECEMBER 2009

DRAFTED BY: JCT

SITE PLAN

348 LANGNER ROAD

348 LANGNER ROAD
WEST SENECA, NEW YORK
PREPARED FOR
DELTA SONIC

FIGURE 2

ATTACHMENT 1

BORING LOGS AND WELL COMPLETION DETAILS

Project No: 0123-005-100

Borehole Number: SB - 1

Project: Delta Sonic Phase II

Client: Delta Sonic

Site Location: 348 Langner Rd, West Seneca

Logged By: TAB

Checked By: BCH

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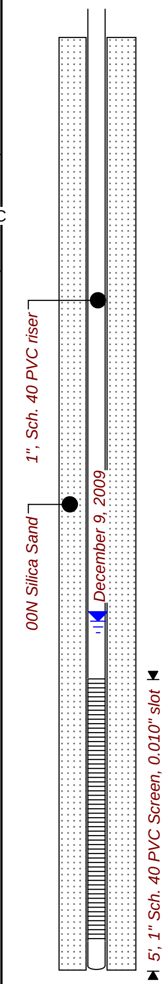
SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 – 12.5 – 25)	Lab Sample	Well Completion Details or Remarks
	0.0	Ground Surface							
0.0	0.0 / 0.0	***Asphalt and Subbase*** Black/grey non plastic fines, with fine to coarse sand and some coarse and fine gravel, dense, loose when disturbed.					0.0		
	-1.0 / 1.0	***Fill*** Black, moist to wet (3.0 fbgs) non plastic fines, some coarse sands, dense, with orange brick, slight sheen.	1		3.2		0.0	STARS VOC & STARS SVOC	
	-3.0 / 3.0	***Silty Clay*** Brown, moist, medium to high plasticity fines, little sand , few coarse sand. very stiff, high plasticity.							
5.0	-4.0 / 4.0	***Silty Clay*** As above, very stiff.	2		2.8		0.0 / 0.0		
10.0	-8.0 / 8.0	***Silty Clay*** As above, wet, few fine gravel, some fine sand, very stiff to soft,	3		3.0		0.0 / 0.0		
	-11.0 / 11.0	***Till*** Grey, wet, masssive, fines with some fine sand, with few sub-rounded fine gravel's, soft, high plasticity,							
15.0	-12.0 / 12.0	***Till*** As above, brown.	4		1.0		0.0 / 0.0		
	-16.0 / 16.0	End of Borehole							



Drilled By: Russo Development
Drill Rig Type: Geo-probe
Drill Method: Direct Push

Drill Date(s): 12/9/09

Hole Size: 2-inch
Stick-up: na
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0123-005-100	**Borehole Number: SB -2**
Project: Delta Sonic Phase II	
Client: Delta Sonic	**Logged By:** TAB
Site Location: 348 Langner Rd, West Seneca	**Checked By:** BCH

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SUBSURFACE PROFILE			SAMPLE				PID VOCs ppm (0 – 12.5 – 25)	Lab Sample	Well Completion Details or Remarks
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol			
0.0	0.0 / 0.0	Ground Surface							
	-1.0 / 1.0	***Asphalt and subbase*** Black/grey non plastic fines, with fine to coarse sand and some coarse and fine gravel, dense, loose when disturbed.	1		2.8				
	-3.0 / 3.0	***Fill*** Black moist to wet (3.0 fbgs) non-plastic fines, w/ some coarse sands, w/ orange brick, dense.							
	-4.0 / 4.0	***Silty Clay*** Brown, moist, silty clay, little sand , few coarse sand and fine gravel.							
5.0	-8.0 / 8.0	***Silty Clay*** As above very dense, high plasticity.	2		3.3				*December 9, 2009*
10.0	-11.0 / 11.0	***Silty Clay*** As above few fine gravel, wet some fine sand.	3		3.1				
	-12.0 / 12.0	***Till*** Grey, wet, high plasticity fines w/ some fine sand, few sub rounded fine gravel, soft.							
15.0	-16.0 / 16.0	***Till*** As above.	4		1.2				
		End of Borehole							
20.0									

Drilled By: Russo Development	***Hole Size: 2-inch***
Drill Rig Type: Geo-probe	***Stick-up: na***
Drill Method: Direct Push	***Datum: Mean Sea Level***
Drill Date(s): 12/9/09	***Sheet: 1 of 1***

Project No: 0123-005-100

Borehole Number: SB-3

Project: Delta Sonic Phase II

Client: Delta Sonic

Site Location: 348 Langner Rd, West Seneca, NY

Logged By: TAB

Checked By: BCH

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SUBSURFACE PROFILE / SAMPLE

Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	PID VOCs ppm (0 – 12.5 – 25)	Lab Sample	Well Completion Details or Remarks
0.0	0.0 / 0.0	Ground Surface						
	0.0 / 0.0 to -1.0 / 1.0	***Asphalt and Subbase*** Black/grey non plastic fines, with fine to coarse sand and some coarse and fine gravel, dense, loose when disturbed.	1		3.3	0.0		
	-1.0 / 1.0 to -4.0 / 4.0	***Fill (reworked)*** Brown, moist, dense, non-plastic fines, some fine to coarse sands and fine to coarse gravels.				0.0	STARS VOC & STARS SVOC	
5.0	-4.0 / 4.0 to -8.0 / 8.0	***Silty Clay*** Brown, moist, high plasticity fines, stiff.	2		.8	0.0, 0.0		
10.0	-8.0 / 8.0 to -11.0 / 11.0	***Silty Clay*** As above, moist to wet w/ trace fine sand, very stiff.	3		3.5	0.0, 0.0		December 9,2009
	-11.0 / 11.0 to -12.0 / 12.0	***Till*** Grey, wet, high plasticity fines w/ some fine sand, with few sub rounded fine gravels, soft, high plasticity.						
15.0	-12.0 / 12.0 to -16.0 / 16.0	***Till*** As above.	4		2.4	0.0, 0.0		
	-16.0 / 16.0	End of Borehole						
20.0								

Drilled By: Russo Development	***Hole Size: 2-inch***
Drill Rig Type: Geo-probe	***Stick-up: NA***
Drill Method: Direct Push	***Datum: Mean Sea Level***
Drill Date(s): 12/9/09	***Sheet: 1 of 1***

Project No: 0123-005-100

Borehole Number: SB-4

Project: Delta Sonic Phase II

Client: Delta Sonic

Site Location: 348 Langner Road, West Seneca, NY

Logged By: TAB

Checked By: BCH

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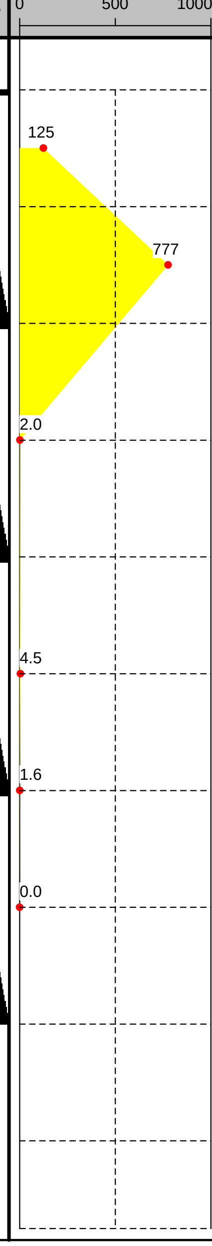
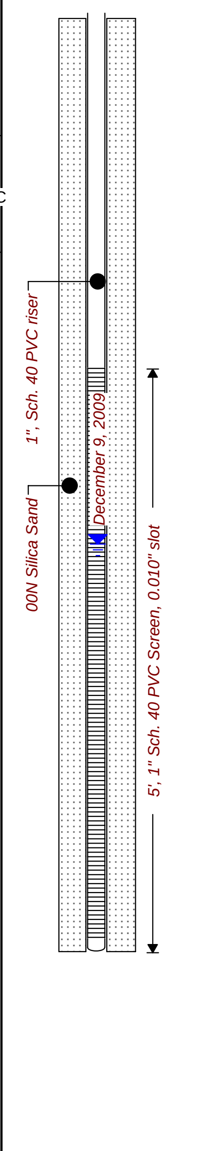
SUBSURFACE PROFILE			SAMPLE				PID VOCs ppm (0 – 500 – 1000)	Lab Sample	Well Completion Details or Remarks
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol			
	0.0	Ground Surface							
0.0	0.0	**Asphalt and Subbase** Black/grey non plastic fines, with fine to coarse sand and some coarse and fine gravel, dense, loose when disturbed.	1		3.4		125		
	-1.0 / 1.0	**Fill** Brown/black, moist, fill, medium plasticity fines, with orange and yellow brick, strong odor at bottom.					777	STARS VOC & SVOC	
	-4.0 / 4.0	**Silty Clay** Olive green, moist, high plasticity fines, with little fine sand, stiff, high plasticity, fine to coarse sand wet seam at 5.0 fbgs with strong odor.	2		3.2				
5.0							2.0		
	-6.0 / 6.0	**Silty Clay** As above, brown, slight odor.							
	-8.0 / 8.0	**Silty Clay** As above, wet, with some fine sand, with few sub-rounded fine gravel, soft.	3		2.6				
10.0							4.5		
	-12.0 / 12.0	**Till** Grey, wet, medium plastic fines with some fine sand, with few sub rounded gravels.	4		2.2		1.6		
							0.0		
15.0									
	-16.0 / 16.0	End of Borehole							





Drilled By: Russo Redevelopment
Drill Rig Type: Geo-probe
Drill Method: Direct Push

Drill Date(s): 12/9/09

Hole Size: 2-inch
Stick-up: .1-inch
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0123-005-100

Borehole Number: SB-5

Project: Delta Sonic Phase II

Client: Delta Sonic

Site Location: 348 Langner Rd, West Seneca NY

Logged By: TAB

Checked By: BCH

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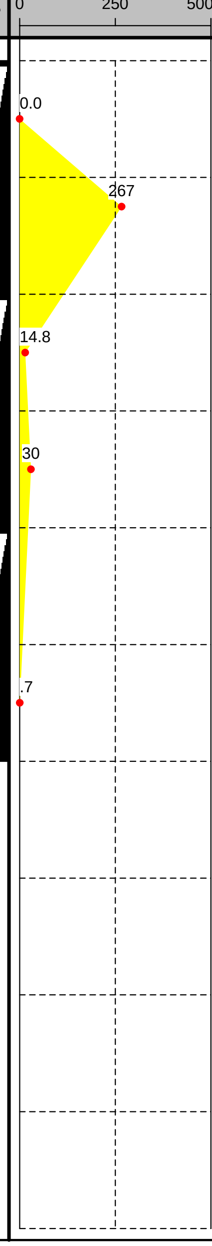
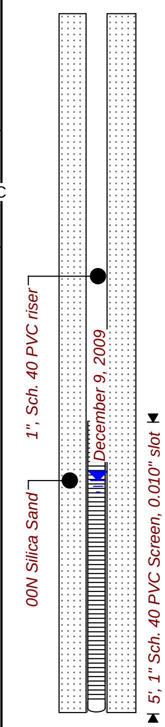
SUBSURFACE PROFILE / SAMPLE

Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Lab Sample
	0.0	Ground Surface				
0.0	0.0 / -1.5 / 1.5	**Asphalt and Sub Base** Black/grey non plastic fines, with fine to coarse sand and some coarse and fine gravel, dense, loose when disturbed.				
	1.5 / -3.0 / 3.0	**Fine Sand** Black to brown, wet, fine sand, rapid dilatancy, odor.	1		2.6	STARS VOC & STARS SVOC
	3.0 / -4.0 / 4.0	**Silty Clay** Dark brown, moist, high plasticity fines, trace fine sand, stiff.				
5.0	4.0 / -8.0 / 8.0	**Silty Clay** Brown, wet, high plasticity fines, little fine sand, trace coarse sand, soft.	2		1.5	
10.0	8.0 / -12.0 / 12.0	**Till** Brown, wet, high plasticity fines with some fine sand, few sub -rounded gravel, soft.	3		3.0	
15.0	12.0	End of Borehole				
20.0						

PID VOCs (ppm)



Well Completion Details or Remarks



Drilled By: Russo Development
Drill Rig Type: Geo-probe
Drill Method: Direct push

Drill Date(s): 12/9/09

Hole Size: 2-inch
Stick-up: 0.5 - inch
Datum: Mean Sea level

Sheet: 1 of 1

Project No: 0123-005-100

Borehole Number: SB-6

Project: Delta Sonic Phase II

Client: Delta Sonic

Site Location: 348 Langner Road, West Seneca NY

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Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 1000 / 2000)	Lab Sample	Well Completion Details or Remarks
0.0	0.0 / 0.0	Ground Surface							
	-0.7 / 0.7	**Asphalt and sub base,** Black grey, non plastic fines with coarse sand and fine gravel, dense, loose when disturbed.	1		2.5				
	-2.0 / 2.0	**Fill (reworked)** Brown, moist, non plastic fines, with some fine sand, with coarse limestone peices and cinders, medium dense.							
	-4.0 / 4.0	**Silty Clay** Brown, moist to wet at interface, high plasticity fines, with trace fine sand, very stiff.						STARS VOC & SVOC	
5.0	-8.0 / 8.0	**Till** As above, trace coarse sand and trace sub-rounded fine gravel.	2		3.5				December 9, 2009
10.0	-12.0 / 12.0	**Till** As above, wet, with few fine sand, few sub rounded gravel.	3		3				
15.0		End of Borehole							
20.0									

Drilled By: Russo Development
Drill Rig Type: Geoprobe
Drill Method: Direct Push

Drill Date(s): 12/9/09

Hole Size: 2-inch
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0123-005-100

Borehole Number: SB-7

Project: Delta Sonic Phase II

Client: Delta Sonic

Site Location: 348 Langner Rd, West Seneca NY

Logged By: TAB

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Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	PID VOCs (ppm)	Lab Sample	Well Completion Details or Remarks
0.0	0.0 / 0.0	Ground Surface						
	0.0 / 0.0	**Asphalt and sub base** Black/grey non plastic fines, with fine to coarse sand and some coarse and fine gravel, dense, loose when disturbed.				0.0		
	-1.0 / 1.0	**Silty Clay** Black to olive green,moist, high plasticity fines with few fine sand, stiff, with rootlets.	1		2.9	1.0	STARS SVOC & VOC	
5.0	-4.0 / 4.0	**Till** As above, brown with some fine sand, few sub angular and sub rounded fine gravels, no rootlets.	2		1.6	0.0, 0.0		December 9, 2009
10.0	-8.0 / 8.0	**Till** as above, wet, few fine gravel, refusal at 11.6 fbgs	3		2.0	0.0, 0.0		
	-11.6 / 11.6	End of Borehole						
15.0								
20.0								

PID VOCs scale: 0 – 12.5 – 25 ppm

Drilled By: Russo Development
Drill Rig Type: Geoprobe
Drill Method: Direct push

Drill Date(s): 12/9/09

Hole Size: 2-inch
Stick-up: NA
Datum: Mean Sea Level.

Sheet: 1 of 1

Project No: 0123 - 005 - 100

Borehole Number: SB -8

Project: Delta Sonic Phase II

Client: Delta Sonic

Site Location: 348 Langner Road, West Seneca NY

Logged By: TAB

Checked By: BCH

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SUBSURFACE PROFILE			SAMPLE				PID VOCs (ppm) 0 / 12.5 / 25	Lab Sample	Well Completion Details or Remarks
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol			
0.0	0.0 0.0	Ground Surface							
	-1.0 1.0	***Asphalt and subbase*** Black/grey non plastic fines, with fine to coarse sand and some coarse and fine gravel, dense, loose when disturbed.							
	-4.0 4.0	***Fill (reworked)*** Brown/black, moist, low plasticity fines, with some fine sand and coarse sand, few coarse gravels, dense.	1		2.8				
5.0	-8.0 8.0	***Silty Clay*** Brown, moist, medium plastic fines w/ trace fine sand, grey vertical grey fine sand f filled factures, very stiff.	2		1.6				
10.0 15.0 20.0		End of Borehole							

Drilled By: Russo Development
Drill Rig Type: Geoprobe
Drill Method: Direct Push

Drill Date(s): 12/9/09

Hole Size: 2-inch
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0123 - 005 - 100

Borehole Number: SB - 9

Project: Delta Sonic Phase II

Client: Delta Sonic

Site Location: 348 Langner Rd, West Seneca, NY

Logged By: TAB

Checked By: BCH

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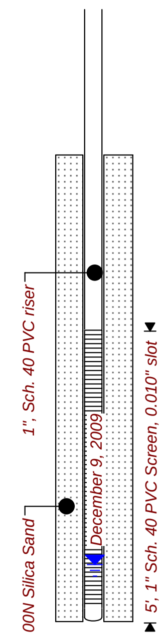
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	PID VOCs ppm (0 – 12.5 – 25)	Lab Sample
-4.0							
	0.0 / 0.0	Ground Surface					
	0.0	**Asphalt and Subbase** Black/grey, non plastic fines, with fine to coarse sand and some coarse and fine gravel, dense, loose when disturbed.					
1.0	-1.0 / 1.0	**Fill** Olive green grey, moist, high plasticity fines with cinders and slag pieces, very dense, sight odor.	1		3,0	0.0; 7.4	STARS SVOC & VOC
	-4.0 / 4.0	**Silty Clay** Brown, moist to wet, high plasticity with trace fine sand, stiff to soft, high placticity.	2		3.2	0.0; 0.0	
6.0							
	-8.0 / 8.0	End of Borehole					
11.0							
16.0							

Well Completion Details or Remarks



Drilled By: Russo Development
Drill Rig Type: Geoprobe
Drill Method: Direct Push

Drill Date(s): 12/9/09

Hole Size: 2-inch
Stick-up: 3.5
Datum:

Sheet: 1 of 1

ATTACHMENT 2

LABORATORY ANALYTICAL DATA SUMMARY PACKAGE

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

Analytical Report

Work Order: RSL0550

Project Description

Benchmark- Langner Rd. Delta Sonic

For:

Mike Lesakowski

Benchmark Environmental & Engineering Science

2558 Hamburg Turnpike, Suite 300

Lackawanna, NY 14218

Brian Fischer

Project Manager

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Tuesday, December 22, 2009

TestAmerica Buffalo
Current Certifications

As of 1/27/2009

STATE	Program	Cert # / Lab ID
Arkansas	CWA, RCRA, SOIL	88-0686
California*	NELAP CWA, RCRA	01169CA
Connecticut	SDWA, CWA, RCRA, SOIL	PH-0568
Florida*	NELAP CWA, RCRA	E87672
Georgia*	SDWA,NELAP CWA, RCRA	956
Illinois*	NELAP SDWA, CWA, RCRA	200003
Iowa	SW/CS	374
Kansas*	NELAP SDWA, CWA, RCRA	E-10187
Kentucky	SDWA	90029
Kentucky UST	UST	30
Louisiana*	NELAP CWA, RCRA	2031
Maine	SDWA, CWA	NY0044
Maryland	SDWA	294
Massachusetts	SDWA, CWA	M-NY044
Michigan	SDWA	9937
Minnesota	SDWA,CWA, RCRA	036-999-337
New Hampshire*	NELAP SDWA, CWA	233701
New Jersey*	NELAP,SDWA, CWA, RCRA,	NY455
New York*	NELAP, AIR, SDWA, CWA, RCRA,CLP	10026
Oklahoma	CWA, RCRA	9421
Pennsylvania*	NELAP CWA,RCRA	68-00281
Tennessee	SDWA	02970
Texas*	NELAP CWA, RCRA	T104704412-08-TX
USDA	FOREIGN SOIL PERMIT	S-41579
USDOE	Department of Energy	DOECAP-STB
Virginia	SDWA	278
Washington*	NELAP CWA,RCRA	C1677
Wisconsin	CWA, RCRA	998310390
West Virginia	CWA,RCRA	252

*As required under the indicated accreditation, the test results in this report meet all NELAP requirements for parameters for which accre ditation is required or available. Any exceptions to NELAP requirements are noted in this report.

CASE NARRATIVE

According to 40CFR Part 136.3, pH, Chlorine Residual, Dissolved Oxygen, Sulfite, and Temperature analyses are to be performed immediately after aqueous sample collection. When these parameters are not indicated as field (e.g. field-pH), they were not analyzed immediately, but as soon as possible after laboratory receipt.

A pertinent document is appended to this report, 1 page, is included and is an integral part of this report.

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TestAmerica Laboratories, Inc. certifies that the analytical results contained herein apply only to the samples tested as received by our Laboratory.

DATA QUALIFIERS AND DEFINITIONS

B	Analyte was detected in the associated Method Blank.
D08	Dilution required due to high concentration of target analyte(s)
D10	Dilution required due to sample color
D12	Dilution required due to sample viscosity
J	Analyte detected at a level less than the Reporting Limit (RL) and greater than or equal to the Method Detection Limit (MDL). Concentrations within this range are estimated.
M8	The MS and/or MSD were below the acceptance limits. See Blank Spike (LCS).
P11	Sample was not sufficiently preserved at time of collection. Sample pH is >2
W1	Sample was prepared and analyzed utilizing the medium level extraction.
NR	Any inclusion of NR indicates that the project specific requirements do not require reporting estimated values below the laboratory reporting limit.

ADDITIONAL COMMENTS

Results are reported on a wet weight basis unless otherwise noted.

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Executive Summary - Detections

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-01 (SB-1(2-4) - Solid)					**Sampled: 12/09/09 15:30**			**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**1.4**	J	5.4	0.39	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
m-Xylene & p-Xylene	**3.3**	J, B	11	0.91	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
o-Xylene	**1.1**	J	5.4	0.71	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
Toluene	**2.3**	J	5.4	0.41	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
Xylenes, total	**4.4**	J, B	11	0.91	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
General Chemistry Parameters										
Percent Solids	**91**		0.010	NR	%	1.00	12/11/09 13:18	JRR	9L11027	Dry Weight
Sample ID: RSL0550-02 (SB-2(2-4) - Solid)					**Sampled: 12/09/09 16:34**			**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
Methyl-t-Butyl Ether (MTBE)	**3.8**	J	6.2	0.61	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
m-Xylene & p-Xylene	**3.6**	J, B	12	1.0	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
Toluene	**3.3**	J	6.2	0.47	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
Xylenes, total	**3.6**	J, B	12	1.0	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
General Chemistry Parameters										
Percent Solids	**80**		0.010	NR	%	1.00	12/11/09 13:20	JRR	9L11027	Dry Weight
Sample ID: RSL0550-03 (SB-3(2-4) - Solid)					**Sampled: 12/09/09 16:42**			**Recvd: 12/10/09 11:20**		
General Chemistry Parameters										
Percent Solids	**93**		0.010	NR	%	1.00	12/11/09 13:22	JRR	9L11027	Dry Weight
Sample ID: RSL0550-04 (SB-4(2-4) - Solid)					**Sampled: 12/09/09 10:28**			**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
p-Cymene	**16**		6.4	0.51	ug/kg dry	1.00	12/11/09 23:39	CDC	9L11117	8260B
Benzene	**110**		6.4	0.31	ug/kg dry	1.00	12/11/09 23:39	CDC	9L11117	8260B
Isopropylbenzene	**190**		6.4	0.96	ug/kg dry	1.00	12/11/09 23:39	CDC	9L11117	8260B
sec-Butylbenzene	**34**		6.4	0.55	ug/kg dry	1.00	12/11/09 23:39	CDC	9L11117	8260B
Toluene	**240**		6.4	0.48	ug/kg dry	1.00	12/11/09 23:39	CDC	9L11117	8260B
Semivolatile Organics by GC/MS										
Fluorene	**250**	D10,J	2200	50	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Naphthalene	**11000**	D10	2200	36	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Phenanthrene	**630**	D10,J	2200	46	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Pyrene	**350**	D10,J	2200	14	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
General Chemistry Parameters										
Percent Solids	**77**		0.010	NR	%	1.00	12/11/09 13:24	JRR	9L11027	Dry Weight
Sample ID: RSL0550-04RE1 (SB-4(2-4) - Solid)					**Sampled: 12/09/09 10:28**			**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**120000**	D08, W1	2600	190	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B
1,3,5-Trimethylbenzene	**35000**	D08, W1	2600	170	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B
Ethylbenzene	**21000**	D08, W1	2600	180	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B
m-Xylene & p-Xylene	**120000**	D08, W1	5200	440	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B

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Executive Summary - Detections

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-04RE1 (SB-4(2-4) - Solid) - cont.						**Sampled: 12/09/09 10:28**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B - cont.										
n-Propylbenzene	**12000**	D08, W1	2600	210	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B
o-Xylene	**43000**	D08, W1	2600	340	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B
Xylenes, total	**160000**	D08, W1	5200	440	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B
Sample ID: RSL0550-05 (SB-5(2-4) - Solid)						**Sampled: 12/09/09 11:12**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
p-Cymene	**450**	W1	120	9.7	ug/kg dry	1.00	12/17/09 13:07	DHC	9L17029	8260B
Benzene	**78**	W1,J	120	5.8	ug/kg dry	1.00	12/17/09 13:07	DHC	9L17029	8260B
Isopropylbenzene	**1600**	W1	120	18	ug/kg dry	1.00	12/17/09 13:07	DHC	9L17029	8260B
n-Propylbenzene	**7800**	W1	120	9.7	ug/kg dry	1.00	12/17/09 13:07	DHC	9L17029	8260B
sec-Butylbenzene	**650**	W1	120	11	ug/kg dry	1.00	12/17/09 13:07	DHC	9L17029	8260B
Semivolatile Organics by GC/MS										
Fluoranthene	**31**	J	210	3.0	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Naphthalene	**330**		210	3.4	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Phenanthrene	**39**	J	210	4.3	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Pyrene	**29**	J	210	1.3	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
General Chemistry Parameters										
Percent Solids	**80**		0.010	NR	%	1.00	12/11/09 13:26	JRR	9L11027	Dry Weight
Sample ID: RSL0550-05RE1 (SB-5(2-4) - Solid)						**Sampled: 12/09/09 11:12**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**92000**	W1, D08	970	70	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
1,3,5-Trimethylbenzene	**31000**	W1, D08	970	62	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
Ethylbenzene	**25000**	W1, D08	970	66	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
m-Xylene & p-Xylene	**110000**	W1, D08	1900	160	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
o-Xylene	**42000**	W1, D08	970	130	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
Toluene	**21000**	W1, D08	970	74	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
Xylenes, total	**150000**	W1, D08	1900	160	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
Sample ID: RSL0550-06 (SB-6(4-6) - Solid)						**Sampled: 12/09/09 16:50**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
m-Xylene & p-Xylene	**1.9**	J, B	11	0.96	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
Toluene	**1.4**	J	5.7	0.43	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
Xylenes, total	**1.9**	J, B	11	0.96	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
General Chemistry Parameters										
Percent Solids	**85**		0.010	NR	%	1.00	12/11/09 13:28	JRR	9L11027	Dry Weight
Sample ID: RSL0550-07 (SB-7(2-4) - Solid)						**Sampled: 12/09/09 16:55**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**1.9**	J	6.1	0.44	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
m-Xylene & p-Xylene	**1.7**	J, B	12	1.0	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
Xylenes, total	**1.7**	J, B	12	1.0	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
Semivolatile Organics by GC/MS										

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Executive Summary - Detections

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-07 (SB-7(2-4) - Solid) - cont.						**Sampled: 12/09/09 16:55**		**Recvd: 12/10/09 11:20**		
Semivolatile Organics by GC/MS - cont.										
Acenaphthene	**490**	D12,J	4000	47	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Benzo(a)anthracene	**250**	D12,J	4000	68	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Benzo(b)fluoranthene	**340**	D12,J	4000	77	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Chrysene	**450**	D12,J	4000	40	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Fluorene	**980**	D12,J	4000	91	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Phenanthrene	**2900**	D12,J	4000	83	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
General Chemistry Parameters										
Percent Solids	**83**		0.010	NR	%	1.00	12/11/09 13:30	JRR	9L11027	Dry Weight
Sample ID: RSL0550-08 (SB-9(2-4) - Solid)						**Sampled: 12/09/09 17:03**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**16**		6.1	0.44	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
p-Cymene	**2.1**	J	6.1	0.49	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
Isopropylbenzene	**1.4**	J	6.1	0.92	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
m-Xylene & p-Xylene	**2.0**	J, B	12	1.0	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
n-Butylbenzene	**2.7**	J	6.1	0.53	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
n-Propylbenzene	**2.4**	J	6.1	0.49	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
Toluene	**1.2**	J	6.1	0.46	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
Xylenes, total	**2.0**	J, B	12	1.0	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
Semivolatile Organics by GC/MS										
Phenanthrene	**580**	D12,J	4200	87	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
General Chemistry Parameters										
Percent Solids	**80**		0.010	NR	%	1.00	12/11/09 13:32	JRR	9L11027	Dry Weight
Sample ID: RSL0550-09 (TMW-1 - Water)						**Sampled: 12/09/09 14:05**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
Acetone	**4.9**	J	5.0	1.3	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Sample ID: RSL0550-10 (TMW-2 - Water)						**Sampled: 12/09/09 14:10**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2-Dichloroethane	**1.8**	P11	1.0	0.21	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
2-Butanone	**12**	P11	5.0	1.3	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
p-Cymene	**3.3**	P11	1.0	0.31	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Acetone	**43**	P11	5.0	1.3	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Isopropylbenzene	**56**	P11	1.0	0.19	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Methylcyclohexane	**33**	P11	1.0	0.50	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
sec-Butylbenzene	**6.3**	P11	1.0	0.30	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Sample ID: RSL0550-10RE1 (TMW-2 - Water)						**Sampled: 12/09/09 14:10**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**2200**	D08	40	13	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
1,3,5-Trimethylbenzene	**690**	D08	40	8.7	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
Benzene	**150**	D08	40	16	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
Ethylbenzene	**1300**	D08	40	7.4	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B

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Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Executive Summary - Detections

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-10RE1 (TMW-2 - Water) - cont.					**Sampled: 12/09/09 14:10**			**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B - cont.										
m-Xylene & p-Xylene	**6100**	D08	80	26	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
n-Propylbenzene	**210**	D08	40	7.4	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
o-Xylene	**2800**	D08	40	14	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
Toluene	**220**	D08	40	20	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
Xylenes, total	**8900**	D08	80	26	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
Sample ID: RSL0550-11 (TMW-3 - Water)					**Sampled: 12/09/09 14:15**			**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
2-Butanone	**100**		5.0	1.3	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
p-Cymene	**5.4**		1.0	0.31	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Acetone	**200**		5.0	1.3	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Isopropylbenzene	**76**		1.0	0.19	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
sec-Butylbenzene	**8.0**		1.0	0.30	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Sample ID: RSL0550-11RE1 (TMW-3 - Water)					**Sampled: 12/09/09 14:15**			**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**3600**	D08, P11	250	81	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
1,3,5-Trimethylbenzene	**1100**	D08, P11	250	54	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
Benzene	**1000**	D08, P11	250	100	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
Cyclohexane	**1500**	D08, P11	250	130	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
Ethylbenzene	**3200**	D08, P11	250	46	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
Methylcyclohexane	**470**	D08, P11	250	120	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
m-Xylene & p-Xylene	**13000**	D08, P11	500	160	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
n-Propylbenzene	**420**	D08, P11	250	46	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
o-Xylene	**5200**	D08, P11	250	90	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
Toluene	**13000**	D08, P11	250	130	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
Xylenes, total	**18000**	D08, P11	500	160	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
Sample ID: RSL0550-12 (TMW-4 - Water)					**Sampled: 12/09/09 14:20**			**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**8.3**		1.0	0.33	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,3,5-Trimethylbenzene	**2.8**		1.0	0.22	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Acetone	**6.7**		5.0	1.3	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Benzene	**0.52**	J	1.0	0.41	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Cyclohexane	**6.2**		1.0	0.53	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Ethylbenzene	**3.0**		1.0	0.18	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Methylcyclohexane	**2.7**		1.0	0.50	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
m-Xylene & p-Xylene	**11**		2.0	0.66	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
n-Propylbenzene	**1.2**		1.0	0.18	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
o-Xylene	**4.0**		1.0	0.36	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Toluene	**3.5**		1.0	0.51	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Xylenes, total	**15**		2.0	0.66	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Sample Summary

Sample Identification	Lab Number	Client Matrix	Date/Time Sampled	Date/Time Received	Sample Qualifiers
SB-1(2-4)	RSL0550-01	Solid	12/09/09 15:30	12/10/09 11:20	
SB-2(2-4)	RSL0550-02	Solid	12/09/09 16:34	12/10/09 11:20	
SB-3(2-4)	RSL0550-03	Solid	12/09/09 16:42	12/10/09 11:20	
SB-4(2-4)	RSL0550-04	Solid	12/09/09 10:28	12/10/09 11:20	
SB-5(2-4)	RSL0550-05	Solid	12/09/09 11:12	12/10/09 11:20	
SB-6(4-6)	RSL0550-06	Solid	12/09/09 16:50	12/10/09 11:20	
SB-7(2-4)	RSL0550-07	Solid	12/09/09 16:55	12/10/09 11:20	
SB-9(2-4)	RSL0550-08	Solid	12/09/09 17:03	12/10/09 11:20	
TMW-1	RSL0550-09	Water	12/09/09 14:05	12/10/09 11:20	
TMW-2	RSL0550-10	Water	12/09/09 14:10	12/10/09 11:20	
TMW-3	RSL0550-11	Water	12/09/09 14:15	12/10/09 11:20	
TMW-4	RSL0550-12	Water	12/09/09 14:20	12/10/09 11:20	

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Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-01 (SB-1(2-4) - Solid)							**Sampled: 12/09/09 15:30**		**Recvd: 12/10/09 11:20**	
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**1.4**	J	5.4	0.39	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
1,3,5-Trimethylbenzene	ND		5.4	0.35	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
p-Cymene	ND		5.4	0.44	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
Benzene	ND		5.4	0.27	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
Ethylbenzene	ND		5.4	0.38	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
Isopropylbenzene	ND		5.4	0.82	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
Methyl-t-Butyl Ether (MTBE)	ND		5.4	0.53	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
m-Xylene & p-Xylene	**3.3**	J, B	11	0.91	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
n-Butylbenzene	ND		5.4	0.47	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
n-Propylbenzene	ND		5.4	0.43	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
o-Xylene	**1.1**	J	5.4	0.71	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
sec-Butylbenzene	ND		5.4	0.47	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
tert-Butylbenzene	ND		5.4	0.57	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
Toluene	**2.3**	J	5.4	0.41	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
Xylenes, total	**4.4**	J, B	11	0.91	ug/kg dry	1.00	12/12/09 16:32	PQ	9L12009	8260B
1,2-Dichloroethane-d4	*113 %*		*Surr Limits:*	*(64-126%)*			*12/12/09 16:32*	*PQ*	*9L12009*	*8260B*
4-Bromofluorobenzene	*98 %*		*Surr Limits:*	*(72-126%)*			*12/12/09 16:32*	*PQ*	*9L12009*	*8260B*
Toluene-d8	*107 %*		*Surr Limits:*	*(71-125%)*			*12/12/09 16:32*	*PQ*	*9L12009*	*8260B*
Semivolatile Organics by GC/MS										
Acenaphthene	ND	D10	910	11	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Acenaphthylene	ND	D10	910	7.4	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Anthracene	ND	D10	910	23	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Benzo(a)anthracene	ND	D10	910	16	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Benzo(a)pyrene	ND	D10	910	22	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Benzo(b)fluoranthene	ND	D10	910	18	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Benzo(ghi)perylene	ND	D10	910	11	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Benzo(k)fluoranthene	ND	D10	910	10	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Chrysene	ND	D10	910	9.1	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Dibenzo(a,h)anthracene	ND	D10	910	11	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Fluoranthene	ND	D10	910	13	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Fluorene	ND	D10	910	21	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Indeno(1,2,3-cd)pyrene	ND	D10	910	25	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Naphthalene	ND	D10	910	15	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Pentachloroethane	ND	D10	54	16	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Phenanthrene	ND	D10	910	19	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
Pyrene	ND	D10	910	5.9	ug/kg dry	5.00	12/12/09 22:00	MKP	9L10099	8270C
2,4,6-Tribromophenol	*90 %*	*D10*	*Surr Limits:*	*(39-146%)*			*12/12/09 22:00*	*MKP*	*9L10099*	*8270C*
2-Fluorobiphenyl	*100 %*	*D10*	*Surr Limits:*	*(37-120%)*			*12/12/09 22:00*	*MKP*	*9L10099*	*8270C*
2-Fluorophenol	*78 %*	*D10*	*Surr Limits:*	*(18-120%)*			*12/12/09 22:00*	*MKP*	*9L10099*	*8270C*
Nitrobenzene-d5	*78 %*	*D10*	*Surr Limits:*	*(34-132%)*			*12/12/09 22:00*	*MKP*	*9L10099*	*8270C*
Phenol-d5	*86 %*	*D10*	*Surr Limits:*	*(11-120%)*			*12/12/09 22:00*	*MKP*	*9L10099*	*8270C*
p-Terphenyl-d14	*98 %*	*D10*	*Surr Limits:*	*(58-147%)*			*12/12/09 22:00*	*MKP*	*9L10099*	*8270C*
General Chemistry Parameters										
Percent Solids	**91**		0.010	NR	%	1.00	12/11/09 13:18	JRR	9L11027	Dry Weight

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Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-02 (SB-2(2-4) - Solid)						**Sampled: 12/09/09 16:34**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	ND		6.2	0.45	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
1,3,5-Trimethylbenzene	ND		6.2	0.40	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
p-Cymene	ND		6.2	0.50	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
Benzene	ND		6.2	0.30	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
Ethylbenzene	ND		6.2	0.43	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
Isopropylbenzene	ND		6.2	0.94	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
Methyl-t-Butyl Ether (MTBE)	**3.8**	J	6.2	0.61	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
m-Xylene & p-Xylene	**3.6**	J, B	12	1.0	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
n-Butylbenzene	ND		6.2	0.54	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
n-Propylbenzene	ND		6.2	0.50	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
o-Xylene	ND		6.2	0.81	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
sec-Butylbenzene	ND		6.2	0.54	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
tert-Butylbenzene	ND		6.2	0.65	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
Toluene	**3.3**	J	6.2	0.47	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
Xylenes, total	**3.6**	J, B	12	1.0	ug/kg dry	1.00	12/12/09 16:58	PQ	9L12009	8260B
1,2-Dichloroethane-d4	*112 %*		*Surr Limits:*	*(64-126%)*			*12/12/09 16:58*	*PQ*	*9L12009*	*8260B*
4-Bromofluorobenzene	*98 %*		*Surr Limits:*	*(72-126%)*			*12/12/09 16:58*	*PQ*	*9L12009*	*8260B*
Toluene-d8	*107 %*		*Surr Limits:*	*(71-125%)*			*12/12/09 16:58*	*PQ*	*9L12009*	*8260B*
Semivolatile Organics by GC/MS										
Acenaphthene	ND	D10	1000	12	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Acenaphthylene	ND	D10	1000	8.5	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Anthracene	ND	D10	1000	27	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Benzo(a)anthracene	ND	D10	1000	18	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Benzo(a)pyrene	ND	D10	1000	25	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Benzo(b)fluoranthene	ND	D10	1000	20	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Benzo(ghi)perylene	ND	D10	1000	12	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Benzo(k)fluoranthene	ND	D10	1000	11	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Chrysene	ND	D10	1000	10	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Dibenzo(a,h)anthracene	ND	D10	1000	12	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Fluoranthene	ND	D10	1000	15	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Fluorene	ND	D10	1000	24	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Indeno(1,2,3-cd)pyrene	ND	D10	1000	29	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Naphthalene	ND	D10	1000	17	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Pentachloroethane	ND	D10	62	18	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Phenanthrene	ND	D10	1000	22	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
Pyrene	ND	D10	1000	6.7	ug/kg dry	5.00	12/12/09 23:28	MKP	9L10099	8270C
2,4,6-Tribromophenol	*77 %*	*D10*	*Surr Limits:*	*(39-146%)*			*12/12/09 23:28*	*MKP*	*9L10099*	*8270C*
2-Fluorobiphenyl	*94 %*	*D10*	*Surr Limits:*	*(37-120%)*			*12/12/09 23:28*	*MKP*	*9L10099*	*8270C*
2-Fluorophenol	*81 %*	*D10*	*Surr Limits:*	*(18-120%)*			*12/12/09 23:28*	*MKP*	*9L10099*	*8270C*
Nitrobenzene-d5	*84 %*	*D10*	*Surr Limits:*	*(34-132%)*			*12/12/09 23:28*	*MKP*	*9L10099*	*8270C*
Phenol-d5	*86 %*	*D10*	*Surr Limits:*	*(11-120%)*			*12/12/09 23:28*	*MKP*	*9L10099*	*8270C*
p-Terphenyl-d14	*87 %*	*D10*	*Surr Limits:*	*(58-147%)*			*12/12/09 23:28*	*MKP*	*9L10099*	*8270C*
General Chemistry Parameters										
Percent Solids	**80**		0.010	NR	%	1.00	12/11/09 13:20	JRR	9L11027	Dry Weight

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Benchmark Environmental & Engineering Science 2558 Hamburg Turnpike, Suite 300 Lackawanna, NY 14218	Work Order: RSL0550 Project: Benchmark- Langner Rd. Delta Sonic Project Number: TURN-0038	Received: 12/10/09 Reported: 12/22/09 15:00

Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-03 (SB-3(2-4) - Solid)						**Sampled: 12/09/09 16:42**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	ND		5.2	0.38	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
1,3,5-Trimethylbenzene	ND		5.2	0.34	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
p-Cymene	ND		5.2	0.42	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
Benzene	ND		5.2	0.26	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
Ethylbenzene	ND		5.2	0.36	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
Isopropylbenzene	ND		5.2	0.79	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
Methyl-t-Butyl Ether (MTBE)	ND		5.2	0.51	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
m-Xylene & p-Xylene	ND		10	0.87	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
n-Butylbenzene	ND		5.2	0.45	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
n-Propylbenzene	ND		5.2	0.42	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
o-Xylene	ND		5.2	0.68	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
sec-Butylbenzene	ND		5.2	0.45	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
tert-Butylbenzene	ND		5.2	0.54	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
Toluene	ND		5.2	0.39	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
Xylenes, total	ND		10	0.87	ug/kg dry	1.00	12/11/09 23:14	CDC	9L11117	8260B
1,2-Dichloroethane-d4	*83 %*		*Surr Limits:*	*(64-126%)*			*12/11/09 23:14*	*CDC*	*9L11117*	*8260B*
4-Bromofluorobenzene	*125 %*		*Surr Limits:*	*(72-126%)*			*12/11/09 23:14*	*CDC*	*9L11117*	*8260B*
Toluene-d8	*96 %*		*Surr Limits:*	*(71-125%)*			*12/11/09 23:14*	*CDC*	*9L11117*	*8260B*
Semivolatile Organics by GC/MS										
Acenaphthene	ND	D12	3600	42	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Acenaphthylene	ND	D12	3600	29	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Anthracene	ND	D12	3600	91	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Benzo(a)anthracene	ND	D12	3600	62	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Benzo(a)pyrene	ND	D12	3600	86	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Benzo(b)fluoranthene	ND	D12	3600	69	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Benzo(ghi)perylene	ND	D12	3600	43	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Benzo(k)fluoranthene	ND	D12	3600	39	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Chrysene	ND	D12	3600	36	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Dibenzo(a,h)anthracene	ND	D12	3600	42	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Fluoranthene	ND	D12	3600	52	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Fluorene	ND	D12	3600	82	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Indeno(1,2,3-cd)pyrene	ND	D12	3600	99	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Naphthalene	ND	D12	3600	59	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Pentachloroethane	ND	D12	210	62	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Phenanthrene	ND	D12	3600	75	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
Pyrene	ND	D12	3600	23	ug/kg dry	20.0	12/12/09 23:53	MKP	9L10099	8270C
2,4,6-Tribromophenol	*89 %*	*D12*	*Surr Limits:*	*(39-146%)*			*12/12/09 23:53*	*MKP*	*9L10099*	*8270C*
2-Fluorobiphenyl	*92 %*	*D12*	*Surr Limits:*	*(37-120%)*			*12/12/09 23:53*	*MKP*	*9L10099*	*8270C*
2-Fluorophenol	*78 %*	*D12*	*Surr Limits:*	*(18-120%)*			*12/12/09 23:53*	*MKP*	*9L10099*	*8270C*
Nitrobenzene-d5	*72 %*	*D12*	*Surr Limits:*	*(34-132%)*			*12/12/09 23:53*	*MKP*	*9L10099*	*8270C*
Phenol-d5	*81 %*	*D12*	*Surr Limits:*	*(11-120%)*			*12/12/09 23:53*	*MKP*	*9L10099*	*8270C*
p-Terphenyl-d14	*87 %*	*D12*	*Surr Limits:*	*(58-147%)*			*12/12/09 23:53*	*MKP*	*9L10099*	*8270C*
General Chemistry Parameters										
Percent Solids	**93**		0.010	NR	%	1.00	12/11/09 13:22	JRR	9L11027	Dry Weight

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-04 (SB-4(2-4) - Solid)						**Sampled: 12/09/09 10:28**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
p-Cymene	**16**		6.4	0.51	ug/kg dry	1.00	12/11/09 23:39	CDC	9L11117	8260B
Benzene	**110**		6.4	0.31	ug/kg dry	1.00	12/11/09 23:39	CDC	9L11117	8260B
Isopropylbenzene	**190**		6.4	0.96	ug/kg dry	1.00	12/11/09 23:39	CDC	9L11117	8260B
Methyl-t-Butyl Ether (MTBE)	ND		6.4	0.63	ug/kg dry	1.00	12/11/09 23:39	CDC	9L11117	8260B
n-Butylbenzene	ND		6.4	0.55	ug/kg dry	1.00	12/11/09 23:39	CDC	9L11117	8260B
sec-Butylbenzene	**34**		6.4	0.55	ug/kg dry	1.00	12/11/09 23:39	CDC	9L11117	8260B
tert-Butylbenzene	ND		6.4	0.66	ug/kg dry	1.00	12/11/09 23:39	CDC	9L11117	8260B
Toluene	**240**		6.4	0.48	ug/kg dry	1.00	12/11/09 23:39	CDC	9L11117	8260B
1,2-Dichloroethane-d4	*86 %*		*Surr Limits:*	*(64-126%)*			*12/11/09 23:39*	*CDC*	*9L11117*	*8260B*
4-Bromofluorobenzene	*114 %*		*Surr Limits:*	*(72-126%)*			*12/11/09 23:39*	*CDC*	*9L11117*	*8260B*
Toluene-d8	*94 %*		*Surr Limits:*	*(71-125%)*			*12/11/09 23:39*	*CDC*	*9L11117*	*8260B*
Semivolatile Organics by GC/MS										
Acenaphthene	ND	D10	2200	26	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Acenaphthylene	ND	D10	2200	18	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Anthracene	ND	D10	2200	56	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Benzo(a)anthracene	ND	D10	2200	38	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Benzo(a)pyrene	ND	D10	2200	53	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Benzo(b)fluoranthene	ND	D10	2200	42	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Benzo(ghi)perylene	ND	D10	2200	26	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Benzo(k)fluoranthene	ND	D10	2200	24	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Chrysene	ND	D10	2200	22	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Dibenzo(a,h)anthracene	ND	D10	2200	26	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Fluoranthene	ND	D10	2200	32	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Fluorene	**250**	D10,J	2200	50	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Indeno(1,2,3-cd)pyrene	ND	D10	2200	60	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Naphthalene	**11000**	D10	2200	36	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Pentachloroethane	ND	D10	130	38	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Phenanthrene	**630**	D10,J	2200	46	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
Pyrene	**350**	D10,J	2200	14	ug/kg dry	10.0	12/13/09 00:17	MKP	9L10099	8270C
2,4,6-Tribromophenol	*87 %*	*D10*	*Surr Limits:*	*(39-146%)*			*12/13/09 00:17*	*MKP*	*9L10099*	*8270C*
2-Fluorobiphenyl	*82 %*	*D10*	*Surr Limits:*	*(37-120%)*			*12/13/09 00:17*	*MKP*	*9L10099*	*8270C*
2-Fluorophenol	*70 %*	*D10*	*Surr Limits:*	*(18-120%)*			*12/13/09 00:17*	*MKP*	*9L10099*	*8270C*
Nitrobenzene-d5	*71 %*	*D10*	*Surr Limits:*	*(34-132%)*			*12/13/09 00:17*	*MKP*	*9L10099*	*8270C*
Phenol-d5	*75 %*	*D10*	*Surr Limits:*	*(11-120%)*			*12/13/09 00:17*	*MKP*	*9L10099*	*8270C*
p-Terphenyl-d14	*83 %*	*D10*	*Surr Limits:*	*(58-147%)*			*12/13/09 00:17*	*MKP*	*9L10099*	*8270C*
General Chemistry Parameters										
Percent Solids	**77**		0.010	NR	%	1.00	12/11/09 13:24	JRR	9L11027	Dry Weight

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-04RE1 (SB-4(2-4) - Solid)						**Sampled: 12/09/09 10:28**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**120000**	D08, W1	2600	190	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B
1,3,5-Trimethylbenzene	**35000**	D08, W1	2600	170	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B
Ethylbenzene	**21000**	D08, W1	2600	180	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B
m-Xylene & p-Xylene	**120000**	D08, W1	5200	440	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B
n-Propylbenzene	**12000**	D08, W1	2600	210	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B
o-Xylene	**43000**	D08, W1	2600	340	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B
Xylenes, total	**160000**	D08, W1	5200	440	ug/kg dry	20.0	12/19/09 12:55	DHC	9L17029	8260B
1,2-Dichloroethane-d4	*114 %*	*D08, W1*	*Surr Limits:*	*(10-190%)*			*12/19/09 12:55*	*DHC*	*9L17029*	*8260B*
4-Bromofluorobenzene	*103 %*	*D08, W1*	*Surr Limits:*	*(10-190%)*			*12/19/09 12:55*	*DHC*	*9L17029*	*8260B*
Toluene-d8	*88 %*	*D08, W1*	*Surr Limits:*	*(10-190%)*			*12/19/09 12:55*	*DHC*	*9L17029*	*8260B*

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-05 (SB-5(2-4) - Solid)						**Sampled: 12/09/09 11:12**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
p-Cymene	**450**	W1	120	9.7	ug/kg dry	1.00	12/17/09 13:07	DHC	9L17029	8260B
Benzene	**78**	W1,J	120	5.8	ug/kg dry	1.00	12/17/09 13:07	DHC	9L17029	8260B
Isopropylbenzene	**1600**	W1	120	18	ug/kg dry	1.00	12/17/09 13:07	DHC	9L17029	8260B
Methyl-t-Butyl Ether (MTBE)	ND	W1	120	12	ug/kg dry	1.00	12/17/09 13:07	DHC	9L17029	8260B
n-Butylbenzene	ND	W1	120	11	ug/kg dry	1.00	12/17/09 13:07	DHC	9L17029	8260B
n-Propylbenzene	**7800**	W1	120	9.7	ug/kg dry	1.00	12/17/09 13:07	DHC	9L17029	8260B
sec-Butylbenzene	**650**	W1	120	11	ug/kg dry	1.00	12/17/09 13:07	DHC	9L17029	8260B
tert-Butylbenzene	ND	W1	120	13	ug/kg dry	1.00	12/17/09 13:07	DHC	9L17029	8260B
1,2-Dichloroethane-d4	*108 %*	*W1*	*Surr Limits:*	*(10-190%)*			*12/17/09 13:07*	*DHC*	*9L17029*	*8260B*
4-Bromofluorobenzene	*77 %*	*W1*	*Surr Limits:*	*(10-190%)*			*12/17/09 13:07*	*DHC*	*9L17029*	*8260B*
Toluene-d8	*77 %*	*W1*	*Surr Limits:*	*(10-190%)*			*12/17/09 13:07*	*DHC*	*9L17029*	*8260B*
Semivolatile Organics by GC/MS										
Acenaphthene	ND		210	2.4	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Acenaphthylene	ND		210	1.7	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Anthracene	ND		210	5.3	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Benzo(a)anthracene	ND		210	3.6	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Benzo(a)pyrene	ND		210	5.0	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Benzo(b)fluoranthene	ND		210	4.0	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Benzo(ghi)perylene	ND		210	2.5	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Benzo(k)fluoranthene	ND		210	2.3	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Chrysene	ND		210	2.1	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Dibenzo(a,h)anthracene	ND		210	2.4	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Fluoranthene	**31**	J	210	3.0	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Fluorene	ND		210	4.8	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Indeno(1,2,3-cd)pyrene	ND		210	5.7	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Naphthalene	**330**		210	3.4	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Pentachloroethane	ND		12	3.6	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Phenanthrene	**39**	J	210	4.3	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
Pyrene	**29**	J	210	1.3	ug/kg dry	1.00	12/13/09 00:42	MKP	9L10099	8270C
2,4,6-Tribromophenol	*106 %*		*Surr Limits:*	*(39-146%)*			*12/13/09 00:42*	*MKP*	*9L10099*	*8270C*
2-Fluorobiphenyl	*106 %*		*Surr Limits:*	*(37-120%)*			*12/13/09 00:42*	*MKP*	*9L10099*	*8270C*
2-Fluorophenol	*93 %*		*Surr Limits:*	*(18-120%)*			*12/13/09 00:42*	*MKP*	*9L10099*	*8270C*
Nitrobenzene-d5	*100 %*		*Surr Limits:*	*(34-132%)*			*12/13/09 00:42*	*MKP*	*9L10099*	*8270C*
Phenol-d5	*99 %*		*Surr Limits:*	*(11-120%)*			*12/13/09 00:42*	*MKP*	*9L10099*	*8270C*
p-Terphenyl-d14	*110 %*		*Surr Limits:*	*(58-147%)*			*12/13/09 00:42*	*MKP*	*9L10099*	*8270C*
General Chemistry Parameters										
Percent Solids	**80**		0.010	NR	%	1.00	12/11/09 13:26	JRR	9L11027	Dry Weight

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-05RE1 (SB-5(2-4) - Solid)						**Sampled: 12/09/09 11:12**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**92000**	W1, D08	970	70	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
1,3,5-Trimethylbenzene	**31000**	W1, D08	970	62	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
Ethylbenzene	**25000**	W1, D08	970	66	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
m-Xylene & p-Xylene	**110000**	W1, D08	1900	160	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
o-Xylene	**42000**	W1, D08	970	130	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
Toluene	**21000**	W1, D08	970	74	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
Xylenes, total	**150000**	W1, D08	1900	160	ug/kg dry	8.00	12/19/09 12:51	DHC	9L17029	8260B
1,2-Dichloroethane-d4	*135 %*	*W1, D08*	*Surr Limits:*	*(10-190%)*			*12/19/09 12:51*	*DHC*	*9L17029*	*8260B*
4-Bromofluorobenzene	*118 %*	*W1, D08*	*Surr Limits:*	*(10-190%)*			*12/19/09 12:51*	*DHC*	*9L17029*	*8260B*
Toluene-d8	*121 %*	*W1, D08*	*Surr Limits:*	*(10-190%)*			*12/19/09 12:51*	*DHC*	*9L17029*	*8260B*

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-06 (SB-6(4-6) - Solid)						**Sampled: 12/09/09 16:50**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	ND		5.7	0.41	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
1,3,5-Trimethylbenzene	ND		5.7	0.37	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
p-Cymene	ND		5.7	0.46	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
Benzene	ND		5.7	0.28	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
Ethylbenzene	ND		5.7	0.39	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
Isopropylbenzene	ND		5.7	0.86	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
Methyl-t-Butyl Ether (MTBE)	ND		5.7	0.56	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
m-Xylene & p-Xylene	**1.9**	J, B	11	0.96	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
n-Butylbenzene	ND		5.7	0.50	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
n-Propylbenzene	ND		5.7	0.46	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
o-Xylene	ND		5.7	0.74	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
sec-Butylbenzene	ND		5.7	0.50	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
tert-Butylbenzene	ND		5.7	0.59	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
Toluene	**1.4**	J	5.7	0.43	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
Xylenes, total	**1.9**	J, B	11	0.96	ug/kg dry	1.00	12/12/09 17:23	PQ	9L12009	8260B
1,2-Dichloroethane-d4	*110 %*		*Surr Limits:*	*(64-126%)*			*12/12/09 17:23*	*PQ*	*9L12009*	*8260B*
4-Bromofluorobenzene	*95 %*		*Surr Limits:*	*(72-126%)*			*12/12/09 17:23*	*PQ*	*9L12009*	*8260B*
Toluene-d8	*103 %*		*Surr Limits:*	*(71-125%)*			*12/12/09 17:23*	*PQ*	*9L12009*	*8260B*
Semivolatile Organics by GC/MS										
Acenaphthene	ND	D10	980	11	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Acenaphthylene	ND	D10	980	7.9	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Anthracene	ND	D10	980	25	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Benzo(a)anthracene	ND	D10	980	17	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Benzo(a)pyrene	ND	D10	980	23	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Benzo(b)fluoranthene	ND	D10	980	19	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Benzo(ghi)perylene	ND	D10	980	12	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Benzo(k)fluoranthene	ND	D10	980	11	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Chrysene	ND	D10	980	9.7	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Dibenzo(a,h)anthracene	ND	D10	980	11	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Fluoranthene	ND	D10	980	14	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Fluorene	ND	D10	980	22	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Indeno(1,2,3-cd)pyrene	ND	D10	980	27	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Naphthalene	ND	D10	980	16	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Pentachloroethane	ND	D10	58	17	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Phenanthrene	ND	D10	980	20	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
Pyrene	ND	D10	980	6.3	ug/kg dry	5.00	12/13/09 01:06	MKP	9L10099	8270C
2,4,6-Tribromophenol	*71 %*	*D10*	*Surr Limits:*	*(39-146%)*			*12/13/09 01:06*	*MKP*	*9L10099*	*8270C*
2-Fluorobiphenyl	*81 %*	*D10*	*Surr Limits:*	*(37-120%)*			*12/13/09 01:06*	*MKP*	*9L10099*	*8270C*
2-Fluorophenol	*67 %*	*D10*	*Surr Limits:*	*(18-120%)*			*12/13/09 01:06*	*MKP*	*9L10099*	*8270C*
Nitrobenzene-d5	*71 %*	*D10*	*Surr Limits:*	*(34-132%)*			*12/13/09 01:06*	*MKP*	*9L10099*	*8270C*
Phenol-d5	*75 %*	*D10*	*Surr Limits:*	*(11-120%)*			*12/13/09 01:06*	*MKP*	*9L10099*	*8270C*
p-Terphenyl-d14	*84 %*	*D10*	*Surr Limits:*	*(58-147%)*			*12/13/09 01:06*	*MKP*	*9L10099*	*8270C*
General Chemistry Parameters										
Percent Solids	**85**		0.010	NR	%	1.00	12/11/09 13:28	JRR	9L11027	Dry Weight

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-07 (SB-7(2-4) - Solid)						**Sampled: 12/09/09 16:55**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**1.9**	J	6.1	0.44	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
1,3,5-Trimethylbenzene	ND		6.1	0.39	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
p-Cymene	ND		6.1	0.49	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
Benzene	ND		6.1	0.30	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
Ethylbenzene	ND		6.1	0.42	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
Isopropylbenzene	ND		6.1	0.91	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
Methyl-t-Butyl Ether (MTBE)	ND		6.1	0.59	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
m-Xylene & p-Xylene	**1.7**	J, B	12	1.0	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
n-Butylbenzene	ND		6.1	0.53	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
n-Propylbenzene	ND		6.1	0.48	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
o-Xylene	ND		6.1	0.79	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
sec-Butylbenzene	ND		6.1	0.53	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
tert-Butylbenzene	ND		6.1	0.63	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
Toluene	ND		6.1	0.46	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
Xylenes, total	**1.7**	J, B	12	1.0	ug/kg dry	1.00	12/12/09 17:49	PQ	9L12009	8260B
1,2-Dichloroethane-d4	*109 %*		*Surr Limits:*	*(64-126%)*			*12/12/09 17:49*	*PQ*	*9L12009*	*8260B*
4-Bromofluorobenzene	*94 %*		*Surr Limits:*	*(72-126%)*			*12/12/09 17:49*	*PQ*	*9L12009*	*8260B*
Toluene-d8	*100 %*		*Surr Limits:*	*(71-125%)*			*12/12/09 17:49*	*PQ*	*9L12009*	*8260B*
Semivolatile Organics by GC/MS										
Acenaphthene	**490**	D12,J	4000	47	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Acenaphthylene	ND	D12	4000	32	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Anthracene	ND	D12	4000	100	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Benzo(a)anthracene	**250**	D12,J	4000	68	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Benzo(a)pyrene	ND	D12	4000	96	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Benzo(b)fluoranthene	**340**	D12,J	4000	77	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Benzo(ghi)perylene	ND	D12	4000	48	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Benzo(k)fluoranthene	ND	D12	4000	44	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Chrysene	**450**	D12,J	4000	40	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Dibenzo(a,h)anthracene	ND	D12	4000	47	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Fluoranthene	ND	D12	4000	57	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Fluorene	**980**	D12,J	4000	91	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Indeno(1,2,3-cd)pyrene	ND	D12	4000	110	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Naphthalene	ND	D12	4000	66	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Pentachloroethane	ND	D12	240	69	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Phenanthrene	**2900**	D12,J	4000	83	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
Pyrene	ND	D12	4000	26	ug/kg dry	20.0	12/13/09 01:30	MKP	9L10099	8270C
2,4,6-Tribromophenol	*99 %*	*D12*	*Surr Limits:*	*(39-146%)*			*12/13/09 01:30*	*MKP*	*9L10099*	*8270C*
2-Fluorobiphenyl	*88 %*	*D12*	*Surr Limits:*	*(37-120%)*			*12/13/09 01:30*	*MKP*	*9L10099*	*8270C*
2-Fluorophenol	*50 %*	*D12*	*Surr Limits:*	*(18-120%)*			*12/13/09 01:30*	*MKP*	*9L10099*	*8270C*
Nitrobenzene-d5	*62 %*	*D12*	*Surr Limits:*	*(34-132%)*			*12/13/09 01:30*	*MKP*	*9L10099*	*8270C*
Phenol-d5	*72 %*	*D12*	*Surr Limits:*	*(11-120%)*			*12/13/09 01:30*	*MKP*	*9L10099*	*8270C*
p-Terphenyl-d14	*88 %*	*D12*	*Surr Limits:*	*(58-147%)*			*12/13/09 01:30*	*MKP*	*9L10099*	*8270C*
General Chemistry Parameters										
Percent Solids	**83**		0.010	NR	%	1.00	12/11/09 13:30	JRR	9L11027	Dry Weight

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THE LEADER IN ENVIRONMENTAL TESTING

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Sample ID: RSL0550-08 (SB-9(2-4) - Solid) **Sampled: 12/09/09 17:03** **Recvd: 12/10/09 11:20**

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**16**		6.1	0.44	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
1,3,5-Trimethylbenzene	ND		6.1	0.39	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
p-Cymene	**2.1**	J	6.1	0.49	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
Benzene	ND		6.1	0.30	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
Ethylbenzene	ND		6.1	0.42	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
Isopropylbenzene	**1.4**	J	6.1	0.92	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
Methyl-t-Butyl Ether (MTBE)	ND		6.1	0.60	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
m-Xylene & p-Xylene	**2.0**	J, B	12	1.0	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
n-Butylbenzene	**2.7**	J	6.1	0.53	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
n-Propylbenzene	**2.4**	J	6.1	0.49	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
o-Xylene	ND		6.1	0.80	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
sec-Butylbenzene	ND		6.1	0.53	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
tert-Butylbenzene	ND		6.1	0.64	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
Toluene	**1.2**	J	6.1	0.46	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
Xylenes, total	**2.0**	J, B	12	1.0	ug/kg dry	1.00	12/12/09 18:14	PQ	9L12009	8260B
1,2-Dichloroethane-d4	*111 %*		*Surr Limits:*	*(64-126%)*			*12/12/09 18:14*	*PQ*	*9L12009*	*8260B*
4-Bromofluorobenzene	*97 %*		*Surr Limits:*	*(72-126%)*			*12/12/09 18:14*	*PQ*	*9L12009*	*8260B*
Toluene-d8	*103 %*		*Surr Limits:*	*(71-125%)*			*12/12/09 18:14*	*PQ*	*9L12009*	*8260B*
Semivolatile Organics by GC/MS										
Acenaphthene	ND	D12	4200	49	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Acenaphthylene	ND	D12	4200	34	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Anthracene	ND	D12	4200	110	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Benzo(a)anthracene	ND	D12	4200	72	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Benzo(a)pyrene	ND	D12	4200	100	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Benzo(b)fluoranthene	ND	D12	4200	80	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Benzo(ghi)perylene	ND	D12	4200	50	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Benzo(k)fluoranthene	ND	D12	4200	46	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Chrysene	ND	D12	4200	41	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Dibenzo(a,h)anthracene	ND	D12	4200	49	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Fluoranthene	ND	D12	4200	60	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Fluorene	ND	D12	4200	95	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Indeno(1,2,3-cd)pyrene	ND	D12	4200	110	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Naphthalene	ND	D12	4200	69	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Pentachloroethane	ND	D12	250	72	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Phenanthrene	**580**	D12,J	4200	87	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
Pyrene	ND	D12	4200	27	ug/kg dry	20.0	12/13/09 01:55	MKP	9L10099	8270C
2,4,6-Tribromophenol	*88 %*	*D12*	*Surr Limits:*	*(39-146%)*			*12/13/09 01:55*	*MKP*	*9L10099*	*8270C*
2-Fluorobiphenyl	*75 %*	*D12*	*Surr Limits:*	*(37-120%)*			*12/13/09 01:55*	*MKP*	*9L10099*	*8270C*
2-Fluorophenol	*50 %*	*D12*	*Surr Limits:*	*(18-120%)*			*12/13/09 01:55*	*MKP*	*9L10099*	*8270C*
Nitrobenzene-d5	*50 %*	*D12*	*Surr Limits:*	*(34-132%)*			*12/13/09 01:55*	*MKP*	*9L10099*	*8270C*
Phenol-d5	*62 %*	*D12*	*Surr Limits:*	*(11-120%)*			*12/13/09 01:55*	*MKP*	*9L10099*	*8270C*
p-Terphenyl-d14	*80 %*	*D12*	*Surr Limits:*	*(58-147%)*			*12/13/09 01:55*	*MKP*	*9L10099*	*8270C*
General Chemistry Parameters										
Percent Solids	**80**		0.010	NR	%	1.00	12/11/09 13:32	JRR	9L11027	Dry Weight

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Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Sample ID: RSL0550-09 (TMW-1 - Water) **Sampled: 12/09/09 14:05** **Recvd: 12/10/09 11:20**

Volatile Organic Compounds by EPA 8260B

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
1,1,1-Trichloroethane	ND		1.0	0.26	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,1,2,2-Tetrachloroethane	ND		1.0	0.21	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,1,2-Trichloroethane	ND		1.0	0.23	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		1.0	0.31	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,1-Dichloroethane	ND		1.0	0.38	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,1-Dichloroethene	ND		1.0	0.29	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,2,4-Trichlorobenzene	ND		1.0	0.41	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,2,4-Trimethylbenzene	ND		1.0	0.33	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,2-Dibromo-3-chloropropane	ND		1.0	0.39	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,2-Dibromoethane	ND		1.0	0.17	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,2-Dichlorobenzene	ND		1.0	0.20	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,2-Dichloroethane	ND		1.0	0.21	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,2-Dichloropropane	ND		1.0	0.33	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,3,5-Trimethylbenzene	ND		1.0	0.22	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,3-Dichlorobenzene	ND		1.0	0.36	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,4-Dichlorobenzene	ND		1.0	0.39	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
2-Butanone	ND		5.0	1.3	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
2-Hexanone	ND		5.0	1.2	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
p-Cymene	ND		1.0	0.31	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
4-Methyl-2-pentanone	ND		5.0	0.91	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Acetone	**4.9**	J	5.0	1.3	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Benzene	ND		1.0	0.41	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Bromodichloromethane	ND		1.0	0.39	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Bromoform	ND		1.0	0.26	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Bromomethane	ND		1.0	0.28	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Carbon disulfide	ND		1.0	0.19	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Carbon Tetrachloride	ND		1.0	0.27	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Chlorobenzene	ND		1.0	0.32	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Dibromochloromethane	ND		1.0	0.32	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Chloroethane	ND		1.0	0.32	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Chloroform	ND		1.0	0.34	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Chloromethane	ND		1.0	0.35	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
cis-1,2-Dichloroethene	ND		1.0	0.38	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
cis-1,3-Dichloropropene	ND		1.0	0.36	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Cyclohexane	ND		1.0	0.53	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Dichlorofluoromethane	ND		1.0	0.34	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Ethylbenzene	ND		1.0	0.18	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Isopropylbenzene	ND		1.0	0.19	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Methyl Acetate	ND		1.0	0.50	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Methyl-t-Butyl Ether (MTBE)	ND		1.0	0.16	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Methylcyclohexane	ND		1.0	0.50	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Methylene Chloride	ND		1.0	0.44	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
m-Xylene & p-Xylene	ND		2.0	0.66	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
n-Butylbenzene	ND		1.0	0.28	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
n-Propylbenzene	ND		1.0	0.18	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
o-Xylene	ND		1.0	0.36	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
sec-Butylbenzene	ND		1.0	0.30	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Styrene	ND		1.0	0.18	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B

Benchmark Environmental & Engineering Science 2558 Hamburg Turnpike, Suite 300 Lackawanna, NY 14218	Work Order: RSL0550 Project: Benchmark- Langner Rd. Delta Sonic Project Number: TURN-0038	Received: 12/10/09 Reported: 12/22/09 15:00

Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-09 (TMW-1 - Water) - cont.						**Sampled: 12/09/09 14:05**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B - cont.										
Tetrachloroethene	ND		1.0	0.36	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Toluene	ND		1.0	0.51	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
trans-1,2-Dichloroethene	ND		1.0	0.42	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
trans-1,3-Dichloropropene	ND		1.0	0.37	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Trichloroethene	ND		1.0	0.46	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Trichlorofluoromethane	ND		1.0	0.15	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Vinyl chloride	ND		1.0	0.24	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
Xylenes, total	ND		2.0	0.66	ug/L	1.00	12/19/09 16:58	DHC	9L19016	8260B
1,2-Dichloroethane-d4	*110 %*		*Surr Limits:*	*(66-137%)*			*12/19/09 16:58*	*DHC*	*9L19016*	*8260B*
4-Bromofluorobenzene	*103 %*		*Surr Limits:*	*(73-120%)*			*12/19/09 16:58*	*DHC*	*9L19016*	*8260B*
Toluene-d8	*101 %*		*Surr Limits:*	*(71-126%)*			*12/19/09 16:58*	*DHC*	*9L19016*	*8260B*

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Sample ID: RSL0550-10 (TMW-2 - Water) **Sampled: 12/09/09 14:10** **Recvd: 12/10/09 11:20**

Volatile Organic Compounds by EPA 8260B

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
1,1,1-Trichloroethane	ND	P11	1.0	0.26	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
1,1,2,2-Tetrachloroethane	ND	P11	1.0	0.21	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
1,1,2-Trichloroethane	ND	P11	1.0	0.23	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	P11	1.0	0.31	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
1,1-Dichloroethane	ND	P11	1.0	0.38	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
1,1-Dichloroethene	ND	P11	1.0	0.29	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
1,2,4-Trichlorobenzene	ND	P11	1.0	0.41	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
1,2-Dibromo-3-chloropropane	ND	P11	1.0	0.39	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
1,2-Dibromoethane	ND	P11	1.0	0.17	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
1,2-Dichlorobenzene	ND	P11	1.0	0.20	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
1,2-Dichloroethane	**1.8**	P11	1.0	0.21	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
1,2-Dichloropropane	ND	P11	1.0	0.33	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
1,3-Dichlorobenzene	ND	P11	1.0	0.36	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
1,4-Dichlorobenzene	ND	P11	1.0	0.39	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
2-Butanone	**12**	P11	5.0	1.3	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
2-Hexanone	ND	P11	5.0	1.2	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
p-Cymene	**3.3**	P11	1.0	0.31	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
4-Methyl-2-pentanone	ND	P11	5.0	0.91	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Acetone	**43**	P11	5.0	1.3	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Bromodichloromethane	ND	P11	1.0	0.39	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Bromoform	ND	P11	1.0	0.26	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Bromomethane	ND	P11	1.0	0.28	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Carbon disulfide	ND	P11	1.0	0.19	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Carbon Tetrachloride	ND	P11	1.0	0.27	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Chlorobenzene	ND	P11	1.0	0.32	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Dibromochloromethane	ND	P11	1.0	0.32	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Chloroethane	ND	P11	1.0	0.32	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Chloroform	ND	P11	1.0	0.34	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Chloromethane	ND	P11	1.0	0.35	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
cis-1,2-Dichloroethene	ND	P11	1.0	0.38	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
cis-1,3-Dichloropropene	ND	P11	1.0	0.36	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Cyclohexane	ND	P11	1.0	0.53	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Dichlorofluoromethane	ND	P11	1.0	0.34	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Isopropylbenzene	**56**	P11	1.0	0.19	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Methyl Acetate	ND	P11	1.0	0.50	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Methyl-t-Butyl Ether (MTBE)	ND	P11	1.0	0.16	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Methylcyclohexane	**33**	P11	1.0	0.50	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Methylene Chloride	ND	P11	1.0	0.44	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
n-Butylbenzene	ND	P11	1.0	0.28	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
sec-Butylbenzene	**6.3**	P11	1.0	0.30	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Styrene	ND	P11	1.0	0.18	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Tetrachloroethene	ND	P11	1.0	0.36	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
trans-1,2-Dichloroethene	ND	P11	1.0	0.42	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
trans-1,3-Dichloropropene	ND	P11	1.0	0.37	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Trichloroethene	ND	P11	1.0	0.46	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Trichlorofluoromethane	ND	P11	1.0	0.15	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B
Vinyl chloride	ND	P11	1.0	0.24	ug/L	1.00	12/19/09 17:23	DHC	9L19016	8260B

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method

Sample ID: RSL0550-10 (TMW-2 - Water) - cont. **Sampled: 12/09/09 14:10** **Recvd: 12/10/09 11:20**

Volatile Organic Compounds by EPA 8260B - cont.

1,2-Dichloroethane-d4	*114 %*	*P11*	*Surr Limits: (66-137%)*				*12/19/09 17:23*	*DHC*	*9L19016*	*8260B*
4-Bromofluorobenzene	*87 %*	*P11*	*Surr Limits: (73-120%)*				*12/19/09 17:23*	*DHC*	*9L19016*	*8260B*
Toluene-d8	*87 %*	*P11*	*Surr Limits: (71-126%)*				*12/19/09 17:23*	*DHC*	*9L19016*	*8260B*

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-10RE1 (TMW-2 - Water)						**Sampled: 12/09/09 14:10**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B										
1,2,4-Trimethylbenzene	**2200**	D08	40	13	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
1,3,5-Trimethylbenzene	**690**	D08	40	8.7	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
Benzene	**150**	D08	40	16	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
Ethylbenzene	**1300**	D08	40	7.4	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
m-Xylene & p-Xylene	**6100**	D08	80	26	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
n-Propylbenzene	**210**	D08	40	7.4	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
o-Xylene	**2800**	D08	40	14	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
Toluene	**220**	D08	40	20	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
Xylenes, total	**8900**	D08	80	26	ug/L	40.0	12/20/09 21:34	NMD	9L20002	8260B
1,2-Dichloroethane-d4	*104 %*	*D08*	*Surr Limits:*	*(66-137%)*			*12/20/09 21:34*	*NMD*	*9L20002*	*8260B*
4-Bromofluorobenzene	*103 %*	*D08*	*Surr Limits:*	*(73-120%)*			*12/20/09 21:34*	*NMD*	*9L20002*	*8260B*
Toluene-d8	*100 %*	*D08*	*Surr Limits:*	*(71-126%)*			*12/20/09 21:34*	*NMD*	*9L20002*	*8260B*

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THE LEADER IN ENVIRONMENTAL TESTING

Benchmark Environmental & Engineering Science	Work Order: RSL0550	Received:	12/10/09
2558 Hamburg Turnpike, Suite 300		Reported:	12/22/09 15:00
Lackawanna, NY 14218	Project: Benchmark- Langner Rd. Delta Sonic		
	Project Number: TURN-0038		

Analytical Report

Sample ID: RSL0550-11 (TMW-3 - Water) **Sampled: 12/09/09 14:15** **Recvd: 12/10/09 11:20**

Volatile Organic Compounds by EPA 8260B

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
1,1,1-Trichloroethane	ND		1.0	0.26	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,1,2,2-Tetrachloroethane	ND		1.0	0.21	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,1,2-Trichloroethane	ND		1.0	0.23	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		1.0	0.31	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,1-Dichloroethane	ND		1.0	0.38	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,1-Dichloroethene	ND		1.0	0.29	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,2,4-Trichlorobenzene	ND		1.0	0.41	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,2-Dibromo-3-chloropropane	ND		1.0	0.39	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,2-Dibromoethane	ND		1.0	0.17	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,2-Dichlorobenzene	ND		1.0	0.20	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,2-Dichloroethane	ND		1.0	0.21	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,2-Dichloropropane	ND		1.0	0.33	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,3-Dichlorobenzene	ND		1.0	0.36	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,4-Dichlorobenzene	ND		1.0	0.39	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
2-Butanone	**100**		5.0	1.3	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
2-Hexanone	ND		5.0	1.2	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
p-Cymene	**5.4**		1.0	0.31	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
4-Methyl-2-pentanone	ND		5.0	0.91	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Acetone	**200**		5.0	1.3	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Bromodichloromethane	ND		1.0	0.39	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Bromoform	ND		1.0	0.26	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Bromomethane	ND		1.0	0.28	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Carbon disulfide	ND		1.0	0.19	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Carbon Tetrachloride	ND		1.0	0.27	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Chlorobenzene	ND		1.0	0.32	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Dibromochloromethane	ND		1.0	0.32	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Chloroethane	ND		1.0	0.32	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Chloroform	ND		1.0	0.34	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Chloromethane	ND		1.0	0.35	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
cis-1,2-Dichloroethene	ND		1.0	0.38	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
cis-1,3-Dichloropropene	ND		1.0	0.36	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Dichlorofluoromethane	ND		1.0	0.34	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Isopropylbenzene	**76**		1.0	0.19	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Methyl Acetate	ND		1.0	0.50	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Methyl-t-Butyl Ether (MTBE)	ND		1.0	0.16	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Methylene Chloride	ND		1.0	0.44	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
n-Butylbenzene	ND		1.0	0.28	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
sec-Butylbenzene	**8.0**		1.0	0.30	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Styrene	ND		1.0	0.18	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Tetrachloroethene	ND		1.0	0.36	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
trans-1,2-Dichloroethene	ND		1.0	0.42	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
trans-1,3-Dichloropropene	ND		1.0	0.37	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Trichloroethene	ND		1.0	0.46	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Trichlorofluoromethane	ND		1.0	0.15	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
Vinyl chloride	ND		1.0	0.24	ug/L	1.00	12/19/09 17:47	DHC	9L19016	8260B
1,2-Dichloroethane-d4	*123 %*		*Surr Limits: (66-137%)*				*12/19/09 17:47*	*DHC*	*9L19016*	*8260B*
4-Bromofluorobenzene	*77 %*		*Surr Limits: (73-120%)*				*12/19/09 17:47*	*DHC*	*9L19016*	*8260B*

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THE LEADER IN ENVIRONMENTAL TESTING

Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-11 (TMW-3 - Water) - cont.							**Sampled: 12/09/09 14:15**		**Recvd: 12/10/09 11:20**	
Volatile Organic Compounds by EPA 8260B - cont.										
Toluene-d8	*75 %*		*Surr Limits: (71-126%)*				*12/19/09 17:47*	*DHC*	*9L19016*	*8260B*

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Sample ID: RSL0550-11RE1 (TMW-3 - Water) **Sampled: 12/09/09 14:15** **Recvd: 12/10/09 11:20**

Volatile Organic Compounds by EPA 8260B

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
1,2,4-Trimethylbenzene	**3600**	D08, P11	250	81	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
1,3,5-Trimethylbenzene	**1100**	D08, P11	250	54	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
Benzene	**1000**	D08, P11	250	100	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
Cyclohexane	**1500**	D08, P11	250	130	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
Ethylbenzene	**3200**	D08, P11	250	46	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
Methylcyclohexane	**470**	D08, P11	250	120	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
m-Xylene & p-Xylene	**13000**	D08, P11	500	160	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
n-Propylbenzene	**420**	D08, P11	250	46	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
o-Xylene	**5200**	D08, P11	250	90	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
Toluene	**13000**	D08, P11	250	130	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
Xylenes, total	**18000**	D08, P11	500	160	ug/L	250	12/21/09 11:43	RJ	9L21005	8260B
1,2-Dichloroethane-d4	*104 %*	*D08, P11*	*Surr Limits:*	*(66-137%)*			*12/21/09 11:43*	*RJ*	*9L21005*	*8260B*
4-Bromofluorobenzene	*104 %*	*D08, P11*	*Surr Limits:*	*(73-120%)*			*12/21/09 11:43*	*RJ*	*9L21005*	*8260B*
Toluene-d8	*101 %*	*D08, P11*	*Surr Limits:*	*(71-126%)*			*12/21/09 11:43*	*RJ*	*9L21005*	*8260B*

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Sample ID: RSL0550-12 (TMW-4 - Water) **Sampled: 12/09/09 14:20** **Recvd: 12/10/09 11:20**

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Volatile Organic Compounds by EPA 8260B										
1,1,1-Trichloroethane	ND		1.0	0.26	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,1,2,2-Tetrachloroethane	ND		1.0	0.21	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,1,2-Trichloroethane	ND		1.0	0.23	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		1.0	0.31	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,1-Dichloroethane	ND		1.0	0.38	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,1-Dichloroethene	ND		1.0	0.29	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,2,4-Trichlorobenzene	ND		1.0	0.41	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,2,4-Trimethylbenzene	**8.3**		1.0	0.33	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,2-Dibromo-3-chloropropane	ND		1.0	0.39	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,2-Dibromoethane	ND		1.0	0.17	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,2-Dichlorobenzene	ND		1.0	0.20	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,2-Dichloroethane	ND		1.0	0.21	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,2-Dichloropropane	ND		1.0	0.33	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,3,5-Trimethylbenzene	**2.8**		1.0	0.22	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,3-Dichlorobenzene	ND		1.0	0.36	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,4-Dichlorobenzene	ND		1.0	0.39	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
2-Butanone	ND		5.0	1.3	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
2-Hexanone	ND		5.0	1.2	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
p-Cymene	ND		1.0	0.31	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
4-Methyl-2-pentanone	ND		5.0	0.91	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Acetone	**6.7**		5.0	1.3	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Benzene	**0.52**	J	1.0	0.41	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Bromodichloromethane	ND		1.0	0.39	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Bromoform	ND		1.0	0.26	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Bromomethane	ND		1.0	0.28	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Carbon disulfide	ND		1.0	0.19	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Carbon Tetrachloride	ND		1.0	0.27	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Chlorobenzene	ND		1.0	0.32	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Dibromochloromethane	ND		1.0	0.32	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Chloroethane	ND		1.0	0.32	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Chloroform	ND		1.0	0.34	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Chloromethane	ND		1.0	0.35	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
cis-1,2-Dichloroethene	ND		1.0	0.38	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
cis-1,3-Dichloropropene	ND		1.0	0.36	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Cyclohexane	**6.2**		1.0	0.53	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Dichlorofluoromethane	ND		1.0	0.34	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Ethylbenzene	**3.0**		1.0	0.18	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Isopropylbenzene	ND		1.0	0.19	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Methyl Acetate	ND		1.0	0.50	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Methyl-t-Butyl Ether (MTBE)	ND		1.0	0.16	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Methylcyclohexane	**2.7**		1.0	0.50	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Methylene Chloride	ND		1.0	0.44	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
m-Xylene & p-Xylene	**11**		2.0	0.66	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
n-Butylbenzene	ND		1.0	0.28	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
n-Propylbenzene	**1.2**		1.0	0.18	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
o-Xylene	**4.0**		1.0	0.36	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
sec-Butylbenzene	ND		1.0	0.30	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Styrene	ND		1.0	0.18	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

Analytical Report

Analyte	Sample Result	Data Qualifiers	RL	MDL	Units	Dil Fac	Date Analyzed	Lab Tech	Batch	Method
Sample ID: RSL0550-12 (TMW-4 - Water) - cont.						**Sampled: 12/09/09 14:20**		**Recvd: 12/10/09 11:20**		
Volatile Organic Compounds by EPA 8260B - cont.										
Tetrachloroethene	ND		1.0	0.36	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Toluene	**3.5**		1.0	0.51	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
trans-1,2-Dichloroethene	ND		1.0	0.42	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
trans-1,3-Dichloropropen e	ND		1.0	0.37	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Trichloroethene	ND		1.0	0.46	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Trichlorofluoromethane	ND		1.0	0.15	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Vinyl chloride	ND		1.0	0.24	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
Xylenes, total	**15**		2.0	0.66	ug/L	1.00	12/21/09 11:19	RJ	9L21005	8260B
1,2-Dichloroethane-d4	*103 %*		*Surr Limits:*	*(66-137%)*			*12/21/09 11:19*	*RJ*	*9L21005*	*8260B*
4-Bromofluorobenzene	*104 %*		*Surr Limits:*	*(73-120%)*			*12/21/09 11:19*	*RJ*	*9L21005*	*8260B*
Toluene-d8	*102 %*		*Surr Limits:*	*(71-126%)*			*12/21/09 11:19*	*RJ*	*9L21005*	*8260B*

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Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

SAMPLE EXTRACTION DATA

Parameter	Batch	Lab Number	Wt/Vol Extracte	Units	Extract Volume	Units	Date Prepared	Lab Tech	Extraction Method
General Chemistry Parameters									
Dry Weight	9L11027	RSL0550-01	10.00	g	10.00	g	12/11/09 09:41	JRR	Dry Weight
Dry Weight	9L11027	RSL0550-02	10.00	g	10.00	g	12/11/09 09:41	JRR	Dry Weight
Dry Weight	9L11027	RSL0550-03	10.00	g	10.00	g	12/11/09 09:41	JRR	Dry Weight
Dry Weight	9L11027	RSL0550-04	10.00	g	10.00	g	12/11/09 09:41	JRR	Dry Weight
Dry Weight	9L11027	RSL0550-05	10.00	g	10.00	g	12/11/09 09:41	JRR	Dry Weight
Dry Weight	9L11027	RSL0550-06	10.00	g	10.00	g	12/11/09 09:41	JRR	Dry Weight
Dry Weight	9L11027	RSL0550-07	10.00	g	10.00	g	12/11/09 09:41	JRR	Dry Weight
Dry Weight	9L11027	RSL0550-08	10.00	g	10.00	g	12/11/09 09:41	JRR	Dry Weight
Semivolatile Organics by GC/MS									
8270C	9L10099	RSL0550-04	30.28	g	1.00	mL	12/11/09 09:00	CXM	3550B MB
8270C	9L10099	RSL0550-02	30.29	g	1.00	mL	12/11/09 09:00	CXM	3550B MB
8270C	9L10099	RSL0550-08	30.39	g	1.00	mL	12/11/09 09:00	CXM	3550B MB
8270C	9L10099	RSL0550-05	30.44	g	1.00	mL	12/11/09 09:00	CXM	3550B MB
8270C	9L10099	RSL0550-03	30.53	g	1.00	mL	12/11/09 09:00	CXM	3550B MB
8270C	9L10099	RSL0550-06	30.53	g	1.00	mL	12/11/09 09:00	CXM	3550B MB
8270C	9L10099	RSL0550-01	30.59	g	1.00	mL	12/11/09 09:00	CXM	3550B MB
8270C	9L10099	RSL0550-07	30.91	g	1.00	mL	12/11/09 09:00	CXM	3550B MB
Volatile Organic Compounds by EPA 8260B									
8260B	9L11117	RSL0550-04	5.12	g	5.00	mL	12/11/09 18:29	CDC	5030B MS
8260B	9L11117	RSL0550-03	5.16	g	5.00	mL	12/11/09 18:29	CDC	5030B MS
8260B	9L12009	RSL0550-02	5.00	g	5.00	mL	12/12/09 13:36	DHC	5030B MS
8260B	9L12009	RSL0550-07	5.00	g	5.00	mL	12/12/09 13:36	DHC	5030B MS
8260B	9L12009	RSL0550-01	5.03	g	5.00	mL	12/12/09 13:36	DHC	5030B MS
8260B	9L12009	RSL0550-08	5.08	g	5.00	mL	12/12/09 13:36	DHC	5030B MS
8260B	9L12009	RSL0550-06	5.14	g	5.00	mL	12/12/09 13:36	DHC	5030B MS
8260B	9L19016	RSL0550-09	5.00	mL	5.00	mL	12/19/09 10:35	DHC	5030B MS TCLP
8260B	9L19016	RSL0550-10	5.00	mL	5.00	mL	12/19/09 10:35	DHC	5030B MS TCLP
8260B	9L19016	RSL0550-11	5.00	mL	5.00	mL	12/19/09 10:35	DHC	5030B MS TCLP
8260B	9L20002	RSL0550-10RE1	5.00	mL	5.00	mL	12/20/09 12:05	RMJ	5030B MS
8260B	9L21005	RSL0550-11RE1	5.00	mL	5.00	mL	12/21/09 09:21	RMJ	5030B MS
8260B	9L21005	RSL0550-12	5.00	mL	5.00	mL	12/21/09 09:21	RMJ	5030B MS
8260B	9L17029	RSL0550-04RE1	5.02	g	500.00	mL	12/17/09 09:48	TRB	Methanol Prep
8260B	9L17029	RSL0550-05	5.13	g	500.00	mL	12/17/09 09:48	TRB	Methanol Prep
8260B	9L17029	RSL0550-05RE1	5.13	g	500.00	mL	12/17/09 09:48	TRB	Methanol Prep

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
Blank Analyzed: 12/11/09 (Lab Number:9L11117-BLK1, Batch: 9L11117)											
Unknown naphthalene 01			NA		ug/kg wet	0.0					
1,2,4-Trimethylbenzene			5.0	0.36	ug/kg wet	ND					
1,3,5-Trimethylbenzene			5.0	0.32	ug/kg wet	ND					
p-Cymene			5.0	0.40	ug/kg wet	ND					
Benzene			5.0	0.24	ug/kg wet	ND					
Ethylbenzene			5.0	0.34	ug/kg wet	ND					
Isopropylbenzene			5.0	0.75	ug/kg wet	ND					
Methyl-t-Butyl Ether (MTBE)			5.0	0.49	ug/kg wet	ND					
m-Xylene & p-Xylene			10	0.84	ug/kg wet	ND					
n-Butylbenzene			5.0	0.44	ug/kg wet	ND					
n-Propylbenzene			5.0	0.40	ug/kg wet	ND					
o-Xylene			5.0	0.65	ug/kg wet	ND					
sec-Butylbenzene			5.0	0.44	ug/kg wet	ND					
tert-Butylbenzene			5.0	0.52	ug/kg wet	ND					
Toluene			5.0	0.38	ug/kg wet	ND					
Xylenes, total			10	0.84	ug/kg wet	ND					
Surrogate: 1,2-Dichloroethane-d4					*ug/kg wet*		*79*	*64-126*			
Surrogate: 4-Bromofluorobenzene					*ug/kg wet*		*124*	*72-126*			
Surrogate: Toluene-d8					*ug/kg wet*		*97*	*71-125*			
LCS Analyzed: 12/11/09 (Lab Number:9L11117-BS1, Batch: 9L11117)											
Unknown naphthalene 01			NA		ug/kg wet	0.00					
1,1,1,2-Tetrachloroethane			5.0	0.50	ug/kg wet	ND		74-127			
1,1,1-Trichloroethane			5.0	0.36	ug/kg wet	ND		77-121			
1,1,2,2-Tetrachloroethane			5.0	0.81	ug/kg wet	ND		80-120			
1,1,2-Trichloroethane			5.0	0.25	ug/kg wet	ND		78-122			
1,1,2-Trichloro-1,2,2-trifluoroethane			5.0	2.5	ug/kg wet	ND		60-140			
1,1-Dichloroethane			5.0	0.25	ug/kg wet	ND		79-126			
1,1-Dichloroethene		50.0	5.0	0.61	ug/kg wet	62.3	125	65-153			
1,1-Dichloropropene			5.0	0.29	ug/kg wet	ND		72-128			
1,1-Dimethoxyethane			25	2.0	ug/kg wet	ND					
1,2,3-Trichlorobenzene			5.0	0.53	ug/kg wet	ND		60-120			
1,2,3-Trichloropropane			5.0	0.51	ug/kg wet	ND		73-128			
1,2,3-Trimethylbenzene			5.0	1.0	ug/kg wet	ND					
1,2,4-Trichlorobenzene			5.0	0.30	ug/kg wet	ND		64-120			
1,2,4-Trimethylbenzene			5.0	0.36	ug/kg wet	ND		74-120			

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Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
LCS Analyzed: 12/11/09 (Lab Number:9L11117-BS1, Batch: 9L11117)											
1,2-Dibromo-3-chloropropane			5.0	4.0	ug/kg wet	ND		63-124			
1,2-Dibromoethane			5.0	0.19	ug/kg wet	ND		78-120			
1,2-Dichlorobenzene			5.0	0.39	ug/kg wet	ND		75-120			
1,2-Dichloroethane			5.0	0.25	ug/kg wet	ND		77-122			
1,2-Dichloroethene, Total			10	2.6	ug/kg wet	ND		82-120			
1,2-Dichloropropane			5.0	2.5	ug/kg wet	ND		75-124			
1,3,5-Trimethylbenzene			5.0	0.32	ug/kg wet	ND		74-120			
1,3-Dichlorobenzene			5.0	0.26	ug/kg wet	ND		74-120			
1,3-Dichloropropane			5.0	0.30	ug/kg wet	ND		72-127			
1,4-Dichlorobenzene			5.0	0.70	ug/kg wet	ND		73-120			
2-Butanone			25	1.8	ug/kg wet	ND		70-134			
2-Hexanone			25	2.5	ug/kg wet	ND		59-130			
p-Cymene			5.0	0.40	ug/kg wet	ND		74-120			
4-Methyl-2-pentanone			25	1.6	ug/kg wet	ND		65-133			
Acetone			25	1.1	ug/kg wet	ND		61-137			
Acrylonitrile			100	2.1	ug/kg wet	ND		65-134			
Benzene		50.0	5.0	0.24	ug/kg wet	44.0	88	79-127			
Bromochloromethane			5.0	0.36	ug/kg wet	ND		75-134			
Bromodichloromethane			5.0	0.26	ug/kg wet	ND		80-122			
Bromoform			5.0	2.5	ug/kg wet	ND		68-126			
Bromomethane			5.0	1.1	ug/kg wet	ND		37-149			
Carbon disulfide			5.0	0.43	ug/kg wet	ND		64-131			
Carbon Tetrachloride			5.0	0.48	ug/kg wet	ND		75-135			
Chlorobenzene		50.0	5.0	0.66	ug/kg wet	49.5	99	76-124			
Dibromochloromethane			5.0	0.28	ug/kg wet	ND		76-125			
Chloroethane			5.0	2.1	ug/kg wet	ND		69-135			
Chloroform			5.0	0.31	ug/kg wet	ND		80-118			
Chloromethane			5.0	0.30	ug/kg wet	ND		63-127			
cis-1,2-Dichloroethene			5.0	0.25	ug/kg wet	ND		81-117			
cis-1,3-Dichloropropene			5.0	0.28	ug/kg wet	ND		82-120			
Cyclohexane			5.0	0.23	ug/kg wet	ND		70-130			
Dibromomethane			5.0	0.52	ug/kg wet	ND		73-130			
Dichlorodifluoromethane			5.0	0.41	ug/kg wet	ND		57-142			
Ethylbenzene			5.0	0.34	ug/kg wet	ND		80-120			
Iodomethane			5.0	0.24	ug/kg wet	ND		59-149			
Isopropylbenzene			5.0	0.75	ug/kg wet	ND		72-120			
Methyl Acetate			5.0	0.27	ug/kg wet	ND		60-140			

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
LCS Analyzed: 12/11/09 (Lab Number:9L11117-BS1, Batch: 9L11117)											
Methyl-t-Butyl Ether (MTBE)			5.0	0.49	ug/kg wet	ND		63-125			
Methylcyclohexane			5.0	0.32	ug/kg wet	ND		60-140			
Methylene Chloride			5.0	0.99	ug/kg wet	ND		61-127			
m-Xylene & p-Xylene			10	0.84	ug/kg wet	ND		70-130			
n-Butylbenzene			5.0	0.44	ug/kg wet	ND		70-120			
n-Propylbenzene			5.0	0.40	ug/kg wet	ND		70-130			
o-Xylene			5.0	0.65	ug/kg wet	ND		70-130			
sec-Butylbenzene			5.0	0.44	ug/kg wet	ND		74-120			
Styrene			5.0	0.25	ug/kg wet	ND		80-120			
tert-Butylbenzene			5.0	0.52	ug/kg wet	ND		73-120			
Tetrachloroethene			5.0	0.67	ug/kg wet	ND		74-122			
Toluene		50.0	5.0	0.38	ug/kg wet	44.1	88	74-128			
trans-1,2-Dichloroethene			5.0	0.52	ug/kg wet	ND		78-126			
trans-1,3-Dichloropropene			5.0	0.24	ug/kg wet	ND		73-123			
trans-1,4-Dichloro-2-butene			25	2.5	ug/kg wet	ND		38-155			
Trichloroethene		50.0	5.0	0.34	ug/kg wet	46.9	94	77-129			
Trichlorofluoromethane			5.0	0.47	ug/kg wet	ND		65-146			
Vinyl acetate			25	1.0	ug/kg wet	ND		53-134			
Vinyl chloride			10	0.61	ug/kg wet	ND		61-133			
Xylenes, total			10	0.84	ug/kg wet	ND		80-120			
Surrogate: 1,2-Dichloroethane-d4					*ug/kg wet*		*81*	*64-126*			
Surrogate: 4-Bromofluorobenzene					*ug/kg wet*		*126*	*72-126*			
Surrogate: Toluene-d8					*ug/kg wet*		*97*	*71-125*			
Volatile Organic Compounds by EPA 8260B											
Blank Analyzed: 12/12/09 (Lab Number:9L12009-BLK1, Batch: 9L12009)											
Unknown naphthalene 01			NA		ug/kg wet	0.0					
1,2,4-Trimethylbenzene			5.0	0.36	ug/kg wet	ND					
1,3,5-Trimethylbenzene			5.0	0.32	ug/kg wet	ND					
p-Cymene			5.0	0.40	ug/kg wet	ND					
Benzene			5.0	0.24	ug/kg wet	ND					
Ethylbenzene			5.0	0.34	ug/kg wet	ND					
Isopropylbenzene			5.0	0.75	ug/kg wet	ND					
Methyl-t-Butyl Ether (MTBE)			5.0	0.49	ug/kg wet	ND					

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Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
Blank Analyzed: 12/12/09 (Lab Number:9L12009-BLK1, Batch: 9L12009)											
m-Xylene & p-Xylene			10	0.84	ug/kg wet	1.7					J
n-Butylbenzene			5.0	0.44	ug/kg wet	ND					
n-Propylbenzene			5.0	0.40	ug/kg wet	ND					
o-Xylene			5.0	0.65	ug/kg wet	ND					
sec-Butylbenzene			5.0	0.44	ug/kg wet	ND					
tert-Butylbenzene			5.0	0.52	ug/kg wet	ND					
Toluene			5.0	0.38	ug/kg wet	ND					
Xylenes, total			10	0.84	ug/kg wet	1.7					J
Surrogate: 1,2-Dichloroethane-d4					*ug/kg wet*		*107*	*64-126*			
Surrogate: 4-Bromofluorobenzene					*ug/kg wet*		*96*	*72-126*			
Surrogate: Toluene-d8					*ug/kg wet*		*106*	*71-125*			
LCS Analyzed: 12/12/09 (Lab Number:9L12009-BS1, Batch: 9L12009)											
Unknown naphthalene 01			NA		ug/kg wet	0.00					
1,1,1,2-Tetrachloroethane			5.0	0.50	ug/kg wet	ND		74-127			
1,1,1-Trichloroethane			5.0	0.36	ug/kg wet	ND		77-121			
1,1,2,2-Tetrachloroethane			5.0	0.81	ug/kg wet	ND		80-120			
1,1,2-Trichloroethane			5.0	0.25	ug/kg wet	ND		78-122			
1,1,2-Trichloro-1,2,2-trifluoroethane			5.0	2.5	ug/kg wet	ND		60-140			
1,1-Dichloroethane			5.0	0.25	ug/kg wet	ND		79-126			
1,1-Dichloroethene		50.0	5.0	0.61	ug/kg wet	67.2	134	65-153			
1,1-Dichloropropene			5.0	0.29	ug/kg wet	ND		72-128			
1,1-Dimethoxyethane			25	2.0	ug/kg wet	ND					
1,2,3-Trichlorobenzene			5.0	0.53	ug/kg wet	ND		60-120			
1,2,3-Trichloropropane			5.0	0.51	ug/kg wet	ND		73-128			
1,2,3-Trimethylbenzene			5.0	1.0	ug/kg wet	ND					
1,2,4-Trichlorobenzene			5.0	0.30	ug/kg wet	ND		64-120			
1,2,4-Trimethylbenzene			5.0	0.36	ug/kg wet	1.12		74-120			J
1,2-Dibromo-3-chloropropane			5.0	4.0	ug/kg wet	ND		63-124			
1,2-Dibromoethane			5.0	0.19	ug/kg wet	ND		78-120			
1,2-Dichlorobenzene			5.0	0.39	ug/kg wet	ND		75-120			
1,2-Dichloroethane			5.0	0.25	ug/kg wet	ND		77-122			
1,2-Dichloroethene, Total			10	2.6	ug/kg wet	ND		82-120			
1,2-Dichloropropane			5.0	2.5	ug/kg wet	ND		75-124			
1,3,5-Trimethylbenzene			5.0	0.32	ug/kg wet	ND		74-120			
1,3-Dichlorobenzene			5.0	0.26	ug/kg wet	ND		74-120			

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
LCS Analyzed: 12/12/09 (Lab Number:9L12009-BS1, Batch: 9L12009)											
1,3-Dichloropropane			5.0	0.30	ug/kg wet	ND		72-127			
1,4-Dichlorobenzene			5.0	0.70	ug/kg wet	ND		73-120			
2-Butanone			25	1.8	ug/kg wet	ND		70-134			
2-Hexanone			25	2.5	ug/kg wet	ND		59-130			
p-Cymene			5.0	0.40	ug/kg wet	ND		74-120			
4-Methyl-2-pentanone			25	1.6	ug/kg wet	ND		65-133			
Acetone			25	1.1	ug/kg wet	ND		61-137			
Acrylonitrile			100	2.1	ug/kg wet	ND		65-134			
Benzene		50.0	5.0	0.24	ug/kg wet	44.6	89	79-127			
Bromochloromethane			5.0	0.36	ug/kg wet	ND		75-134			
Bromodichloromethane			5.0	0.26	ug/kg wet	ND		80-122			
Bromoform			5.0	2.5	ug/kg wet	ND		68-126			
Bromomethane			5.0	1.1	ug/kg wet	ND		37-149			
Carbon disulfide			5.0	0.43	ug/kg wet	ND		64-131			
Carbon Tetrachloride			5.0	0.48	ug/kg wet	ND		75-135			
Chlorobenzene		50.0	5.0	0.66	ug/kg wet	48.0	96	76-124			
Dibromochloromethane			5.0	0.28	ug/kg wet	ND		76-125			
Chloroethane			5.0	2.1	ug/kg wet	ND		69-135			
Chloroform			5.0	0.31	ug/kg wet	ND		80-118			
Chloromethane			5.0	0.30	ug/kg wet	ND		63-127			
cis-1,2-Dichloroethene			5.0	0.25	ug/kg wet	ND		81-117			
cis-1,3-Dichloropropene			5.0	0.28	ug/kg wet	ND		82-120			
Cyclohexane			5.0	0.23	ug/kg wet	ND		70-130			
Dibromomethane			5.0	0.52	ug/kg wet	ND		73-130			
Dichlorodifluoromethane			5.0	0.41	ug/kg wet	ND		57-142			
Ethylbenzene			5.0	0.34	ug/kg wet	ND		80-120			
Iodomethane			5.0	0.24	ug/kg wet	ND		59-149			
Isopropylbenzene			5.0	0.75	ug/kg wet	ND		72-120			
Methyl Acetate			5.0	0.27	ug/kg wet	ND		60-140			
Methyl-t-Butyl Ether (MTBE)			5.0	0.49	ug/kg wet	ND		63-125			
Methylcyclohexane			5.0	0.32	ug/kg wet	ND		60-140			
Methylene Chloride			5.0	0.99	ug/kg wet	ND		61-127			
m-Xylene & p-Xylene			10	0.84	ug/kg wet	2.16		70-130			J,B
n-Butylbenzene			5.0	0.44	ug/kg wet	ND		70-120			
n-Propylbenzene			5.0	0.40	ug/kg wet	ND		70-130			
o-Xylene			5.0	0.65	ug/kg wet	ND		70-130			
sec-Butylbenzene			5.0	0.44	ug/kg wet	ND		74-120			

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Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
LCS Analyzed: 12/12/09 (Lab Number:9L12009-BS1, Batch: 9L12009)											
Styrene			5.0	0.25	ug/kg wet	ND		80-120			
tert-Butylbenzene			5.0	0.52	ug/kg wet	ND		73-120			
Tetrachloroethene			5.0	0.67	ug/kg wet	ND		74-122			
Toluene		50.0	5.0	0.38	ug/kg wet	43.2	86	74-128			
trans-1,2-Dichloroethene			5.0	0.52	ug/kg wet	ND		78-126			
trans-1,3-Dichloropropene			5.0	0.24	ug/kg wet	ND		73-123			
trans-1,4-Dichloro-2-butene			25	2.5	ug/kg wet	ND		38-155			
Trichloroethene		50.0	5.0	0.34	ug/kg wet	46.3	93	77-129			
Trichlorofluoromethane			5.0	0.47	ug/kg wet	ND		65-146			
Vinyl acetate			25	1.0	ug/kg wet	ND		53-134			
Vinyl chloride			10	0.61	ug/kg wet	ND		61-133			
Xylenes, total			10	0.84	ug/kg wet	2.16		80-120			J,B
Surrogate: 1,2-Dichloroethane-d4					*ug/kg wet*		*112*	*64-126*			
Surrogate: 4-Bromofluorobenzene					*ug/kg wet*		*101*	*72-126*			
Surrogate: Toluene-d8					*ug/kg wet*		*110*	*71-125*			
Matrix Spike Analyzed: 12/12/09 (Lab Number:9L12009-MS1, Batch: 9L12009)											
QC Source Sample: RSL0550-08											
Unknown naphthalene 01	0.00		NA		ug/kg dry	0.00					
1,1,1,2-Tetrachloroethane	ND		6.2	0.62	ug/kg dry	ND		74-127			
1,1,1-Trichloroethane	ND		6.2	0.45	ug/kg dry	ND		77-121			
1,1,2,2-Tetrachloroethane	ND		6.2	1.0	ug/kg dry	ND		80-120			
1,1,2-Trichloroethane	ND		6.2	0.31	ug/kg dry	ND		78-122			
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		6.2	3.1	ug/kg dry	ND		60-140			
1,1-Dichloroethane	ND		6.2	0.31	ug/kg dry	ND		79-126			
1,1-Dichloroethene	ND	62.2	6.2	0.76	ug/kg dry	63.4	102	65-153			
1,1-Dichloropropene	ND		6.2	0.36	ug/kg dry	ND		72-128			
1,1-Dimethoxyethane	ND		31	2.5	ug/kg dry	ND					
1,2,3-Trichlorobenzene	ND		6.2	0.66	ug/kg dry	ND		60-120			
1,2,3-Trichloropropane	ND		6.2	0.63	ug/kg dry	ND		73-128			
1,2,3-Trimethylbenzene	ND		6.2	1.3	ug/kg dry	ND					
1,2,4-Trichlorobenzene	ND		6.2	0.38	ug/kg dry	ND		64-120			
1,2,4-Trimethylbenzene	15.7		6.2	0.45	ug/kg dry	15.8		74-120			
1,2-Dibromo-3-chloropropane	ND		6.2	5.0	ug/kg dry	ND		63-124			
1,2-Dibromoethane	ND		6.2	0.24	ug/kg dry	ND		78-120			

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Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
Matrix Spike Analyzed: 12/12/09 (Lab Number:9L12009-MS1, Batch: 9L12009)											
QC Source Sample: RSL0550-08											
1,2-Dichlorobenzene	ND		6.2	0.49	ug/kg dry	ND		75-120			
1,2-Dichloroethane	ND		6.2	0.31	ug/kg dry	ND		77-122			
1,2-Dichloroethene, Total	ND		12	3.3	ug/kg dry	ND		82-120			
1,2-Dichloropropane	ND		6.2	3.1	ug/kg dry	ND		75-124			
1,3,5-Trimethylbenzene	ND		6.2	0.40	ug/kg dry	ND		74-120			
1,3-Dichlorobenzene	ND		6.2	0.32	ug/kg dry	ND		74-120			
1,3-Dichloropropane	ND		6.2	0.37	ug/kg dry	ND		72-127			
1,4-Dichlorobenzene	ND		6.2	0.87	ug/kg dry	ND		73-120			
2-Butanone	8.92		31	2.3	ug/kg dry	6.28		70-134			J
2-Hexanone	ND		31	3.1	ug/kg dry	ND		59-130			
p-Cymene	2.10		6.2	0.50	ug/kg dry	2.25		74-120			J
4-Methyl-2-pentanone	ND		31	2.0	ug/kg dry	ND		65-133			
Acetone	55.2		31	1.4	ug/kg dry	37.8		61-137			
Acrylonitrile	ND		120	2.6	ug/kg dry	ND		65-134			
Benzene	ND	62.2	6.2	0.30	ug/kg dry	42.6	68	79-127			M8
Bromochloromethane	ND		6.2	0.45	ug/kg dry	ND		75-134			
Bromodichloromethane	ND		6.2	0.32	ug/kg dry	ND		80-122			
Bromoform	ND		6.2	3.1	ug/kg dry	ND		68-126			
Bromomethane	ND		6.2	1.4	ug/kg dry	ND		37-149			
Carbon disulfide	ND		6.2	0.53	ug/kg dry	ND		64-131			
Carbon Tetrachloride	ND		6.2	0.60	ug/kg dry	ND		75-135			
Chlorobenzene	ND	62.2	6.2	0.82	ug/kg dry	40.1	64	76-124			M8
Dibromochloromethane	ND		6.2	0.34	ug/kg dry	ND		76-125			
Chloroethane	ND		6.2	2.6	ug/kg dry	ND		69-135			
Chloroform	ND		6.2	0.38	ug/kg dry	ND		80-118			
Chloromethane	ND		6.2	0.38	ug/kg dry	ND		63-127			
cis-1,2-Dichloroethene	ND		6.2	0.31	ug/kg dry	ND		81-117			
cis-1,3-Dichloropropene	ND		6.2	0.35	ug/kg dry	ND		82-120			
Cyclohexane	ND		6.2	0.29	ug/kg dry	ND		70-130			
Dibromomethane	ND		6.2	0.64	ug/kg dry	ND		73-130			
Dichlorodifluoromethane	ND		6.2	0.51	ug/kg dry	ND		57-142			
Ethylbenzene	ND		6.2	0.43	ug/kg dry	ND		80-120			
Iodomethane	ND		6.2	0.30	ug/kg dry	ND		59-149			
Isopropylbenzene	1.37		6.2	0.94	ug/kg dry	1.34		72-120			J
Methyl Acetate	ND		6.2	0.34	ug/kg dry	ND		60-140			
Methyl-t-Butyl Ether (MTBE)	ND		6.2	0.61	ug/kg dry	ND		63-125			

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Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
Matrix Spike Analyzed: 12/12/09 (Lab Number:9L12009-MS1, Batch: 9L12009)											
QC Source Sample: RSL0550-08											
Methylcyclohexane	1.48		6.2	0.40	ug/kg dry	1.78		60-140			J
Methylene Chloride	7.58		6.2	1.2	ug/kg dry	6.90		61-127			
m-Xylene & p-Xylene	1.97		12	1.0	ug/kg dry	1.85		70-130			J,B
n-Butylbenzene	2.66		6.2	0.54	ug/kg dry	3.01		70-120			J
n-Propylbenzene	2.40		6.2	0.50	ug/kg dry	2.31		70-130			J
o-Xylene	ND		6.2	0.81	ug/kg dry	ND		70-130			
sec-Butylbenzene	ND		6.2	0.54	ug/kg dry	ND		74-120			
Styrene	ND		6.2	0.31	ug/kg dry	ND		80-120			
tert-Butylbenzene	ND		6.2	0.65	ug/kg dry	ND		73-120			
Tetrachloroethene	ND		6.2	0.83	ug/kg dry	ND		74-122			
Toluene	1.24	62.2	6.2	0.47	ug/kg dry	38.4	60	74-128			M8
trans-1,2-Dichloroethene	ND		6.2	0.64	ug/kg dry	ND		78-126			
trans-1,3-Dichloropropen e	ND		6.2	0.30	ug/kg dry	ND		73-123			
trans-1,4-Dichloro-2-bute ne	ND		31	3.1	ug/kg dry	ND		38-155			
Trichloroethene	ND	62.2	6.2	0.43	ug/kg dry	42.5	68	77-129			M8
Trichlorofluoromethane	ND		6.2	0.59	ug/kg dry	ND		65-146			
Vinyl acetate	ND		31	1.3	ug/kg dry	ND		53-134			
Vinyl chloride	ND		12	0.76	ug/kg dry	ND		61-133			
Xylenes, total	1.97		12	1.0	ug/kg dry	1.85		80-120			J,B
Surrogate: 1,2-Dichloroethane-d4					*ug/kg dry*		*103*	*64-126*			
Surrogate: 4-Bromofluorobenzene					*ug/kg dry*		*97*	*72-126*			
Surrogate: Toluene-d8					*ug/kg dry*		*104*	*71-125*			
Matrix Spike Dup Analyzed: 12/12/09 (Lab Number:9L12009-MSD1, Batch: 9L12009)											
QC Source Sample: RSL0550-08											
Unknown naphthalene 01	0.00		NA		ug/kg dry	0.00					
1,1,1,2-Tetrachloroethane	ND		6.2	0.62	ug/kg dry	ND		74-127		20	
1,1,1-Trichloroethane	ND		6.2	0.45	ug/kg dry	ND		77-121		20	
1,1,2,2-Tetrachloroethane	ND		6.2	1.0	ug/kg dry	ND		80-120		20	
1,1,2-Trichloroethane	ND		6.2	0.31	ug/kg dry	ND		78-122		20	
1,1,2-Trichloro-1,2,2-triflu oroethane	ND		6.2	3.1	ug/kg dry	ND		60-140		20	
1,1-Dichloroethane	ND		6.2	0.31	ug/kg dry	ND		79-126		20	
1,1-Dichloroethene	ND	61.8	6.2	0.76	ug/kg dry	68.5	111	65-153	8	22	
1,1-Dichloropropene	ND		6.2	0.35	ug/kg dry	ND		72-128		20	
1,1-Dimethoxyethane	ND		31	2.5	ug/kg dry	ND					

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LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
Matrix Spike Dup Analyzed: 12/12/09 (Lab Number:9L12009-MSD1, Batch: 9L12009)											
QC Source Sample: RSL0550-08											
1,2,3-Trichlorobenzene	ND		6.2	0.66	ug/kg dry	ND		60-120		20	
1,2,3-Trichloropropane	ND		6.2	0.63	ug/kg dry	ND		73-128		20	
1,2,3-Trimethylbenzene	ND		6.2	1.3	ug/kg dry	ND					
1,2,4-Trichlorobenzene	ND		6.2	0.38	ug/kg dry	ND		64-120		20	
1,2,4-Trimethylbenzene	15.7		6.2	0.45	ug/kg dry	19.0		74-120	19	20	
1,2-Dibromo-3-chloropropane	ND		6.2	4.9	ug/kg dry	ND		63-124		20	
1,2-Dibromoethane	ND		6.2	0.23	ug/kg dry	ND		78-120		20	
1,2-Dichlorobenzene	ND		6.2	0.48	ug/kg dry	ND		75-120		20	
1,2-Dichloroethane	ND		6.2	0.31	ug/kg dry	ND		77-122		20	
1,2-Dichloroethene, Total	ND		12	3.2	ug/kg dry	ND		82-120		20	
1,2-Dichloropropane	ND		6.2	3.1	ug/kg dry	ND		75-124		20	
1,3,5-Trimethylbenzene	ND		6.2	0.40	ug/kg dry	ND		74-120		20	
1,3-Dichlorobenzene	ND		6.2	0.32	ug/kg dry	ND		74-120		20	
1,3-Dichloropropane	ND		6.2	0.37	ug/kg dry	ND		72-127		20	
1,4-Dichlorobenzene	ND		6.2	0.87	ug/kg dry	ND		73-120		20	
2-Butanone	8.92		31	2.3	ug/kg dry	ND		70-134		20	
2-Hexanone	ND		31	3.1	ug/kg dry	ND		59-130		20	
p-Cymene	2.10		6.2	0.50	ug/kg dry	3.02		74-120	29	20	J
4-Methyl-2-pentanone	ND		31	2.0	ug/kg dry	ND		65-133		20	
Acetone	55.2		31	1.4	ug/kg dry	22.6		61-137	50	15	J
Acrylonitrile	ND		120	2.5	ug/kg dry	ND		65-134		20	
Benzene	ND	61.8	6.2	0.30	ug/kg dry	45.3	73	79-127	6	20	M8
Bromochloromethane	ND		6.2	0.45	ug/kg dry	ND		75-134		20	
Bromodichloromethane	ND		6.2	0.32	ug/kg dry	ND		80-122		20	
Bromoform	ND		6.2	3.1	ug/kg dry	ND		68-126		20	
Bromomethane	ND		6.2	1.4	ug/kg dry	ND		37-149		20	
Carbon disulfide	ND		6.2	0.53	ug/kg dry	ND		64-131		20	
Carbon Tetrachloride	ND		6.2	0.60	ug/kg dry	ND		75-135		20	
Chlorobenzene	ND	61.8	6.2	0.82	ug/kg dry	42.9	69	76-124	7	25	M8
Dibromochloromethane	ND		6.2	0.34	ug/kg dry	ND		76-125		20	
Chloroethane	ND		6.2	2.6	ug/kg dry	ND		69-135		20	
Chloroform	ND		6.2	0.38	ug/kg dry	ND		80-118		20	
Chloromethane	ND		6.2	0.37	ug/kg dry	ND		63-127		20	
cis-1,2-Dichloroethene	ND		6.2	0.30	ug/kg dry	ND		81-117		20	
cis-1,3-Dichloropropene	ND		6.2	0.35	ug/kg dry	ND		82-120		20	
Cyclohexane	ND		6.2	0.28	ug/kg dry	ND		70-130		20	

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THE LEADER IN ENVIRONMENTAL TESTING

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
Matrix Spike Dup Analyzed: 12/12/09 (Lab Number:9L12009-MSD1, Batch: 9L12009)											
QC Source Sample: RSL0550-08											
Dibromomethane	ND		6.2	0.64	ug/kg dry	ND		73-130		20	
Dichlorodifluoromethane	ND		6.2	0.51	ug/kg dry	ND		57-142		20	
Ethylbenzene	ND		6.2	0.43	ug/kg dry	ND		80-120		20	
Iodomethane	ND		6.2	0.30	ug/kg dry	ND		59-149		20	
Isopropylbenzene	1.37		6.2	0.93	ug/kg dry	2.08		72-120	43	20	J
Methyl Acetate	ND		6.2	0.33	ug/kg dry	ND		60-140		20	
Methyl-t-Butyl Ether (MTBE)	ND		6.2	0.61	ug/kg dry	ND		63-125		20	
Methylcyclohexane	1.48		6.2	0.40	ug/kg dry	3.98		60-140	76	20	J
Methylene Chloride	7.58		6.2	1.2	ug/kg dry	4.78		61-127	36	15	J
m-Xylene & p-Xylene	1.97		12	1.0	ug/kg dry	1.97		70-130	6	20	J,B
n-Butylbenzene	2.66		6.2	0.54	ug/kg dry	4.72		70-120	44	20	J
n-Propylbenzene	2.40		6.2	0.49	ug/kg dry	3.84		70-130	50	20	J
o-Xylene	ND		6.2	0.81	ug/kg dry	ND		70-130		20	
sec-Butylbenzene	ND		6.2	0.54	ug/kg dry	2.04		74-120		20	J
Styrene	ND		6.2	0.31	ug/kg dry	ND		80-120		20	
tert-Butylbenzene	ND		6.2	0.64	ug/kg dry	ND		73-120		20	
Tetrachloroethene	ND		6.2	0.83	ug/kg dry	ND		74-122		20	
Toluene	1.24	61.8	6.2	0.47	ug/kg dry	40.7	64	74-128	6	20	M8
trans-1,2-Dichloroethene	ND		6.2	0.64	ug/kg dry	ND		78-126		20	
trans-1,3-Dichloropropene	ND		6.2	0.30	ug/kg dry	ND		73-123		20	
trans-1,4-Dichloro-2-butene	ND		31	3.1	ug/kg dry	ND		38-155		20	
Trichloroethene	ND	61.8	6.2	0.43	ug/kg dry	45.6	74	77-129	7	24	M8
Trichlorofluoromethane	ND		6.2	0.58	ug/kg dry	ND		65-146		20	
Vinyl acetate	ND		31	1.3	ug/kg dry	ND		53-134		20	
Vinyl chloride	ND		12	0.75	ug/kg dry	ND		61-133		20	
Xylenes, total	1.97		12	1.0	ug/kg dry	1.97		80-120	6	20	J,B
Surrogate: 1,2-Dichloroethane-d4					*ug/kg dry*		*103*	*64-126*			
Surrogate: 4-Bromofluorobenzene					*ug/kg dry*		*96*	*72-126*			
Surrogate: Toluene-d8					*ug/kg dry*		*103*	*71-125*			
Volatile Organic Compounds by EPA 8260B											
Blank Analyzed: 12/17/09 (Lab Number:9L17029-BLK1, Batch: 9L17029)											
1,2,4-Trimethylbenzene			100	7.2	ug/kg wet	ND					
1,3,5-Trimethylbenzene			100	6.4	ug/kg wet	ND					

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
Blank Analyzed: 12/17/09 (Lab Number:9L17029-BLK1, Batch: 9L17029)											
p-Cymene			100	8.0	ug/kg wet	ND					
Benzene			100	4.8	ug/kg wet	ND					
Ethylbenzene			100	6.8	ug/kg wet	ND					
Isopropylbenzene			100	15	ug/kg wet	ND					
Methyl-t-Butyl Ether (MTBE)			100	9.8	ug/kg wet	ND					
m-Xylene & p-Xylene			200	17	ug/kg wet	ND					
n-Butylbenzene			100	8.8	ug/kg wet	ND					
n-Propylbenzene			100	8.0	ug/kg wet	ND					
o-Xylene			100	13	ug/kg wet	ND					
sec-Butylbenzene			100	8.8	ug/kg wet	ND					
tert-Butylbenzene			100	10	ug/kg wet	ND					
Toluene			100	7.6	ug/kg wet	ND					
Xylenes, total			200	17	ug/kg wet	ND					
Surrogate: 1,2-Dichloroethane-d4					*ug/kg wet*		*90*	*10-190*			
Surrogate: 4-Bromofluorobenzene					*ug/kg wet*		*95*	*10-190*			
Surrogate: Toluene-d8					*ug/kg wet*		*92*	*10-190*			
LCS Analyzed: 12/17/09 (Lab Number:9L17029-BS1, Batch: 9L17029)											
1,1-Dichloroethene		2410	97	12	ug/kg wet	2470	102	10-190			
Benzene		2410	97	4.6	ug/kg wet	2230	92	10-190			
Chlorobenzene		2410	97	13	ug/kg wet	2250	93	10-190			
Toluene		2410	97	7.3	ug/kg wet	2200	91	10-190			
Trichloroethene		2410	97	6.6	ug/kg wet	2240	93	10-190			
Surrogate: 1,2-Dichloroethane-d4					*ug/kg wet*		*86*	*10-190*			
Surrogate: 4-Bromofluorobenzene					*ug/kg wet*		*91*	*10-190*			
Surrogate: Toluene-d8					*ug/kg wet*		*89*	*10-190*			
Volatile Organic Compounds by EPA 8260B											
Blank Analyzed: 12/19/09 (Lab Number:9L19016-BLK1, Batch: 9L19016)											
1,1,1-Trichloroethane			1.0	0.26	ug/L	ND					
1,1,2,2-Tetrachloroethane			1.0	0.21	ug/L	ND					
1,1,2-Trichloroethane			1.0	0.23	ug/L	ND					
1,1,2-Trichloro-1,2,2-trifluoroethane			1.0	0.31	ug/L	ND					
1,1-Dichloroethane			1.0	0.38	ug/L	ND					

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THE LEADER IN ENVIRONMENTAL TESTING

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
Blank Analyzed: 12/19/09 (Lab Number:9L19016-BLK1, Batch: 9L19016)											
1,1-Dichloroethene			1.0	0.29	ug/L	ND					
1,2,4-Trichlorobenzene			1.0	0.41	ug/L	ND					
1,2,4-Trimethylbenzene			1.0	0.33	ug/L	ND					
1,2-Dibromo-3-chloropropane			1.0	0.39	ug/L	ND					
1,2-Dibromoethane			1.0	0.17	ug/L	ND					
1,2-Dichlorobenzene			1.0	0.20	ug/L	ND					
1,2-Dichloroethane			1.0	0.21	ug/L	ND					
1,2-Dichloropropane			1.0	0.33	ug/L	ND					
1,3,5-Trimethylbenzene			1.0	0.22	ug/L	ND					
1,3-Dichlorobenzene			1.0	0.36	ug/L	ND					
1,4-Dichlorobenzene			1.0	0.39	ug/L	ND					
2-Butanone			5.0	1.3	ug/L	ND					
2-Hexanone			5.0	1.2	ug/L	ND					
p-Cymene			1.0	0.31	ug/L	ND					
4-Methyl-2-pentanone			5.0	0.91	ug/L	ND					
Acetone			5.0	1.3	ug/L	ND					
Benzene			1.0	0.41	ug/L	ND					
Bromodichloromethane			1.0	0.39	ug/L	ND					
Bromoform			1.0	0.26	ug/L	ND					
Bromomethane			1.0	0.28	ug/L	ND					
Carbon disulfide			1.0	0.19	ug/L	ND					
Carbon Tetrachloride			1.0	0.27	ug/L	ND					
Chlorobenzene			1.0	0.32	ug/L	ND					
Dibromochloromethane			1.0	0.32	ug/L	ND					
Chloroethane			1.0	0.32	ug/L	ND					
Chloroform			1.0	0.34	ug/L	ND					
Chloromethane			1.0	0.35	ug/L	ND					
cis-1,2-Dichloroethene			1.0	0.38	ug/L	ND					
cis-1,3-Dichloropropene			1.0	0.36	ug/L	ND					
Cyclohexane			1.0	0.53	ug/L	ND					
Dichlorofluoromethane			1.0	0.34	ug/L	ND					
Ethylbenzene			1.0	0.18	ug/L	ND					
Isopropylbenzene			1.0	0.19	ug/L	ND					
Methyl Acetate			1.0	0.50	ug/L	ND					
Methyl-t-Butyl Ether (MTBE)			1.0	0.16	ug/L	ND					
Methylcyclohexane			1.0	0.50	ug/L	ND					
Methylene Chloride			1.0	0.44	ug/L	ND					

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Project Number: TURN-0038

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LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
Blank Analyzed: 12/19/09 (Lab Number:9L19016-BLK1, Batch: 9L19016)											
m-Xylene & p-Xylene			2.0	0.66	ug/L	ND					
n-Butylbenzene			1.0	0.28	ug/L	ND					
n-Propylbenzene			1.0	0.18	ug/L	ND					
o-Xylene			1.0	0.36	ug/L	ND					
sec-Butylbenzene			1.0	0.30	ug/L	ND					
Styrene			1.0	0.18	ug/L	ND					
Tetrachloroethene			1.0	0.36	ug/L	ND					
Toluene			1.0	0.51	ug/L	ND					
trans-1,2-Dichloroethene			1.0	0.42	ug/L	ND					
trans-1,3-Dichloropropene			1.0	0.37	ug/L	ND					
Trichloroethene			1.0	0.46	ug/L	ND					
Trichlorofluoromethane			1.0	0.15	ug/L	ND					
Vinyl chloride			1.0	0.24	ug/L	ND					
Xylenes, total			2.0	0.66	ug/L	ND					
Surrogate: 1,2-Dichloroethane-d4					*ug/L*		*109*	*66-137*			
Surrogate: 4-Bromofluorobenzene					*ug/L*		*102*	*73-120*			
Surrogate: Toluene-d8					*ug/L*		*100*	*71-126*			
LCS Analyzed: 12/19/09 (Lab Number:9L19016-BS1, Batch: 9L19016)											
1,1,1-Trichloroethane		25.0	1.0	0.26	ug/L	27.5	110	73-126			
1,1,2,2-Tetrachloroethane		25.0	1.0	0.21	ug/L	22.9	92	70-126			
1,1,2-Trichloroethane		25.0	1.0	0.23	ug/L	23.7	95	76-122			
1,1,2-Trichloro-1,2,2-trifluoroethane		25.0	1.0	0.31	ug/L	27.8	111	60-140			
1,1-Dichloroethane		25.0	1.0	0.38	ug/L	25.9	104	71-129			
1,1-Dichloroethene		25.0	1.0	0.29	ug/L	26.0	104	65-138			
1,2,4-Trichlorobenzene		25.0	1.0	0.41	ug/L	23.8	95	70-122			
1,2,4-Trimethylbenzene		25.0	1.0	0.33	ug/L	21.8	87	76-121			
1,2-Dibromo-3-chloropropane		25.0	1.0	0.39	ug/L	20.2	81	56-134			
1,2-Dibromoethane		25.0	1.0	0.17	ug/L	24.4	98	77-120			
1,2-Dichlorobenzene		25.0	1.0	0.20	ug/L	23.9	95	77-120			
1,2-Dichloroethane		25.0	1.0	0.21	ug/L	25.9	104	75-127			
1,2-Dichloropropane		25.0	1.0	0.33	ug/L	25.6	102	76-120			
1,3,5-Trimethylbenzene		25.0	1.0	0.22	ug/L	23.2	93	77-121			
1,3-Dichlorobenzene		25.0	1.0	0.36	ug/L	23.9	95	77-120			
1,4-Dichlorobenzene		25.0	1.0	0.39	ug/L	23.5	94	75-120			

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LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
LCS Analyzed: 12/19/09 (Lab Number:9L19016-BS1, Batch: 9L19016)											
2-Butanone		125	5.0	1.3	ug/L	124	99	57-140			
2-Hexanone		125	5.0	1.2	ug/L	117	94	65-127			
p-Cymene		25.0	1.0	0.31	ug/L	23.7	95	73-120			
4-Methyl-2-pentanone		125	5.0	0.91	ug/L	115	92	71-125			
Acetone		125	5.0	1.3	ug/L	126	101	56-142			
Benzene		25.0	1.0	0.41	ug/L	25.1	100	71-124			
Bromodichloromethane		25.0	1.0	0.39	ug/L	24.4	98	80-122			
Bromoform		25.0	1.0	0.26	ug/L	20.7	83	66-128			
Bromomethane		25.0	1.0	0.28	ug/L	25.7	103	36-150			
Carbon disulfide		25.0	1.0	0.19	ug/L	23.7	95	59-134			
Carbon Tetrachloride		25.0	1.0	0.27	ug/L	28.8	115	72-134			
Chlorobenzene		25.0	1.0	0.32	ug/L	24.0	96	72-120			
Dibromochloromethane		25.0	1.0	0.32	ug/L	22.4	90	75-125			
Chloroethane		25.0	1.0	0.32	ug/L	30.7	123	69-136			
Chloroform		25.0	1.0	0.34	ug/L	26.4	105	73-127			
Chloromethane		25.0	1.0	0.35	ug/L	26.6	106	49-142			
cis-1,2-Dichloroethene		25.0	1.0	0.38	ug/L	25.7	103	74-124			
cis-1,3-Dichloropropene		25.0	1.0	0.36	ug/L	24.6	98	74-124			
Cyclohexane		25.0	1.0	0.53	ug/L	26.9	107	70-130			
Dichlorofluoromethane			1.0	0.34	ug/L	ND					
Ethylbenzene		25.0	1.0	0.18	ug/L	24.3	97	77-123			
Isopropylbenzene		25.0	1.0	0.19	ug/L	23.7	95	77-122			
Methyl Acetate		25.0	1.0	0.50	ug/L	25.1	101	60-140			
Methyl-t-Butyl Ether (MTBE)		25.0	1.0	0.16	ug/L	25.2	101	64-127			
Methylcyclohexane		25.0	1.0	0.50	ug/L	26.6	106	60-140			
Methylene Chloride		25.0	1.0	0.44	ug/L	24.8	99	57-132			
m-Xylene & p-Xylene		50.0	2.0	0.66	ug/L	47.9	96	76-122			
n-Butylbenzene		25.0	1.0	0.28	ug/L	23.0	92	71-128			
n-Propylbenzene		25.0	1.0	0.18	ug/L	23.9	95	77-120			
o-Xylene		25.0	1.0	0.36	ug/L	24.3	97	76-122			
sec-Butylbenzene		25.0	1.0	0.30	ug/L	23.8	95	74-127			
Styrene		25.0	1.0	0.18	ug/L	25.0	100	70-130			
Tetrachloroethene		25.0	1.0	0.36	ug/L	24.6	98	74-122			
Toluene		25.0	1.0	0.51	ug/L	23.7	95	70-122			
trans-1,2-Dichloroethene		25.0	1.0	0.42	ug/L	26.2	105	73-127			
trans-1,3-Dichloropropene		25.0	1.0	0.37	ug/L	22.6	90	72-123			
Trichloroethene		25.0	1.0	0.46	ug/L	25.8	103	74-123			

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LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
LCS Analyzed: 12/19/09 (Lab Number:9L19016-BS1, Batch: 9L19016)											
Trichlorofluoromethane		25.0	1.0	0.15	ug/L	28.5	114	62-152			
Vinyl chloride		25.0	1.0	0.24	ug/L	27.1	108	65-133			
Xylenes, total		75.0	2.0	0.66	ug/L	72.2	96	76-122			
Surrogate: 1,2-Dichloroethane-d4					*ug/L*		*106*	*66-137*			
Surrogate: 4-Bromofluorobenzene					*ug/L*		*104*	*73-120*			
Surrogate: Toluene-d8					*ug/L*		*99*	*71-126*			
Volatile Organic Compounds by EPA 8260B											
Blank Analyzed: 12/20/09 (Lab Number:9L20002-BLK1, Batch: 9L20002)											
1,1,1-Trichloroethane			1.0	0.26	ug/L	ND					
1,1,2,2-Tetrachloroethane			1.0	0.21	ug/L	ND					
1,1,2-Trichloroethane			1.0	0.23	ug/L	ND					
1,1,2-Trichloro-1,2,2-trifluoroethane			1.0	0.31	ug/L	ND					
1,1-Dichloroethane			1.0	0.38	ug/L	ND					
1,1-Dichloroethene			1.0	0.29	ug/L	ND					
1,2,4-Trichlorobenzene			1.0	0.41	ug/L	ND					
1,2,4-Trimethylbenzene			1.0	0.33	ug/L	ND					
1,2-Dibromo-3-chloropropane			1.0	0.39	ug/L	ND					
1,2-Dibromoethane			1.0	0.17	ug/L	ND					
1,2-Dichlorobenzene			1.0	0.20	ug/L	ND					
1,2-Dichloroethane			1.0	0.21	ug/L	ND					
1,2-Dichloropropane			1.0	0.33	ug/L	ND					
1,3,5-Trimethylbenzene			1.0	0.22	ug/L	ND					
1,3-Dichlorobenzene			1.0	0.36	ug/L	ND					
1,4-Dichlorobenzene			1.0	0.39	ug/L	ND					
2-Butanone			5.0	1.3	ug/L	ND					
2-Hexanone			5.0	1.2	ug/L	ND					
p-Cymene			1.0	0.31	ug/L	ND					
4-Methyl-2-pentanone			5.0	0.91	ug/L	ND					
Acetone			5.0	1.3	ug/L	ND					
Benzene			1.0	0.41	ug/L	ND					
Bromodichloromethane			1.0	0.39	ug/L	ND					
Bromoform			1.0	0.26	ug/L	ND					
Bromomethane			1.0	0.28	ug/L	ND					
Carbon disulfide			1.0	0.19	ug/L	ND					

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LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
Blank Analyzed: 12/20/09 (Lab Number:9L20002-BLK1, Batch: 9L20002)											
Carbon Tetrachloride			1.0	0.27	ug/L	ND					
Chlorobenzene			1.0	0.32	ug/L	ND					
Dibromochloromethane			1.0	0.32	ug/L	ND					
Chloroethane			1.0	0.32	ug/L	ND					
Chloroform			1.0	0.34	ug/L	ND					
Chloromethane			1.0	0.35	ug/L	ND					
cis-1,2-Dichloroethene			1.0	0.38	ug/L	ND					
cis-1,3-Dichloropropene			1.0	0.36	ug/L	ND					
Cyclohexane			1.0	0.53	ug/L	ND					
Dichlorofluoromethane			1.0	0.34	ug/L	ND					
Ethylbenzene			1.0	0.18	ug/L	ND					
Isopropylbenzene			1.0	0.19	ug/L	ND					
Methyl Acetate			1.0	0.50	ug/L	ND					
Methyl-t-Butyl Ether (MTBE)			1.0	0.16	ug/L	ND					
Methylcyclohexane			1.0	0.50	ug/L	ND					
Methylene Chloride			1.0	0.44	ug/L	ND					
m-Xylene & p-Xylene			2.0	0.66	ug/L	ND					
n-Butylbenzene			1.0	0.28	ug/L	ND					
n-Propylbenzene			1.0	0.18	ug/L	ND					
o-Xylene			1.0	0.36	ug/L	ND					
sec-Butylbenzene			1.0	0.30	ug/L	ND					
Styrene			1.0	0.18	ug/L	ND					
Tetrachloroethene			1.0	0.36	ug/L	ND					
Toluene			1.0	0.51	ug/L	ND					
trans-1,2-Dichloroethene			1.0	0.42	ug/L	ND					
trans-1,3-Dichloropropene			1.0	0.37	ug/L	ND					
Trichloroethene			1.0	0.46	ug/L	ND					
Trichlorofluoromethane			1.0	0.15	ug/L	ND					
Vinyl chloride			1.0	0.24	ug/L	ND					
Xylenes, total			2.0	0.66	ug/L	ND					
Surrogate: 1,2-Dichloroethane-d4					*ug/L*		*103*	*66-137*			
Surrogate: 4-Bromofluorobenzene					*ug/L*		*106*	*73-120*			
Surrogate: Toluene-d8					*ug/L*		*102*	*71-126*			
LCS Analyzed: 12/20/09 (Lab Number:9L20002-BS1, Batch: 9L20002)											
1,1,1-Trichloroethane		25.0	1.0	0.26	ug/L	26.0	104	73-126			

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
LCS Analyzed: 12/20/09 (Lab Number:9L20002-BS1, Batch: 9L20002)											
1,1,2,2-Tetrachloroethane		25.0	1.0	0.21	ug/L	23.4	94	70-126			
1,1,2-Trichloroethane		25.0	1.0	0.23	ug/L	24.0	96	76-122			
1,1,2-Trichloro-1,2,2-trifluoroethane		25.0	1.0	0.31	ug/L	25.7	103	60-140			
1,1-Dichloroethane		25.0	1.0	0.38	ug/L	24.6	98	71-129			
1,1-Dichloroethene		25.0	1.0	0.29	ug/L	25.2	101	65-138			
1,2,4-Trichlorobenzene		25.0	1.0	0.41	ug/L	23.4	94	70-122			
1,2,4-Trimethylbenzene		25.0	1.0	0.33	ug/L	20.9	84	76-121			
1,2-Dibromo-3-chloropropane		25.0	1.0	0.39	ug/L	21.4	86	56-134			
1,2-Dibromoethane		25.0	1.0	0.17	ug/L	24.8	99	77-120			
1,2-Dichlorobenzene		25.0	1.0	0.20	ug/L	22.8	91	77-120			
1,2-Dichloroethane		25.0	1.0	0.21	ug/L	23.8	95	75-127			
1,2-Dichloropropane		25.0	1.0	0.33	ug/L	24.9	100	76-120			
1,3,5-Trimethylbenzene		25.0	1.0	0.22	ug/L	22.4	90	77-121			
1,3-Dichlorobenzene		25.0	1.0	0.36	ug/L	22.7	91	77-120			
1,4-Dichlorobenzene		25.0	1.0	0.39	ug/L	22.4	90	75-120			
2-Butanone		125	5.0	1.3	ug/L	123	99	57-140			
2-Hexanone		125	5.0	1.2	ug/L	122	98	65-127			
p-Cymene		25.0	1.0	0.31	ug/L	22.9	91	73-120			
4-Methyl-2-pentanone		125	5.0	0.91	ug/L	121	97	71-125			
Acetone		125	5.0	1.3	ug/L	120	96	56-142			
Benzene		25.0	1.0	0.41	ug/L	24.3	97	71-124			
Bromodichloromethane		25.0	1.0	0.39	ug/L	23.4	94	80-122			
Bromoform		25.0	1.0	0.26	ug/L	23.1	92	66-128			
Bromomethane		25.0	1.0	0.28	ug/L	25.2	101	36-150			
Carbon disulfide		25.0	1.0	0.19	ug/L	23.8	95	59-134			
Carbon Tetrachloride		25.0	1.0	0.27	ug/L	26.9	108	72-134			
Chlorobenzene		25.0	1.0	0.32	ug/L	23.8	95	72-120			
Dibromochloromethane		25.0	1.0	0.32	ug/L	23.5	94	75-125			
Chloroethane		25.0	1.0	0.32	ug/L	26.7	107	69-136			
Chloroform		25.0	1.0	0.34	ug/L	24.9	100	73-127			
Chloromethane		25.0	1.0	0.35	ug/L	23.5	94	49-142			
cis-1,2-Dichloroethene		25.0	1.0	0.38	ug/L	24.9	100	74-124			
cis-1,3-Dichloropropene		25.0	1.0	0.36	ug/L	24.2	97	74-124			
Cyclohexane		25.0	1.0	0.53	ug/L	25.3	101	70-130			
Dichlorofluoromethane			1.0	0.34	ug/L	ND					
Ethylbenzene		25.0	1.0	0.18	ug/L	24.1	96	77-123			
Isopropylbenzene		25.0	1.0	0.19	ug/L	23.1	92	77-122			

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THE LEADER IN ENVIRONMENTAL TESTING

Benchmark Environmental & Engineering Science 2558 Hamburg Turnpike, Suite 300 Lackawanna, NY 14218	Work Order: RSL0550 Project: Benchmark- Langner Rd. Delta Sonic Project Number: TURN-0038	Received: 12/10/09 Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
LCS Analyzed: 12/20/09 (Lab Number:9L20002-BS1, Batch: 9L20002)											
Methyl Acetate		25.0	1.0	0.50	ug/L	24.5	98	60-140			
Methyl-t-Butyl Ether (MTBE)		25.0	1.0	0.16	ug/L	25.9	104	64-127			
Methylcyclohexane		25.0	1.0	0.50	ug/L	26.0	104	60-140			
Methylene Chloride		25.0	1.0	0.44	ug/L	24.1	97	57-132			
m-Xylene & p-Xylene		50.0	2.0	0.66	ug/L	47.9	96	76-122			
n-Butylbenzene		25.0	1.0	0.28	ug/L	22.0	88	71-128			
n-Propylbenzene		25.0	1.0	0.18	ug/L	23.0	92	77-120			
o-Xylene		25.0	1.0	0.36	ug/L	23.9	96	76-122			
sec-Butylbenzene		25.0	1.0	0.30	ug/L	23.0	92	74-127			
Styrene		25.0	1.0	0.18	ug/L	24.8	99	70-130			
Tetrachloroethene		25.0	1.0	0.36	ug/L	24.4	98	74-122			
Toluene		25.0	1.0	0.51	ug/L	23.7	95	70-122			
trans-1,2-Dichloroethene		25.0	1.0	0.42	ug/L	25.4	101	73-127			
trans-1,3-Dichloropropene		25.0	1.0	0.37	ug/L	23.4	94	72-123			
Trichloroethene		25.0	1.0	0.46	ug/L	24.8	99	74-123			
Trichlorofluoromethane		25.0	1.0	0.15	ug/L	27.1	108	62-152			
Vinyl chloride		25.0	1.0	0.24	ug/L	24.6	98	65-133			
Xylenes, total		75.0	2.0	0.66	ug/L	71.8	96	76-122			
Surrogate: 1,2-Dichloroethane-d4					*ug/L*		*99*	*66-137*			
Surrogate: 4-Bromofluorobenzene					*ug/L*		*105*	*73-120*			
Surrogate: Toluene-d8					*ug/L*		*100*	*71-126*			
Volatile Organic Compounds by EPA 8260B											
Blank Analyzed: 12/21/09 (Lab Number:9L21005-BLK1, Batch: 9L21005)											
1,1,1-Trichloroethane			1.0	0.26	ug/L	ND					
1,1,2,2-Tetrachloroethane			1.0	0.21	ug/L	ND					
1,1,2-Trichloroethane			1.0	0.23	ug/L	ND					
1,1,2-Trichloro-1,2,2-trifluoroethane			1.0	0.31	ug/L	ND					
1,1-Dichloroethane			1.0	0.38	ug/L	ND					
1,1-Dichloroethene			1.0	0.29	ug/L	ND					
1,2,4-Trichlorobenzene			1.0	0.41	ug/L	ND					
1,2,4-Trimethylbenzene			1.0	0.33	ug/L	ND					
1,2-Dibromo-3-chloropropane			1.0	0.39	ug/L	ND					
1,2-Dibromoethane			1.0	0.17	ug/L	ND					

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

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Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
Blank Analyzed: 12/21/09 (Lab Number:9L21005-BLK1, Batch: 9L21005)											
1,2-Dichlorobenzene			1.0	0.20	ug/L	ND					
1,2-Dichloroethane			1.0	0.21	ug/L	ND					
1,2-Dichloropropane			1.0	0.33	ug/L	ND					
1,3,5-Trimethylbenzene			1.0	0.22	ug/L	ND					
1,3-Dichlorobenzene			1.0	0.36	ug/L	ND					
1,4-Dichlorobenzene			1.0	0.39	ug/L	ND					
2-Butanone			5.0	1.3	ug/L	ND					
2-Hexanone			5.0	1.2	ug/L	ND					
p-Cymene			1.0	0.31	ug/L	ND					
4-Methyl-2-pentanone			5.0	0.91	ug/L	ND					
Acetone			5.0	1.3	ug/L	ND					
Benzene			1.0	0.41	ug/L	ND					
Bromodichloromethane			1.0	0.39	ug/L	ND					
Bromoform			1.0	0.26	ug/L	ND					
Bromomethane			1.0	0.28	ug/L	ND					
Carbon disulfide			1.0	0.19	ug/L	ND					
Carbon Tetrachloride			1.0	0.27	ug/L	ND					
Chlorobenzene			1.0	0.32	ug/L	ND					
Dibromochloromethane			1.0	0.32	ug/L	ND					
Chloroethane			1.0	0.32	ug/L	ND					
Chloroform			1.0	0.34	ug/L	ND					
Chloromethane			1.0	0.35	ug/L	ND					
cis-1,2-Dichloroethene			1.0	0.38	ug/L	ND					
cis-1,3-Dichloropropene			1.0	0.36	ug/L	ND					
Cyclohexane			1.0	0.53	ug/L	ND					
Dichlorofluoromethane			1.0	0.34	ug/L	ND					
Ethylbenzene			1.0	0.18	ug/L	ND					
Isopropylbenzene			1.0	0.19	ug/L	ND					
Methyl Acetate			1.0	0.50	ug/L	ND					
Methyl-t-Butyl Ether (MTBE)			1.0	0.16	ug/L	ND					
Methylcyclohexane			1.0	0.50	ug/L	ND					
Methylene Chloride			1.0	0.44	ug/L	ND					
m-Xylene & p-Xylene			2.0	0.66	ug/L	ND					
n-Butylbenzene			1.0	0.28	ug/L	ND					
n-Propylbenzene			1.0	0.18	ug/L	ND					
o-Xylene			1.0	0.36	ug/L	ND					
sec-Butylbenzene			1.0	0.30	ug/L	ND					

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
Blank Analyzed: 12/21/09 (Lab Number:9L21005-BLK1, Batch: 9L21005)											
Styrene			1.0	0.18	ug/L	ND					
Tetrachloroethene			1.0	0.36	ug/L	ND					
Toluene			1.0	0.51	ug/L	ND					
trans-1,2-Dichloroethene			1.0	0.42	ug/L	ND					
trans-1,3-Dichloropropene			1.0	0.37	ug/L	ND					
Trichloroethene			1.0	0.46	ug/L	ND					
Trichlorofluoromethane			1.0	0.15	ug/L	ND					
Vinyl chloride			1.0	0.24	ug/L	ND					
Xylenes, total			2.0	0.66	ug/L	ND					
Surrogate: 1,2-Dichloroethane-d4					*ug/L*		*102*	*66-137*			
Surrogate: 4-Bromofluorobenzene					*ug/L*		*102*	*73-120*			
Surrogate: Toluene-d8					*ug/L*		*100*	*71-126*			
LCS Analyzed: 12/21/09 (Lab Number:9L21005-BS1, Batch: 9L21005)											
1,1,1-Trichloroethane		25.0	1.0	0.26	ug/L	27.3	109	73-126			
1,1,2,2-Tetrachloroethane		25.0	1.0	0.21	ug/L	24.3	97	70-126			
1,1,2-Trichloroethane		25.0	1.0	0.23	ug/L	24.8	99	76-122			
1,1,2-Trichloro-1,2,2-trifluoroethane		25.0	1.0	0.31	ug/L	27.8	111	60-140			
1,1-Dichloroethane		25.0	1.0	0.38	ug/L	25.9	104	71-129			
1,1-Dichloroethene		25.0	1.0	0.29	ug/L	26.8	107	65-138			
1,2,4-Trichlorobenzene		25.0	1.0	0.41	ug/L	23.8	95	70-122			
1,2,4-Trimethylbenzene		25.0	1.0	0.33	ug/L	21.9	88	76-121			
1,2-Dibromo-3-chloropropane		25.0	1.0	0.39	ug/L	22.0	88	56-134			
1,2-Dibromoethane		25.0	1.0	0.17	ug/L	25.2	101	77-120			
1,2-Dichlorobenzene		25.0	1.0	0.20	ug/L	23.7	95	77-120			
1,2-Dichloroethane		25.0	1.0	0.21	ug/L	25.0	100	75-127			
1,2-Dichloropropane		25.0	1.0	0.33	ug/L	25.6	102	76-120			
1,3,5-Trimethylbenzene		25.0	1.0	0.22	ug/L	23.4	94	77-121			
1,3-Dichlorobenzene		25.0	1.0	0.36	ug/L	23.7	95	77-120			
1,4-Dichlorobenzene		25.0	1.0	0.39	ug/L	23.2	93	75-120			
2-Butanone		125	5.0	1.3	ug/L	129	103	57-140			
2-Hexanone		125	5.0	1.2	ug/L	126	101	65-127			
p-Cymene		25.0	1.0	0.31	ug/L	24.3	97	73-120			
4-Methyl-2-pentanone		125	5.0	0.91	ug/L	126	101	71-125			
Acetone		125	5.0	1.3	ug/L	129	103	56-142			

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
LCS Analyzed: 12/21/09 (Lab Number:9L21005-BS1, Batch: 9L21005)											
Benzene		25.0	1.0	0.41	ug/L	25.3	101	71-124			
Bromodichloromethane		25.0	1.0	0.39	ug/L	24.2	97	80-122			
Bromoform		25.0	1.0	0.26	ug/L	22.7	91	66-128			
Bromomethane		25.0	1.0	0.28	ug/L	26.3	105	36-150			
Carbon disulfide		25.0	1.0	0.19	ug/L	24.1	96	59-134			
Carbon Tetrachloride		25.0	1.0	0.27	ug/L	28.7	115	72-134			
Chlorobenzene		25.0	1.0	0.32	ug/L	24.1	96	72-120			
Dibromochloromethane		25.0	1.0	0.32	ug/L	23.5	94	75-125			
Chloroethane		25.0	1.0	0.32	ug/L	29.4	118	69-136			
Chloroform		25.0	1.0	0.34	ug/L	26.0	104	73-127			
Chloromethane		25.0	1.0	0.35	ug/L	25.4	101	49-142			
cis-1,2-Dichloroethene		25.0	1.0	0.38	ug/L	25.5	102	74-124			
cis-1,3-Dichloropropene		25.0	1.0	0.36	ug/L	24.9	100	74-124			
Cyclohexane		25.0	1.0	0.53	ug/L	27.3	109	70-130			
Dichlorofluoromethane			1.0	0.34	ug/L	ND					
Ethylbenzene		25.0	1.0	0.18	ug/L	24.6	98	77-123			
Isopropylbenzene		25.0	1.0	0.19	ug/L	24.6	98	77-122			
Methyl Acetate		25.0	1.0	0.50	ug/L	25.9	104	60-140			
Methyl-t-Butyl Ether (MTBE)		25.0	1.0	0.16	ug/L	26.8	107	64-127			
Methylcyclohexane		25.0	1.0	0.50	ug/L	27.5	110	60-140			
Methylene Chloride		25.0	1.0	0.44	ug/L	24.6	98	57-132			
m-Xylene & p-Xylene		50.0	2.0	0.66	ug/L	48.9	98	76-122			
n-Butylbenzene		25.0	1.0	0.28	ug/L	23.3	93	71-128			
n-Propylbenzene		25.0	1.0	0.18	ug/L	24.4	98	77-120			
o-Xylene		25.0	1.0	0.36	ug/L	24.5	98	76-122			
sec-Butylbenzene		25.0	1.0	0.30	ug/L	24.5	98	74-127			
Styrene		25.0	1.0	0.18	ug/L	25.3	101	70-130			
Tetrachloroethene		25.0	1.0	0.36	ug/L	25.0	100	74-122			
Toluene		25.0	1.0	0.51	ug/L	24.5	98	70-122			
trans-1,2-Dichloroethene		25.0	1.0	0.42	ug/L	26.4	105	73-127			
trans-1,3-Dichloropropene		25.0	1.0	0.37	ug/L	23.6	95	72-123			
Trichloroethene		25.0	1.0	0.46	ug/L	25.9	104	74-123			
Trichlorofluoromethane		25.0	1.0	0.15	ug/L	29.8	119	62-152			
Vinyl chloride		25.0	1.0	0.24	ug/L	26.8	107	65-133			
Xylenes, total		75.0	2.0	0.66	ug/L	73.4	98	76-122			
Surrogate: 1,2-Dichloroethane-d4					*ug/L*		*102*	*66-137*			

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Benchmark Environmental & Engineering Science 2558 Hamburg Turnpike, Suite 300 Lackawanna, NY 14218	Work Order: RSL0550 Project: Benchmark- Langner Rd. Delta Sonic Project Number: TURN-0038	Received: 12/10/09 Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Volatile Organic Compounds by EPA 8260B											
LCS Analyzed: 12/21/09 (Lab Number:9L21005-BS1, Batch: 9L21005)											
Surrogate: 4-Bromofluorobenzene					*ug/L*		*106*	*73-120*			
Surrogate: Toluene-d8					*ug/L*		*100*	*71-126*			

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
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LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Semivolatile Organics by GC/MS											
Blank Analyzed: 12/12/09 (Lab Number:9L10099-BLK1, Batch: 9L10099)											
Acenaphthene			170	1.9	ug/kg wet	ND					
Acenaphthylene			170	1.4	ug/kg wet	ND					
Anthracene			170	4.2	ug/kg wet	ND					
Benzo(a)anthracene			170	2.9	ug/kg wet	ND					
Benzo(a)pyrene			170	4.0	ug/kg wet	ND					
Benzo(b)fluoranthene			170	3.2	ug/kg wet	ND					
Benzo(ghi)perylene			170	2.0	ug/kg wet	ND					
Benzo(k)fluoranthene			170	1.8	ug/kg wet	ND					
Chrysene			170	1.7	ug/kg wet	ND					
Dibenzo(a,h)anthracene			170	1.9	ug/kg wet	ND					
Fluoranthene			170	2.4	ug/kg wet	ND					
Fluorene			170	3.8	ug/kg wet	ND					
Indeno(1,2,3-cd)pyrene			170	4.6	ug/kg wet	ND					
Naphthalene			170	2.8	ug/kg wet	ND					
Phenanthrene			170	3.5	ug/kg wet	ND					
Pyrene			170	1.1	ug/kg wet	ND					
Surrogate: 2,4,6-Tribromophenol					*ug/kg wet*		*93*	*39-146*			
Surrogate: 2-Fluorobiphenyl					*ug/kg wet*		*96*	*37-120*			
Surrogate: 2-Fluorophenol					*ug/kg wet*		*89*	*18-120*			
Surrogate: Nitrobenzene-d5					*ug/kg wet*		*89*	*34-132*			
Surrogate: Phenol-d5					*ug/kg wet*		*94*	*11-120*			
Surrogate: p-Terphenyl-d14					*ug/kg wet*		*94*	*58-147*			
LCS Analyzed: 12/12/09 (Lab Number:9L10099-BS1, Batch: 9L10099)											
Acenaphthene		3320	170	2.0	ug/kg wet	3760	113	53-120			
Acenaphthylene			170	1.4	ug/kg wet	ND		58-121			
Anthracene			170	4.3	ug/kg wet	ND		62-129			
Benzo(a)anthracene			170	2.9	ug/kg wet	ND		65-133			
Benzo(a)pyrene			170	4.1	ug/kg wet	ND		64-127			
Benzo(b)fluoranthene			170	3.3	ug/kg wet	ND		64-135			
Benzo(ghi)perylene			170	2.0	ug/kg wet	ND		50-152			
Benzo(k)fluoranthene			170	1.9	ug/kg wet	ND		58-138			
Chrysene			170	1.7	ug/kg wet	ND		64-131			
Dibenzo(a,h)anthracene			170	2.0	ug/kg wet	ND		54-148			
Fluoranthene			170	2.4	ug/kg wet	ND		62-131			
Fluorene			170	3.9	ug/kg wet	ND		63-126			

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Benchmark Environmental & Engineering Science 2558 Hamburg Turnpike, Suite 300 Lackawanna, NY 14218	Work Order: RSL0550 Project: Benchmark- Langner Rd. Delta Sonic Project Number: TURN-0038	Received: Reported:	12/10/09 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	RL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Semivolatile Organics by GC/MS											
LCS Analyzed: 12/12/09 (Lab Number:9L10099-BS1, Batch: 9L10099)											
Indeno(1,2,3-cd)pyrene			170	4.6	ug/kg wet	ND		56-149			
Naphthalene			170	2.8	ug/kg wet	ND		46-120			
Phenanthrene			170	3.5	ug/kg wet	ND		60-130			
Pyrene		3320	170	1.1	ug/kg wet	4060	122	51-133			
Surrogate: 2,4,6-Tribromophenol					*ug/kg wet*		*104*	*39-146*			
Surrogate: 2-Fluorobiphenyl					*ug/kg wet*		*113*	*37-120*			
Surrogate: 2-Fluorophenol					*ug/kg wet*		*102*	*18-120*			
Surrogate: Nitrobenzene-d5					*ug/kg wet*		*101*	*34-132*			
Surrogate: Phenol-d5					*ug/kg wet*		*107*	*11-120*			
Surrogate: p-Terphenyl-d14					*ug/kg wet*		*106*	*58-147*			
LCS Dup Analyzed: 12/12/09 (Lab Number:9L10099-BSD1, Batch: 9L10099)											
Acenaphthene		3330	170	2.0	ug/kg wet	3950	119	53-120	5	35	
Acenaphthylene			170	1.4	ug/kg wet	ND		58-121		18	
Anthracene			170	4.3	ug/kg wet	ND		62-129		15	
Benzo(a)anthracene			170	2.9	ug/kg wet	ND		65-133		15	
Benzo(a)pyrene			170	4.1	ug/kg wet	ND		64-127		15	
Benzo(b)fluoranthene			170	3.3	ug/kg wet	ND		64-135		15	
Benzo(ghi)perylene			170	2.0	ug/kg wet	ND		50-152		15	
Benzo(k)fluoranthene			170	1.9	ug/kg wet	ND		58-138		22	
Chrysene			170	1.7	ug/kg wet	ND		64-131		15	
Dibenzo(a,h)anthracene			170	2.0	ug/kg wet	ND		54-148		15	
Fluoranthene			170	2.4	ug/kg wet	ND		62-131		15	
Fluorene			170	3.9	ug/kg wet	ND		63-126		15	
Indeno(1,2,3-cd)pyrene			170	4.7	ug/kg wet	ND		56-149		15	
Naphthalene			170	2.8	ug/kg wet	ND		46-120		29	
Phenanthrene			170	3.5	ug/kg wet	ND		60-130		15	
Pyrene		3330	170	1.1	ug/kg wet	4230	127	51-133	4	35	
Surrogate: 2,4,6-Tribromophenol					*ug/kg wet*		*114*	*39-146*			
Surrogate: 2-Fluorobiphenyl					*ug/kg wet*		*118*	*37-120*			
Surrogate: 2-Fluorophenol					*ug/kg wet*		*110*	*18-120*			
Surrogate: Nitrobenzene-d5					*ug/kg wet*		*109*	*34-132*			
Surrogate: Phenol-d5					*ug/kg wet*		*112*	*11-120*			

Benchmark Environmental & Engineering Science
2558 Hamburg Turnpike, Suite 300
Lackawanna, NY 14218

Work Order: RSL0550

Project: Benchmark- Langner Rd. Delta Sonic
Project Number: TURN-0038

Received: 12/10/09
Reported: 12/22/09 15:00

LABORATORY QC DATA

Analyte	Source Result	Spike Level	MRL	MDL	Units	Result	% REC	% REC Limits	% RPD	RPD Limit	Data Qualifiers
Semivolatile Organics by GC/MS											
LCS Dup Analyzed: 12/12/09 (Lab Number:9L10099-BSD1, Batch: 9L10099)											
Surrogate: p-Terphenyl-d14					*ug/kg wet*		*109*	*58-147*			

Chain of Custody Record

TAL-4124 (1007)

Temperature on Receipt ____

Drinking Water? Yes ☐ No ☒

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Client: Benchmark Eng

Address: 12 2558 Hamburg Turnpike

City: Lackawanna | State: NY | Zip Code: 14218

Project Name and Location (State): Delta Sonic

Contract/Purchase Order/Quote No.:

Project Manager: Mike Lesakowski

Telephone Number (Area Code)/Fax Number: (716) 856-0599

Site Contact: T. Behrendt | Lab Contact: B. Fischer

Carrier/Waybill Number:

Date: 12/9/09

Lab Number:

Chain of Custody Number: 159232

Page 1 of 1

Analysis (Attach list if more space is needed)

Special Instructions/ Conditions of Receipt

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	STARS VOC 8260	STARS SVOC 8270	TCL+STARS VOC 8260
SB-1 (2-4)	12/9/09	1530				X	X						1	1	
SB-2 (2-4)		1634				X	X						1	1	
SB-3 (2-4)		1642				X	X						1	1	
SB-4 (2-4)		1028				X	X						1	1	
SB-5 (2-4)		1112				X	X						1	1	
SB-6 (4-6)		1650				X	X						1	1	
SB-7 (2-4)		1655				X	X						1	1	
SB-9 (2-4)		1703 ~~1655~~				X	X						1	1	
TMW-1	12	1405		X						X					1
TMW-2		1410		X						X					1
TMW-3		1415		X						X					1
TMW-4		1420		X						X					1

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☒ Other STD

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished By: [signature]	12/9/09	1400	1. Received By: [signature]	12-10-09	11:20
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments: 2.0°

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

APPENDIX C

SITE-SPECIFIC HEALTH AND SAFETY PLAN

SITE HEALTH AND SAFETY PLAN
for
BROWNFIELD CLEANUP PROGRAM
RI/IRM ACTIVITIES

348 LANGNER ROAD SITE
WEST SENECA, NEW YORK

September 2011 0123-005-102

Prepared for:

Delta Sonic Car Wash Systems, Inc.
570 Delaware Avenue
Buffalo, New York 14202

348 LANGNER ROAD SITE
HEALTH AND SAFETY PLAN FOR RI/IRM ACTIVITIES

ACKNOWLEDGEMENT

Plan Reviewed by (initial):

Corporate Health and Safety Director: Thomas H. Forbes, P.E.

Project Manager: Michael Lesakowski

Designated Site Safety and Health Officer: Bryan C. Hann

Acknowledgement:
I acknowledge that I have reviewed the information contained in this site-specific Health and Safety Plan, and understand the hazards associated with performance of the field activities described herein. I agree to comply with the requirements of this plan.

NAME (PRINT)	SIGNATURE	DATE

348 LANGNER ROAD SITE
HEALTH AND SAFETY PLAN FOR RI/IRM ACTIVITIES

TABLE OF CONTENTS

TABLE OF CONTENTS

348 LANGNER ROAD SITE
HEALTH AND SAFETY PLAN FOR RI/IRM ACTIVITIES

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ATTACHMENTS

1.0 INTRODUCTION

1.1 General

In accordance with OSHA requirements contained in 29 CFR 1910.120, this Health and Safety Plan (HASP) describes the specific health and safety practices and procedures to be employed by TurnKey Environmental Restoration, LLC and Benchmark Environmental Engineering & Science, PLLC employees (referred to jointly hereafter as "TurnKey-Benchmark") during Remedial Investigation (RI) and Interim Remedial Measures (IRM) activities at the 348 Langner Road Site located in the town of West Seneca, Erie County, New York. This HASP presents procedures for TurnKey-Benchmark employees who will be involved with RI/IRM field activities; it does not cover the activities of other contractors, subcontractors or other individuals on the Site. These firms will be required to develop and enforce their own HASPs as discussed in Section 2.0. TurnKey-Benchmark accepts no responsibility for the health and safety of contractor, subcontractor or other personnel.

This HASP presents information on known Site health and safety hazards using available historical information, and identifies the equipment, materials and procedures that will be used to eliminate or control these hazards. Environmental monitoring will be performed during the course of field activities to provide real-time data for on-going assessment of potential hazards.

1.2 Background

The Site is an approximately 2.6-acre parcel located at the corner of Langner Road and Ridge Road in the Town of West Seneca, New York (see Figures 1 and 2). The parcel is currently improved with one convenience store building, one car wash building, four product dispenser islands and two underground storage tank (UST) areas containing a total of eight petroleum USTs. The Site is bound by Langner Road to the east, Ridge Road to the north, a rail line to the west, and commercial buildings to the south.

The Site has been a gas station since the 1950s. Prior to the current location of the product dispensers and buildings, the gas station and fuel assets were located in the northeastern portion of the property where the current carwash building sits.

During the completion of a previous study, contaminated soils, and petroleum-like odors were observed Site-wide. Several locations exhibited petroleum-like odors and elevated PID readings. Based on the findings of previous investigations, the NYSDEC opened a spill file for the Site (No. 0910758). The spill file for the Site was administratively closed by the Department upon acceptance into the BCP, and further remediation will be directed under the guidance of the BCP.

1.3 Known and Suspected Environmental Conditions

Benchmark Environmental Engineering and Science, PLLC (Benchmark) conducted an environmental site investigation of the subject property, and the findings are described below:

- Visual and olfactory evidence of impacted soil/fill was noted in multiple soil boring locations by field personnel. Elevated photoionization detector (PID) readings for volatile organic compounds (VOCs) were detected in multiple locations across the site, with readings as high as 777 ppm being detected.
- Petroleum-impacted soil exceeding TAGM #4046 RSCOs for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) were detected at multiple soil boring locations across the site.
- Groundwater impacts exceeding NYSDEC groundwater quality standards (GWQS) for VOCs (i.e., up to 42,879 ug/L total VOCs) were detected in several temporary monitoring wells across the Site.
- Based on the data collected during the site investigation, the NYSDEC was contacted and Spill No. 09-10758 was opened for the Site.

1.4 Parameters of Interest

Based on the previous investigations, constituents of potential concern (COPCs) in soil and, potentially groundwater, at the Site include:

- **Volatile Organic Compounds (VOCs)** – VOCs present at elevated concentration may include 1,2,4- and 1,3,5-trimethylbenzene, 1,1-,1,2-, and 1,3-dichlorobenzene, isopropylbenzene, toluene, ethylbenzene, total xylenes, trichloroethene, tetrachloroethene.

- **Semi-Volatile Organic Compounds (SVOCs) –** SVOCs present at elevated concentrations may include polynuclear aromatic hydrocarbons (PAHs), which are byproducts of incomplete combustion and impurities in petroleum products.

1.5 Overview of RI/IRM Activities

TurnKey-Benchmark personnel will be on-site to observe and perform RI and IRM activities. The field activities to be completed as part of the RI and IRM are described below.

Remedial Investigation Activities

1. **Subsurface Soil Sampling:** TurnKey-Benchmark will advance sixteen (16) soil borings and collect one subsurface soil sample from each boring for the purpose of determining the nature and extent of potential COPC impacts.

2. **Monitoring Well Installation/Development and Sampling:** TurnKey-Benchmark will observe the installation of seven (7) on-site groundwater monitoring wells, develop the wells, and collect groundwater samples for the purpose of determining the nature and extent of potential COPC impacts.

Planned IRM Activities

1. **Demolition of Existing Structures:** The remediation contractor will demolish to grade, one existing structure listed as Buildings #1.
2. **Soil Excavation:** The remediation contractor would perform soil excavation activities.
3. **Verification Sampling:** The remediation contractor or consultant would collect soil samples from the sidewalls and bottom of the excavations using a backhoe to verify that cleanup objectives have been met.
4. **Backfilling:** The remediation contractor would coordinate and perform backfilling activities.
5. **Groundwater and Surface Management:** The remediation contractor would direct groundwater/surface water collection during soil excavation activities and coordinate disposal of the collected water.

2.0 ORGANIZATIONAL STRUCTURE

This section of the HASP describes the lines of authority, responsibility and communication as they pertain to health and safety functions at the Site. The purpose of this chapter is to identify the personnel who impact the development and implementation of the HASP and to describe their roles and responsibilities. This chapter also identifies other contractors and subcontractors involved in work operations and establishes the lines of communications among them for health and safety matters. The organizational structure described in this chapter is consistent with the requirements of 29 CFR 1910.120(b)(2). This section will be reviewed by the Project Manager and updated as necessary to reflect the current organizational structure at this Site.

2.1 Roles and Responsibilities

All Turnkey-Benchmark personnel on the Site must comply with the minimum requirements of this HASP. The specific responsibilities and authority of management, safety and health, and other personnel on this Site are detailed in the following paragraphs.

2.1.1 Corporate Health and Safety Director

The TurnKey-Benchmark Corporate Health and Safety Director is ***Mr. Thomas H. Forbes, P.E.*** The Corporate Health and Safety Director responsible for developing and implementing the Health and Safety program and policies for Benchmark Environmental Engineering & Science, PLLC and TurnKey Environmental Restoration, LLC, and consulting with corporate management to ensure adequate resources are available to properly implement these programs and policies. The Corporate Health and Safety Director coordinates TurnKey-Benchmark's Health and Safety training and medical monitoring programs and assists project management and field staff in developing site-specific health and safety plans.

2.1.2 Project Manager

The Project Manager for this Site is ***Mr. Michael Lesakowski.*** The Project Manager has the responsibility and authority to direct all TurnKey-Benchmark work operations at the Site. The Project Manager coordinates safety and health functions with the Site Safety and Health Officer, and bears ultimate responsibility for proper implementation of this HASP. He may delegate authority to expedite and facilitate any application of the program, including modifications to the overall project approach as necessary to circumvent unsafe work conditions. Specific duties of the Project Manager include:

- Preparing and coordinating the Site work plan.
- Providing TurnKey-Benchmark workers with work assignments and overseeing their performance.
- Coordinating health and safety efforts with the Site Safety and Health Officer (SSHO).
- Reviewing the emergency response coordination plan to assure its effectiveness.
- Serving as the primary liaison with Site contractors and the property owner.

2.1.3 Site Safety and Health Officer

The Site Safety and Health Officer (SSHO) for this Site is ***Mr. Bryan C. Hann***. The qualified alternate SSHO is ***Mr. Nathan Munley.*** The SSHO reports to the Project Manager. The SSHO is on-site or readily accessible to the Site during all work operations and has the authority to halt Site work if unsafe conditions are detected. The specific responsibilities of the SSHO are:

- Managing the safety and health functions for TurnKey-Benchmark personnel on the Site.
- Serving as the point of contact for safety and health matters.
- Ensuring that TurnKey-Benchmark field personnel working on the Site have received proper training (per 29 CFR Part 1910.120(e)), that they have obtained medical clearance to wear respiratory protection (per 29 CFR Part 1910.134), and that they are properly trained in the selection, use and maintenance of personal protective equipment, including qualitative respirator fit testing.
- Performing or overseeing Site monitoring as required by the HASP.
- Assisting in the preparation and review of the HASP.

- Maintaining site-specific safety and health records as described in this HASP.
- Coordinating with the Project Manager, Site Workers, and Contractor's SSHO as necessary for safety and health efforts.

2.1.4 Site Workers

Site workers are responsible for: complying with this HASP or a more stringent HASP, if appropriate (i.e., Contractor and Subcontractor's HASP); using proper PPE; reporting unsafe acts and conditions to the SSHO; and following the safety and health instructions of the Project Manager and SSHO.

2.1.5 Other Site Personnel

Other Site personnel who will have health and safety responsibilities will include the Drilling Contractor, who will be responsible for developing, implementing and enforcing a Health and Safety Plan equally stringent or more stringent than TurnKey-Benchmark's HASP. TurnKey-Benchmark assumes no responsibility for the health and safety of anyone outside its direct employ. Each Contractor's HASP shall cover all non-TurnKey/Benchmark Site personnel. Each Contractor shall assign a SSHO who will coordinate with TurnKey-Benchmark's SSHO as necessary to ensure effective lines of communication and consistency between contingency plans.

In addition to TurnKey-Benchmark and Contractor personnel, other individuals who may have responsibilities in the work zone include subcontractors and governmental agencies performing Site inspection work (i.e., the New York State Department of Environmental Conservation). The Contractor shall be responsible for ensuring that these individuals have received OSHA-required training (29 CFR 1910.120(e)), including initial, refresher and site-specific training, and shall be responsible for the safety and health of these individuals while they are on-site.

3.0 HAZARD EVALUATION

Due to the presence of certain contaminants at the Site, the possibility exists that workers will be exposed to hazardous substances during field activities. The principal points of exposure would be through direct contact with and incidental ingestion of soil, and through the inhalation of contaminated particles or vapors. Other points of exposure may include direct contact with groundwater. In addition, the use of drilling and/or medium to large-sized construction equipment (e.g., excavator) will also present conditions for potential physical injury to workers. Further, since work will be performed outdoors, the potential exists for heat/cold stress to impact workers, especially those wearing protective equipment and clothing. Adherence to the medical evaluations, worker training relative to chemical hazards, safe work practices, proper personal protection, environmental monitoring, establishment work zones and Site control, appropriate decontamination procedures and contingency planning outlined herein will reduce the potential for chemical exposures and physical injuries.

3.1 Chemical Hazards

As discussed in Section 1.3, historic activities have potentially resulted in impacts to Site soils and groundwater. Visual and olfactory observations, as well as elevated PID readings, indicate a potential VOC impact to Site soil. In addition to VOCs, soil and groundwater may be impacted by SVOCs (PAHs) due to historic use as a gasoline filling station. Table 1 lists exposure limits for airborne concentrations of the COPCs identified in Section 1.4 of this HASP. Brief descriptions of the toxicology of the prevalent COPCs and related health and safety guidance and criteria are provided below.

- **1,2,4-Trimethylbenzene (CAS #95-63-6)** is a common gasoline additive. Acute exposure predominantly results in skin irritation and inhalation causes chemical pneumonitis. Symptoms include headache, dizziness, fatigue, muscular weakness, drowsiness.

- **1,3,5-Trimethylbenzene (CAS #108-67-8)** is a colorless, odorless flammable liquid. The substance is irritating to the eyes , the skin and the respiratory tract . If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system.

- **Isopropylbenzene (CAS #98-82-8)** is a colorless, gasoline-like odor flammable liquid. Acute exposure typically results in irritation of the eyes, mucous membranes and upper respiratory tract. Can be absorbed through the skin. Possible central nervous system depressant. Symptoms may include irritation, dizziness, nausea, lack of coordination and narcosis.

- **N-Propylbenzene (CAS #103-65-1)** is a colorless to pale yellow flammable liquid. Inhalation or contact may irritate or burn skin and eyes. In case fire, smoke-vapor may produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation.

- **Chlorobenzene (CAS #108-90-7)** is a colorless, faint almond-like odor, flammable liquid. Acute exposure predominantly results in irritation of the respiratory tract, eyes and skin.

- **Dichlorobenzene (1,1-, 1,2-, and 1,3-) (CAS #106-46-7, 95-50-1, 541-73-1)** are colorless to pale yellow, pleasant odor, flammable liquid. Acute exposure predominantly results in irritation of the respiratory tract, eyes and skin. Symptoms may include headache, nausea, swelling of the eyes, runny nose, drowsiness, central nervous system depression, kidney and liver damage, unconsciousness and death.

- **Ethylbenzene (CAS #100-41-4)** is a component of automobile gasoline. Over-exposure may cause kidney, skin liver and/or respiratory disease. Signs of exposure may include dermatitis, irritation of the eyes and mucus membranes, headache. Narcosis and coma may result in more severe cases.

- **Toluene (CAS #108-88-3)** is a common component of paint thinners and automobile fuel. Acute exposure predominantly results in central nervous system depression. Symptoms include headache, dizziness, fatigue, muscular weakness, drowsiness, and coordination loss. Repeated exposures may cause removal of lipids from the skin, resulting in dry, fissured dermatitis.

- **Xylenes (o, m, and p) (CAS #95-47-6, 108-38-3, and 106-42-3)** are colorless, flammable liquids present in paint thinners and fuels. Acute exposure may cause central nervous system depression, resulting in headache, dizziness, fatigue, muscular weakness, drowsiness, and coordination loss. Repeated exposures may also cause removal of lipids from the skin, producing dry, fissured dermatitis. Exposure of high concentrations of vapor may cause eye irritation and damage, as well as irritation of the mucus membranes.

- **Polycyclic Aromatic Hydrocarbons (PAHs)** are formed as a result of the pyrolysis and incomplete combustion of organic matter such as fossil fuel. PAH aerosols formed during the combustion process disperse throughout the atmosphere, resulting in the deposition of PAH condensate in soil, water and on vegetation. In addition, several products formed from petroleum processing operations (e.g., roofing materials and asphalt) also contain elevated levels of PAHs. Hence, these compounds are widely dispersed in the environment. PAHs are characterized by a molecular structure containing three or more fused, unsaturated carbon rings. Seven of the PAHs are classified by USEPA as probable human carcinogens (USEPA Class B2). These are: benzo(a)pyrene; benzo(a)anthracene; benzo(b)fluoranthene; benzo(k)fluoranthene; chrysene; dibenzo(a,h)anthracene; and indeno(1,2,3-cd)pyrene. The primary route of exposure to PAHs is through incidental ingestion and inhalation of contaminated particulates. PAHs are characterized by an organic odor, and exist as oily liquids in pure form. Acute exposure symptoms may include acne-type blemishes in areas of the skin exposed to sunlight.

With respect to the anticipated RI/IRM activities discussed in Section 1.5, possible routes of exposure to the above-mentioned contaminants are presented in Table 2. The use of proper respiratory equipment, as outlined in Section 7.0 of this HASP, will minimize the potential for exposure to airborne contamination. Exposure to contaminants through dermal and other routes will also be minimized through the use of protective clothing (Section 7.0), safe work practices (Section 6.0), and proper decontamination procedures (Section 12.0).

3.2 Physical Hazards

RI/IRM field activities at the 348 Langner Road Site may present the following physical hazards:

- The potential for physical injury during heavy construction equipment use, such as backhoes, excavators and drilling equipment.
- The potential for heat/cold stress to employees during the summer/winter months (see Section 10.0).
- The potential for slip and fall injuries due to rough, uneven terrain and/or open excavations.

These hazards represent only some of the possible means of injury that may be present during RI/IRM operations and sampling activities at the Site. Since it is impossible to list all potential sources of injury, it shall be the responsibility of each individual to exercise proper care and caution during all phases of the work.

4.0 TRAINING

4.1 Site Workers

All personnel performing RI/IRM activities at the Site (such as, but not limited to, equipment operators, general laborers, and drillers) and who may be exposed to hazardous substances, health hazards, or safety hazards and their supervisors/managers responsible for the Site shall receive training in accordance with 29 CFR 1910.120(e) before they are permitted to engage in operations in the exclusion zone or contaminant reduction zone. This training includes an initial 40-hour Hazardous Waste Site Worker Protection Course, an 8-hour Annual Refresher Course subsequent to the initial 40-hour training, and 3 days of actual field experience under the direct supervision of a trained, experienced supervisor. Additional site-specific training shall also be provided by the SSHO prior to the start of field activities. A description of topics to be covered by this training is provided below.

4.1.1 Initial and Refresher Training

Initial and refresher training is conducted by a qualified instructor as specified under OSHA 29 CFR 1910.120(e)(5), and is specifically designed to meet the requirements of OSHA 29 CFR 1910.120(e)(3) and 1910.120(e)(8). The training covers, as a minimum, the following topics:

- OSHA HAZWOPER regulations.
- Site safety and hazard recognition, including chemical and physical hazards.
- Medical monitoring requirements.
- Air monitoring, permissible exposure limits, and respiratory protection level classifications.
- Appropriate use of personal protective equipment (PPE), including chemical compatibility and respiratory equipment selection and use.
- Work practices to minimize risk.
- Work zones and Site control.

- Safe use of engineering controls and equipment.
- Decontamination procedures.
- Emergency response and escape.
- Confined space entry procedures.
- Heat and cold stress monitoring.
- Elements of a Health and Safety Plan.
- Spill containment.

Initial training also incorporates workshops for PPE and respiratory equipment use (Levels A, B and C), and respirator fit testing. Records and certification received from the course instructor documenting each employee's successful completion of the training identified above are maintained on file at TurnKey-Benchmark's Buffalo, NY office. Contractors and Subcontractors are required to provide similar documentation of training for all their personnel who will be involved in on-site work activities.

Any employee who has not been certified as having received health and safety training in conformance with 29 CFR 1910.120(e) is prohibited from working in the exclusion and contamination reduction zones, or to engage in any on-site work activities that may involve exposure to hazardous substances or wastes.

4.1.2 Site Training

Site workers are given a copy of the HASP and provided a site-specific briefing prior to the commencement of work to ensure that employees are familiar with the HASP and the information and requirements it contains. The Site briefing shall be provided by the SSHO prior to initiating field activities and shall include:

- Names of personnel and alternates responsible for Site safety and health.
- Safety, health and other hazards present on the Site.
- The site lay-out including work zones and places of refuge.

- The emergency communications system and emergency evacuation procedures.
- Use of PPE.
- Work practices by which the employee can minimize risks from hazards.
- Safe use of engineering controls and equipment on the site.
- Medical surveillance, including recognition of symptoms and signs of over-exposure as described in Chapter 5 of this HASP.
- Decontamination procedures as detailed in Chapter 12 of this HASP.
- The emergency response plan as detailed in Chapter 15 of this HASP.
- Confined space entry procedures, if required, as detailed in Chapter 13 of this HASP.
- The spill containment program as detailed in Chapter 9 of this HASP.
- Site control as detailed in Chapter 11 of this HASP.

Supplemental health and safety briefings will also be conducted by the SSHO on an as-needed basis during the course of the work. Supplemental briefings are provided as necessary to notify employees of any changes to this HASP as a result of information gathered during ongoing Site characterization and analysis. Conditions for which the SSHO may schedule additional briefings include, but are not limited to: a change in Site conditions (e.g., based on monitoring results); changes in the work schedule/plan; newly discovered hazards; and safety incidents occurring during Site work.

4.2 Supervisor Training

On-site safety and health personnel who are directly responsible for or who supervise the safety and health of workers engaged in hazardous waste operations (i.e., SSHO) shall receive, in addition to the appropriate level of worker training described in Section 4.1, above, 8 additional hours of specialized supervisory training, in compliance with 29 CFR 1910.120(e)(4).

4.3 Emergency Response Training

Emergency response training is addressed in Appendix A of this HASP, Emergency Response Plan.

4.4 Site Visitors

Each Contractor's SSHO will provide a site-specific briefing to all Site visitors and other non-TurnKey/Benchmark personnel who enter the Site beyond the Site entry point. The site-specific briefing will provide information about Site hazards, the Site layout including work zones and places of refuge, the emergency communications system and emergency evacuation procedures, and other pertinent safety and health requirements as appropriate.

Site visitors will not be permitted to enter the exclusion zone or contaminant reduction zones unless they have received the level of training required for Site workers as described in Section 4.1.

5.0 MEDICAL MONITORING

Medical monitoring examinations are provided to TurnKey-Benchmark employees as stipulated under 29 CFR Part 1910.120(f). These exams include initial employment, annual and employment termination physicals for all TurnKey-Benchmark employees involved in hazardous waste site field operations. Post-exposure examinations are also provided for employees who may have been injured, received a health impairment, or developed signs or symptoms of over-exposure to hazardous substances or were accidentally exposed to substances at concentrations above the permissible exposure limits without necessary personal protective equipment. Such exams are performed as soon as possible following development of symptoms or the known exposure event.

Medical evaluations are performed by Health Works, an occupational health care provider under contract with TurnKey-Benchmark. Health Works is located in Seneca Square Plaza, 1900 Ridge Road, West Seneca, New York 14224. The facility can be reached at (716) 823-5050 to schedule routine appointments or post-exposure examinations.

Medical evaluations are conducted according to the TurnKey-Benchmark Medical Monitoring Program and include an evaluation of the workers' ability to use respiratory protective equipment. The examinations include:

- Occupational/medical history review.
- Physical exam, including vital sign measurement.
- Spirometry testing.
- Eyesight testing.
- Audio testing (minimum baseline and exit, annual for employees routinely exposed to greater than 85db).
- EKG (for employees >40 yrs age or as medical conditions dictate).
- Chest X-ray (baseline and exit, and every 5 years).
- Blood biochemistry (including blood count, white cell differential count, serum multiplastic screening).
- Medical certification of physical requirements (i.e., sight, musculoskeletal,

cardiovascular) for safe job performance and to wear respiratory protection equipment.

The purpose of the medical evaluation is to determine an employee's fitness for duty on hazardous waste sites; and to establish baseline medical data.

In conformance with OSHA regulations, TurnKey-Benchmark will maintain and preserve medical records for a period of 30 years following termination of employment. Employees are provided a copy of the physician's post-exam report, and have access to their medical records and analyses.

6.0 SAFE WORK PRACTICES

All TurnKey-Benchmark employees shall conform to the following safe work practices during all on-site work activities conducted within the exclusion and contamination reduction zones:

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth contact is strictly prohibited.

- The hands and face must be thoroughly washed upon leaving the work area and prior to engaging in any activity indicated above.

- Respiratory protective equipment and clothing must be worn by all personnel entering the Site as required by the HASP or as modified by the Site safety officer. Excessive facial hair (i.e., beards, long mustaches or sideburns) that interferes with the satisfactory respirator-to-face seal is prohibited.

- Contact with surfaces/materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, cross contamination and need for decontamination.

- Medicine and alcohol can synergize the effects of exposure to toxic chemicals. Due to possible contraindications, use of prescribed drugs should be reviewed with the TurnKey-Benchmark occupational physician. Alcoholic beverage and illegal drug intake are strictly forbidden during the workday.

- All personnel shall be familiar with standard operating safety procedures and additional instructions contained in this Health and Safety Plan.

- On-site personnel shall use the "buddy" system. No one may work alone (i.e., out of earshot or visual contact with other workers) in the exclusion zone.

- Personnel and equipment in the contaminated area shall be minimized, consistent with effective Site operations.

- All employees have the obligation to immediately report and if possible, correct unsafe work conditions.

- Use of contact lenses on-site will not be permitted. Spectacle kits for insertion into full-face respirators will be provided for TurnKey-Benchmark employees, as requested and required.

The recommended specific safety practices for working around the contractor's equipment (e.g., backhoes, bulldozers, excavators, drill rigs etc.) are as follows:

- Although the Contractor and subcontractors are responsible for their equipment and safe operation of the Site, TurnKey-Benchmark personnel are also responsible for their own safety.
- Subsurface work will not be initiated without first clearing underground utility services.
- Heavy equipment should not be operated within 20 feet of overhead wires. This distance may be increased if windy conditions are anticipated or if lines carry high voltage. The Site should also be sufficiently clear to ensure the project staff can move around the heavy machinery safely.
- Care should be taken to avoid overhead wires when moving heavy-equipment from location to location.
- Hard hats, safety boots and safety glasses should be worn at all times in the vicinity of heavy equipment. Hearing protection is also recommended.
- The work Site should be kept neat. This will prevent personnel from tripping and will allow for fast emergency exit from the Site.
- Proper lighting must be provided when working at night.
- Construction activities should be discontinued during an electrical storm or severe weather conditions.
- The presence of combustible gases should be checked before igniting any open flame.
- Personnel shall stand upwind of any construction operation when not immediately involved in sampling/logging/observing activities.
- Personnel will not approach the edge of an unsecured trench/excavation closer than 2 feet.

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 Equipment Selection

Personal protective equipment (PPE) will be donned when work activities may result in exposure to physical or chemical hazards beyond acceptable limits, and when such exposure can be mitigated through appropriate PPE. The selection of PPE will be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the Site, the task-specific conditions and duration, and the hazards and potential hazards identified at the Site.

Equipment designed to protect the body against contact with known or suspect chemical hazards are grouped into four categories according to the degree of protection afforded. These categories, designated A through D consistent with United States Environmental Protection Agency (USEPA) Level of Protection designation, are:

- **Level A:** Should be selected when the highest level of respiratory, skin and eye protection is needed.
- **Level B:** Should be selected when the highest level of respiratory protection is needed, but a lesser level of skin protection is required. Level B protection is the minimum level recommended on initial Site entries until the hazards have been further defined by on-site studies. Level B (or Level A) is also necessary for oxygen-deficient atmospheres.
- **Level C:** Should be selected when the types of airborne substances are known, the concentrations have been measured and the criteria for using air-purifying respirators are met. In atmospheres where no airborne contaminants are present, Level C provides dermal protection only.
- **Level D:** Should not be worn on any Site with elevated respiratory or skin hazards. This is generally a work uniform providing minimal protection.

OSHA requires the use of certain PPE under conditions where an immediate danger to life and health (IDLH) may be present. Specifically, OSHA 29 CFR 1910.120(g)(3)(iii) requires use of a positive pressure self-contained breathing apparatus, or positive pressure air-line respirator equipped with an escape air supply when chemical exposure levels present a substantial possibility of immediate serious injury, illness or death, or impair the ability to escape. Similarly, OSHA 29 CFR 1910.120(g)(3)(iv) requires donning totally-encapsulating chemical protective suits (with a protection level equivalent to Level A protection) in conditions where skin absorption of a hazardous substance may result in a substantial possibility of immediate serious illness, injury or death, or impair the ability to escape.

In situations where the types of chemicals, concentrations, and possibilities of contact are unknown, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be further characterized. The individual components of clothing and equipment must be assembled into a full protective ensemble to protect the worker from site-specific hazards, while at the same time minimizing hazards and drawbacks of the personal protective gear itself. Ensemble components are detailed below for levels A/B, C, and D protection.

7.2 Protection Ensembles

7.2.1 Level A/B Protection Ensemble

Level A/B ensembles include similar respiratory protection, however Level A provides a higher degree of dermal protection than Level B. Use of Level A over Level B is determined by: comparing the concentrations of identified substances in the air with skin toxicity data, and assessing the effect of the substance (by its measured air concentrations or splash potential) on the small area of the head and neck unprotected by Level B clothing.

The recommended PPE for level A/B is:

- Pressure-demand, full-face piece self-contained breathing apparatus (MSHA/-NIOSH approved) or pressure-demand supplied-air respirator with escape self-contained breathing apparatus (SCBA).
- Chemical-resistant clothing. For Level A, clothing consists of totally-encapsulating chemical resistant suit. Level B incorporates hooded one-or two-piece chemical splash suit.
- Inner and outer chemical resistant gloves.
- Chemical-resistant safety boots/shoes.
- Hardhat.

7.2.2 Level C Protection Ensemble

Level C protection is distinguished from Level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for Level C is that conditions permit wearing an air-purifying device. The device (when required) must be an air-purifying respirator (MSHA/NIOSH approved) equipped with filter cartridges. Cartridges must be able to remove the substances encountered. Respiratory protection will be used only with proper fitting, training and the approval of a qualified individual. In addition, an air-purifying respirator can be used only if: oxygen content of the atmosphere is at least 19.5% in volume; substances are identified and concentrations measured; substances have adequate warning properties; the individual passes a qualitative fit-test for the mask; and an appropriate cartridge/canister is used, and its service limit concentration is not exceeded.

Recommended PPE for Level C conditions includes:

- Full-face piece, air-purifying respirator equipped with MSHA and NIOSH approved organic vapor/acid gas/dust/mist combination cartridges or as designated by the SSHO.
- Chemical-resistant clothing (hooded, one or two-piece chemical splash suit or disposable chemical-resistant one-piece suit).
- Inner and outer chemical-resistant gloves.
- Chemical-resistant safety boots/shoes.
- Hardhat.

An air-monitoring program is part of all response operations when atmospheric contamination is known or suspected. It is particularly important that the air be monitored thoroughly when personnel are wearing air-purifying respirators. Continual surveillance using direct-reading instruments is needed to detect any changes in air quality necessitating a higher level of respiratory protection.

7.2.3 Level D Protection Ensemble

As indicated above, Level D protection is primarily a work uniform. It can be worn in areas where only boots can be contaminated, where there are no inhalable toxic substances and where the atmospheric contains at least 19.5% oxygen.

Recommended PPE for Level D includes:

- Coveralls.
- Safety boots/shoes.
- Safety glasses or chemical splash goggles.
- Hardhat.
- Optional gloves; escape mask; face shield.

7.2.4 Recommended Level of Protection for Site Tasks

Based upon current information regarding both the contaminants suspected to be present at the Site and the various tasks that are included in the remedial activities, the minimum required levels of protection for these tasks shall be as identified in Table 3.

8.0 EXPOSURE MONITORING

8.1 General

Based on the results of historic sample analysis and the nature of the proposed work activities at the Site, the possibility exists that organic vapors and/or particulates may be released to the air during intrusive construction activities. Ambient breathing zone concentrations may at times, exceed the permissible exposure limits (PELs) established by OSHA for the individual compounds (see Table 1), in which case respiratory protection will be required. Respiratory and dermal protection may be modified (upgraded or downgraded) by the SSHO based upon real-time field monitoring data.

8.1.1 On-Site Work Zone Monitoring

TurnKey-Benchmark personnel will conduct routine, real-time air monitoring during all intrusive construction phases such as excavation, backfilling, drilling, etc. The work area will be monitored at regular intervals using a photo-ionization detector (PID). Observed values will be recorded and maintained as part of the permanent field record.

8.1.2 Off-Site Community Air Monitoring

In addition to on-site monitoring within the work zone(s), monitoring at the down-wind portion of the Site perimeter will be conducted. This will provide a real-time method for determination of vapor and/or particulate releases to the surrounding community as a result of ground intrusive investigation work.

Ground intrusive activities are defined by NYSDOH Appendix 1A Generic Community Air Monitoring Plan and attached as Appendix C. Ground intrusive activities include soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells. Non-intrusive activities include the collection of soil and sediment samples or the collection of groundwater samples from existing wells. Continuous monitoring is required for ground intrusive activities and periodic monitoring is required for non-intrusive activities. Periodic monitoring consists of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring while bailing a well, and taking a reading prior to leaving a sampling location. This may be upgraded to continuous if the sampling location is in close proximity to individuals not involved in the Site activity (i.e., on a curb of a busy street). The action levels below will be used during periodic monitoring.

8.2 Monitoring Action Levels

8.2.1 On-Site Work Zone Action Levels

The PID, or other appropriate instrument(s), will be used by TurnKey-Benchmark personnel to monitor organic vapor concentrations as specified in this HASP. In addition, fugitive dust/particulate concentrations will be monitored during major soil intrusion (viz., well/boring installation) using a real-time particulate monitor as specified in this plan. In the absence of such monitoring, appropriate respiratory protection for particulates shall be donned. Sustained readings obtained in the breathing zone may be interpreted (with regard to other Site conditions) as follows for TurnKey-Benchmark personnel:

- Total atmospheric concentrations of unidentified vapors or gases ranging from 0 to 1 ppm above background on the PID) - Continue operations under Level D (see Appendix A).

- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings from >1 ppm to 5 ppm above background on the PID (vapors not suspected of containing high levels of chemicals toxic to the skin) - Continue operations under Level C (see Appendix A).

- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings of >5 ppm to 50 ppm above background on the PID - Continue operations under Level B (see Attachment 1), re-evaluate and alter (if possible) construction methods to achieve lower vapor concentrations.

- Total atmospheric concentrations of unidentified vapors or gases above 50 ppm on the PID - Discontinue operations and exit the work zone immediately.

The explosimeter may be used to monitor levels of both combustible gases and oxygen during RI/IRM activities. Action levels based on the instrument readings shall be as follows:

- Less than 10% LEL - Continue engineering operations with caution.

- 10-25% LEL - Continuous monitoring with extreme caution, determine source/cause of elevated reading.
- Greater than 25% LEL - Explosion hazard, evaluate source and leave the Work Zone.
- 19.5% - 21% oxygen - proceed with extreme caution; attempt to determine potential source of oxygen displacement.
- Less than 19.5% oxygen - leave work zone immediately.
- 21-25% oxygen - Continue engineering operations with caution.
- Greater than 25% oxygen - Fire hazard potential, leave Work Zone immediately.

The particulate monitor will be used to monitor respirable dust concentrations during all intrusive activities and during handling of Site soil/fill. Action levels based on the instrument readings shall be as follows:

- Less than 50 mg/m^3 - Continue field operations.
- 50-150 mg/m^3 - Don dust/particulate mask or equivalent
- Greater than 150 mg/m^3 - Don dust/particulate mask or equivalent. Initiate engineering controls to reduce respirable dust concentration (viz., wetting of excavated soils or tools at discretion of Site Health and Safety Officer).

Readings with the organic vapor analyzer, combustible gas meter, and particulate monitor will be recorded and documented on the appropriate Project Field Forms. All instruments will be calibrated before use on a daily basis and the procedure will be documented on the appropriate Project Field Forms.

8.2.2 Community Air Monitoring Action Levels

In addition to the action levels prescribed in Section 8.2.1 for TurnKey-Benchmark personnel on-site, the following criteria shall also be adhered to for the protection of downwind receptors consistent with NYSDOH requirements (Appendix C):

- **<u>ORGANIC VAPOR PERIMETER MONITORING</u>:**
  - If the <u>sustained</u> ambient air concentration of organic vapors at the downwind perimeter of the exclusion zone <u>exceeds 5 ppm</u> above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the <u>sustained</u> organic vapor decreases below 5 ppm over background, work activities can resume but more frequent intervals of monitoring, as directed by the Site Health and Safety Officer, must be conducted.

  - If the <u>sustained</u> ambient air concentration of organic vapors at the downwind perimeter of the exclusion zone are <u>greater than 5 ppm</u> over background <u>but less than 25 ppm</u> for the 15-minute average, activities can resume provided that: the organic vapor level 200 feet downwind of the working site or half the distance to the nearest off-site residential or commercial structure, whichever is less, is below 5 ppm over background; and more frequent intervals of monitoring, as directed by the Site Health and Safety Officer, are conducted.

  - If the <u>sustained</u> organic vapor level is <u>above 25 ppm</u> at the perimeter of the exclusion zone for the 15-minute average, the Site Health and Safety Officer must be notified and work activities shut down. The Site Health and Safety Officer will determine when re-entry of the exclusion zone is possible and will implement downwind air monitoring to ensure vapor emissions do not impact the nearest off-site residential or commercial structure at levels exceeding those specified in the ***Organic Vapor Contingency Monitoring Plan*** below. All readings will be recorded and will be available for New York State Department of Environmental Conservation (DEC) and Department of Health (DOH) personnel to review.

- **<u>ORGANIC VAPOR CONTINGENCY MONITORING PLAN:</u>**
  - If the <u>sustained</u> organic vapor level is <u>greater than 5 ppm</u> over background 200 feet downwind from the work area or half the distance to the nearest off-site residential or commercial property, whichever is less, all work activities must be halted.

  - If, following the cessation of the work activities or as the result of an emergency, <u>sustained</u> organic levels <u>persist above 5 ppm</u> above background 200 feet downwind or half the distance to the nearest off-site residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest off-site residential or commercial structure (20-foot zone).

- If efforts to abate the emission source are unsuccessful and if sustained organic vapor levels approach or exceed 5 ppm above background within the 20-foot zone for more than 30 minutes, or are sustained at levels greater than 10 ppm above background for longer than one minute, then the ***Major Vapor Emission Response Plan*** (see below) will automatically be placed into effect.

o **MAJOR VAPOR EMISSION RESPONSE PLAN:**

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in this Health and Safety Plan and the Emergency Response Plan (Appendix A) will be advised.

2. The local police authorities will immediately be contacted by the Site Health and Safety Officer and advised of the situation.

3. Frequent air monitoring will be conducted at 30-minute intervals within the 20-foot zone. If two sustained successive readings below action levels are measured, air monitoring may be halted or modified by the Site Health and Safety Officer.

The following personnel are to be notified in the listed sequence in the event that a Major Vapor Emission Plan is activated:

Responsible Person	Contact	Phone Number
SSHO	Police	911
SSHO	State Emergency Response Hotline	(800) 457-7362

Additional emergency numbers are listed in the Emergency Response Plan included as Appendix A.

o **EXPLOSIVE VAPORS:**

- Sustained atmospheric concentrations of greater than 10% LEL in the work area - Initiate combustible gas monitoring at the downwind portion of the Site perimeter.

- Sustained atmospheric concentrations of greater than 10% LEL at the downwind Site perimeter – Halt work and contact local Fire Department.

o **Airborne Particulate Community Air Monitoring**

Respirable (PM-10) particulate monitoring will be performed on a continuous basis at the upwind and downwind perimeter of the exclusion zone. The monitoring will be performed using real-time monitoring equipment capable of measuring PM-10 and integrating over a period of 15-minutes for comparison to the airborne particulate action levels. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities. All readings will be recorded and will be available for NYSDEC and NYSDOH review. Readings will be interpreted as follows:

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (ug/m^3) greater than the background (upwind perimeter) reading for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression provided that the downwind PM-10 particulate levels do not exceed 150 ug/m^3 above the upwind level and that visible dust is not migrating from the work area.

- If, after implementation of dust suppression techniques downwind PM-10 levels are greater than 150 ug/m^3 above the upwind level, work activities must be stopped and dust suppression controls re-evaluated. Work can resume provided that supplemental dust suppression measures and/or other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

Pertinent emergency response information including the telephone number of the Fire Department is included in the Emergency Response Plan (Appendix A).

9.0 SPILL RELEASE/RESPONSE

This chapter of the HASP describes the potential for and procedures related to spills or releases of known or suspected petroleum and/or hazardous substances on the Site. The purpose of this Section of the HASP is to plan appropriate response, control, counter-measures and reporting, consistent with OSHA requirements in 29 CFR 1910.120(b)(4)(ii)(J) and (j)(1)(viii). The spill containment program addresses the following elements:

- Potential hazardous material spills and available controls.
- Initial notification and evaluation.
- Spill response.
- Post-spill evaluation.

9.1 Potential Spills and Available Controls

An evaluation was conducted to determine the potential for hazardous material and oil/petroleum spills at this Site. For the purpose of this evaluation, hazardous materials posing a significant spill potential are considered to be:

- CERCLA Hazardous Substances as identified in 40 CFR Part 302, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).

- Extremely Hazardous Substances as identified in 40 CFR Part 355, Appendix A, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).

- Hazardous Chemicals as defined under Section 311(e) of the Emergency Planning and Community Right-To-Know Act of 1986, where such chemicals are present or will be stored in excess of 10,000 lbs.

- Toxic Chemicals as defined in 40 CFR Part 372, where such chemicals are present or will be stored in excess of 10,000 lbs.

- Chemicals regulated under 6NYCRR Part 597, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).

Oil/petroleum products are considered to pose a significant spill potential whenever the following situations occur:

- The potential for a "harmful quantity" of oil (including petroleum and non-petroleum-based fuels and lubricants) to reach navigable waters of the U.S. exists (40 CFR Part 112.4). Harmful quantities are considered by USEPA to be volumes that could form a visible sheen on the water or violate applicable water quality standards.

- The potential for any amount of petroleum to reach any waters of NY State, including groundwater, exists. Petroleum, as defined by NY State in 6NYCRR Part 612, is a petroleum-based heat source, energy source, or engine lubricant/maintenance fluid.

- The potential for any release, to soil or water, of petroleum from a bulk storage facility regulated under 6NYCRR Part 612. A regulated petroleum storage facility is defined by NY State as a site having stationary tank(s) and intra-facility piping, fixtures and related equipment with an aggregate storage volume of 1,100 gallons or greater.

The evaluation indicates that, based on Site history and decommissioning records, a hazardous material spill and/or a petroleum product spill is not likely to occur during RI/IRM efforts.

9.2 Initial Spill Notification and Evaluation

Any worker who discovers a hazardous substance or oil/petroleum spill will immediately notify the Project Manager and SSHO. The worker will, to the best of his/her ability, report the material involved, the location of the spill, the estimated quantity of material spilled, the direction/flow of the spill material, related fire/explosion incidents, if any, and any associated injuries. The Emergency Response Plan presented in Attachment H2 of this HASP will immediately be implemented if an emergency release has occurred.

Following initial report of a spill, the Project Manager will make an evaluation as to whether the release exceeds RQ levels. If an RQ level is exceeded, the Project Manager will notify the Site owner and NYSDEC at 1-800-457-7362 within 2 hours of spill discovery. The Project Manager will also determine what additional agencies (e.g., USEPA) are to be contacted regarding the release, and will follow-up with written reports as required by the applicable regulations.

9.3 Spill Response

For all spill situations, the following general response guidelines will apply:

- Only those personnel involved in overseeing or performing containment operations will be allowed within the spill area. If necessary, the area will be roped, ribboned, or otherwise blocked off to prevent unauthorized access.
- Appropriate PPE, as specified by the SSHO, will be donned before entering the spill area.
- Ignition points will be extinguished/removed if fire or explosion hazards exist.
- Surrounding reactive materials will be removed.
- Drains or drainage in the spill area will be blocked to prevent inflow of spilled materials or applied materials.

For minor spills, the Contractor will maintain a Spill Control and Containment Kit in the Field Office or other readily accessible storage location. The kit will consist of, at a minimum, a 50 lb. bag of "speedy dry" granular absorbent material, absorbent pads, shovels, empty 5-gallon pails and an empty open-top 55-gallon drum. Spilled materials will be absorbed, and shoveled into a 55-gallon drum for proper disposal (NYSDEC approval will be secured for on-site treatment of the impacted soils/absorbent materials, if applicable). Impacted soils will be hand-excavated to the point that no visible signs of contamination remains, and will be drummed with the absorbent.

In the event of a major release or a release that threatens surface water, a spill response contractor will be called to the Site. The response contractor may use heavy equipment (e.g., excavator, backhoe, etc.) to berm the soils surrounding the spill Site or create diversion trenching to mitigate overland migration or release to navigable waters. Where feasible, pumps will be used to transfer free liquid to storage containers. Spill control/cleanup contractors in the Western New York area that may be contacted for assistance include:

- The Environmental Service Group of NY, Inc.: (716) 695-6720
- Environmental Products and Services, Inc.: (716) 447-4700
- Op-Tech: (716) 873-7680

9.4 Post-Spill Evaluation

If a reportable quantity of hazardous material or oil/petroleum is spilled as determined by the Project Manager, a written report will be prepared as indicated in Section 9.2. The report will identify the root cause of the spill, type and amount of material released, date/time of release, response actions, agencies notified and/or involved in cleanup, and procedures to be implemented to avoid repeat incidents. In addition, all re-useable spill cleanup and containment materials will be decontaminated, and spill kit supplies/disposable items will be replenished.

10.0 HEAT/COLD STRESS MONITORING

Since some of the work activities at the Site will be scheduled for both the summer and winter months, measures will be taken to minimize heat/cold stress to TurnKey-Benchmark employees. The Site Safety and Health Officer and/or his or her designee will be responsible for monitoring TurnKey-Benchmark field personnel for symptoms of heat/cold stress.

10.1 Heat Stress Monitoring

Personal protective equipment may place an employee at risk of developing heat stress, a common and potentially serious illnesses often encountered at construction, landfill, waste disposal, industrial or other unsheltered sites. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning and age. Personal protective equipment may severely reduce the body's normal ability to maintain temperature equilibrium (via evaporation and convection), and require increased energy expenditure due to its bulk and weight.

Proper training and preventive measures will mitigate the potential for serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress, the following steps should be taken:

- Adjust work schedules.
- Modify work/rest schedules according to monitoring requirements.
- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat (i.e., eight fluid ounces must be ingested for approximately every 1 lb of weight lost). The normal thirst

mechanism is not sensitive enough to ensure that enough water will be consumed to replace lost perspiration. When heavy sweating occurs, workers should be encouraged to drink more.

- Train workers to recognize the symptoms of heat related illness.

Heat-Related Illness - Symptoms:

- Heat rash may result from continuous exposure to heat or humid air.

- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include: muscle spasms; pain in the hands, feet and abdomen.

- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include: pale, cool, moist skin; heavy sweating; dizziness; nausea; fainting.

- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are: red, hot, usually dry skin; lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

The monitoring of personnel wearing protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism.

- Heart rate may be measured by the radial pulse for 30 seconds as early as possible in the resting period. The rate at the beginning of the rest period should not exceed 100 beats per minute. If the rate is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest periods stay the same, If the pulse rate is 100 beats per minute at the beginning of the nest rest period, the following work cycle should be further shortened by 33%.

- Body temperature may be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature at the beginning of the rest period should not exceed 99.6 degrees Fahrenheit. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period remains the same. However, if the oral temperature exceeds 99.6 degrees Fahrenheit at the beginning of the next period, the work cycle may be further shortened by 33%. Oral temperature should be measured at the end of the rest period to make sure that it has dropped below 99.6 degrees Fahrenheit. No TurnKey-Benchmark employee will be permitted to continue wearing semi-permeable or impermeable garments when his/her oral temperature exceeds 100.6 degrees Fahrenheit.

10.2 Cold Stress Monitoring

Exposure to cold conditions may result in frostbite or hypothermia, each of which progresses in stages as shown below.

- **Frostbite** occurs when body tissue (usually on the extremities) begins to freeze. The three states of frostbite are:

    1) **Frost nip** - This is the first stage of the freezing process. It is characterized by a whitened area of skin, along with a slight burning or painful sensation. Treatment consists of removing the victim from the cold conditions, removal of boots and gloves, soaking the injured part in warm water (102 to 108 degrees Fahrenheit) and drinking a warm beverage. Do not rub skin to generate friction/ heat.

    2) **Superficial Frostbite** - This is the second stage of the freezing process. It is characterized by a whitish gray area of tissue, which will be firm to the touch but will yield little pain. The treatment is identical for Frost nip.

    3) **Deep Frostbite** - In this final stage of the freezing process the affected tissue will be cold, numb and hard and will yield little to no pain. Treatment is identical to that for Frost nip.

- **Hypothermia** is a serious cold stress condition occurring when the body loses heat at a rate faster than it is produced. If untreated, hypothermia may be fatal. The stages of hypothermia may not be clearly defined or visible at first, but generally include:

    1) Shivering
    2) Apathy (i.e., a change to an indifferent or uncaring mood)

3) Unconsciousness
4) Bodily freezing

Employees exhibiting signs of hypothermia should be treated by medical professionals. Steps that can be taken while awaiting help include:

1) Remove the victim from the cold environment and remove wet or frozen clothing. (Do this carefully as frostbite may have started.)

2) Perform active re-warming with hot liquids for drinking (Note: do not give the victim any liquid containing alcohol or caffeine) and a warm water bath (102 to 108 degrees Fahrenheit).

3) Perform passive re-warming with a blanket or jacket wrapped around the victim.

In any potential cold stress situation, it is the responsibility of the Site Health and Safety Officer to encourage the following:

- Education of workers to recognize the symptoms of frostbite and hypothermia.
- Workers should dress warmly, with more layers of thin clothing as opposed to one thick layer.
- Personnel should remain active and keep moving.
- Personnel should be allowed to take shelter in a heated areas, as necessary.
- Personnel should drink warm liquids (no caffeine or alcohol if hypothermia has set in).
- For monitoring the body's recuperation from excess cold, oral temperature recordings should occur:
  - At the Site Safety Technicians discretion when suspicion is based on changes in a worker's performance or mental status.
  - At a workers request.
  - As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind chill less than 20 degrees Fahrenheit or wind chill

less than 30 degrees Fahrenheit with precipitation).

- As a screening measure, whenever anyone worker on-site develops hypothermia.

Any person developing moderate hypothermia (a core body temperature of 92 degrees Fahrenheit) will not be allowed to return to work for 48 hours without the recommendation of a qualified medical doctor.

11.0 WORK ZONES AND SITE CONTROL

Work zones around the areas designated for construction activities will be established on a daily basis and communicated to all employees and other Site users by the SSHO. It shall be each Contractor's Site Safety and Health Officer's responsibility to ensure that all Site workers are aware of the work zone boundaries and to enforce proper procedures in each area. The zones will include:

- Exclusion Zone ("Hot Zone") - The area where contaminated materials may be exposed, excavated or handled and all areas where contaminated equipment or personnel may travel. Flagging tape will delineate the zone. All personnel entering the Exclusion Zone must wear the prescribed level of personal protective equipment identified in Section 7.

- Contamination Reduction Zone - The zone where decontamination of personnel and equipment takes place. Any potentially contaminated clothing, equipment and samples must remain in the Contamination Reduction Zone until decontaminated.

- Support Zone - The part of the site that is considered non-contaminated or "clean." Support equipment will be located in this zone, and personnel may wear normal work clothes within this zone.

In the absence of other task-specific work zone boundaries established by the SSHO, the following boundaries will apply to all investigation and construction activities involving disruption or handling of Site soils or groundwater:

- Exclusion Zone: 50 foot radius from the outer limit of the sampling/construction activity.

- Contaminant Reduction Zone: 100 foot radius from the outer limit of the sampling/construction activity.

- Support Zone: Areas outside the Contaminant Reduction Zone.

Access of non-essential personnel to the Exclusion and Contamination Reduction Zones will be strictly controlled by the SSHO. Only personnel who are essential to the completion of the task will be allowed access to these areas and only if they are wearing the prescribed level of protection. Entrance of all personnel must be approved by the SSHO.

The SSHO will maintain a Health and Safety Logbook containing the names of TurnKey-Benchmark workers and their level of protection. The zone boundaries may be changed by the SSHO as environmental conditions warrant, and to respond to the necessary changes in work locations on-site.

12.0 DECONTAMINATION

12.1 Decontamination for TurnKey-Benchmark Employees

The degree of decontamination required is a function of a particular task and the environment within which it occurs. The following decontamination procedure will remain flexible, thereby allowing the decontamination crew to respond appropriately to the changing environmental conditions that may arise at the Site. All TurnKey-Benchmark personnel on-site shall follow the procedure below, or the Contractor's procedure (if applicable), whichever is more stringent.

Station 1 - Equipment Drop: Deposit visibly contaminated (if any) re-useable equipment used in the contamination reduction and exclusion zones (tools, containers, monitoring instruments, radios, clipboards, etc.) on plastic sheeting.

Station 2 - Boots and Gloves Wash and Rinse: Scrub outer boots and outer gloves. Deposit tape and gloves in waste disposal container.

Station 3 - Tape, Outer Boot and Glove Removal: Remove tape, outer boots and gloves. Deposit tape and gloves in waste disposal container.

Station 4 - Canister or Mask Change: If worker leaves exclusive zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot cover donned, and worker returns to duty.

Station 5 - Outer Garment/Face Piece Removal: Protective suit removed and deposited in separate container provided by Contractor. Face piece or goggles are removed if used. Avoid touching face with fingers. Face piece and/or goggles deposited on plastic sheet. Hard hat removed and placed on plastic sheet.

Station 6 - Inner Glove Removal: Inner gloves are the last personal protective equipment to be removed. Avoid touching the outside of the gloves with bare fingers. Dispose of these gloves in waste disposal container.

Following PPE removal, personnel shall wash hands, face and forearms with absorbent wipes. If field activities proceed for duration of 6 consecutive months or longer, shower facilities will be provided for worker use in accordance with OSHA 29 CFR 1910.120(n).

12.2 Decontamination for Medical Emergencies

In the event of a minor, non-life threatening injury, personnel should follow the decontamination procedures as defined, and then administer first-aid.

In the event of a major injury or other serious medical concern (e.g., heat stroke), immediate first-aid is to be administered and the victim transported to the hospital in lieu of further decontamination efforts unless exposure to a Site contaminant would be considered "Immediately Dangerous to Life or Health."

12.3 Decontamination of Field Equipment

The Contractor in accordance with his approved Health and Safety Plan in the Contamination Reduction Zone will conduct decontamination of heavy equipment. As a minimum, this will include manually removing heavy soil contamination, followed by steam cleaning on an impermeable pad.

TurnKey-Benchmark personnel will conduct decontamination of all tools used for sample collection purposes. It is expected that all tools will be constructed of nonporous, nonabsorbent materials (i.e., metal), which will aid in the decontamination effort. Any tool or part of a tool made of porous, absorbent material (i.e., wood) will be placed into suitable containers and prepared for disposal.

Decontamination of bailers, split-spoons, spatula knives, and other tools used for environmental sampling and examination shall be as follows:

- Disassemble the equipment
- Water wash to remove all visible foreign matter.
- Wash with detergent.
- Rinse all parts with distilled-deionized water.
- Allow to air dry.
- Wrap all parts in aluminum foil or polyethylene.

13.0 CONFINED SPACE ENTRY

OSHA 29 CFR 1910.146 identifies a confined space as a space that is large enough and so configured that an employee can physically enter and do assigned work, has limited or restricted means for entry and exit, and is not intended for continuous employee occupancy. Confined spaces include, but are not limited to, trenches, storage tanks, process vessels, pits, sewers, tunnels, underground utility vaults, pipelines, sumps, wells, and excavations.

Confined space entry by TurnKey-Benchmark employees is not anticipated to be necessary to complete the RI/IRM activities identified in Section 2.0. In the event that the scope of work changes or confined space entry appears necessary, the Project Manager will be consulted to determine if feasible engineering alternatives to confined space entry can be implemented. If confined space entry by TurnKey-Benchmark employees cannot be avoided through reasonable engineering measures, task-specific confined space entry procedures will be developed and a confined-space entry permit will be issued through TurnKey-Benchmark's corporate Health and Safety Director. TurnKey-Benchmark employees shall not enter a confined space without these procedures and permits in place.

14.0 FIRE PREVENTION AND PROTECTION

14.1 General Approach

Recommended practices and standards of the National Fire Protection Association (NFPA) and other applicable regulations will be followed in the development and application of Project Fire Protection Programs. When required by regulatory authorities, the project management will prepare and submit a Fire Protection Plan for the approval of the contracting officers, authorized representative or other designated official. Essential considerations for the Fire Protection Plan will include:

- Proper Site preparation and safe storage of combustible and flammable materials.
- Availability of coordination with private and public fire authorities.
- Adequate job-site fire protection and inspections for fire prevention.
- Adequate indoctrination and training of employees.

14.2 Equipment and Requirements

Fire extinguishers will be provided by each Contractor and are required on all heavy equipment and in each field trailer. Fire extinguishers will be inspected, serviced, and maintained in accordance with the manufacturer's instructions. As a minimum, all extinguishers shall be checked monthly and weighed semi-annually, and recharged if necessary. Recharge or replacement shall be mandatory immediately after each use.

14.3 Flammable and Combustible Substances

All storage, handling or use of flammable and combustible substances will be under the supervision of qualified persons. All tanks, containers and pumping equipment, whether portable or stationary, used for the storage and handling of flammable and combustible liquids, will meet the recommendations of the National Fire Protection Association.

14.4 Hot Work

If the scope of work necessitates welding or blowtorch operation, the hot work permit presented in Appendix B will be completed by the SSHO and reviewed/issued by the Project Manager.

15.0 EMERGENCY INFORMATION

In accordance with OSHA 29 CFR Part 1910, an Emergency Response Plan is attached to this HASP as Appendix A. The hospital route map is presented within Appendix A as Figure 1.

16.0 REFERENCES

1. New York State Department of Health. 2002. *Generic Community Air Monitoring Plan, Appendix 1A, Draft DER-10 Technical Guidance for Site Investigation and Remediation.* December.

TABLES

TABLE 1

TOXICITY DATA FOR CONSTITUENTS OF POTENTIAL CONCERN

348 Langner Road Site
West Seneca, New York

Parameter	Synonyms	CAS No.	Code	Concentration Limits [1]		
				PEL	TLV	IDLH
Volatile Organic Compounds (VOCs): ppm						
Benzene	Benzol, Phenyl hydride	71-43-2	Ca	1	0.5	500
Ethylbenzene	Ethylbenzol, Phenylethane	100-41-4	*none*	100	100	800
Methy Tert-Butyl Ether	MTBE	1634-04-4	*none*	--	50	--
Toluene	Methyl benzene, Methyl benzol	108-88-3	C-300	200	50	500
Xylene, Total	o-, m-, p-isomers	1330-20-7	*none*	100	100	900
Semi-volatile Organic Compounds (SVOCs) [2] : ppm						
Acenaphthene	*none*	83-32-9	*none*	--	--	--
Acenaphthylene	*none*	208-96-8	*none*	--	--	--
Anthracene	*none*	120-12-7	*none*	--	--	--
Benzo(a)anthracene	*none*	56-55-3	*none*	--	--	--
Benzo(a)pyrene	*none*	50-32-8	*none*	--	--	--
Benzo(b)fluoranthene	*none*	205-99-2	*none*	--	--	--
Benzo(ghi)perylene	*none*	191-24-2	*none*	--	--	--
Benzo(k)fluoranthene	*none*	207-08-9	*none*	--	--	--
Chrysene	*none*	218 01 9	*none*	--	--	--
Dibenzo(a,h)anthracene	*none*	53-70-3	*none*	--	--	--
Fluoranthene	*none*	206-44-0	*none*	--	--	--
Fluorene	*none*	86-73-7	*none*	--	--	--
Indeno(1,2,3-cd)pyrene	*none*	193-39-5	*none*	--	--	--
Naphthalene	Naphthalin, Tar camphor, White tar	91-20-3	*none*	10	10	250
Phenanthrene	*none*	85-01-8	*none*	--	--	--
Pyrene	*none*	129-00-0	*none*	--	--	--

Notes:
1. Concentration limits as reported by NIOSH Pocket Guide to Chemical Hazards, February 2004 (NIOSH Publication No. 97-140, fourth printing with chages and updates.
2. " -- " = concentration limit not available; exposure should be minimized to the extent feasible through appropriate engineering controls & PPE.

Explanation:
Ca = NIOSH considers constituent to be a potential occupational carcinogen.
C-## = Ceiling Level equals the maximum exposure concentration allowable during the work day.
IDLH = Immediately Dangerous to Life or Health.
ND indicates that an IDLH has not as yet been determined.
TLV = Threshold Limit Value, established by American Conference of Industrial Hygienists (ACGIH), equals the maximum exposure concentration allowable for 8 hours/day @ 40 ho
TLVs are the amounts of chemicals in the air that almost all healthy adult workers are predicted to be able to tolerate without adverse effects. There are three types.
TLV-TWA (TLV-Time-Weighted Average) which is averaged over the normal eight-hour day/forty-hour work week. (Most TLVs.)
TLV-C or Ceiling limits are the concentration that should not be exceeded during any part of the working exposure.
Unless the initials "STEL" or "C" appear in the Code column, the TLV value should be considered to be the eight-hour TLV-TWA.
PEL = Permissible Exposure Limit, established by OSHA, equals the maximium exposure conconcentration allowable for 8 hours per day @ 40 hours per week

TABLE 2

POTENTIAL ROUTES OF EXPOSURE TO THE CONSTITUENTS OF POTENTIAL CONCERN

348 Langner Road Site
West Seneca, New York

Activity [1]	Direct Contact with Soil/Fill	Inhalation of Vapors or Dust	Direct Contact with Groundwater
Remedial Investigation Tasks			
1. Subsurface Soil Sampling	x	x	
2. Monitoring Well Installation/Development and Sampling	x	x	x
Interim Remedial Measures Tasks			
1. Soil Excavation	x	x	
2. Backfilling	x	x	
3. Verification Sampling	x	x	
4. Groundwater and Surface Water Management	x		x

Notes:
1. Activity as described in Section 1.5 of the Health and Safety Plan.

TABLE 3

REQUIRED LEVELS OF PROTECTION
FOR RI/IRM TASKS

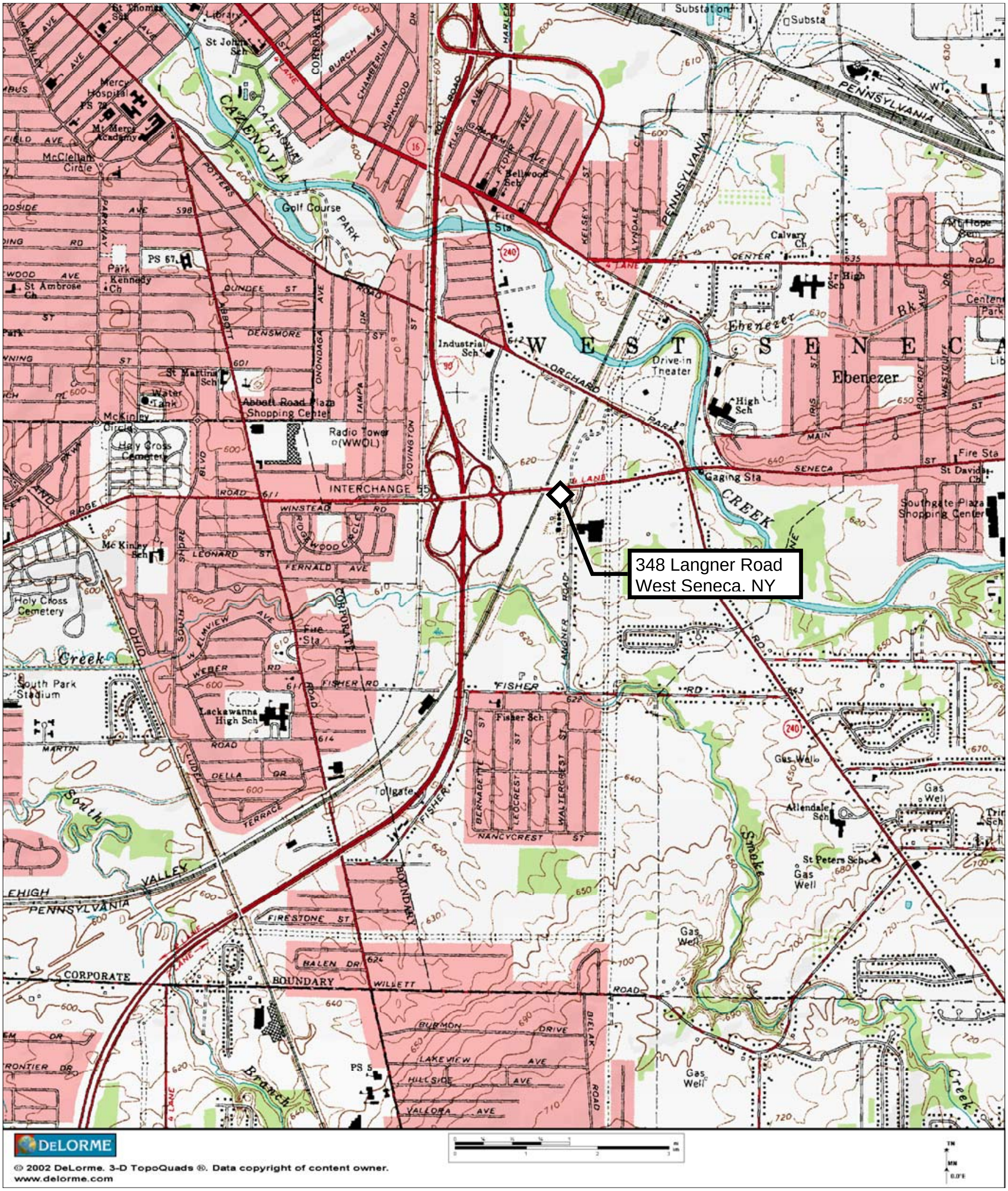
348 Langner Road Site
West Seneca, New York

Activity	Respiratory Protection [1]	Clothing	Gloves [2]	Boots [2, 3]	Other Required PPE/Modifications [2, 4]
Remedial Investigation Tasks					
1. Subsurface Soil Sampling	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS
2. Monitoring Well Installation/Development and Sampling	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	SGSS
Interim Remedial Measures Tasks					
1. Soil Excavation	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS
2. Backfilling	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS
3. Verification Sampling	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS
4. Groundwater and Surface Water Management	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS

Notes:
1. Respiratory equipment shall conform to guidelines presented in Section 7.0 of this HASP. The Level C requirement is an air-purifying respirator equiped with organic compound/acid gas/dust cartridge.
2. HH = hardhat; L= Latex; L/N = latex inner glove, nitrile outer glove; N = Nitrile; S = Saranex; SG = safety glasses; SGSS = safety glasses with sideshields; STSS = steel toe safety shoes.
3. Latex outer boot (or approved overboot) required whenever contact with contaminated materials may occur. SSHO may downgrade to STSS (steel-toed safety shoes) if contact will be limited to cover/replacement soils.
4. Dust masks shall be donned as directed by the SSHO (site safety and health officer) or site safety technician whenever potentially contaminated airborne particulates (i.e., dust) are present in significant amounts in the breathing zone. Goggles may be substituted with safety glasses w/side-shields whenever contact with contaminated liquids is not anticipated.

FIGURES

FIGURE 1



SITE LOCATION AND VICINITY MAP

348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

PREPARED FOR

DELTA SONIC

TurnKey Environmental Restoration, LLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

PROJECT NO.: 0123-005-102

DATE: AUGUST 2011

DRAFTED BY: JGT

Base Image per Erie Co. GIS — Parcel Information per Town of West Seneca Assessor Office — Not to Scale

N

TurnKey Environmental Restoration, LLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

PROJECT NO.: 0123-005-102

DATE: SEPTEMBER 2011

DRAFTED BY: JGT

SITE PLAN (AERIAL)

348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

PREPARED FOR

DELTA SONIC

FIGURE 2

ATTACHMENT A

EMERGENCY RESPONSE PLAN

EMERGENCY RESPONSE PLAN
for
BROWNFIELD CLEANUP PROGRAM
RI/IRM ACTIVITIES

348 LANGNER ROAD SITE
WEST SENECA, NEW YORK

September 2011 0123-005-102

Prepared for:

Delta Sonic Car Wash Systems, Inc.
570 Delaware Avenue
Buffalo, New York 14202

348 LANGNER ROAD SITE
HEALTH AND SAFETY PLAN FOR RI/IRM ACTIVITIES
APPENDIX A: EMERGENCY RESPONSE PLAN

TABLE OF CONTENTS

LIST OF FIGURES

1.0 GENERAL

This report presents the site-specific Emergency Response Plan (ERP) referenced in the Site Health and Safety Plan (HASP) prepared for Remedial Investigation (RI) and Interim Remedial Measures (IRM) activities at the 348 Langner Road, Site in West Seneca, New York. This appendix of the HASP describes potential emergencies that may occur at the Site; procedures for responding to those emergencies; roles and responsibilities during emergency response; and training all workers must receive in order to follow emergency procedures. This ERP also describes the provisions this Site has made to coordinate its emergency response planning with other contractors on-site and with off-site emergency response organizations.

This ERP is consistent with the requirements of 29 CFR 1910.120(l) and provides the following site-specific information:

- Pre-emergency planning.
- Personnel roles, lines of authority, and communication.
- Emergency recognition and prevention.
- Safe distances and places of refuge.
- Evacuation routes and procedures.
- Decontamination procedures.
- Emergency medical treatment and first aid.
- Emergency alerting and response procedures.
- Critique of response and follow-up.
- Emergency personal protective equipment (PPE) and equipment.

2.0 PRE-EMERGENCY PLANNING

This Site has been evaluated for potential emergency occurrences, based on site hazards, the required work tasks, the site topography, and prevailing weather conditions. The results of that evaluation indicate the potential for the following site emergencies to occur at the locations indicated.

Type of Emergency:
1. Medical, due to physical injury

Source of Emergency:
1. Slip/trip/fall

Location of Source:
1. Non-specific

3.0 ON-SITE EMERGENCY RESPONSE EQUIPMENT

Emergency procedures may require specialized equipment to facilitate worker rescue, contamination control and reduction, or post-emergency clean up. Emergency response equipment available on the Site is listed below. The equipment inventory and storage locations are based on the potential emergencies described above. This equipment inventory is designed to meet on-site emergency response needs and any specialized equipment needs that off-site responders might require because of the hazards at this Site but not ordinarily stocked.

Any additional personal protective equipment (PPE) required and stocked for emergency response is also listed in below. During an emergency, the Emergency Response Coordinator (ERC) is responsible for specifying the level of PPE required for emergency response. At a minimum, PPE used by emergency responders will comply with Section 7.0, Personal Protective Equipment, of this HASP. Emergency response equipment is inspected at regular intervals and maintained in good working order. The equipment inventory is replenished as necessary to maintain response capabilities.

Emergency Equipment	Quantity	Location
First Aid Kit	1	Site Vehicle
Chemical Fire Extinguisher	2 (minimum)	All heavy equipment and Site Vehicle

Emergency PPE	Quantity	Location
Full-face respirator	1 for each worker	Site Vehicle
Chemical-resistant suits	4 (minimum)	Site Vehicle

4.0 EMERGENCY PLANNING MAPS

An area-specific map of the Site will be developed on a daily basis during performance of field activities. The map will be marked to identify critical on-site emergency planning information, including: emergency evacuation routes, a place of refuge, an assembly point, and the locations of key site emergency equipment. Site zone boundaries will be shown to alert responders to known areas of contamination. There are no major topographical features, however the direction of prevailing winds/weather conditions that could affect emergency response planning are also marked on the map. The map will be posted at site-designated place of refuge and inside the TurnKey personnel field vehicle.

5.0 EMERGENCY CONTACTS

The following identifies the emergency contacts for this ERP.

Emergency Telephone Numbers:

Project Manager: ***Michael Lesakowski***
Work: (716) 856-0599
Mobile: (716) 818-3954

Corporate Health and Safety Director: ***Thomas H. Forbes***
Work: (716) 856-0599
Mobile: (716) 864-1730

Site Safety and Health Officer (SSHO): ***Bryan C. Hann***
Work: (716) 856-0635
Mobile: (716) 870-1165

Alternate SSHO: ***Nathan Munley***
Work: (716) 856-0635
Mobile: (716) 289-1072

MERCY HOSPITAL of BUFFALO (ER):	(716) 826-7000
FIRE:	911
AMBULANCE:	911
BUFFALO POLICE:	911
STATE EMERGENCY RESPONSE HOTLINE:	(800) 457-7362
NATIONAL RESPONSE HOTLINE:	(800) 424-8802
NYSDOH:	(716) 847-4385
NYSDEC:	(716) 851-7220
NYSDEC 24-HOUR SPILL HOTLINE:	(800) 457-7252

The Site location is:
348 Langner Road Site
348 Langner Road
West Seneca, New York 14224
Site Phone Number: (Insert Cell Phone or Field Trailer): ____________________

6.0 EMERGENCY ALERTING & EVACUATION

Internal emergency communication systems are used to alert workers to danger, convey safety information, and maintain site control. Any effective system can be employed. Two-way radio headsets or field telephones are often used when work teams are far from the command post. Hand signals and air-horn blasts are also commonly used. Every system must have a backup. It shall be the responsibility of each contractor's Site Health and Safety Officer to ensure all personnel entering the site understand an adequate method of internal communication. Unless all personnel are otherwise informed, the following signals shall be used.

1) Emergency signals by portable air horn, siren, or whistle: two short blasts, personal injury; continuous blast, emergency requiring site excavation.

2) Visual signals: hand gripping throat, out of air/cannot breathe; hands on top of head, need assistance; thumbs up, affirmative/ everything is OK; thumbs down, no/negative; grip partner's wrist or waist, leave area immediately.

If evacuation notice is given, site workers leave the worksite with their respective buddies, if possible, by way of the nearest exit. Emergency decontamination procedures detailed in Section 12.0 of the HASP are followed to the extent practical without compromising the safety and health of site personnel. The evacuation routes and assembly area will be determined by conditions at the time of the evacuation based on wind direction, the location of the hazard source, and other factors as determined by rehearsals and inputs from emergency response organizations. Wind direction indicators are located so that workers can determine a safe up wind or cross wind evacuation route and assembly area if not informed by the emergency response coordinator at the time the evacuation alarm sounds. Since work conditions and work zones within the site may be changing on daily basis, it shall be the responsibility of the construction Site Health and Safety Officer to review evacuation routes and procedures as necessary and to inform all TurnKey-Benchmark workers of any changes.

Personnel exiting the site will gather at a designated assembly point. To determine that everyone has successfully exited the site, personnel will be accounted for at the assembly site. If any worker cannot be accounted for, notification is given to the SSHO (***Bryan Hann*** or ***Nathan Munley***) so that appropriate action can be initiated. Contractors and subcontractors on this site have coordinated their emergency response plans to ensure that these plans are compatible and that source(s) of potential emergencies are recognized, alarm systems are clearly understood, and evacuation routes are accessible to all personnel relying upon them.

7.0 EXTREME WEATHER CONDITIONS

In the event of adverse weather conditions, the Site Safety and Health Officer in conjunction with the Contractor's SSHO will determine if engineering operations can continue without sacrificing the health and safety of site personnel. Items to be considered prior to determining if work should continue include but are not limited to:

- Potential for heat/cold stress.
- Weather-related construction hazards (e.g., flooding or wet conditions producing undermining of structures or sheeting, high wind threats, etc).
- Limited visibility.
- Potential for electrical storms.
- Limited site access/egress (e.g., due to heavy snow)

8.0 EMERGENCY MEDICAL TREATMENT & FIRST AID

Personnel Exposure:

The following general guidelines will be employed in instances where health impacts threaten to occur acute exposure is realized:

- Skin Contact: Use copious amounts of soap and water. Wash/rinse affected area for at least 15 minutes. Decontaminate and provide medical attention. Eyewash stations will be provided on site. If necessary, transport to Buffalo General Hospital.

- Inhalation: Move to fresh air and, if necessary, transport to Hospital.

- Ingestion: Decontaminate and transport to Hospital.

Personal Injury:

Minor first-aid will be applied on-site as deemed necessary. In the event of a life threatening injury, the individual should be transported to Hospital via ambulance. The Site Health and Safety Officer will supply available chemical specific information to appropriate medical personnel as requested.

First aid kits will conform to Red Cross and other applicable good health standards, and shall consist of a weatherproof container with individually sealed packages for each type of item. First aid kits will be fully equipped before being sent out on each job and will be checked weekly by the SSHO to ensure that the expended items are replaced.

Directions to Mercy Hospital of Buffalo (see Figure 1):

The following directions describe the best route from the Site to Mercy Hospital of Buffalo:

- Travel north along Langner Road (0.1 miles)
- Turn left on Ridge Road (1.1 miles)
- Turn right onto Abbott Road (1.5 miles)
- Hospital on the left (565 Abbott Road)

9.0 EMERGENCY RESPONSE CRITIQUE & RECORD KEEPING

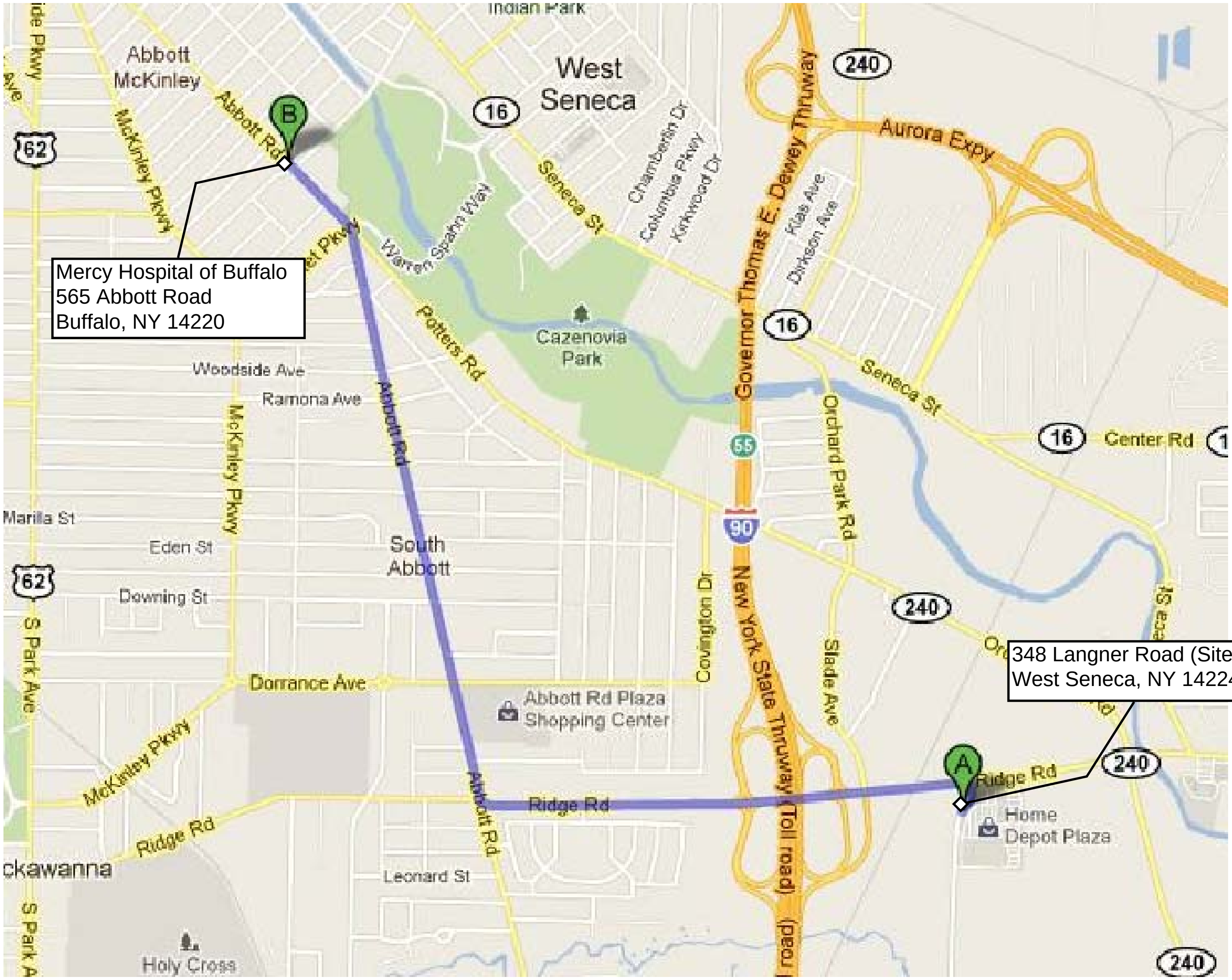
Following an emergency, the SSHO and Project Manager shall review the effectiveness of this Emergency Response Plan (ERP) in addressing notification, control and evacuation requirements. Updates and modifications to this ERP shall be made accordingly. It shall be the responsibility of each contractor to establish and assure adequate records of the following:

- Occupational injuries and illnesses.
- Accident investigations.
- Reports to insurance carrier or State compensation agencies.
- Reports required by the client.
- Records and reports required by local, state, federal and/or international agencies.
- Property or equipment damage.
- Third party injury or damage claims.
- Environmental testing logs.
- Explosive and hazardous substances inventories and records.
- Records of inspections and citations.
- Safety training.

10.0 EMERGENCY RESPONSE TRAINING

All persons who enter the worksite, including visitors, shall receive a site-specific briefing about anticipated emergency situations and the emergency procedures by the SSHO. Where this site relies on off-site organizations for emergency response, the training of personnel in those off-site organizations has been evaluated and is deemed adequate for response to this site.

FIGURES



Mercy Hospital of Buffalo:
From Site:

- Head North on Langner Road.
- Turn Left onto Ridge Road.
- Turn Right onto Abbott Road.
- Hospital on Left

(2.7 - Miles from Site)

TurnKey Environmental Restoration, LLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

PROJECT NO.: 0123-005-102

DATE: AUGUST 2011

DRAFTED BY: JGT

HOSPITAL ROUTE MAP

EMERGENCY RESPONCE PLAN

348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

PREPARED FOR

DELTA SONIC

FIGURE 1

ATTACHMENT B

HOT WORK PERMIT FORM

HOT WORK PERMIT

PART 1 - INFORMATION

Issue Date:

Date Work to be Performed: Start: Finish (permit terminated):

Performed By:

Work Area:

Object to be Worked On:

PART 2 - APPROVAL

(for 1, 2 or 3: mark Yes, No or NA)*

Will working be on or in: Finish (permit terminated):

1. Metal partition, wall, ceiling covered by combustible material?	yes	no
2. Pipes, in contact with combustible material?	yes	no
3. Explosive area?	yes	no

* = If any of these conditions exist (marked "yes"), a permit will not be issued without being reviewed and approved by Thomas H. Forbes (Corporate Health and Safety Director). Required Signature below.

PART 3 - REQUIRED CONDITIONS**

(Check all conditions that must be met)

	PROTECTIVE ACTION		PROTECTIVE EQUIPMENT
	Specific Risk Assessment Required		Goggles/visor/welding screen
	Fire or spark barrier		Apron/fireproof clothing
	Cover hot surfaces		Welding gloves/gauntlets/other:
	Move movable fire hazards, specifically		Wellintons/Knee pads
	Erect screen on barrier		Ear protection: Ear muffs/Ear plugs
	Restrict Access		B.A.: SCBA/Long Breather
	Wet the ground		Respirator: Type:
	Ensure adequate ventilation		Cartridge:
	Provide adequate supports		Local Exhaust Ventilation
	Cover exposed drain/floor or wall cracks		Extinguisher/Fire blanket
	Fire watch (must remain on duty during duration of permit)		Personal flammable gas monitor
	Issue additional permit(s):		

Other precautions:

** Permit will not be issued until these conditions are met.

SIGNATURES

Orginating Employee: Date:

Project Manager: Date:

Part 2 Approval: Date:

ATTACHMENT C-1

NYSDOH GENERIC COMMUNITY AIR MONITORING PLAN

Appendix C1
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

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

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

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

Community Air Monitoring Plan

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

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

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

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

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

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

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

December 2009

ATTACHMENT C-2

FUGITIVE DUST

Appendix C2
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

APPENDIX D

PROJECT DOCUMENTATION FORMS

DAILY LOG				
	DATE			
	REPORT NO.			
	PAGE	OF		

CORRECTIVE MEASURES REPORT

Date:

Project:

Job No:

Location:

CQA Monitor(s):

Client:

Contractor:

Contractor's Supervisor:

WEATHER CONDITIONS:

Ambient Air Temp. - A.M.:

Ambient Air Temp. - P.M.:

Wind Direction:

Wind Speed:

Precipitation:

Corrective Measures Undertaken (reference Problem Identification Report No.)

Retesing Location:

Suggested Method of Minimizing Re-Occurrence:

Approvals (initial):

CQA Engineer:

Project Manager:

Signed:

CQA Representative

INSPECTOR'S DAILY REPORT

CONTRACTOR			
CLIENT		DATE:	

LOCATION		DAY		JOB NO.	
WEATHER	TEMP ° F	START		END	

WORK PERFORMED:

CONTRACTOR ACTIVITIES:

[PUT CONTRACTOR ACTIVITIES HERE, BE SPECIFIC. TYPE OF EQUIPMENT, ACTIVITIES PERFORMED, BY WHOM, LOCATION OF LANDFILL ETC.]

TURNKEY ACTIVITIES:

[PUT ENGINEER ACTIVITIES HERE, BE SPECIFIC. TYPE OF EQUIPMENT, ACTIVITIES AND TESTING PERFORMED, SAMPLES COLLECTED, BY WHOM, LOCATION OF LANDFILL ETC.]

TEST PERFORMED		*QA PERSONNEL* SIGNATURE	
PICTURES TAKEN	none	REPORT NO.	
VISITORS	none	SHEET	1 OF

INSPECTOR'S DAILY REPORT

CONTRACTOR					
CLIENT			DATE:		
LOCATION			DAY		JOB NO.	
WEATHER		TEMP	° F	START		END	

INSPECTOR'S DAILY REPORT

MEETINGS HELD & RESULTS:

CONTRACTOR'S WORK FORCE AND EQUIPMENT

DESCRIPTION	*H*	#	*DESCRIPTION*	*H*	#	*DESCRIPTION*	*H*	#	*DESCRIPTION*	*H*	#
Field Engineer						Equipment			Front Loader Ton		
Superintendent			Ironworker			Generators			Bulldozer		
						Welding Equip.			DJ Dump truck		
Laborer-Foreman			Carpenter						Water Truck		
Laborer									Backhoe		
Operating Engineer			Concrete Finisher						Excavator		
						Roller			Pad foot roller		
Carpenter						Paving Equipment					
						Air Compressor					

REMARKS:

REFERENCES TO OTHER FORMS:

SAMPLES COLLECTED:					
SAMPLE NUMBER					
APPROX. LOCATION OF STOCKPILE					
NO. OF STOCKPILE					
DATE OF COLLECTION					
CLIMATOLOGIC CONDITIONS					
FIELD OBSERVATION		SHEET		OF	

DAILY LOG				
	DATE			
	REPORT NO.			
	PAGE	OF		

PROBLEM IDENTIFICATION REPORT

Date:

Project:

Job No:

Location:

CQA Monitor(s):

Client:

Contractor:

Contractor's Supervisor:

WEATHER CONDITIONS:

Ambient Air Temp. - A.M.:

Ambient Air Temp. - P.M.:

Wind Direction:

Wind Speed:

Precipitation:

Problem Description:

Problem Location (reference test location, sketch on back of form as appropriate):

Problem Causes:

Suggested Corrective Measures or Variances:

Linked to Corrective Measures Report No. *or Variance Log No.*

Approvals (initial):

CQA Engineer:

Project Manager:

Signed:

CQA Representative

APPENDIX E

SOIL-FILL MANAGEMENT PLAN

SOIL/FILL MANAGEMENT PLAN
for

348 LANGNER ROAD SITE
WEST SENECA, NEW YORK

Revised January 2012 | 0123-005-102

Prepared for:

Delta Sonic Car Wash Systems, Inc.
570 Delaware Avenue
Buffalo, New York 14202

SOIL/FILL MANAGEMENT PLAN

348 Langner Road Site

Table of Contents

Table of Contents

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 Background and History

The Site is an approximately 2.6-acre parcel located at the corner of Langner Road and Ridge Road in the Town of West Seneca, New York (see Figures 1 and 2). The parcel is currently improved with one convenience store building, one car wash building, four product dispenser islands and two underground storage tank (UST) areas containing a total of eight petroleum USTs. The Site is bound by Langner Road to the east, Ridge Road to the north, vacant land and a rail line to the west, and commercial buildings to the south.

The Site has been a gas station since the 1950s. Prior to the current location of the product dispensers and buildings, the gas station and fuel assets were located in the northeastern portion of the property where the current carwash building sits.

During the completion of soil borings during the 2010 Phase II Investigation (see Appendix B), contaminated soils, and petroleum-like odors were observed Site-wide. Several locations exhibited petroleum-like odors and elevated PID readings (as high as 777 ppm). Based on the findings of previous investigations, the NYSDEC opened a spill file for the Site (No. 0910758). The spill file for the Site was administratively closed by the Department upon acceptance into the BCP, and further remediation will be directed under the guidance of the BCP. Details of the previous investigations are presented in Section 2.8 below.

1.2 Previous Environmental Investigations

A summary of the investigations that have occurred at the Site are presented below.

1.2.1 January 2010 – Limited Phase II Site Investigation Report

Benchmark Environmental Engineering and Science, PLLC (Benchmark) conducted an environmental site investigation of the subject property, and the findings are described below:

- Visual and olfactory evidence of impacted soil/fill was noted in multiple soil boring locations by field personnel. Elevated photoionization detector (PID) readings for volatile organic compounds (VOCs) were detected in multiple locations across the site, with readings as high as 777 ppm being detected.

- Petroleum-impacted soil exceeding TAGM #4046 RSCOs for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) were detected at multiple soil boring locations across the site.
- Groundwater impacts exceeding NYSDEC groundwater quality standards (GWQS) for VOCs (i.e., up to 42,879 ug/L total VOCs) were detected in several temporary monitoring wells across the Site.
- Based on the data collected during the site investigation, the NYSDEC was contacted and Spill No. 09-10758 was opened for the Site.

1.3 Purpose and Scope

The purpose of this Soil/Fill Management Plan (SFMP) is to protect both the environment and human health during redevelopment of the Site and subsequent to completion of Brownfield Cleanup activities. While assessments of surface and subsurface soil/fill and groundwater at the Site will be performed during the RI, subsurface information is never 100 percent complete or accurate. As such, it is not unreasonable to anticipate the possibility that some quantity of impacted subsurface soil/fill may be encountered following completion of the IRM and Brownfield cleanup and redevelopment activities. In particular, soil/fill impacts may be encountered during development activities such as infrastructure construction (i.e., roads, waterline, sewers, electric, cable, etc.) or foundation excavation and site grading. The SFMP will be modified/ expanded as appropriate based on the results of the RI and IRM.

Compliance with this SFMP is required to properly manage any impacted subsurface soil/fill encountered during redevelopment activities at the Site. This SFMP was developed with the express purpose of addressing unknown subsurface impacts if and when encountered. The SFMP also facilitates the transfer of responsibilities with property ownership.

This SFMP provides protocols for development and post-development activities. Items discussed herein include:

- Excavation, grading, sampling and handling of Site soils.
- Acceptability of soil/fill from off-site sources for backfill or sub-grade fill.
- Erosion and dust control measures.

- Fencing and other access controls.
- Health and safety procedures for subsurface construction work and the protection of the surrounding community.
- Acceptability and placement of final cover.
- Property Use Limitations/Environmental Easement.

1.4 Soil/Fill Management Program Responsibility

The property owner(s) or responsible entity will be responsible for all monitoring, implementation, and reporting requirements of this Plan. The property owner(s) will not perform, contract, nor permit their employees, agents, or assigns to perform any excavations or disturbance of Site soils, except as delineated in this Plan. The property owner(s) or responsible entity will be responsible for proper notification and reporting to regulatory agencies (i.e., NYSDEC Region 9, Division of Environmental Remediation and New York State Department of Health (NYSDOH) prior to and following construction activities. The NYSDEC may provide periodic construction oversight and monitoring during construction activities to verify that the requirements of this SFMP are adhered to.

2.0 SOIL/FILL MANAGEMENT

2.1 Excavation and Handling of On-Site Soil/Fill

An environmental professional with experience in environmental site investigations and the New York State Brownfield Cleanup Program will inspect soil/fill excavations or disturbances (e.g., when using heavy equipment to disturb more than 10 cubic yards) on behalf of the subject property owner. The soil/fill will be inspected for staining or discoloration, and will be field screened for the presence of volatile organic compounds (VOCs) with a photoionization detector (PID). The PID detector will be calibrated as per the manufacturer's requirements. Sampling and analyses to verify excavation limits and analysis for disposal purposes will be in accordance with the protocols delineated in Section 2.3.

Excavation of impacted soil/fill will continue horizontally until visually impacted materials are removed to the satisfaction of TurnKey and the NYSDEC representative. All excavation work will be directed by an experienced engineer or scientist to remove all visually-impacted material. Impacted material will either be direct loaded, placed in roll-off containers, or be stockpiled on and covered with polyethylene sheeting, in accordance with the MECP (Appendix A of this SFMP) in an area away from the primary work activities and then sampled to determine whether it is subject to special disposal/reuse requirements[1]. Any stockpiled excavated material will be covered with polyethylene sheeting at the end of the work day. The length of time soil can be stockpiled should be limited to 90 days due to potential hazardous waste storage requirement concerns. If excavated materials must be stored on-Site for more than 90 days, analytical sampling to determine if the material is characteristically hazardous will be conducted. Regardless of sampling results, if stockpiled soil causes objectionable odors, the length of time stored on-Site will be modified accordingly.

Sampling and analyses to verify excavation limits and analysis for disposal purposes will be in accordance with the protocols delineated in Section 2.3.

[1] The presence of subsurface construction and demolition debris, such as brick, concrete, wood, miscellaneous metal products, etc. does not necessitate stockpiling in accordance with this SFMP.

2.2 Backfill Material

2.2.1 Use Criteria

Material used to backfill excavations or to increase site grades or elevations may be comprised of on-Site soil/fill or off-Site soil/fill. Backfill materials used on-Site must meet the following criteria:

- Excavated on-Site soil/fill with no evidence of visible or olfactory evidence of contamination that has been tested to meet the criteria on Table 1, in accordance with DER-10, Table 5.4(e)4.
- Off-site soil will originate from known sources having no evidence of disposal or releases of hazardous substances, hazardous, toxic or radioactive wastes, or petroleum, which has been tested in accordance with DER10, 5.4(e)10, or at a reduced frequency if agreeable to the Department.
- All off-site sources of soil/fill to be used as backfill must be tested in accordance with the Sampling and Analytical Protocol (Section 2.3), and found to contain concentrations less than criteria listed in Table 1 – Criteria for Use of Off-Site Soil.
- No off-site materials meeting the definition of a solid waste as defined in 6NYCRR, Part 360-1.2(a) shall be used as backfill.

2.2.2 Borrow Source Sampling Requirements

If an off-site soil/fill borrow source is of unknown origin or originates from a commercial, industrial or urban site, then it must be tested to meet the criteria identified on Table 1, in accordance with DER-10, 5.4(e)10 for composite sampling. A tiered approach based on the volume of borrow source material imported will be used to determine the frequency of characterization sampling in accordance with NYSDEC DER-10, Table 5.4(e)10. DER-10 Section 5.4(e)3(3) and Section 5.4(f)2 allows for sites which require large amounts of cover material/backfill to utilize a reduced sampling frequency, with permission from the Department. Based on the estimated quantity of backfill material required for the Site, the proposed borrow source VOC discrete sampling is as follows:

A minimum of one sample will be collected for each 500 cubic yards (CY) up to 1,000 CY of material excavated. If more than 1,000 CY of borrow source material from the same general vicinity is utilized and all samples of the first 1,000 CY meet the criteria listed in Table 1, the sample collection frequency may be reduced to one sample for each additional 1,000 CY of borrow source material from the same general vicinity, up to 5,000 CY. For borrow sources greater than 5,000 CY, sampling frequency may be reduced to one sample per 5,000 CY, provided all earlier samples met Table 1 criteria.

If an off-site soil/fill borrow source is of known origin, NYSDEC would be involved in the decision as to whether the source is acceptable for use and whether sampling of the source is required.

Grab samples will be collected for VOC analysis. For all other analyses, a minimum of three grab samples will be collected per composite sample. Approximately equal aliquots of the grab samples will be composited in the field using a stainless steel trowel and bowl. The trowel and bowl shall be decontaminated with a non-phosphate detergent (i.e., Alconox®) and potable water wash solution followed by a distilled water rinse between sampling locations. The soil/fill samples will be analyzed in accordance with USEPA SW-846 Methodology by a NYSDOH ELAP-certified laboratory.

2.3 Soil/Fill Sampling and Analysis Protocol

Excavated soil/fill that is designated for off-site disposal shall be sampled in accordance with the requirements of the off-site commercial solid waste disposal or treatment facility and the appropriate regulatory authorities. In addition, the resulting excavation following removal of impacted soil/fill will require verification sampling and analysis to determine the limits of impact. Both characterization and verification sampling and analysis are discussed in the following sections.

2.3.1 Potentially Impacted Soil/Fill Characterization

The following procedure represents a suggested method for determining off-Site disposal requirements for impacted soil/fill designated for off-site disposal. The sampling procedures, frequency and parameter list must be coordinated with the off-site solid waste disposal or treatment facility prior to undertaking characterization work.

Excavated soil/fill should be separately stockpiled in 250 CY or smaller piles. A representative sample will be collected from each stockpile. If the stockpiles are from a single source area or have a similar class of contaminants associated with them, sampling may be reduced to one sample per 1,000 cubic yards following receipt of data from four 250 cubic yard stockpiles without concentrations of analytes greater than the guidance concentrations in Table 1.

The samples will be analyzed by a NYSDOH ELAP-certified laboratory for target compound list (TCL) VOCs (if sustained PID readings are >5 ppm), TCL SVOCs, target analyte list (TAL) metals and PCBs. If the results are below the concentrations in Table 1, the soil can be re-used on-Site. If the analysis of the soil/fill samples reveals concentrations of analytes greater than the concentrations in Table 1, then a duplicate sample will be analyzed by the Toxicity Characteristic Leaching Procedure (TCLP) method to determine the appropriate off-site disposal method. Parameters to be analyzed for by TCLP protocol (i.e. VOCs, SVOCs, metals, etc.) will be determined by the potential off-site disposal or treatment facility. If TCLP hazardous waste characteristic values are exceeded, the soil/fill will be disposed of in a permitted hazardous waste disposal facility, or treated to render the material non-hazardous. If TCLP analytical results are below hazardous waste characteristic values, the soil/fill will be disposed or treated off-site in a permitted commercial solid waste landfill or treatment facility.

2.3.2 Verification Sampling

Verification sampling will be performed, in accordance with DER-10, on the excavation sidewalls and bottom of the excavation after lateral and vertical excavation limits have been achieved and visibly impacted soil/fill has been removed. In general, one sidewall sample will be collected for each 30 linear feet of excavation sidewall and one sample will be collected from the bottom of the excavation for each 900 square feet of excavation bottom. The samples will be collected by retrieving a discrete sample from across the excavation face. The backhoe bucket will be used to assist in sample collection and avoid the need for confined space entry. For excavations having lengths greater than 30 feet, an additional sample will be collected for each additional 30 feet of excavation length. Verification sampling analytical protocols will be determined based on the areas of concern as follows:

- Gasoline tank areas: TCL plus STARS List VOCs

- Diesel and/or fuel oil tank areas: TCL plus STARS List VOCs, STARS List SVOCs,
- Former transformer areas (if any): TCL PCBs
- Other impacted areas (if any): TCL VOCs, TCL SVOCs, TAL metals, TCL PCBs (as appropriate based on RI data)

A Category B deliverables package will be requested to facilitate data evaluation by a third-party validation expert.

2.4 Erosion Controls

An important element of soil/fill management for this Site is the mitigation and control of surface erosion from stormwater runoff. For this reason, the Master Erosion Control Plan, developed and incorporated as Appendix A, will be used during all construction activities.

2.5 Dust Controls

Particulate monitoring will be performed along the downwind-occupied perimeter of the Site during subgrade excavation, grading, and handling activities in accordance with the NYSDOH Generic Community Monitoring Plan contained in Appendix B. Dust suppression techniques will be employed as necessary to mitigate fugitive dust from unvegetated or disturbed soil/fill during intrusive activities. Techniques to be used may include one or more of the following:

- Applying water on haul roads.
- Wetting equipment and excavation faces.
- Spraying water on buckets during excavation and dumping.
- Hauling materials in properly tarped containers or vehicles.
- Restricting vehicle speeds on-site.
- Covering excavated areas and materials after excavation activity ceases.
- Reducing the excavation size and/or number of excavations.

All reasonable attempts will be made to keep visible and/or fugitive dust to a minimum. During intrusive activities, the New York State Department of Health (NYSDOH) Community Air Monitoring Plan and NYSDEC Fugitive Dust Suppression and Particulate Monitoring Program will be followed. These documents are included in Appendix B.

2.6 Fencing and Access Control

The northern and western perimeter of the Site is currently restricted to general access due to the nature of surrounding properties. Vehicular access is allowed through access drives along Langner Road. Interior temporary fencing shall be erected and maintained as necessary during construction activities to control access to open excavations and construction areas. Temporary fencing will be relocated by the property owner(s) as necessary as construction proceeds.

2.7 Property Use Limitations

Environmental easements will be part of the final remedial measures for the Site and will include:

- Use restrictions such as industrial, commercial and office use. The zoning specifically prohibits residential use.
- Requirements for annual certification as discussed in Section 2.8.

The environmental easement will be recorded with Erie County. The environmental easement will be binding for the current property owner and all subsequent property owners and occupants.

2.8 Notification and Reporting Requirements

The NYSDEC must be notified that subgrade activities are being initiated a minimum of five working days in advance of construction. The property owner(s) or other responsible entity shall complete and submit to the NYSDEC an annual report certifying that: the institutional controls put in place are still in place, have not been altered and are still effective and the conditions at the Site are fully protective of public health and the environment. If sub-grade excavation activities are completed during the year covered by the Annual Report, the Site owner shall include a certification that all work was performed in conformance with the SFMP.

3.0 HEALTH AND SAFETY PROCEDURES

During future intrusive or construction activities, the property owner(s) shall be responsible for implementing suitable procedures to prevent both Site construction workers and the community from adverse exposure to potential hazards posed by the intrusive work. This will be accomplished through adherence to a written, site-specific worker Health and Safety Plan (HASP), prepared in accordance with the regulations contained in OSHA 29CFR 1910.120 and a Community Air Monitoring Plan (CAMP) prepared in conformance with NYSDOH requirements. The site-specific worker HASP should include the following items:

- A safety and health or hazard analysis for each Site task and operation.
- Employee training requirements.
- Personal protective equipment (PPE) to be used by employees for the Site tasks.
- Medical surveillance requirements.
- Frequency and type of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of equipment.
- Site control measures.
- Decontamination procedures.
- An emergency response plan.
- Confined space entry procedures.
- A spill containment program.

As an integral component of the worker HASP, the property owner(s) will be responsible for implementing a CAMP designed to prevent the surrounding community from adverse exposures due to potential release/migration of airborne particulates. The community as referenced herein includes potential receptors located off-site (e.g., neighboring residents or businesses). The NYSDOH Generic CAMP, presented as Appendix B, will be implemented during construction work involving disturbance or handling of Site soil/fill. The Plan includes appropriate monitoring, mitigation and response measures consistent with NYSDOH and NYSDEC guidelines.

4.0 REFERENCES

1. Benchmark Environmental Engineering & Science, PLLC. *Limited Phase II Site Investigation Report, 348 Langner Road Parcel [348 Langner Road Site], West Seneca, New York*. January 2010.

TABLES

TurnKey Environmental Restoration, LLC

TABLE 1

RI / IRM / AAR Work Plan - SFMP

Criteria for Imported Soil-Fill

348 Langner Road Site

West Seneca, New York

Parameter	Allowable Concentration of Imported Soil/Fill for Residential Cleanup	Allowable Concentration of Imported Soil/Fill for Commercial Cleanup
Volatile Organic Compounds (mg/kg)		
1,1,1-Trichloroethane	0.68	0.68
1,1-Dichloroethane	0.27	0.27
1,1-Dichloroethene	0.33	0.33
1,2-Dichlorobenzene	1.1	1.1
1,2-Dichloroethane	0.02	0.01
1,2-Dichloroethene(cis)	0.25	0.25
1,2-Dichloroethene(trans)	0.19	0.19
1,3-Dichlorobenzene	2.4	2.4
1,4-Dichlorobenzene	1.8	1.8
1,4-Dioxane	0.1	0.15
Acetone	0.05	0.05
Benzene	0.06	0.06
Butylbenzene	12	12
Carbon tetrachloride	0.76	0.76
Chlorobenzene	1.1	1.1
Chloroform	0.37	0.37
Ethylbenzene	1	1
Hexachlorobenzene	0.33	3.2
Methyl ethyl ketone	0.12	0.12
Methyl tert-butyl ether	0.93	0.93
Methylene chloride	0.05	0.05
Propylbenzene-n	3.9	3.9
Sec-Butylbenzene	11	11
Tert-Butylbenzene	5.9	5.9
Tetrachloroethene	1.3	1.3
Toluene	0.7	0.07
Trichloroethene	0.47	0.47

TABLE 1

RI / IRM / AAR Work Plan - SFMP

Criteria for Imported Soil-Fill

348 Langner Road Site

West Seneca, New York

Parameter	Allowable Concentration of Imported Soil/Fill for Residential Cleanup	Allowable Concentration of Imported Soil/Fill for Commercial Cleanup
Volatile Organic Compounds (mg/kg)		
Trimethylbenzene-1,2,4	3.6	3.6
Trimethylbenzene-1,3,5	8.4	8.4
Vinyl chloride	0.02	0.02
Xylene (mixed)	1.6	1.6
Semi-Volatile Organic Compounds (mg/kg)		
Acenaphthene	98	98
Acenaphthylene	100	107
Anthracene	100	500
Benzo(a)anthracene	1	1
Benzo(a)pyrene	1	1
Benzo(b)fluoranthene	1	1.7
Benzo(g,h,i)perylene	100	500
Benzo(k)fluoranthene	1	1.7
Chrysene	1	1
Dibenz(a,h)anthracene	0.33	0.56
Fluoranthene	100	500
Fluorene	100	386
Indeno(1,2,3-cd)pyrene	0.5	5.6
m-Cresol(s)	0.33	0.33
Naphthalene	12	12
o-Cresol(s)	0.33	0.33
p-Cresol(s)	0.33	0.33
Pentachlorophenol	0.8	0.8
Phenanthrene	100	500
Phenol	0.33	0.33
Pyrene	100	500

TABLE 1

RI / IRM / AAR Work Plan - SFMP

Criteria for Imported Soil-Fill

348 Langner Road Site

West Seneca, New York

Parameter	Allowable Concentration of Imported Soil/Fill for Residential Cleanup	Allowable Concentration of Imported Soil/Fill for Commercial Cleanup
Metals (mg/kg)		
Arsenic	16	16
Barium	350	400
Beryllium	14	47
Cadmium	2.5	7.5
Chromium, Hexavalent[1]	19	19
Chromium, Trivalent[1]	36	1500
Copper	270	270
Cyanide	27	27
Lead	400	450
Manganese	2000	2000
Mercury (total)	0.73	0.73
Nickel	130	130
Selenium	4	4
Silver	8.3	8.3
Zinc	2200	2480
PCBs/Pesticides (mg/kg)		
2,4,5-TP Acid (Silvex)	3.8	3.8
4,4'-DDE	1.8	17
4,4'-DDT	1.7	47
4,4'-DDD	2.6	14
Aldrin	0.019	0.19
Alpha-BHC	0.02	0.02
Beta-BHC	0.072	0.09
Chlordane (alpha)	0.91	2.9
Delta-BHC	0.25	0.25
Dibenzofuran	14	210
Dieldrin	0.039	0.1
Endosulfan I	4.8	102

TABLE 1

RI / IRM / AAR Work Plan - SFMP

Criteria for Imported Soil-Fill

348 Langner Road Site

West Seneca, New York

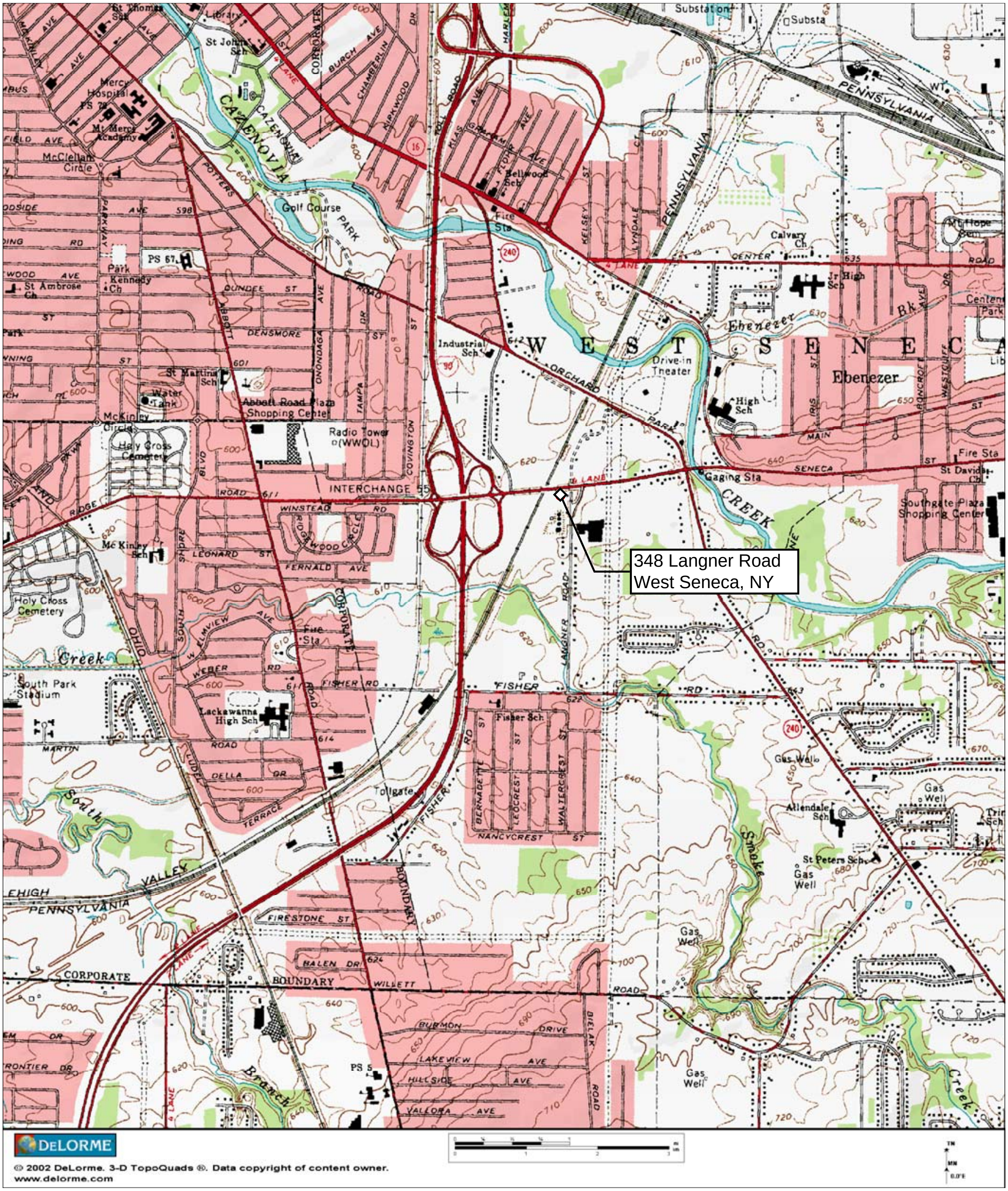
Parameter	Allowable Concentration of Imported Soil/Fill for Residential Cleanup	Allowable Concentration of Imported Soil/Fill for Commercial Cleanup
PCBs/Pesticides (mg/kg)		
Endosulfan II	4.8	102
Endosulfan sulfate	4.8	200
Endrin	0.06	0.06
Heptachlor	0.38	0.38
Lindane	0.1	0.1
Polychlorinated biphenyls	1	1

Notes:

1. The SCO for Hexavalent or Trivalent Chromium is considered to be met if the analysis for the total species of this contaminant is below the specific SCO for Hexavalent Chromium.

FIGURES

FIGURE 1



SITE LOCATION AND VICINITY MAP

TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

PREPARED FOR

DELTA SONIC

PROJECT NO.: 0123-005-102

DATE: AUGUST 2011

DRAFTED BY: JGT

Base Image per Erie Co. GIS

Parcel Information per Town of West Seneca Assessor Office

Not to Scale

N

TurnKey Environmental Restoration, LLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

PROJECT NO.: 0123-005-102

DATE: SEPTEMBER 2011

DRAFTED BY: JGT

SITE PLAN (AERIAL)

348 LANGNER ROAD SITE

WEST SENECA, NEW YORK

PREPARED FOR

DELTA SONIC

FIGURE 2

APPENDIX A

MASTER EROSION CONTROL PLAN
(MEC PLAN)

SFMP - APPENDIX A

MASTER EROSION CONTROL PLAN

348 LANGNER ROAD SITE
WEST SENECA, NEW YORK

Revised January 2012 0123-005-102

Prepared for:

Delta Sonic Car Wash Systems, Inc.
570 Delaware Avenue
Buffalo, New York 14202

MASTER EROSION CONTROL PLAN

348 Langner Road Site

Table of Contents

APPENDICES

1.0 PURPOSE AND SCOPE

A Soil/Fill Management Plan (SFMP) was prepared as part of the Remedial Investigation / Interim Remedial Measures / Alternatives Analysis Report (RI/IRM/AAR) Work Plan and describes protocols for the proper handling of impacted soil/fill encountered during future intrusive or construction activities at the Site. The property owner(s) at the time of the construction will be responsible for all monitoring, implementation and reporting requirements of the SFMP.

Since erosion control will be a critical component of preventing the potential migration of contaminants onto developed property or off-site during construction activities on the Site, this Master Erosion Control Plan (MECP) was prepared to provide guidance to during construction activities. This MECP is a critical component of the SFMP. This document is generic in nature and provides minimum erosion control practices to be used by property owner(s).

2.0 GENERAL PERMIT REQUIREMENTS

If construction activities disturb more than 1 acre of land, the Federal Water Pollution Control Act (as amended, 33 U.S.C. 1251 et. seq.) and the New York State Environmental Conservation Law (Article 17, Titles 7 and 8, and Article 70) would apply.

With some exceptions, operators of construction activities that will result in the disturbance of 1 or more acres of land must obtain coverage under SPDES General Permit (GP-02-01) prior to the commencement of soil disturbance. Also requiring a permit are construction activities disturbing less than 1 acre if they are part of a larger common plan of development or sale with a planned disturbance of equal to or greater than 1 acre, or activities that are designated by the NYSDEC. The NYSDEC can require a permit for construction activities disturbing less than 1 acre based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to waters of the United States.

As the Site is being remediated and redeveloped under the Brownfield Cleanup Program, this MECP is intended to meet the functional equivalent of NYSDEC Storm water Pollution Prevention Plan. Implementation of the MECP will be the responsibility of the remediation subcontractor.

3.0 POTENTIAL EROSION CONTROL CONCERNS

Potential areas and items of concern during site construction activities include the following:

- Remediated areas or off-site properties adjacent to the construction activity need protection so they do not become impacted by Site operations

- Storm water inlets will require protective measures to limit sediment transfer to storm sewers

- Runoff from soil stockpiles will require erosion controls

- Surface slopes need to be minimized as much as practical to control sediment transfer

- Soil/fill excavated during construction will require proper handling and disposal as described in the SFMP

4.0 EROSION CONTROL MEASURES

4.1 Background

Standard soil conservation practices need to be incorporated into the construction plans to mitigate soil erosion damage, off-site sediment migration, and water pollution from erosion. These practices combine vegetative and structural measures, many of which will be permanent in nature and become part of the completed project (i.e., drainage channels and grading). Other measures will be temporary and serve only during the construction stage. Selected erosion and sediment control measures will meet the following criteria:

- Minimize erosion through project design (maximum slopes, phased construction, etc.).

- Incorporate temporary and permanent erosion control measures.

- Remove sediment from sediment-laden storm water before it leaves the Site.

4.2 Temporary Measures

Temporary erosion and sedimentation control measures and facilities will be used during construction. These measures will be installed and maintained by the property owner(s) until they are either no longer needed or until such time as permanent measures are installed and become effective. At a minimum, the following temporary measures will be used:

- Silt fencing
- Straw/hay bales
- Temporary vegetation/mulching
- Temporary sedimentation basins
- Cautious placement, compaction and grading of stockpiles

Appendix A-A presents erosion control details.

4.2.1 Silt Fencing

Construction and regrading activities will result in surface water flow to drainage ditches and swales, storm sewers, and adjacent properties. Silt fencing will be the primary sediment control measure used in these areas. Prior to extensive soil excavation or grading activities, silt fences will be installed along the perimeter of all construction areas. The orientation of the fencing will be adjusted as necessary as the work proceeds to accommodate changing Site conditions. Intermediate fencing will be used upgradient of the perimeter fencing to help lower surface water runoff velocities and reduce the volume of sediment to perimeter fencing. Stockpiles will also be surrounded with silt fencing.

As sediment collects, the silt fences will be cleaned as necessary to maintain their integrity. Removed sediment will be used elsewhere on-site as general fill. All perimeter silt fences will remain in place until construction activities in an area are completed and vegetative cover has been established.

4.2.2 Straw and/or Hay Bales

Straw and/or hay bales will be used to intercept sediment laden storm water runoff in drainage channels during construction. The use of either hay or straw will be based on the availability of materials at the time of construction. Bales will be placed in swales and ditches where the anticipated flow velocity is not expected to be greater than 5 feet/second (fps). Intermediate bales will be placed upgradient of the final barrier to reduce flow velocities and sediment loadings where higher velocities are anticipated.

As with silt fencing, sediment will be removed as necessary from behind the bales and disposed of on-site. Bales that have become laden with sediment or that have lost their structural integrity or effectiveness due to the weather will be replaced.

4.2.3 Cautious Placement of Stockpiles

Excavation activities may produce stockpiles of soil and subgrade soil/fill materials. Careful placement and construction of stockpiles will be required to control erosion. If possible, stockpiles will be placed no closer than 50 feet from storm water inlets and parcel boundaries. Additionally, stockpiles may be graded and compacted, as necessary, to promote positive surface water runoff and dust control. Impacted stockpiles will be underlain and covered with secured polyethylene sheeting until proper disposal has been secured, and at the end of each work day

4.3 Permanent Control Measures During Site Redevelopment

Permanent erosion and sedimentation control measures and structures will be installed as soon as practical during construction for long-term erosion protection. Examples of permanent erosion control measures include:

- Using maximum slopes in erosion prone areas to limit erosion.
- Minimizing the potential contact with, and migration of, subsurface soil/fill through the placement of a "clean" soil cover system in all areas not covered with structures, roads, parking areas, sidewalks, etc.
- Planting and maintaining vegetation.
- Limiting runoff flow velocities to the extent practical.
- Lining collection channels with riprap, erosion control fabric, vegetation, or similar materials.

5.0 CONSTRUCTION MANAGEMENT PRACTICES

5.1 General

The following general construction practices should be evaluated for erosion and sedimentation control purposes during Site construction activities:

- Clearing and grading only as much area as is necessary to accommodate the construction needs to minimize disturbance of areas subject to erosion (i.e. phasing the work).

- Covering exposed or disturbed areas of the Site as quickly as practical.

- Installed all erosion and sediment control measures prior to disturbing the Site subgrade.

- Minimizing both on-site and off-site tracking of soil by vehicles by using routine entry/exit routes. Any soil tracked into adjacent roadways will be cleaned up in a timely fashion.

5.2 Monitoring, Inspection, and Maintenance

All erosion and sedimentation controls described in this Plan should be inspected by a qualified representative of the property owner(s) within 24 hours of a heavy rainfall event and repaired or modified as necessary to effectively control erosion of turbidity problems. Inspections should include areas under construction, stockpile areas, erosion control devices (i.e., silt fences, hay bales, etc.), and entry/exit routes. Routine inspections of the entire Site should also be made during the construction. If inspections indicate problems, corrective measures should be implemented within 24 hours. Appendix A-B includes the Inspection and Maintenance Report Form.

APPENDIX A-A

EROSION CONTROL DETAILS

- Silt Fence
- Straw Bale Dike
- Perimeter Dike/Swale
- Temporary Swale
- Sediment Trap for Drop Inlet

New York State
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water

New York State Standards and Specifications for Erosion and Sediment Control

August 2005

New York State
Department of Environmental Conservation

George E. Pataki, Governor

STANDARD AND SPECIFICATIONS FOR TEMPORARY CRITICAL AREA PLANTINGS

Definition

Providing erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope subject to erosion.

Purpose

To provide temporary erosion and sediment control. Temporary control is achieved by covering all bare ground areas that exist as a result of construction or a natural event.

Conditions Where Practice Applies

Temporary seedings may be necessary on construction sites to protect an area, or section, where final grading is complete, when preparing for winter work shutdown, or to provide cover when permanent seedings are likely to fail due to mid-summer heat and drought. The intent is to provide temporary protective cover during temporary shutdown of construction and/or while waiting for optimal planting time.

Criteria

Water management practices must be installed as appropriate for site conditions. The area must be rough graded and slopes physically stable. Large debris and rocks are usually removed. Seedbed must be seeded within 24 hours of disturbance or scarification of the soil surface will be necessary prior to seeding.

Fertilizer or lime are not typically used for temporary seedings.

IF: Spring or summer or early fall, then seed the area with ryegrass (annual or perennial) at 30 lbs. per acre (Approximately 0.7 lb./1000 sq. ft. or use 1 lb./1000 sq. ft.).
IF: Late fall or early winter, then seed Certified 'Aroostook' winter rye (cereal rye) at 100 lbs. per acre (2.5 lbs./1000 sq. ft.).

Any seeding method may be used that will provide uniform application of seed to the area and result in relatively good soil to seed contact.

Mulch the area with hay or straw at 2 tons/acre (approx. 90 lbs./1000 sq. ft. or 2 bales). Quality of hay or straw mulch allowable will be determined based on long term use and visual concerns. Mulch anchoring will be required where wind or areas of concentrated water are of concern. Wood fiber hydromulch or other sprayable products approved for erosion control (nylon web or mesh) may be used if applied according to manufacturers' specification. Caution is advised when using nylon or other synthetic products. They may be difficult to remove prior to final seeding.

STANDARD AND SPECIFICATIONS FOR MULCHING

Definition

Applying coarse plant residue or chips, or other suitable materials, to cover the soil surface.

Purpose

The primary purpose is to provide initial erosion control while a seeding or shrub planting is establishing. Mulch will conserve moisture and modify the surface soil temperature and reduce fluctuation of both. Mulch will prevent soil surface crusting and aid in weed control. Mulch is also used alone for temporary stabilization in non-growing months.

Conditions Where Practice Applies

On soils subject to erosion and on new seedings and shrub plantings. Mulch is useful on soils with low infiltration rates by retarding runoff.

Criteria

Site preparation prior to mulching requires the installation of necessary erosion control or water management practices and drainage systems.

Slope, grade and smooth the site to fit needs of selected mulch products.

Remove all undesirable stones and other debris to meet the needs of the anticipated land use and maintenance required.

Apply mulch after soil amendments and planting is accomplished or simultaneously if hydroseeding is used.

Select appropriate mulch material and application rate or material needs. Determine local availability.

Select appropriate mulch anchoring material.

NOTE: The best combination for grass/legume establishment is straw (cereal grain) mulch applied at 2 ton/acre (90 lbs./1000sq.ft.) and anchored with wood fiber mulch (hydromulch) at 500 – 750 lbs./acre (11 – 17 lbs./1000 sq. ft.). The wood fiber mulch must be applied through a hydroseeder immediately after mulching.

Table 3.7
Guide to Mulch Materials, Rates, and Uses

Mulch Material	Quality Standards	per 1000 Sq. Ft.	per Acre	Depth of Application	Remarks
Wood chips or shavings	Air-dried. Free of objectionable coarse material	500-900 lbs.	10-20 tons	2-7”	Used primarily around shrub and tree plantings and recreation trails to inhibit weed competition. Resistant to wind blowing. Decomposes slowly.
Wood fiber cellulose (partly digested wood fibers)	Made from natural wood usually with green dye and dispersing agent	50 lbs.	2,000 lbs.	—	Apply with hydromulcher. No tie down required. Less erosion control provided than 2 tons of hay or straw.
Gravel, Crushed Stone or Slag	Washed; Size 2B or 3A—1 1/2”	9 cu. yds.	405 cu. yds.	3”	Excellent mulch for short slopes and around plants and ornamentals. Use 2B where subject to traffic. (Approximately 2,000 lbs./cu. yd.). Frequently used over filter fabric for better weed control.
Hay or Straw	Air-dried; free of undesirable seeds & coarse materials	90-100 lbs. 2-3 bales	2 tons (100-120 bales)	cover about 90% surface	Use small grain straw where mulch is maintained for more than three months. Subject to wind blowing unless anchored. Most commonly used mulching material. Provides the best micro-environment for germinating seeds.
Jute twisted yarn	Undyed, unbleached plain weave. Warp 78 ends/yd., Weft 41 ends/yd. 60-90 lbs./roll	48” x 50 yds. or 48” x 75 yds.	—	—	Use without additional mulch. Tie down as per manufacturers specifications. Good for center line of concentrated water flow.
Excelsior wood fiber mats	Interlocking web of excelsior fibers with photodegradable plastic netting	8” x 100” 2-sided plastic, 48” x 180” 1-sided plastic	—	—	Use without additional mulch. Excellent for seeding establishment. Tie down as per manufacturers specifications. Approximately 72 lbs./roll for excelsior with plastic on both sides. Use two sided plastic for centerline of waterways.
Compost	Up to 3” pieces, moderately to highly stable	3-9 cu. yds.	134-402 cu. yds.	1-3”	Coarser textured mulches may be more effective in reducing weed growth and wind erosion.
Straw or coconut fiber, or combination	Photodegradable plastic net on one or two sides	Most are 6.5 ft. x 3.5 ft.	81 rolls	—	Designed to tolerate higher velocity water flow, centerlines of waterways, 60 sq. yds. per roll.

Table 3.8
Mulch Anchoring Guide

Anchoring Method or Material	Kind of Mulch to be Anchored	How to Apply
1. Peg and Twine	Hay or straw	After mulching, divide areas into blocks approximately 1 sq. yd. in size. Drive 4-6 pegs per block to within 2" to 3" of soil surface. Secure mulch to surface by stretching twine between pegs in criss-cross pattern on each block. Secure twine around each peg with 2 or more tight turns. Drive pegs flush with soil. Driving stakes into ground tightens the twine.
2. Mulch netting	Hay or straw	Staple the light-weight paper, jute, wood fiber, or plastic nettings to soil surface according to manufacturer's recommendations. Should be biodegradable. Most products are not suitable for foot traffic.
3. Wood cellulose fiber	Hay or straw	Apply with hydroseeder immediately after mulching. Use 500 lbs. wood fiber per acre. Some products contain an adhesive material ("tackifier"), possibly advantageous.
4. Mulch anchoring tool	Hay or straw	Apply mulch and pull a mulch anchoring tool (blunt, straight discs) over mulch as near to the contour as possible. Mulch material should be "tucked" into soil surface about 3".
5. Tackifier	Hay or straw	Mix and apply polymeric and gum tackifiers according to manufacturer's instructions. Avoid application during rain. A 24-hour curing period and a soil temperature higher than 45^0 Fahrenheit are required.

STANDARD AND SPECIFICATIONS FOR TEMPORARY SWALE

Definition

A temporary excavated drainage way.

Purpose

The purpose of a temporary swale is to prevent runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet or to intercept sediment laden water and divert it to a sediment trapping device.

Conditions Where Practice Applies

Temporary swales are constructed:

1. to divert flows from entering a disturbed area.

2. intermittently across disturbed areas to shorten overland flow distances.

3. to direct sediment laden water along the base of slopes to a trapping device.

4. to transport offsite flows across disturbed areas such as rights-of-way.

Swales collecting runoff from disturbed areas shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 5A.2 on page 5A.5 for details.

	Swale A	Swale B
Drainage Area	<5 Ac	5-10 Ac
Bottom Width of Flow Channel	4 ft	6 ft
Depth of Flow Channel	1 ft	1 ft
Side Slopes	2:1 or flatter	2:1 or flatter
Grade	0.5% Min. 20% Max.	0.5% Min. 20% Max.

For drainage areas larger than 10 acres, refer to the Standard and Specification for Waterways on page 5B.11.

Stabilization

Stabilization of the swale shall be completed within 7 days of installation in accordance with the appropriate standard and specifications for vegetative stabilization or stabilization with mulch as determined by the time of year. The flow channel shall be stabilized as per the following criteria:

Type of Treatment	Channel Grade[1]	Flow Channel A (<5 Ac.)	Flow Channel B (5-10 Ac)
1	0.5-3.0%	Seed & Straw Mulch	Seed & Straw Mulch
2	3.1-5.0%	Seed & Straw Mulch	Seed and cover with RECP, Sod, or lined with plastic or 2 in. stone
3	5.1-8.0%	Seed and cover with RECP, Sod, or line with plastic or 2 in. stone	Line with 4-8 in. or stone or Recycled Concrete Equivalent[2] or geotextile
4	8.1-20%	Line with 4-8 in. stone or Recycled Concrete Equivalent[2] or geotextile	Site Specific Engineering Design

[1] In highly erodible soils, as defined by the local approving agency, refer to the next higher slope grade for type of stabilization.
[2] Recycled Concrete Equivalent shall be concrete broken into the required size, and shall contain no steel reinforcement.

Outlet

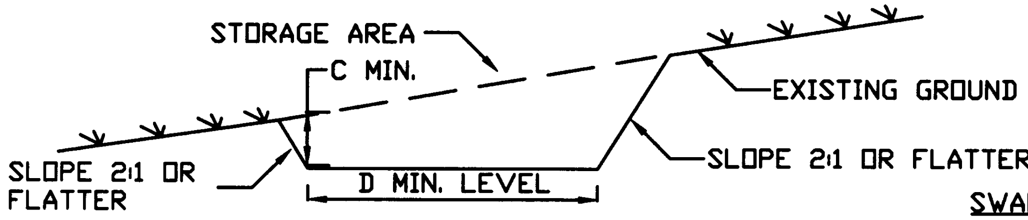
Swale shall have an outlet that functions with a minimum of erosion, and dissipates runoff velocity prior to discharge off the site.

Runoff shall be conveyed to a sediment trapping device such as a sediment trap or sediment basin until the drainage area above the swale is adequately stabilized.

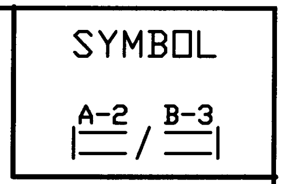
The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet condition.

If a swale is used to divert clean water flows from entering a disturbed area, a sediment trapping device may not be needed.

Figure 5A.2
Temporary Swale



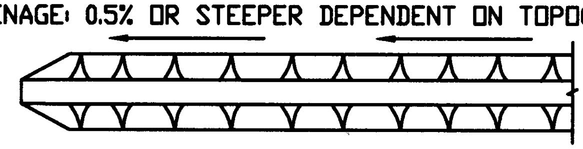
CROSS SECTION



	SWALE A	SWALE B
C	1'	1'
D	4'	6'

POSITIVE DRAINAGE: 0.5% OR STEEPER DEPENDENT ON TOPOGRAPHY

OUTLET AS REQUIRED
SEE ITEM 8 BELOW.



PLAN VIEW

CONSTRUCTION SPECIFICATIONS

1. ALL TEMPORARY SWALES SHALL HAVE UNINTERUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET DIRECTLY INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSIVE VELOCITY.
4. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE SWALE.
5. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
6. FILLS SHALL BE COMPACTED BY EARTH MOVING EQUIPMENT.
7. ALL EARTH REMOVED AND NOT NEEDED FOR CONSTRUCTION SHALL BE PLACED SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE SWALE.
8. STABILIZATION SHALL BE AS PER THE FLOW CHANNEL STABILIZATION CHART BELOW:

TYPE OF TREATMENT	CHANNEL GRADE	A(5 AC. OR LESS)	B(5 AC -10AC)
1	0.5-3.0%	SEED AND STRAW MULCH	SEED AND STRAW MULCH
2	3.1-5.0%	SEED AND STRAW MULCH	SEED AND COVER USING RECP
3	5.1-8.0%	SEED AND COVER WITH RECP	LINED WITH 4-8' RIP-RAP OR GEOTEXTILE
4	8.1-20.%	LINED WITH 4-8' RIP-RAP OR GEOTEXTILE	ENGINEERED DESIGN

9. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	TEMPORARY SWALE

STANDARD AND SPECIFICATIONS FOR PERIMETER DIKE/SWALE

Definition

A temporary ridge of soil excavated from an adjoining swale located along the perimeter of the site or disturbed area.

Purpose

The purpose of a perimeter dike/swale is to prevent off site storm runoff from entering a disturbed area and to prevent sediment laden storm runoff from leaving the construction site or disturbed area.

Conditions Where Practice Applies

Perimeter dike/swale is constructed to divert flows from entering a disturbed area, or along tops of slopes to prevent flows from eroding the slope, or along base of slopes to direct sediment laden flows to a trapping device.

The perimeter dike/swale shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 5A.3 on page 5A.8 for details.

The perimeter dike/swale shall not be constructed outside the property lines without obtaining legal easements from affected adjacent property owners. A design is not required for perimeter dike/swale. The following criteria shall be used:

Drainage area – Less than 2 acres (for drainage areas larger than 2 acres but less than 10 acres, see earth dike or temporary swale; for drainage areas larger than 10 acres, see standard and specifications for diversion).

Height – 18 inches minimum from bottom of swale to top of dike evenly divided between dike height and swale depth.

Bottom width of dike – 2 feet minimum.

Width of swale – 2 feet minimum.

Grade – Dependent upon topography, but shall have positive drainage (sufficient grade to drain) to an adequate outlet. Maximum allowable grade not to exceed 8 percent.

Stabilization – The disturbed area of the dike and swale shall be stabilized within 7 days of installation, in accordance with the standard and specifications for temporary swales.

Outlet

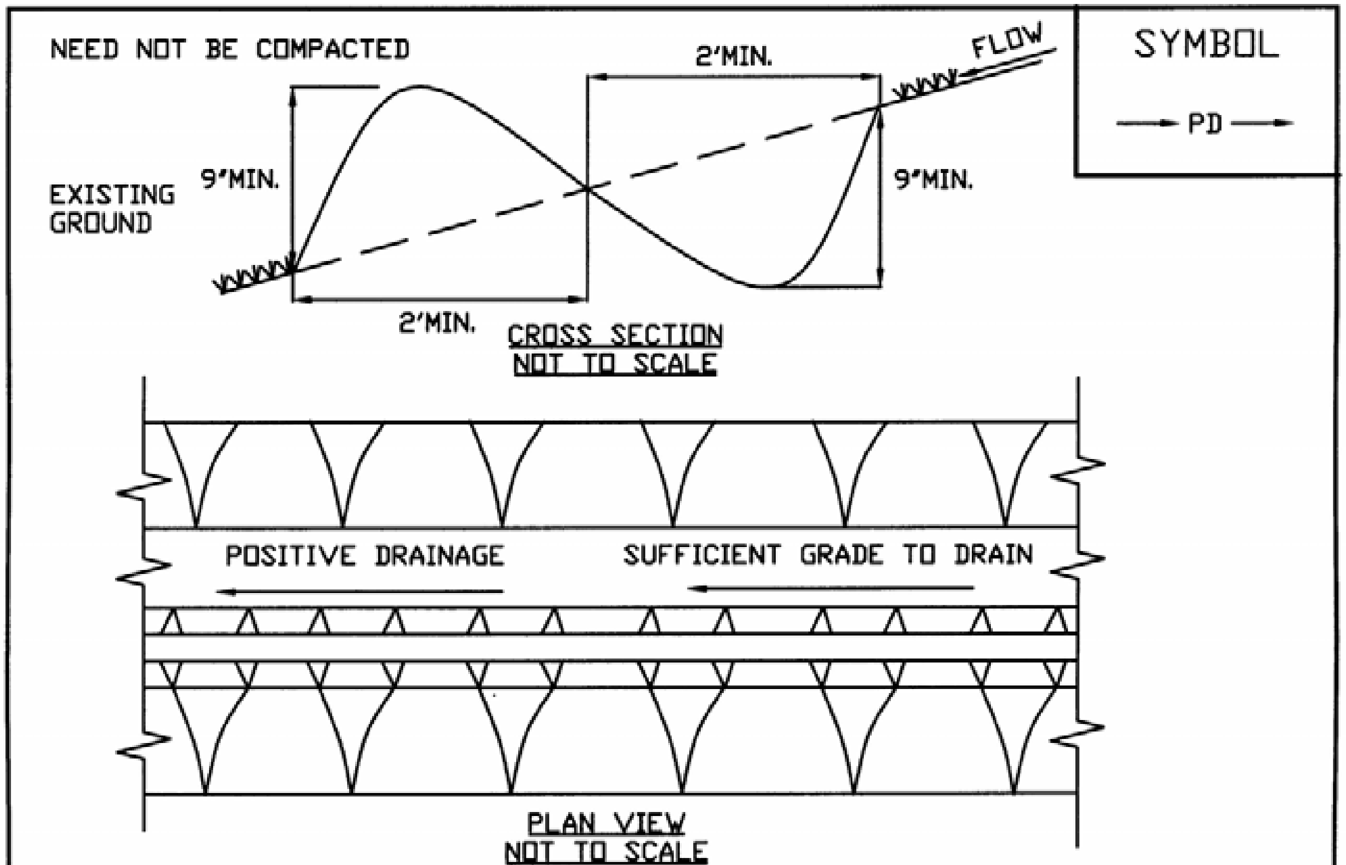
1. Perimeter dike/swale shall have a stabilized outlet.

2. Diverted runoff from a protected or stabilized upland area shall outlet directly onto an undisturbed stabilized area.

3. Diverted runoff from a disturbed or exposed upland area shall be conveyed to a sediment trapping device such as a sediment trap, sediment basin, or to an area protected by any of these practices.

4. The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

Figure 5A.3
Perimeter Dike/Swale



CONSTRUCTION SPECIFICATIONS

1. ALL PERIMETER DIKE/SWALE SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSION VELOCITY.
4. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED IN THE STANDARD.
5. STABILIZATION OF THE AREA DISTURBED BY THE DIKE AND SWALE SHALL BE DONE IN ACCORDANCE WITH THE STANDARD AND SPECIFICATIONS FOR TEMPORARY SEEDING AND MULCHING, AND SHALL BE DONE WITHIN 10 DAYS.
6. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

MAX. DRAINAGE AREA LIMIT: 2 ACRES

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	PERIMETER DIKE OR SWALE

STANDARD AND SPECIFICATIONS FOR STRAW BALE DIKE

Definition

A temporary barrier of straw, or similar material, used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a bale dike is to reduce runoff velocity and effect deposition of the transported sediment load. Straw bale dikes have an estimated design life of three (3) months.

Conditions Where Practice Applies

The straw bale dike is used where:

1. No other practice is feasible.
2. There is no concentration of water in a channel or other drainage way above the barrier.
3. Erosion would occur in the form of sheet erosion.
4. Length of slope above the straw bale dike does not exceed these limits.

Constructed Slope	Percent Slope	Slope Length (ft.)
2:1	50	25
3:1	33	50
4:1	25	75

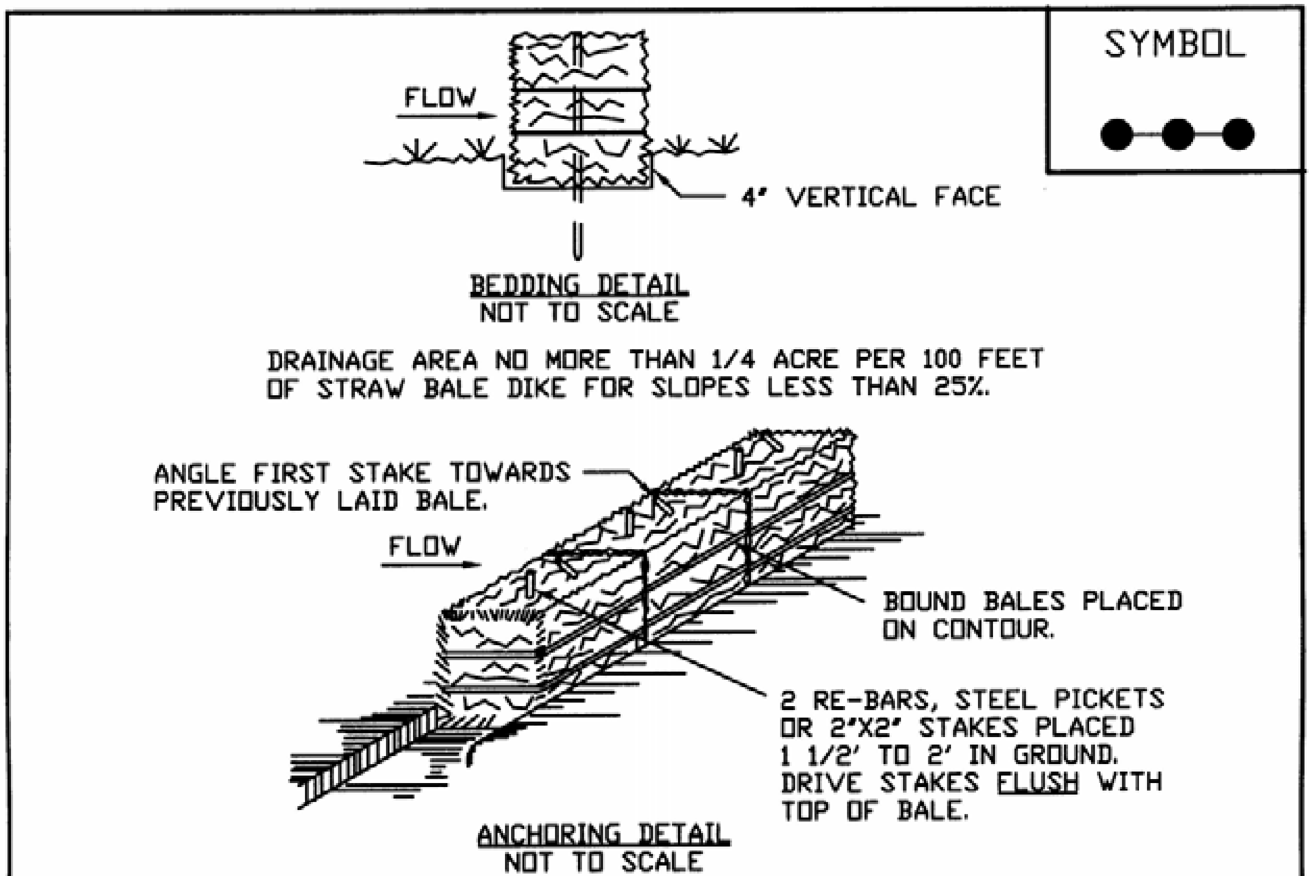
Where slope gradient changes through the drainage area, steepness refers to the steepest slope section contributing to the straw bale dike.

The practice may also be used for a single family lot if the slope is less than 15 percent. The contributing drainage areas in this instance shall be less than one quarter of an acre per 100 feet of fence and the length of slope above the dike shall be less than 200 feet.

Design Criteria

The above table is adequate, in general, for a one-inch rainfall event. Larger storms could cause failure of this practice. Use of this practice in sensitive areas for longer than one month should be specifically designed to store expected runoff. All bales shall be placed on the contour with cut edge of bale adhering to the ground. See Figure 5A.7 on page 5A.18 or details.

Figure 5A.7
Straw Bale Dike



CONSTRUCTION SPECIFICATIONS

1. BALES SHALL BE PLACED AT THE TOE OF A SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF (4) INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR RE-BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULLNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	STRAW BALE DIKE

STANDARD AND SPECIFICATIONS FOR SILT FENCE

Definition

A temporary barrier of geotextile fabric installed on the contours across a slope used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a silt fence is to reduce runoff velocity and effect deposition of transported sediment load. Limits imposed by ultraviolet stability of the fabric will dictate the maximum period the silt fence may be used (approximately one year).

Conditions Where Practice Applies

A silt fence may be used subject to the following conditions:

1. Maximum allowable slope lengths contributing runoff to a silt fence placed on a slope are:

Slope Steepness	Maximum Length (ft.)
2:1	25
3:1	50
4:1	75
5:1 or flatter	100

2. Maximum drainage area for overland flow to a silt fence shall not exceed ¼ acre per 100 feet of fence, with maximum ponding depth of 1.5 feet behind the fence; and

3. Erosion would occur in the form of sheet erosion; and

4. There is no concentration of water flowing to the barrier.

Design Criteria

Design computations are not required for installations of 1 month or less. Longer installation periods should be designed for expected runoff. All silt fences shall be placed as close to the areas as possible, but at least 10 feet from the toe of a slope to allow for maintenance and roll down. The area beyond the fence must be undisturbed or stabilized.

Sensitive areas to be protected by silt fence may need to be reinforced by using heavy wire fencing for added support to prevent collapse.

Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. A detail of the silt fence shall be shown on the plan. See Figure 5A.8 on page 5A.21 for details.

Criteria for Silt Fence Materials

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance.

Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682

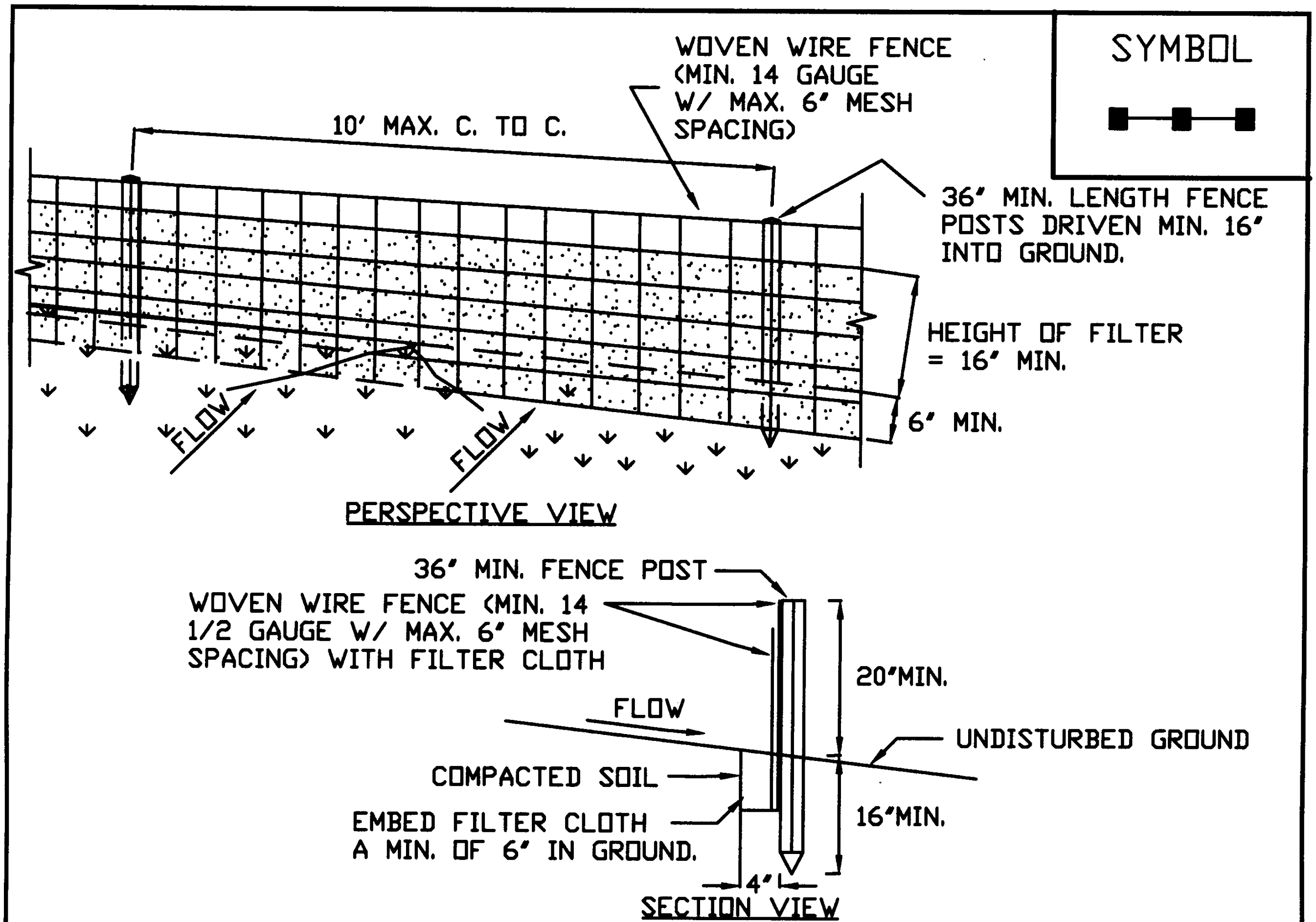
Mullen Burst Strength (PSI)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751 (modified)
Slurry Flow Rate (gal/min/sf)	0.3	
Equivalent Opening Size	40-80	US Std Sieve CW-02215
Ultraviolet Radiation Stability (%)	90	ASTM G-26

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.0 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot.

3. Wire Fence (for fabricated units): Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.

4. Prefabricated Units: Envirofence, Geofab, or approved equal, may be used in lieu of the above method providing the unit is installed per details shown in Figure 5A.8.

Figure 5A.8
Silt Fence



CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	SILT FENCE

STANDARD AND SPECIFICATIONS FOR SEDIMENT TRAP

Definition

A temporary sediment control device formed by excavation and/or embankment to intercept sediment laden runoff and retain the sediment.

Purpose

The purpose of the structure is to intercept sediment-laden runoff and trap the sediment in order to protect drainage ways, properties, and rights-of-way below the sediment trap from sedimentation.

Conditions Where Practice Applies

A sediment trap is usually installed in a drainage way, at a storm drain inlet, or other points of collection from a disturbed area.

Sediment traps should be used to artificially break up the natural drainage area into smaller sections where a larger device (sediment basin) would be less effective.

Design Criteria

If any of the design criteria presented here cannot be met, see Standard and Specification for Sediment Basin on page 5A.49.

Drainage Area

The drainage area for sediment traps shall be in accordance with the specific type of sediment trap used (Type I through V).

Location

Sediment traps shall be located so that they can be installed prior to grading or filling in the drainage area they are to protect. Traps must not be located any closer than 20 feet from a proposed building foundation if the trap is to function during building construction. Locate traps to obtain maximum storage benefit from the terrain and for ease of cleanout and disposal of the trapped sediment.

Trap Size

The volume of a sediment trap as measured at the elevation of the crest of the outlet shall be at least 3,600 cubic feet per acre of drainage area. The volume of a constructed trap shall be calculated using standard mathematical procedures. The volume of a natural sediment trap may be approximated by the equation: Volume (cu.ft.) = 0.4 x surface area (sq.ft.) x maximum depth (ft.).

Trap Cleanout

Sediment shall be removed and the trap restored to the original dimensions when the sediment has accumulated to ½ of the design depth of the trap. Sediment removed from the trap shall be deposited in a protected area and in such a manner that it will not erode.

Embankment

All embankments for sediment traps shall not exceed five (5) feet in height as measured at the low point of the original ground along the centerline of the embankment. Embankments shall have a minimum four (4) foot wide top and side slopes of 2:1 or flatter. The embankment shall be compacted by traversing with equipment while it is being constructed. The embankment shall be stabilized with seed and mulch as soon as it is completed

The elevation of the top of any dike directing water to any sediment trap will equal or exceed the maximum height of the outlet structure along the entire length of the trap.

Excavation

All excavation operations shall be carried out in such a manner that erosion and water pollution shall be minimal. Excavated portions of sediment traps shall have 1:1 or flatter slopes.

Outlet

The outlet shall be designed, constructed, and maintained in such a manner that sediment does not leave the trap and that erosion at or below the outlet does not occur.

Sediment traps must outlet onto stabilized (preferable undisturbed) ground, into a watercourse, stabilized channel, or into a storm drain system. Distance between inlet and outlet should be maximized to the longest length practicable.

Trap Details Needed on Erosion and Sediment Control Plans

Each trap shall be delineated on the plans in such a manner that it will not be confused with any other features. Each trap on a plan shall indicate all the information necessary to properly construct and maintain the structure. If the drawings are such that this information cannot be delineated on the drawings, then a table shall be developed. If a table is developed, then each trap on a plan shall have a number and the numbers shall be consecutive.

The following information shall be shown for each trap in a summary table format on the plans.

1. Trap number
2. Type of trap
3. Drainage area
4. Storage required
5. Storage provided (if applicable)
6. Outlet length or pipe sizes
7. Storage depth below outlet or cleanout elevation
8. Embankment height and elevation (if applicable)

Type of Sediment Traps

There are five (5) specific types of sediment traps which vary according to their function, location, or drainage area.

I. Pipe Outlet Sediment Trap
II. Grass Outlet Sediment Trap
III. Catch Basin Sediment Trap
IV. Stone Outlet Sediment Trap
V. Riprap Outlet Sediment Trap

I. Pipe Outlet Sediment Trap

A Pipe Outlet Sediment Trap consists of a trap formed by embankment or excavation. The outlet for the trap is through a perforated riser and a pipe through the embankment. The outlet pipe and riser shall be made of steel, corrugated metal or other suitable material. The top of the embankment shall be at least 1 ½ feet above the crest of the riser. The top 2/3 of the riser shall be perforated with one (1) inch nominal diameter holes or slits spaced six (6) inches vertically and horizontally placed in the concave portion of the corrugated pipe.

No holes or slits will be allowed within six (6) inches of the top of the horizontal barrel. All pipe connections shall be watertight. The riser shall be wrapped with ½ to ¼ inch hardware cloth wire then wrapped with filter cloth with a sieve size between #40-80 and secured with strapping or connecting band at the top and bottom of the cloth. The cloth shall cover an area at least six (6) inches above the highest hole and six (6) inches below the lowest hole. The top of the riser pipe shall not be covered with filter cloth. The riser shall have a base with sufficient weight to prevent flotation of the riser. Two approved bases are:

1. A concrete base 12 in. thick with the riser embedded 9 in. into the concrete base, or

2. One quarter inch, minimum, thick steel plate attached to the riser by a continuous weld around the circumference of the riser to form a watertight connection. The plate shall have 2.5 feet of stone, gravel, or earth placed on it to prevent flotation. In either case, each side of the square base measurement shall be the riser diameter plus 24 inches.

Pipe outlet sediment traps shall be limited to a five (5) acre maximum drainage area. Pipe outlet sediment traps may be interchangeable in the field with stone outlet or riprap sediment traps provided that these sediment traps are constructed in accordance with the detail and specifications for that trap.

Select pipe diameter from the following table:

<u>Minimum Sizes</u>

Barrel Diameter[1] (in.)	Riser Diameter[1] (in.)	Maximum Drainage Area (ac.)
12	15	1
15	18	2
18	21	3
21	24	4
21	27	5

[1] Barrel diameter may be same size as riser diameter.

See details for Pipe Outlet Sediment Trap ST-I in Figure 5A.16 (1) and 5A.16 (2) on pages 5A.38 and 5A.39.

II. Grass Outlet Sediment Trap

A Grass Outlet Sediment Trap consists of a trap formed by excavating the earth to create a holding area. The trap has a discharge point over natural existing grass. The outlet crest width (feet) shall be equal to four (4) times the drainage area (acres) with a minimum width of four (4) feet. The outlet shall be free of any restrictions to flow. The outlet lip must remain undisturbed and level. The volume of this trap shall be computed at the elevation of the crest of the outlet. Grass outlet sediment traps shall be limited to a five (5) acre maximum drainage area.

See details for Grass Outlet Sediment Trap ST-II in Figure 5A.17 on page 5A.40.

III. Catch Basin Sediment Trap

A Catch Basin Sediment Trap consists of a basin formed by excavation on natural ground that discharges through an opening in a storm drain inlet structure. This opening can either be the inlet opening or a temporary opening made by omitting bricks or blocks in the inlet.

A yard drain inlet or an inlet in the median strip of a dual highway could use the inlet opening for the type outlet. The trap should be out of the roadway so as not to interfere with future compaction or construction. Placing the trap on the opposite side of the opening and diverting water from the roadway to the trap is one means of doing this. Catch basin sediment traps shall be limited to a three (3) acre maximum drainage area. The volume of this trap is measured at the elevation of the crest of the outlet (invert of the inlet opening).

See details for Catch Basin Sediment Trap ST-III in Figure 5A.18 on page 5A.41.

IV. Stone Outlet Sediment Trap

A Stone Outlet Sediment Trap consists of a trap formed by an embankment or excavation. The outlet of this trap is over a stone section placed on level ground. The minimum length (feet) of the outlet shall be equal to four (4) times the drainage area (acres).

Required storage shall be 3,600 cubic feet per acre of drainage area.

The outlet crest (top of stone in weir section) shall be level, at least one (1) foot below top of embankment and no more than one (1) foot above ground beneath the outlet. Stone used in the outlet shall be small riprap (4 in. x 8 in.). To provide more efficient trapping effect, a layer of filter cloth should be embedded one (1) foot back into the upstream face of the outlet stone or a one (1) foot thick layer of two (2) inch or finer aggregate shall be placed on the upstream face of the outlet.

Stone Outlet Sediment Traps may be interchangeable in the field with pipe or riprap outlet sediment traps provided they are constructed in accordance with the detail and specifications for those traps. Stone outlet sediment traps shall be limited to a five (5) acre maximum drainage area.

See details for Stone Outlet Sediment Trap ST-IV in Figure 5A.19 on page 5A.42.

V. Riprap Outlet Sediment Trap

A Riprap Outlet Sediment Trap consists of a trap formed by an excavation and embankment. The outlet for this trap shall be through a partially excavated channel lined with riprap. This outlet channel shall discharge onto a stabilized area or to a stable watercourse. The riprap outlet sediment trap may be used for drainage areas of up to a maximum of 15 acres.

Design Criteria for Riprap Outlet Sediment Trap

1. The total contributing drainage area (disturbed or undisturbed either on or off the developing property) shall not exceed 15 acres.
2. The storage needs for this trap shall be computed using 3600 cubic feet of required storage for each acre of drainage area. The storage volume provided can be figured by computing the volume of storage area available behind the outlet structure up to an elevation of one (1) foot below the level weir crest.
3. The maximum height of embankment shall not exceed five (5) feet.
4. The elevation of the top of any dike directing water to a riprap outlet sediment trap will equal or exceed the minimum elevation of the embankment along the entire length of this trap.

Riprap Outlet Sediment Trap ST-V
(for Stone Lined Channel)

Contributing Drainage Area (ac.)	Depth of Channel (a) (ft.)	Length of Weir (b) (ft.)
1	1.5	4.0
2	1.5	5.0
3	1.5	6.0
4	1.5	10.0
5	1.5	12.0
6	1.5	14.0
7	1.5	16.0
8	2.0	10.0
9	2.0	10.0
10	2.0	12.0
11	2.0	14.0
12	2.0	14.0
13	2.0	16.0
14	2.0	16.0
15	2.0	18.0

See details for Riprap Outlet Sediment Trap ST-V on Figures 5A.20(1) and 5A.20(2) on pages 5A.43 and 5A.44.

Optional Dewatering Methods

Optional dewatering devices may be designed for use with sediment traps. Included are two methods, which may be used. See Figure 5A.21 on page 5A.45 for details.

Figure 5A.16(1)
Pipe Outlet Sediment Trap: ST-I

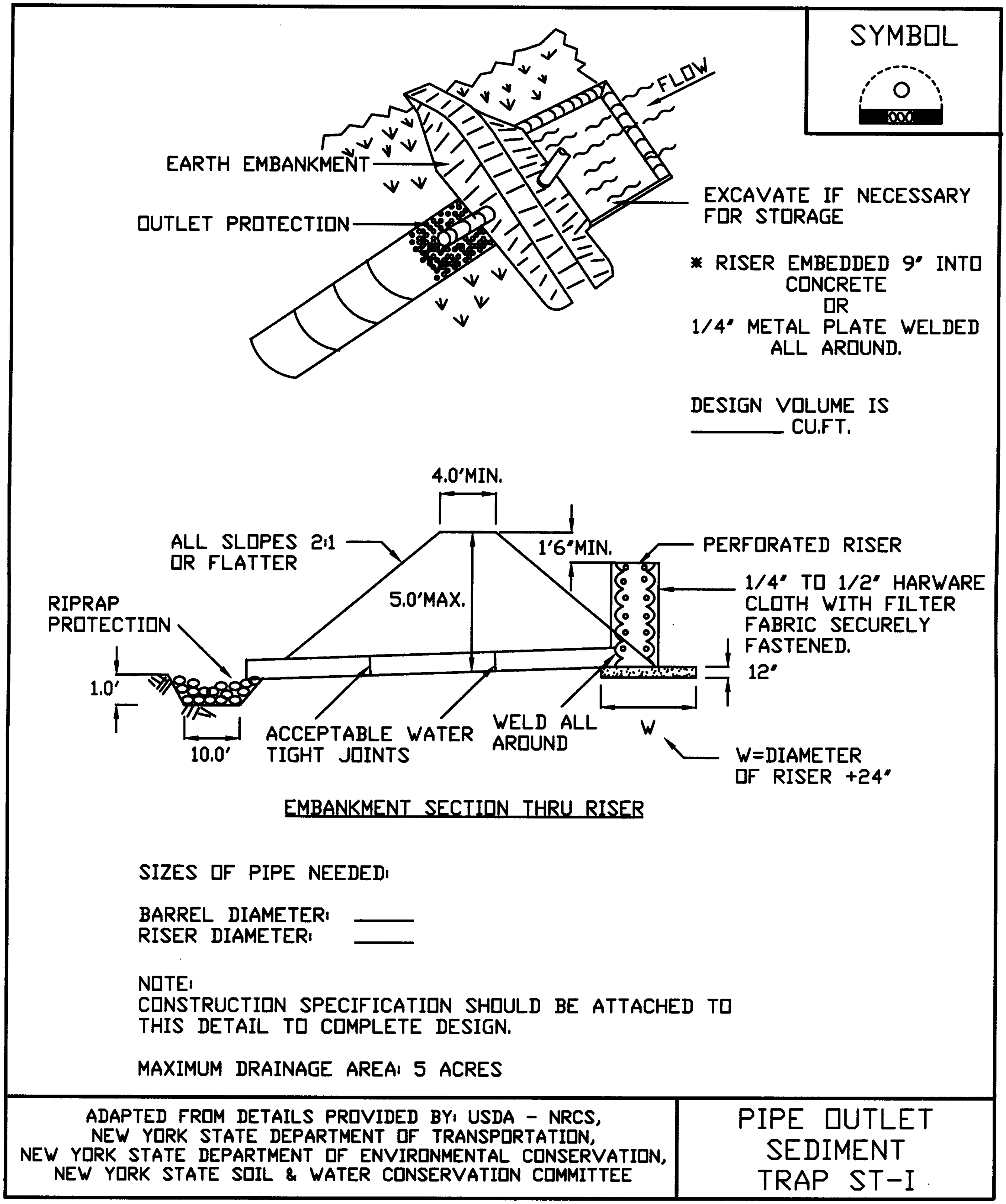


Figure 5A.16(2)
Pipe Outlet Sediment Trap: ST-I—Construction Specifications

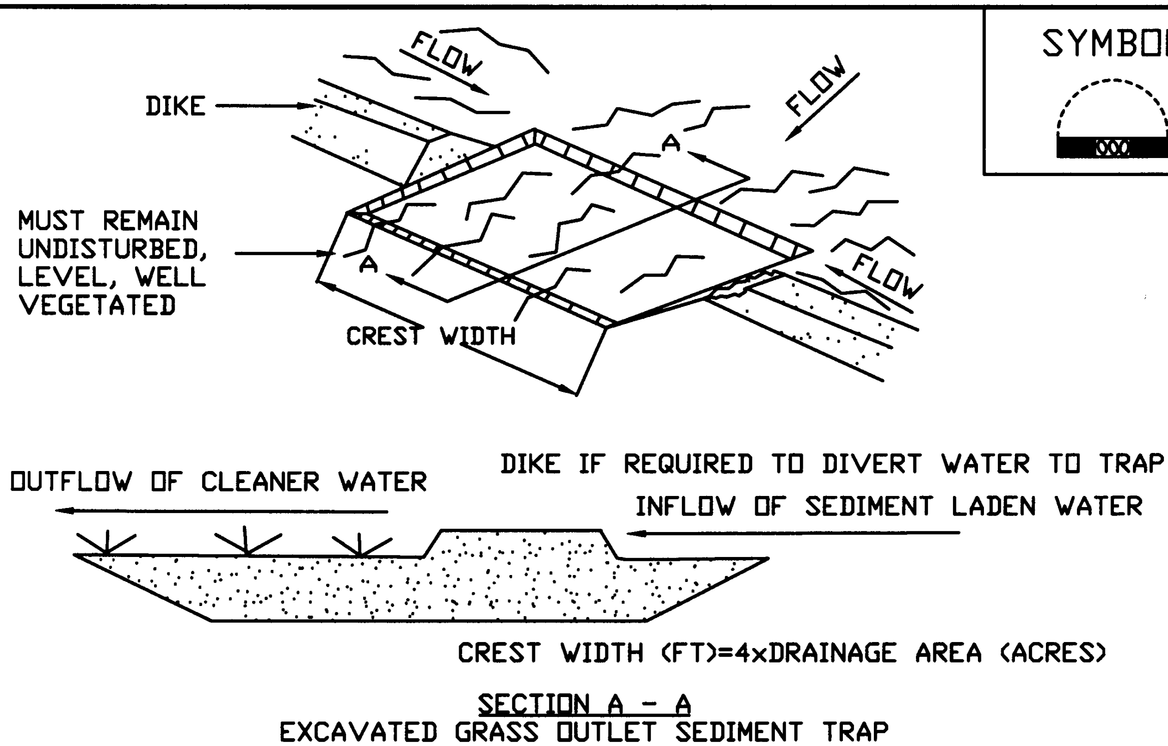
SYMBOL

CONSTRUCTION SPECIFICATIONS

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS OR OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL, OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. VOLUME OF SEDIMENT STORAGE SHALL BE 3600 CUBIC FEET PER ACRE OF CONTRIBUTORY DRAINAGE.
4. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND STABILIZED.
5. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
6. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
7. THE STRUCTURE SHALL BE REMOVED AND AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
8. ALL FILL SLOPES SHALL BE 2:1 OR FLATTER; CUT SLOPES 1:1 OR FLATTER.
9. ALL PIPE CONNECTIONS SHALL BE WATERTIGHT.
10. THE TOP 2/3 OF THE RISER SHALL BE PERFORATED WITH ONE (1) INCH DIAMETER HOLES OR SLITS SPACED SIX (6) INCHES VERTICALLY AND HORIZONTALLY AND PLACED IN THE CONCAVE PORTION OF PIPE. NO HOLES WILL BE ALLOWED WITHIN SIX (6) INCHES OF THE HORIZONTAL BARREL.
11. THE RISER SHALL BE WRAPPED WITH 1/4 TO 1/2 INCH HARDWARE CLOTH WIRE THEN WRAPPED WITH FILTER CLOTH (HAVING AN EQUIVALENT SIEVE SIZE OF 40-80). THE FILTER CLOTH SHALL EXTEND SIX (6) INCHES ABOVE THE HIGHEST HOLE AND SIX (6) INCHES BELOW THE LOWEST HOLE. WHERE ENDS OF THE FILTER CLOTH COME TOGETHER, THEY SHALL BE OVER-LAPPED, FOLDED AND STAPLED TO PREVENT BYPASS.
12. STRAPS OR CONNECTING BANDS SHALL BE USED TO HOLD THE FILTER CLOTH AND WIRE FABRIC IN PLACE. THEY SHALL BE PLACED AT THE TOP AND BOTTOM OF THE CLOTH.
13. FILL MATERIAL AROUND THE PIPE SPILLWAY SHALL BE HAND COMPACTED IN FOUR (4) INCH LAYERS. A MINIMUM OF TWO (2) FEET OF HAND COMPACTED BACKFILL SHALL BE PLACED OVER THE PIPE SPILLWAY BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT.
14. THE RISER SHALL BE ANCHORED WITH EITHER A CONCRETE BASE OR STEEL PLATE BASE TO PREVENT FLOTATION. FOR CONCRETE BASED THE DEPTH SHALL BE TWELVE (12) INCHES WITH THE RISER EMBEDDED NINE (9) INCHES. A 1/4 INCH MINIMUM THICKNESS STEEL PLATE SHALL BE ATTACHED TO THE RISER BY A CONTINUOUS WELD AROUND THE BOTTOM TO FORM A WATERTIGHT CONNECTION AND THEN PLACE TWO (2) FEET OF STONE, GRAVEL, OR TAMPED EARTH ON THE PLATE.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	PIPE OUTLET SEDIMENT TRAP ST-I

Figure 5A.17
Grass Outlet Sediment Trap: ST-II



SYMBOL

CONSTRUCTION SPECIFICATIONS

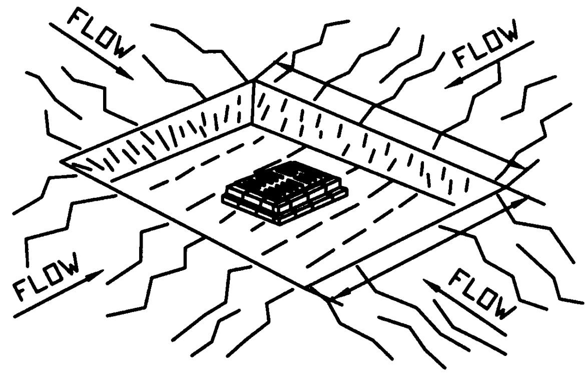
1. VOLUME OF SEDIMENT STORAGE SHALL BE 3600 CUBIC FEET PER ACRE OF CONTRIBUTORY DRAINAGE AREA.
2. MINIMUM CREST WIDTH SHALL BE 4 x DRAINAGE AREA
3. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND STABILIZED.
4. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
5. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
6. THE SEDIMENT TRAP SHALL BE REMOVED AND AREA STABILIZED WHEN THE REMAINING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
7. ALL CUT SLOPES SHALL BE 1:1 OR FLATTER.

MAXIMUM DRAINAGE AREA: 5 ACRES

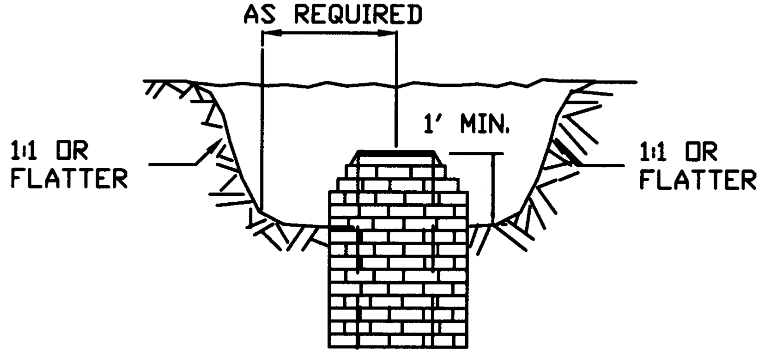
ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	GRASS OUTLET SEDIMENT TRAP ST-II

Figure 5A.18
Catch Basin Sediment Trap: ST-III

SYMBOL



YARD DRAIN



CROSS SECTION

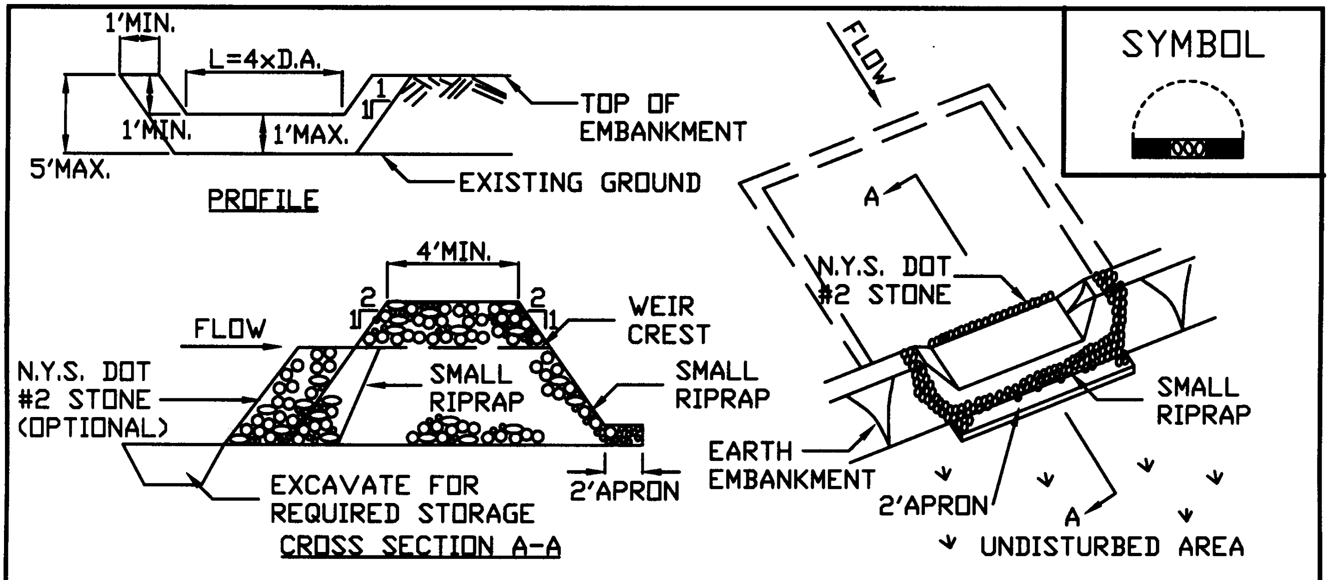
CONSTRUCTION SPECIFICATIONS

1. SEDIMENT SHALL BE REMOVED AND THE TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND STABILIZED.
2. THE VOLUME OF SEDIMENT STORAGE SHALL BE 3600 CUBIC FEET PER ACRE OF CONTRIBUTORY DRAINAGE.
3. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
4. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
5. THE SEDIMENT TRAP SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE CONSTRUCTED DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
6. ALL CUT SLOPES SHALL BE 1:1 OR FLATTER.

MAXIMUM DRAINAGE AREA: 3 ACRES

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	CATCH BASIN SEDIMENT TRAP ST-III

Figure 5A.19
Stone Outlet Sediment Trap: ST-IV



OPTION: A ONE FOOT LAYER OF N.Y.S. DOT #2 STONE MAY BE PLACED ON THE UPSTREAM SIDE OF THE RIPRAP INPLACE OF THE EMBEDDED FILTER CLOTH.

CONSTRUCTION SPECIFICATIONS

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS AND OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. ALL CUT AND FILL SLOPES SHALL BE 2:1 OR FLATTER.
4. THE STONE USED IN THE OUTLET SHALL BE SMALL RIPRAP 4"-8" ALONG WITH A 1' THICKNESS OF 2" AGGREGATE PLACED ON THE UP-GRADE SIDE ON THE SMALL RIPRAP OR EMBEDDED FILTER CLOTH IN THE RIPRAP.
5. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. IT SHALL BE PLACED ON SITE AND STABILIZED.
6. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
7. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
8. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

MAXIMUM DRAINAGE AREA 5 ACRES

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	STONE OUTLET SEDIMENT TRAP ST-IV

Figure 5A.20(1)
Riprap Outlet Sediment Trap: ST-V

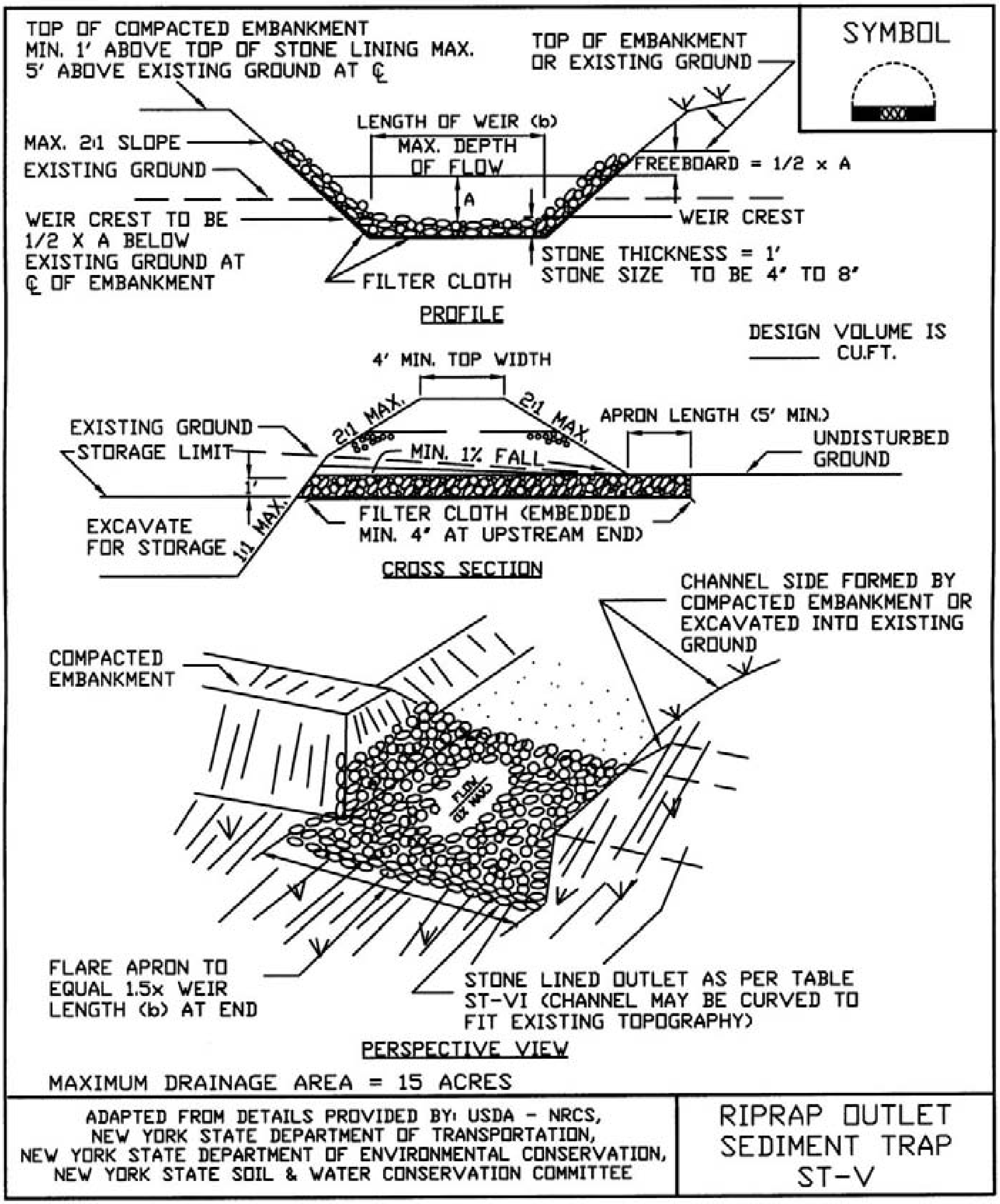


Figure 5A.202)
Riprap Outlet Sediment Trap: ST-V—Construction Specifications

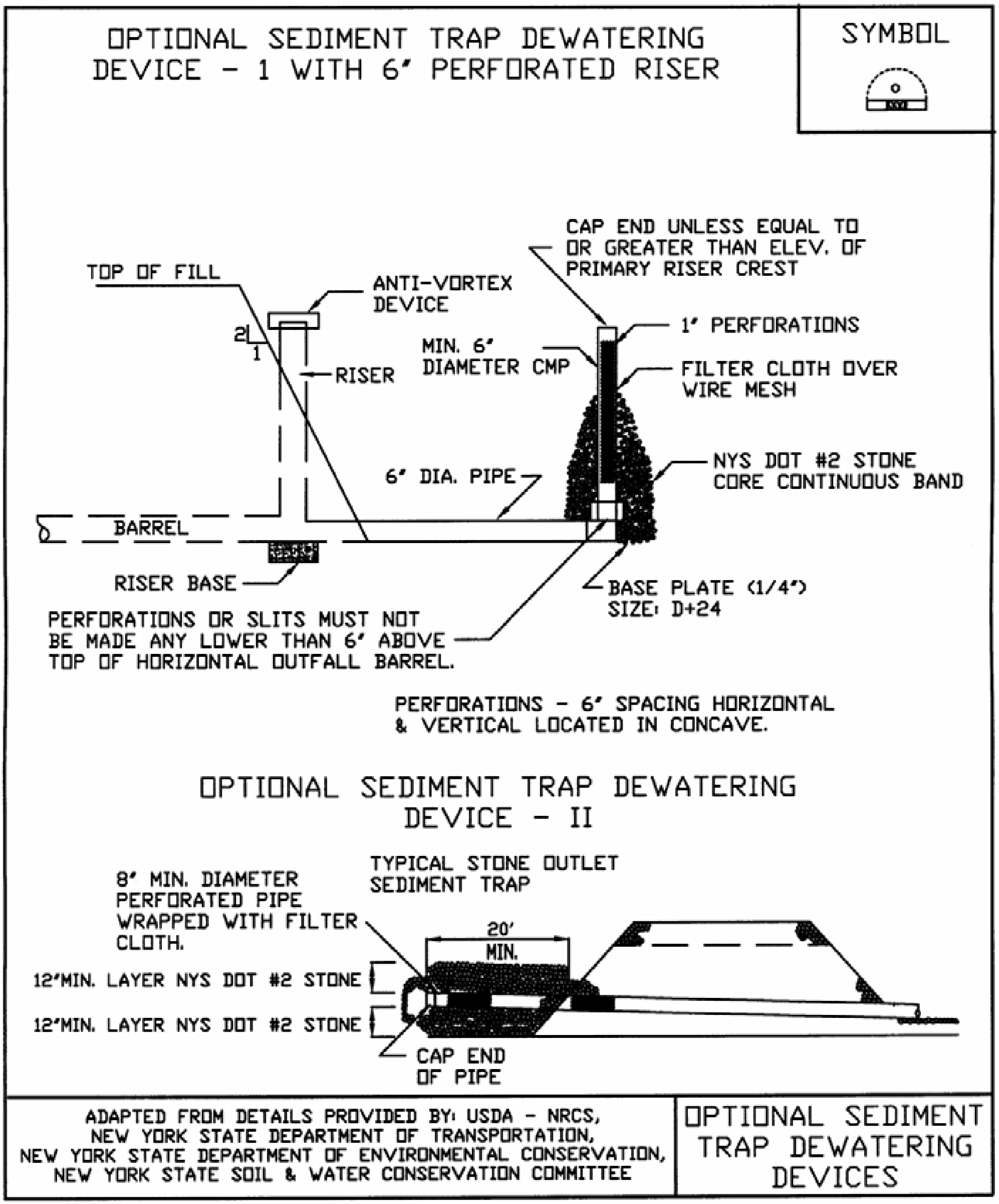
SYMBOL

CONSTRUCTION SPECIFICATIONS

1. THE AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS OR OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED. MAXIMUM HEIGHT OF OF EMBANKMENT SHALL BE FIVE (5) FEET, MEASURED AT CENTERLINE OF EMBANKMENT.
3. ALL FILL SLOPES SHALL BE 2:1 OR FLATTER, CUT SLOPES 1:1 OR FLATTER.
4. ELEVATION OF THE TOP OF ANY DIKE DIRECTING WATER INTO TRAP MUST EQUAL OR EXCEED THE HEIGHT OF EMBANKMENT.
5. STORAGE AREA PROVIDED SHALL BE FIGURED BY COMPUTING THE VOLUME AVAILABLE BEHIND THE OUTLET CHANNEL UP TO AN ELEVATION OF ONE (1) FOOT BELOW THE LEVEL WEIR CREST.
6. FILTER CLOTH SHALL BE PLACED OVER THE BOTTOM AND SIDES OF THE OUTLET CHANNEL PRIOR TO PLACEMENT OF STONE. SECTIONS OF FABRIC MUST OVERLAP AT LEAST ONE (1) FOOT WITH SECTION NEAREST THE ENTRANCE PLACED ON TOP. FABRIC SHALL BE EMBEDDED AT LEAST SIX (6) INCHES INTO EXISTING GROUND AT ENTRANCE OUTLET CHANNEL.
7. STONE USED IN THE OUTLET CHANNEL SHALL BE FOUR (4) TO EIGHT (8) INCH RIPRAP. TO PROVIDE A FILTERING EFFECT, A LAYER OF FILTER CLOTH SHALL BE EMBEDDED ONE (1) FOOT WITH SECTION NEAREST ENTRANCE PLACED ON TOP. FABRIC SHALL BE EMBEDDED AT LEAST SIX (6) INCHES INTO EXISTING GROUND AT ENTRANCE OF OUTLET CHANNEL.
8. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE.
9. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRED AS NEEDED.
10. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION ARE MINIMIZED.
11. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
12. DRAINAGE AREA FOR THIS PRACTICE IS LIMITED TO 15 ACRES OR LESS.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	RIPRAP OUTLET SEDIMENT TRAP ST-V

Figure 5A.21
Optional Sediment Trap Dewatering Devices



ATTACHMENT A-B

INSPECTION AND MAINTENANCE REPORT FORM

Inspection and Maintenance Report Form

To be completed every 7 days and within 24 hours of a rainfall event of 0.5 inches or more

Regular Inspector:_______________Rainfall Event Inspector:_____________Rainfall (inches):_____

Contractor Activities	OK	NO	N/A	Notes
Are construction onsite traffic routes, parking, and storage of equipment and supplies restricted to areas specifically designated for those uses?				
Are locations of temporary soil stock piles of construction materials in approved areas?				
Is there any evidence of spills and resulting cleanup procedures?				
General Erosion & Sediment Controls				
Are sediment and erosion BMPs installed in the proper location and according to the specifications set out in the SWM & ECP?				
Are all operational storm drain inlets protected from sediment inflow?				
Do any seeded or landscaped areas require maintenance, irrigation, fertilization, seeding or mulching?				
Is there any evidence that sediment is leaving the site?				
Is there any evidence of erosion or cut fill slopes?				
Perimeter Road Use				
Does much sediment get tracked on to the perimeter road? Is the gravel clean or is it filled with sediment? Does all traffic use the perimeter road to leave the site? Is maintenance or repair required for the perimeter road?				

_____________________________ _____________________________

Inspected by (Signature) Date

Inspection and Maintenance Report Form

To be completed every 7 days and within 24 hours of a rainfall event of 0.5 inches or more

Inspector:______________________________

STABILIZATION MEASURES					
Area	Date Since Last Disturbed	Date of Next Disturbance	Stabilized? Yes/No	Stabilized with	Condition

Stabilization Required: ____

____

____

____

____

____

To be performed by: ____________________ On or before: ____________________

APPENDIX B

NYSDOH
GENERIC COMMUNITY AIR MONITORING PLAN
&
FUGITIVE DUST

Appendix B1
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

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

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

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

Community Air Monitoring Plan

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

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

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

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

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

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

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

December 2009

Appendix B2
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

APPENDIX F

FIELD OPERATING PROCEDURES

(PROVIDED ELECTRONICALLY)

TurnKey Environmental Restoration, LLC

Field Operating Procedures

Abandonment of Borehole Procedures

ABANDONMENT OF BOREHOLE PROCEDURE

PURPOSE

Soil borings that are not completed as monitoring wells will be plugged by filling the holes with a cement/bentonite grout. Field staff will calculate the borehole volume and compare it to the final installed volume of grout to evaluate whether bridging or loss to the formation has occurred. These calculations and the actual volume placed will be noted on the Boring Log.

PROCEDURE

1. Determine most suitable seal materials. Grout specifications generally have mixture ratios as follows:

   <u>Grout Slurry Composition (% Weight)</u>

1.5 to 3.0%	-	Bentonite (Quick Gel)
40 to 60 %	-	Cement (Portland Type I)
40 to 60 %	-	Potable Water

2. Calculate the volume of the borehole base on the bit or auger head diameter plus 10% and determine the volume of grout to be emplaced. Generally, the total mixed volume is the borehole volume plus 20%.

3. Identify the equipment to be used for the preparation and mixing of the grout. Ensure the volume of the tanks to be used for mixing has been measured adequately. Document these volumes on the **Field Borehole Log** (sample attached).

4. Identify the source of the water to be used for the grout and determine its suitability for use. In particular, water with high sulfate, or chloride levels or heated water should not be used. These types of waters can cause operational difficulties or modify the set-up for the grout.

5. Identify the equipment to be used for emplacing the grout. Ensure that the pump to be used has adequate pressure to enable complete return to surface.

6. Identify the volumes to be pumped at each stage or in total if only one stage is to be used.

7. Prepare the borehole abandonment plan and discuss the plan and activities with the drilling contractor prior to beginning any mixing activities.

8. Begin mixing the grout to be emplaced.

9. Record the type and amount of materials used during the mixing operation. Ensure the ratios are within specifications tolerance.

10. Begin pumping the grout through the return line bypass system to confirm all pump and surface fittings are secure.

11. Initiate downhole pumping from the bottom of the borehole. Record the times and volumes emplaced on the Field Borehole Log (sample attached).

12. Document the return circulation of grout. This may be facilitated by using a colored dye or other tagging method if a mudded borehole condition exists prior to grout injection.

13. Identify what procedures will be used for grouting in the upper 3 feet. When casing exists in the borehole, decisions are required as to the timing for removal and final disposition of the casing. Generally, it will not be removed prior to grouting because of the potential for difficult access and loss of circulation in the upper soil or rock layers. Accordingly, when cement return is achieved at surface, the casing is commonly removed and the borehole is topped off with grout or soils. If casing removal is not possible or not desired, the casing left in place should be cut off at a depth of 5 feet or greater below ground surface. If casing is not present during grouting, the grout level in the borehole is topped off after the rods or tremie pipe is removed.

14. Clear and clean the surface near the borehole. Level the ground to above the pre-existing grade. Add grout or cement as necessary to the area near the borehole. (Note: On occasion, the grout may settle over several days. If settling occurs, the

natural soils from the immediate vicinity can be used to level to settled area to match the existing grade.

15. A follow-up check at each site should be made within one week to 10 days of completion. Document the visit and describe any action taken on a Field Activity Daily Log.

ATTACHMENTS

Field Borehole Log (sample)

REFERENCES

New York State Department of Environmental Conservation, July 1988, Drilling and Monitoring Well Installation Guidance Manual.

Driscoll, F.G., 1987, Groundwater and Wells, Johnson Division, St. Paul, Minnesota, 1089 p.

TurnKey Environmental Restoration, LLC

FIELD BOREHOLE LOG

PROJECT:		**Log of Boring No.:**	
BORING LOCATION:		ELEVATION AND DATUM:	
DRILLING CONTRACTOR:		DATE STARTED:	DATE FINISHED:
DRILLING METHOD:		TOTAL DEPTH:	SCREEN INTERVAL:
DRILLING EQUIPMENT:		DEPTH TO WATER: FIRST: COMPL.:	CASING:
SAMPLING METHOD:		LOGGED BY:	
HAMMER WEIGHT:	DROP:	RESPONSIBLE PROFESSIONAL:	REG. NO.

Depth (fbgs)	SAMPLES: Sample No.	Sample	Blows (per 6")	SPT N-Value	Recovery	PID Scan (ppm)	SAMPLE DESCRIPTION USCS Classification: Color, Moisture Condition, % of Soil Type, Texture, Plasticity, Fabric, Bedding, Weathering/Fracturing, Odor, Other SURFACE ELEVATION (FMSL):	REMARKS

ABANDONMENT:				
Volume of cement/bentonite grout required:	V = pr2 x 7.48 =	gallons	borehole depth =	ft.
Volume of cement/bentonite grout installed:		gallons	borehole diameter =	ft.
Has bridging of grout occurred?	☐ yes ☐ no		borehole radius =	ft.
If yes, explain resolution:				
Method of installation:				
Project No:	**TurnKey Environmental Restoration, LLC**		Figure	

TurnKey Environmental Restoration, LLC

FIELD OPERATING PROCEDURES

Calibration & Maintenance of Portable Dissolved Oxygen Meter

FOP 007.0

CALIBRATION AND MAINTENANCE OF PORTABLE DISSOLVED OXYGEN METER

PURPOSE

This guideline describes a method for calibration of a portable dissolved oxygen meter. This meter measures the concentration of dissolved oxygen within a water sample. This parameter is of interest both as a general indicator of water quality, and because of its pertinence to fate and transport of organics and inorganics. This guideline presents a method for calibration of this meter, which is performed to verify instrument accuracy and function. All field instruments will be calibrated, verified and recalibrated at frequencies required by their respective operating manuals or manufacturer's specifications, but not less than once each day that the instrument is in use. Field personnel should have access to all operating manuals for the instruments used for the field measurements. This procedure also documents critical maintenance activities for this meter.

ACCURACY

The calibrated accuracy of the dissolved oxygen meter will be within ± 1% of full-scale over the temperature range of 23° to 113° F (-5° to +45° C).

PROCEDURE

1. Calibrate the dissolved oxygen meter to ambient air based on probe temperature and true local atmospheric pressure conditions (or feet above sea level). Because procedures vary with different brands and models of meters, refer to the manufacturer's recommended calibration procedures.

2. In the event of a failure to adequately calibrate, follow the corrective action directed by the manufacturer.
3. If calibration cannot be achieved or maintained, obtain a replacement instrument (rental instruments) and/or order necessary repairs/adjustment.

4. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample). Information will include, at a minimum:
   - Time, date, and initials of the field team member performing the calibration
   - The unique identifier for the meter, including manufacturer, model, and serial number
   - The brand and expiration dates of calibration solutions
   - The calibration readings
   - The instrument settings (if applicable)
   - The approximate response time
   - The overall adequacy of calibration including the Pass or fail designation in accordance with the accuracy specifications presented above
   - Corrective action taken (see Step 5 above) in the event of failure to adequately calibrate

MAINTENANCE

- When not in use or between measurements, the dissolved oxygen probe will be kept immersed in or moist with deionized water.

- The meter batteries will be checked prior to each meter's use and will be replaced when the meter cannot be redline adjusted.

- The meter response time and stability will be tracked to determine the need for instrument maintenance. When response time becomes greater than two minutes, probe service is indicated.

ATTACHMENTS

Equipment Calibration Log (sample)

TurnKey Environmental Restoration, LLC

EQUIPMENT CALIBRATION

PROJECT INFORMATION:

Project Name: Date:

Project No.:

Client: Instrument Source: ☐ TK ☐ Rental

METER TYPE	UNITS	TIME	MAKE/MODEL	SERIAL NUMBER	CAL. BY	STANDARD	READING	SETTI
☐ pH meter	units		Myron L Company Ultra Meter 6P	606987		4.00		
						7.00		
						10.01		
☐ Turbidity meter	NTU		Hach 2100P Turbidimeter	970600014560		< 0.4		
						20		
						100		
						800		
☐ Sp. conductance meter	uS/mS		Myron L Company Ultra Meter 6P	606987		[illegible] μS @ 25 °C		
☐ PID	ppm		Photovac 2020 PID	[illegible]		open air zero		MIBK re factor =
						_____ ppm Iso. Gas		
☐ Particulate meter	mg/m^3					zero air		
☐ Oxygen	%					open air		
☐ Hydrogen sulfide	ppm					open air		
☐ Carbon monoxide	ppm					open air		
☐ LEL	%					open air		
☐ Radiation Meter	uR/[illegible]					background area		
☐								

ADDITIONAL REMARKS:

PREPARED BY: **DATE:**

FIELD OPERATING PROCEDURES

Calibration and Maintenance of Portable Field pH/Eh Meter

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD pH/Eh METER

PURPOSE

This guideline describes a method for calibration of a portable pH/Eh meter. The pH/Eh meter measures the hydrogen ion concentration or acidity of a water sample (pH function), and the oxidation/reduction potential of a water sample (Eh function). Calibration is performed to verify instrument accuracy and function. All field instruments will be calibrated, verified and recalibrated at frequencies required by their respective operating manuals or manufacturer's specifications, but not less than once each day that the instrument is in use. Field personnel should have access to all operating manuals for the instruments used for the field measurements. This procedure also documents critical maintenance activities for this meter.

ACCURACY

The calibrated accuracy of the pH/Eh meter will be:

pH   ± 0.2 pH unit, over the temperature range of ± 0.2 C.

Eh   ± 0.2 millivolts (mV) over the range of ± 399.9 mV, otherwise ± 2 mV.

PROCEDURE

Note: Meters produced by different manufacturers may have different calibration procedures. These instructions will take precedence over the procedure provided herein. This procedure is intended to be used as a general guideline, or in the absence of available manufacturer's instructions.

1. Obtain and active the meter to be used. As stated above, initial calibrations will be performed at the beginning of each sampling day.

2. Immerse the sensing probe in a container of certified pH 7.0 buffer solution traceable to the National Bureau of Standards.

3. Measure the temperature of the buffer solution, and adjust the temperature setting accordingly.

4. Compare the meter reading to the known value of the buffer solution while stirring. If the reading obtained by the meter does not agree with the known value of the buffer solution, recalibrate the meter according to the manufacturer's instructions until the desired reading is obtained. This typically involves accessing and turning a dial or adjustment screw while measuring the pH of the buffer solution. The meter is adjusted until the output agrees with the known solution pH.

5. Repeat Steps 2 through 5 with a pH 4.0 and 10.0 buffer solution to provide a three-point calibration. Standards used to calibrate the pH meter will be of concentrations that bracket the expected values of the samples to be analyzed, especially for two-point calibrations (see note below).

Note: Some pH meters only allow two-point calibrations. Two-point calibrations should be within the suspected range of the groundwater to be analyzed. For example, if the groundwater pH is expected to be approximately 8, the two-point calibration should bracket that value. Buffer solutions of 7 and 10 should then be used for the two-point calibration.

6. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample). Information will include, at a minimum:

   - Time, date, and initials of the field team member performing the calibration
   - The unique identifier for the meter, including manufacturer, model, and serial number
   - The brand and expiration dates of buffer solutions
   - The instrument readings
   - The instrument settings (if applicable)

- Pass or fail designation in accordance with the accuracy specifications presented above
- Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate

MAINTENANCE

- When not in use, or between measurements, keep the pH/Eh probe immersed in or moist with buffer solutions.

- Check the meter batteries at the end of each day and recharge or replace as needed.

- Replace the pH/Eh probe any time that the meter response time becomes greater than two minutes or the meeting system consistently fails to retain its calibrated accuracy for a minimum of ten sample measurements.

- If a replacement of the pH/Eh probe fails to resolve instrument response time and stability problems, obtain a replacement instrument (rental instruments) and/or order necessary repairs/adjustment.

ATTACHMENTS

Equipment Calibration Log (sample)

TurnKey Environmental Restoration, LLC

EQUIPMENT CALIBRATION

PROJECT INFORMATION:

Project Name: Date:

Project No.:

Client: Instrument Source: ☐ TK ☐ Rental

METER TYPE	UNITS	TIME	MAKE/MODEL	SERIAL NUMBER	CAL. BY	STANDARD	READING	SETTI
☐ pH meter	units		Myron L Company Ultra Meter 6P	606987		4.00		
						7.00		
						10.01		
☐ Turbidity meter	NTU		Hach 2100P Turbidimeter	970600014560		< 0.4		
						20		
						100		
						800		
☐ Sp. conductance meter	uS/mS		Myron L Company Ultra Meter 6P	606987		[illegible] μS @ 25 °C		
☐ PID	ppm		Photovac 2020 PID	[illegible]		open air zero		MIBK re factor =
						_____ ppm Iso. Gas		
☐ Particulate meter	mg/m^3					zero air		
☐ Oxygen	%					open air		
☐ Hydrogen sulfide	ppm					open air		
☐ Carbon monoxide	ppm					open air		
☐ LEL	%					open air		
☐ Radiation Meter	uR/H					background area		
☐								

ADDITIONAL REMARKS:

PREPARED BY: **DATE:**

FIELD OPERATING PROCEDURES

Calibration and Maintenance of Portable Field Turbidity Meter

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD TURBIDITY METER

PURPOSE

This guideline describes the method for calibration of the HACH 2100P portable field turbidity meter. Turbidity is one water quality parameter measured during purging and development of wells. Turbidity is measured as a function of the samples ability to transmit light, expressed as Nephelometric Turbidity Units (NTUs). The turbidity meter is factory calibrated and must be checked daily prior to using the meter in the field. Calibration is performed to verify instrument accuracy and function. This procedure also documents critical maintenance activities for this meter.

ACCURACY

Accuracy shall be ± 2% of reading below 499 NTU or ± 3% of reading above 500 NTU with resolution to 0.01 NTU in the lowest range. The range key provides for automatic or manual range selection for ranges of 0.00 to 9.99, 0.0 to 99.9 and 0 to 1000 NTU. Another key provides for selecting automatic signal averaging. Pressing the key shall toggle signal averaging on or off.

PROCEDURE

Calibration of the 2100P Turbidimeter is based on formazin, the primary standard for turbidity. The instrument's electronic and optical design provides long-term stability and minimizes the need for frequent calibration. The two-detector ratioing system compensates for most fluctuations in lamp output. **A formazin recalibration should be performed at least once every three months,** more often if experience indicates the need. During calibration, use a primary standard such as StablCal™ Stabilized Standards or formazin standards.

Note: Meters produced by different manufacturers may have different calibration check procedures. These manufacturers' instructions will take precedence over the procedure provided here. This procedure is intended to be used as a general guideline, or in the absence of available manufacturer's instructions.

Note: Because the turbidity meter measures light transmission, it is critical that the meter and standards be cared for as precision optical instruments. Scratches, dirt, dust, etc. can all temporarily or permanently affect the accuracy of meter readings.

Preparing StablCal Stabilized Standards in Sealed Vials

Sealed vials that have been sitting undisturbed for longer than a month must be shaken to break the condensed suspension into its original particle size. Start at *step 1* for these standards. If the standards are used on at least a weekly interval, start at *step 3*.

Note: These instructions do not apply to < 0.1 NTU StablCal Standards; < 0.1 NTU StablCal Standards should not be shaken or inverted.

1. Shake the standard vigorously for 2-3 minutes to re-suspend any particles.
2. Allow the standard to stand undisturbed for 5 minutes.
3. Gently invert the vial of StablCal 5 to 7 times.
4. Prepare the vial for measurement using traditional preparation techniques. This usually consists of oiling the vial (see *Section 2.3.2 on page 11 of the manual*)

and marking the vial to maintain the same orientation in the sample cell compartment (see *Section 2.3.3 on page 12 of the manual*). This step will eliminate any optical variations in the sample vial.

5. Let the vial stand for one minute. The standard is now ready for use in the calibration procedure.

Calibration Procedure

1. Turn the meter on.

2. Shake pre-mixed formazin primary standards in accordance with the above procedure.

3. Wipe the outside of the < 0.1 NTU standard and insert the sample cell in the cell compartment by aligning the orientation mark on the cell with the mark on the front of the cell compartment.

4. Close the lid and press **I/O**.

5. Press the **CAL** button. The **CAL** and **S0** icons will be displayed and the 0 will flash. The four-digit display will show the value of the **S0** standard for the previous calibration. If the blank value was forced to 0.0, the display will be blank. Press the right arrow key (→) to get a numerical display.

6. Press **READ**. The instrument will count from 60 to 0, read the blank and use it to calculate a correction factor for the 20 NTU standard measurement. If the dilution water is ≥ 0.5 NTU, E 1 will appear when the calibration is calculated (*see Section 3.6.2.3 on page 31 of the manual*). The display will automatically increment to the next standard. Remove the sample cell from the cell compartment

Note: The turbidity of the dilution water can be "forced" to zero by pressing → rather than reading the dilution water. The display will show "S0 NTU" and the ↑ key must be pressed to continue with the next standard.

7. Repeat steps 1 through 7 for the 20, 100 and 800 standards.

8. Following the 800 NTU standard calibration, the display will increment back to the **S0** display. Remove the sample cell from the cell compartment.

9. Press **CAL** to accept the calibration. The instrument will return to measurement mode automatically.

10. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample). Information will include, at a minimum:
    - Time, date, and initials of the field team member performing the calibration
    - The unique identifier for the meter, including manufacturer, model, and serial number
    - The brand of calibration standards
    - The instrument readings
    - The instrument settings (if applicable)
    - Pass or fail designation in accordance with the accuracy specifications presented above
    - Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate.

Note: Pressing CAL completes the calculation of the calibration coefficients. If calibration errors occurred during calibration, error messages will appear after CAL is pressed. If E 1 or E 2 appear, check the standard preparation and review the calibration; repeat the calibration if necessary. If "CAL?" appears, an error may have

occurred during calibration. If "CAL?" is flashing, the instrument is using the default calibration.

NOTES

- If the **I/O** key is pressed during calibration, the new calibration data is lost and the old calibration will be used for measurements. Once in calibration mode, only the **READ, I/O,** ↑ , and →keys function. Signal averaging and range mode must be selected before entering the calibration mode.

- If **E 1** or **E 2** are displayed, an error occurred during calibration. Check the standard preparation and review the calibration; repeat the calibration if necessary. Press **DIAG** to cancel the error message (**E 1** or **E 2)**. To continue without repeating the calibration, press **I/O** twice to restore the previous calibration. If "**CAL?"** is displayed, an error may have occurred during calibration. The previous calibration may not be restored. Either recalibrate or use the calibration as is.

- To review a calibration, press **CAL** and then ↑ to view the calibration standard values. As long as **READ** is never pressed and **CAL** is not flashing, the calibration will not be updated. Press **CAL** again to return to the measurement mode.

MAINTENANCE

- **Cleaning**: Keep the turbidimeter and accessories as clean as possible and store the instrument in the carrying case when not in use. Avoid prolonged exposure to sunlight and ultraviolet light. Wipe spills up promptly. Wash sample cells with non-abrasive laboratory detergent, rinse with distilled or demineralized water, and air dry. Avoid scratching the cells and wipe all moisture and fingerprints off the cells before inserting them into the instrument. Failure to do so can give inaccurate readings. See *Section 2.3.1 on page 11of the manual* for more information about sample cell care.

- **Battery Replacement**: AA alkaline cells typically last for about 300 tests with the signal-averaging mode off, about 180 tests if signal averaging is used. The "battery" icon flashes when battery replacement is needed. Refer to *Section 1.4.2 on page 5 of the manual* for battery installation instructions. If the batteries are changed within 30 seconds, the instrument retains the latest range and signal average selections. If it takes more than 30 seconds, the instrument uses the default settings. If, after changing batteries, the instrument will not turn off or on and the batteries are good, remove the batteries and reinstall them. If the instrument still won't function, contact Hach Service or the nearest authorized dealer.

- **Lamp Replacement**: The procedure in *Section 4.0 on page 49 of the manual* explains lamp installation and electrical connections. Use a small screwdriver to remove and install the lamp leads in the terminal block. The instrument requires calibration after lamp replacement.

ATTACHMENTS

Equipment Calibration Log (sample)

TurnKey Environmental Restoration, LLC

EQUIPMENT CALIBRATION

PROJECT INFORMATION:

Project Name: Date:

Project No.:

Client: Instrument Source: ☐ TK ☐ Rental

METER TYPE	UNITS	TIME	MAKE/MODEL	SERIAL NUMBER	CAL. BY	STANDARD	READING	SETTI
☐ pH meter	units		Myron L Company Ultra Meter 6P	606987		4.00		
						7.00		
						10.01		
☐ Turbidity meter	NTU		Hach 2100P Turbidimeter	970600014560		< 0.4		
						20		
						100		
						800		
☐ Sp. conductance meter	uS/mS		Myron L Company Ultra Meter 6P	606987		[illegible] µS @ 25 °C		
☐ PID	ppm		Photovac 2020 PID	ED [illegible] 301		open air zero		MIBK re factor =
						_____ ppm Iso. Gas		
☐ Particulate meter	mg/m^3					zero air		
☐ Oxygen	%					open air		
☐ Hydrogen sulfide	ppm					open air		
☐ Carbon monoxide	ppm					open air		
☐ LEL	%					open air		
☐ Radiation Meter	uR/[illegible]					background area		
☐								

ADDITIONAL REMARKS:

PREPARED BY: **DATE:**

FIELD OPERATING PROCEDURES

Calibration and Maintenance of Portable Photoionization Meter

FOP 011.0

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

PURPOSE

This procedure describes a general method for the calibration and maintenance of a portable photoionization detector (PID). The PID detects and initially quantifies a reading of the volatile organic compound (VOC) concentration in air. The PID is used as a field-screening tool for initial evaluation of soil samples and for ambient air monitoring of compounds with ionization potentials (IP) less than the PID lamp electron voltage (eV) rating. The IP is the amount of energy required to move an electron to an infinite distance from the nucleus thus creating a positive ion plus an electron. It should be noted that all of the major components of air (i.e., carbon dioxide, methane, nitrogen, oxygen etc.) have IP's above 12 eV. As a result, they will not be ionized by the 9.5, 10.2, 10.6 or 11.7 eV lamps typically utilized in field PIDs. The response of the PID will then be the sum of the organic and inorganic compounds in air that are ionized by the appropriate lamp (i.e., 9.5, 10.2, 10.6 or 11.7 eV). Attached to this FOP is a table summarizing common organic compounds and their respective IPs.

Calibration is performed to verify instrument accuracy and function. All field instruments will be calibrated, verified and recalibrated at frequencies required by their respective operating manuals or manufacturer's specifications, but not less than once each day that the instrument is in use. Field personnel should have access to all operating manuals for the instruments used for the field measurements. This procedure also documents critical maintenance activities for this meter.

Note: The information included below is equipment manufacturer- and model-specific, however, accuracy, calibration, and maintenance procedures for this type of portable equipment are typically similar. The information below pertains to the Photovac 2020 photoionization detector equipped with a 10.6 eV lamp. The actual equipment to be used in the field will be equivalent or similar. The previously mentioned attached table indicates the compounds that cannot be detected by a standard 10.6 eV lamp.

Note: The PID indicates total VOC concentration readings that are normalized to an isobutylene standard, so actual quantification of individual compounds is not provided. In addition, the PID response to compounds is highly variable, dependent on ionization potential of the compound, and the presence or absence of other compounds.

ACCURACY

The Photovac 2020 is temperature compensated so that a 20 ºC change in temperature corresponds to a change in reading of less than two percent full-scale at maximum sensitivity. The useful range of the instrument is from 0.5 – 2000 ppm isobutylene with an accuracy of ± 10% or ± 2 ppm. Response time is less than three seconds to 90 percent of full-scale. The operating temperature range is 0 to 40º C and the operating humidity range is 0 to 100 % relative humidity (non-condensing).

PROCEDURE

1. Calibrate all field test equipment at the beginning of each sampling day. Check and recalibrate the PID according to the manufacture's specifications.

2. Calibrate the PID meter using a compressed gas cylinder containing a 100-ppm isobutylene standard, a flow regulator, and a tubing assembly. In

addition, a compressed gas cylinder containing zero air ("clean" air) may be required if ambient air conditions do not permit calibration to "clean air".

3. Fill two Tedlar bags equipped with a one-way valve with zero-air (if applicable) and 100-ppm isobutylene gas.

4. Assemble the calibration equipment and actuate the PID in its calibration mode. Connect the PID probe to the zero air calibration bag (or calibrate to ambient air if conditions permit) and wait for a stable indication.

5. Change the response factor of the PID to the Methyl Isobutyl Ketone (MIBK) setting, which is a response factor of 1.0 for the Photovac 2020.

6. Connect the PID probe to the 100-ppm isobutylene standard calibration bag. Measure an initial reading of the isobutylene standard and wait for a stable indication.

7. Keep the PID probe connected to the 100-ppm isobutylene standard calibration bag, calibrate to 100-ppm with the isobutylene standard and wait for a stable indication.

8. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample), indicating the meter readings before and after the instrument has been adjusted. This is important, not only for data validation, but also to establish maintenance schedules and component replacement. Information will include, at a minimum:
   - Time, date and initials of the field team member performing the calibration
   - The unique identifier for the meter, including manufacturer, model, and serial number
   - The brand and expiration date of the isobutylene gas
   - The instrument readings: before and after calibration
   - The instrument settings (if applicable)

- Pass or fail designation in accordance with the accuracy specifications presented above
- Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate.

MAINTENANCE

- The probe and dust filter of the PID should be checked before and after every use for cleanliness. Should instrument response become unstable, recalibration should be performed. If this does not resolve the problem, access the photoionization bulb and clean with the manufacturer-supplied abrasive compound, then recalibrate.

- The PID battery must be recharged after each use. Store the PID in its carrying case when not in use. Additional maintenance details related to individual components of the PID are provided in the equipment manufacturer's instruction manual. If calibration or instrument performance is not in accordance with specifications, send the instrument to the equipment manufacturer for repair.

- Maintain a log for each monitoring instrument. Record all maintenance performed on the instrument on this log with date and name of the organization performing the maintenance.

ATTACHMENTS

Table 1; Summary of Ionization Potentials
Equipment Calibration Log (sample)

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
A		
2-Amino pyridine	8	
Acetaldehyde	10.21	
Acetamide	9.77	
Acetic acid	10.69	X
Acetic anhydride	10	
Acetone	9.69	
Acetonitrile	12.2	X
Acetophenone	9.27	
Acetyl bromide	10.55	
Acetyl chloride	11.02	X
Acetylene	11.41	X
Acrolein	10.1	
Acrylamide	9.5	
Acrylonitrile	10.91	X
Allyl alcohol	9.67	
Allyl chloride	9.9	
Ammonia	10.2	
Aniline	7.7	
Anisidine	7.44	
Anisole	8.22	
Arsine	9.89	
B		
1,3-Butadiene (butadiene)	9.07	
1-Bromo-2-chloroethane	10.63	X
1-Bromo-2-methylpropane	10.09	
1-Bromo-4-fluorobenzene	8.99	
1-Bromobutane	10.13	
1-Bromopentane	10.1	
1-Bromopropane	10.18	
1-Bromopropene	9.3	
1-Butanethiol	9.14	
1-Butene	9.58	
1-Butyne	10.18	
2,3-Butadione	9.23	
2-Bromo-2-methylpropane	9.89	
2-Bromobutane	9.98	
2-Bromopropane	10.08	

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
2-Bromothiophene	8.63	
2-Butanone (MEK)	9.54	
3-Bromopropene	9.7	
3-Butene nitrile	10.39	
Benzaldehyde	9.53	
Benzene	9.25	
Benzenethiol	8.33	
Benzonitrile	9.71	
Benzotrifluoride	9.68	
Biphenyl	8.27	
Boron oxide	13.5	X
Boron trifluoride	15.56	X
Bromine	10.54	
Bromobenzene	8.98	
Bromochloromethane	10.77	X
Bromoform	10.48	
Butane	10.63	X
Butyl mercaptan	9.15	
cis-2-Butene	9.13	
m-Bromotoluene	8.81	
n-Butyl acetate	10.01	
n-Butyl alcohol	10.04	
n-Butyl amine	8.71	
n-Butyl benzene	8.69	
n-Butyl formate	10.5	
n-Butyraldehyde	9.86	
n-Butyric acid	10.16	
n-Butyronitrile	11.67	X
o-Bromotoluene	8.79	
p-Bromotoluene	8.67	
p-tert-Butyltoluene	8.28	
s-Butyl amine	8.7	
s-Butyl benzene	8.68	
sec-Butyl acetate	9.91	
t-Butyl amine	8.64	
t-Butyl benzene	8.68	
trans-2-Butene	9.13	
C		

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
1-Chloro-2-methylpropane	10.66	X
1-Chloro-3-fluorobenzene	9.21	
1-Chlorobutane	10.67	X
1-Chloropropane	10.82	X
2-Chloro-2-methylpropane	10.61	X
2-Chlorobutane	10.65	X
2-Chloropropane	10.78	X
2-Chlorothiophene	8.68	
3-Chloropropene	10.04	
Camphor	8.76	
Carbon dioxide	13.79	X
Carbon disulfide	10.07	
Carbon monoxide	14.01	X
Carbon tetrachloride	11.47	X
Chlorine	11.48	X
Chlorine dioxide	10.36	
Chlorine trifluoride	12.65	X
Chloroacetaldehyde	10.61	X
α -Chloroacetophenone	9.44	
Chlorobenzene	9.07	
Chlorobromomethane	10.77	X
Chlorofluoromethane (Freon 22)	12.45	X
Chloroform	11.37	X
Chlorotrifluoromethane (Freon 13)	12.91	X
Chrysene	7.59	
Cresol	8.14	
Crotonaldehyde	9.73	
Cumene (isopropyl benzene)	8.75	
Cyanogen	13.8	X
Cyclohexane	9.8	
Cyclohexanol	9.75	
Cyclohexanone	9.14	
Cyclohexene	8.95	
Cyclo-octatetraene	7.99	
Cyclopentadiene	8.56	
Cyclopentane	10.53	
Cyclopentanone	9.26	
Cyclopentene	9.01	

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Cyclopropane	10.06	
m-Chlorotoluene	8.83	
o-Chlorotoluene	8.83	
p-Chlorotoluene	8.7	
D		
1,1-Dibromoethane	10.19	
1,1-Dichloroethane	11.12	X
1,1-Dimethoxyethane	9.65	
1,1-Dimethylhydrazine	7.28	
1,2-Dibromoethene	9.45	
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon 114)	12.2	X
1,2-Dichloroethane	11.12	X
1,2-Dichloropropane	10.87	X
1,3-Dibromopropane	10.07	
1,3-Dichloropropane	10.85	X
2,2-Dimethyl butane	10.06	
2,2-Dimethyl propane	10.35	
2,3-Dichloropropene	9.82	
2,3-Dimethyl butane	10.02	
3,3-Dimethyl butanone	9.17	
cis-Dichloroethene	9.65	
Decaborane	9.88	
Diazomethane	9	
Diborane	12	X
Dibromochloromethane	10.59	
Dibromodifluoromethane	11.07	X
Dibromomethane	10.49	
Dibutylamine	7.69	
Dichlorodifluoromethane (Freon 12)	12.31	X
Dichlorofluoromethane	12.39	X
Dichloromethane	11.35	X
Diethoxymethane	9.7	
Diethyl amine	8.01	
Diethyl ether	9.53	
Diethyl ketone	9.32	
Diethyl sulfide	8.43	
Diethyl sulfite	9.68	
Difluorodibromomethane	11.07	X

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Dihydropyran	8.34	
Diiodomethane	9.34	
Diisopropylamine	7.73	
Dimethoxymethane (methylal)	10	
Dimethyl amine	8.24	
Dimethyl ether	10	
Dimethyl sulfide	8.69	
Dimethylaniline	7.13	
Dimethylformamide	9.18	
Dimethylphthalate	9.64	
Dinitrobenzene	10.71	X
Dioxane	9.19	
Diphenyl	7.95	
Dipropyl amine	7.84	
Dipropyl sulfide	8.3	
Durene	8.03	
m-Dichlorobenzene	9.12	
N,N-Diethyl acetamide	8.6	
N,N-Diethyl formamide	8.89	
N,N-Dimethyl acetamide	8.81	
N,N-Dimethyl formamide	9.12	
o-Dichlorobenzene	9.06	
p-Dichlorobenzene	8.95	
p-Dioxane	9.13	
trans-Dichloroethene	9.66	
E		
Epichlorohydrin	10.2	
Ethane	11.65	X
Ethanethiol (ethyl mercaptan)	9.29	
Ethanolamine	8.96	
Ethene	10.52	
Ethyl acetate	10.11	
Ethyl alcohol	10.48	
Ethyl amine	8.86	
Ethyl benzene	8.76	
Ethyl bromide	10.29	
Ethyl chloride (chloroethane)	10.98	X
Ethyl disulfide	8.27	

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Ethyl ether	9.51	
Ethyl formate	10.61	X
Ethyl iodide	9.33	
Ethyl isothiocyanate	9.14	
Ethyl mercaptan	9.29	
Ethyl methyl sulfide	8.55	
Ethyl nitrate	11.22	X
Ethyl propionate	10	
Ethyl thiocyanate	9.89	
Ethylene chlorohydrin	10.52	
Ethylene diamine	8.6	
Ethylene dibromide	10.37	
Ethylene dichloride	11.05	X
Ethylene oxide	10.57	
Ethylenelmine	9.2	
Ethynylbenzene	8.82	
F		
2-Furaldehyde	9.21	
Fluorine	15.7	X
Fluorobenzene	9.2	
Formaldehyde	10.87	X
Formamide	10.25	
Formic acid	11.05	X
Freon 11 (trichlorofluoromethane)	11.77	X
Freon 112 (1,1,2,2-tetrachloro-1,2-difluoroethane)	11.3	X
Freon 113 (1,1,2-trichloro-1,2,2-trifluororethane)	11.78	X
Freon 114 (1,2-dichloro-1,1,2,2-tetrafluoroethane)	12.2	X
Freon 12 (dichlorodifluoromethane)	12.31	X
Freon 13 (chlorotrifluoromethane)	12.91	X
Freon 22 (chlorofluoromethane)	12.45	X
Furan	8.89	
Furfural	9.21	
m-Fluorotoluene	8.92	
o-Fluorophenol	8.66	
o-Fluorotoluene	8.92	
p-Fluorotoluene	8.79	
H		
1-Hexene	9.46	

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
2-Heptanone	9.33	
2-Hexanone	9.35	
Heptane	10.08	
Hexachloroethane	11.1	X
Hexane	10.18	
Hydrazine	8.1	
Hydrogen	15.43	X
Hydrogen bromide	11.62	X
Hydrogen chloride	12.74	X
Hydrogen cyanide	13.91	X
Hydrogen fluoride	15.77	X
Hydrogen iodide	10.38	
Hydrogen selenide	9.88	
Hydrogen sulfide	10.46	
Hydrogen telluride	9.14	
Hydroquinone	7.95	
I		
1-Iodo-2-methylpropane	9.18	
1-Iodobutane	9.21	
1-Iodopentane	9.19	
1-Iodopropane	9.26	
2-Iodobutane	9.09	
2-Iodopropane	9.17	
Iodine	9.28	
Iodobenzene	8.73	
Isobutane	10.57	
Isobutyl acetate	9.97	
Isobutyl alcohol	10.12	
Isobutyl amine	8.7	
Isobutyl formate	10.46	
Isobutyraldehyde	9.74	
Isobutyric acid	10.02	
Isopentane	10.32	
Isophorone	9.07	
Isoprene	8.85	
Isopropyl acetate	9.99	
Isopropyl alcohol	10.16	
Isopropyl amine	8.72	

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Isopropyl benzene	8.69	
Isopropyl ether	9.2	
Isovaleraldehyde	9.71	
m-Iodotoluene	8.61	
o-Iodotoluene	8.62	
p-Iodotoluene	8.5	
K		
Ketene	9.61	
L		
2,3-Lutidine	8.85	
2,4-Lutidine	8.85	
2,6-Lutidine	8.85	
M		
2-Methyl furan	8.39	
2-Methyl napthalene	7.96	
1-Methyl napthalene	7.96	
2-Methyl propene	9.23	
2-Methyl-1-butene	9.12	
2-Methylpentane	10.12	
3-Methyl-1-butene	9.51	
3-Methyl-2-butene	8.67	
3-Methylpentane	10.08	
4-Methylcyclohexene	8.91	
Maleic anhydride	10.8	X
Mesityl oxide	9.08	
Mesitylene	8.4	
Methane	12.98	X
Methanethiol (methyl mercaptan)	9.44	
Methyl acetate	10.27	
Methyl acetylene	10.37	
Methyl acrylate	9.9	
Methyl alcohol	10.85	X
Methyl amine	8.97	
Methyl bromide	10.54	
Methyl butyl ketone	9.34	
Methyl butyrate	10.07	
Methyl cellosolve	9.6	
Methyl chloride	11.28	X

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Methyl chloroform (1,1,1-trichloroethane)	11	X
Methyl disulfide	8.46	
Methyl ethyl ketone	9.53	
Methyl formate	10.82	X
Methyl iodide	9.54	
Methyl isobutyl ketone	9.3	
Methyl isobutyrate	9.98	
Methyl isocyanate	10.67	X
Methyl isopropyl ketone	9.32	
Methyl isothiocyanate	9.25	
Methyl mercaptan	9.44	
Methyl methacrylate	9.7	
Methyl propionate	10.15	
Methyl propyl ketone	9.39	
α -Methyl styrene	8.35	
Methyl thiocyanate	10.07	
Methylal (dimethoxymethane)	10	
Methylcyclohexane	9.85	
Methylene chloride	11.32	X
Methyl-n-amyl ketone	9.3	
Monomethyl aniline	7.32	
Monomethyl hydrazine	7.67	
Morpholine	8.2	
n-Methyl acetamide	8.9	
N		
1-Nitropropane	10.88	X
2-Nitropropane	10.71	X
Naphthalene	8.12	
Nickel carbonyl	8.27	
Nitric oxide, (NO)	9.25	
Nitrobenzene	9.92	
Nitroethane	10.88	X
Nitrogen	15.58	X
Nitrogen dioxide	9.78	
Nitrogen trifluoride	12.97	X
Nitromethane	11.08	X
Nitrotoluene	9.45	
p-Nitrochloro benzene	9.96	

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
O		
Octane	9.82	
Oxygen	12.08	X
Ozone	12.08	X
P		
1-Pentene	9.5	
1-Propanethiol	9.2	
2,4-Pentanedione	8.87	
2-Pentanone	9.38	
2-Picoline	9.02	
3-Picoline	9.02	
4-Picoline	9.04	
n-Propyl nitrate	11.07	X
Pentaborane	10.4	
Pentane	10.35	
Perchloroethylene	9.32	
Pheneloic	8.18	
Phenol	8.5	
Phenyl ether (diphenyl oxide)	8.82	
Phenyl hydrazine	7.64	
Phenyl isocyanate	8.77	
Phenyl isothiocyanate	8.52	
Phenylene diamine	6.89	
Phosgene	11.77	X
Phosphine	9.87	
Phosphorus trichloride	9.91	
Phthalic anhydride	10	
Propane	11.07	X
Propargyl alcohol	10.51	
Propiolactone	9.7	
Propionaldehyde	9.98	
Propionic acid	10.24	
Propionitrile	11.84	X
Propyl acetate	10.04	
Propyl alcohol	10.2	
Propyl amine	8.78	
Propyl benzene	8.72	
Propyl ether	9.27	

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Propyl formate	10.54	
Propylene	9.73	
Propylene dichloride	10.87	X
Propylene imine	9	
Propylene oxide	10.22	
Propyne	10.36	
Pyridine	9.32	
Pyrrole	8.2	
Q		
Quinone	10.04	
S		
Stibine	9.51	
Styrene	8.47	
Sulfur dioxide	12.3	X
Sulfur hexafluoride	15.33	X
Sulfur monochloride	9.66	
Sulfuryl fluoride	13	X
T		
o-Terphenyls	7.78	
1,1,2,2-Tetrachloro-1,2-difluoroethane (Freon 112)	11.3	X
1,1,1-Trichloroethane	11	X
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	11.78	X
2,2,4-Trimethyl pentane	9.86	
o-Toluidine	7.44	
Tetrachloroethane	11.62	X
Tetrachloroethene	9.32	
Tetrachloromethane	11.47	X
Tetrahydrofuran	9.54	
Tetrahydropyran	9.25	
Thiolacetic acid	10	
Thiophene	8.86	
Toluene	8.82	
Tribromoethene	9.27	
Tribromofluoromethane	10.67	X
Tribromomethane	10.51	
Trichloroethene	9.45	
Trichloroethylene	9.47	
Trichlorofluoromethane (Freon 11)	11.77	X

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

Chemical Name	Ionization Potential (eV)	Cannot be Read by 10.6 eV PID
Trichloromethane	11.42	X
Triethylamine	7.5	
Trifluoromonobromo-methane	11.4	X
Trimethyl amine	7.82	
Tripropyl amine	7.23	
V		
o-Vinyl toluene	8.2	
Valeraldehyde	9.82	
Valeric acid	10.12	
Vinyl acetate	9.19	
Vinyl bromide	9.8	
Vinyl chloride	10	
Vinyl methyl ether	8.93	
W		
Water	12.59	X
X		
2,4-Xylidine	7.65	
m-Xylene	8.56	
o-Xylene	8.56	
p-Xylene	8.45	

EQUIPMENT CALIBRATION

PROJECT INFORMATION:

Project Name: Date:

Project No.:

Client: Instrument Source: ☐ TK ☐ Rental

	METER TYPE	UNITS	TIME	MAKE/MODEL	SERIAL NUMBER	CAL. BY	STANDARD	READING	SETTI
☐	pH meter	units		Myron L Company Ultra Meter 6P	606987		4.00		
							7.00		
							10.01		
☐	Turbidity meter	NTU		Hach 2100P Turbidimeter	970600014560		< 0.4		
							20		
							100		
							800		
☐	Sp. conductance meter	uS/mS		Myron L Company Ultra Meter 6P	606987		μS @ 25 °C		
☐	PID	ppm		Photovac 2020 PID	[illegible]		open air zero		MIBK re factor =
							_____ ppm Iso. Gas		
☐	Particulate meter	mg/m^3					zero air		
☐	Oxygen	%					open air		
☐	Hydrogen sulfide	ppm					open air		
☐	Carbon monoxide	ppm					open air		
☐	LEL	%					open air		
☐	Radiation Meter	uR/H					background area		
☐									

ADDITIONAL REMARKS:

PREPARED BY: **DATE:**

TurnKey Environmental Restoration, LLC

Field Operating Procedures

Calibration and Maintenance of Portable Specific Conductance Meter

CALIBRATION AND MAINTENANCE OF PORTABLE SPECIFIC CONDUCTANCE METER

PURPOSE

This guideline describes a method for calibration of a portable specific conductance meter. This meter measures the ability of a water sample to conduct electricity, which is largely a function of the dissolved solids within the water. The instrument has been calibrated by the manufacturer according to factory specifications. This guideline presents a method for checking the factory calibration of a portable specific conductance meter. A calibration check is performed to verify instrument accuracy and function. All field test equipment will be checked at the beginning of each sampling day. This procedure also documents critical maintenance activities for this meter.

ACCURACY

The calibrated accuracy of the specific conductance meter will be within ± 1 percent of full-scale, with repeatability of ± 1 percent. The built-in cell will be automatically temperature compensated from at least 32º to 160° F (0° to 71°C).

PROCEDURE

Note: The information included below is equipment manufacturer- and model-specific, however, accuracy, calibration, and maintenance procedures for this type of portable equipment are typically similar. The information below pertains to the Myron L Company Ultrameter Model 6P. The actual equipment to be used in the field will be equivalent or similar.

1. Calibrate all field test equipment at the beginning of each sampling day. Check and recalibrate the specific conductance meter according to the manufacture's specifications.

2. Use a calibration solution of known specific conductivity and salinity. For maximum accuracy, use a Standard Solution Value closest to the samples to be tested.

3. Rinse conductivity cell three times with proper standard.

4. Re-fill conductivity cell with same standard.

5. Press **COND** or **TDS**, then press **CAL/MCLR**. The "CAL" icon will appear on the display.

6. Press the **↑/MS** or **MR/↓** key to step the displayed value toward the standard's value or hold a key down to cause rapid scrolling of the reading.

7. Press CAL/MCLR once to confirm new value and end the calibration sequence for this particular solution type.

8. Repeat steps 1 through 7 with additional new solutions, as necessary.

9. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample), indicating the meter readings before and after the instrument has been adjusted. This is important, not only for data validation, but also to establish maintenance schedules and component replacement. Information will include, at a minimum:
   - Time, date and initials of the field team member performing the calibration
   - The unique identifier for the meter, including manufacturer, model, and serial number
   - The brand and expiration date of the calibration standards
   - The instrument readings: before and after calibration

- The instrument settings (if applicable)
- The overall adequacy of calibration including the Pass or fail designation in accordance with the accuracy specifications presented above.
- Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate.

MAINTENANCE

NOTE: Ultrameters should be rinsed with clean water after use. Solvents should be avoided. Shock damage from a fall may cause instrument failure.

Temperature Extremes

Solutions in excess of 160°F/71°C should not be placed in the cell cup area; this may cause damage. Care should be exercised not to exceed rated operating temperature. Leaving the Ultrameter in a vehicle or storage shed on a hot day can easily subject the instrument to over 150°F voiding the warranty.

Battery Replacement

Dry Instrument THOROUGHLY. Remove the four bottom screws. Open instrument carefully; it may be necessary to rock the bottom slightly side to side to release it from the RS-232 connector. Carefully detach battery from circuit board. Replace with 9-volt alkaline battery. Replace bottom, ensuring the sealing gasket is installed in the groove of the top half of case. Re-install screws, tighten evenly and securely.

NOTE: Because of nonvolatile EEPROM circuitry, all data stored in memory and all calibration settings are protected even during power loss or battery replacement.

<u>Cleaning Sensors</u>

The conductivity cell cup should be kept as clean as possible. Flushing with clean water following use will prevent buildup on electrodes. However, if very dirty samples — particularly scaling types — are allowed to dry in the cell cup, a film will form. This film reduces accuracy. When there are visible films of oil, dirt, or scale in the cell cup or on the electrodes, use a foaming non-abrasive household cleaner. Rinse out the cleaner and your Ultrameter is ready for accurate measurements.

NOTE: Maintain a log for each monitoring instrument. Record all maintenance performed on the instrument on this log with date and name of the organization performing the maintenance.

ATTACHMENTS

Equipment Calibration Log (sample)

TurnKey Environmental Restoration, LLC

EQUIPMENT CALIBRATION

PROJECT INFORMATION:

Project Name: Date:

Project No.:

Client: Instrument Source: ☐ TK ☐ Rental

	METER TYPE	UNITS	TIME	MAKE/MODEL	SERIAL NUMBER	CAL. BY	STANDARD	READING	SETTI
☐	pH meter	units		Myron L Company Ultra Meter 6P	606987		4.00		
							7.00		
							10.01		
☐	Turbidity meter	NTU		Hach 2100P Turbidimeter	970600014560		< 0.4		
							20		
							100		
							800		
☐	Sp. conductance meter	uS/mS		Myron L Company Ultra Meter 6P	606987		μS @ 25 °C		
☐	PID	ppm		Photovac 2020 PID	[illegible]		open air zero		MIBK re factor =
							_____ ppm Iso. Gas		
☐	Particulate meter	mg/m^3					zero air		
☐	Oxygen	%					open air		
☐	Hydrogen sulfide	ppm					open air		
☐	Carbon monoxide	ppm					open air		
☐	LEL	%					open air		
☐	Radiation Meter	uR/H					background area		
☐									

ADDITIONAL REMARKS:

PREPARED BY: **DATE:**

TurnKey Environmental Restoration, LLC

Field Operating Procedures

Documentation Requirements for Drilling and Well Installation

DOCUMENTATION REQUIREMENTS FOR DRILLING AND WELL INSTALLATION

PURPOSE

The purpose of these documentation requirements is to document the procedures used for drilling and installing wells in order to ensure the quality of the data obtained from these operations. TurnKey field technical personnel will be responsible for developing and maintaining documentation for quality control of field operations. At least one field professional will monitor each major operation (e.g. one person per drilling rig) to document and record field procedures for quality control. These procedures provide a description of the format and information for this documentation.

PROCEDURE

Project Field Book

Personnel assigned by the TurnKey Field Team Leader or Project Manager will maintain a Project Field Book for all site activities. These Field Books will be started upon initiation of any site activities to document the field investigation process. The Field Books will meet the following criteria:

- Permanently bound, with nominal 8.5-inch by 11-inch gridded pages.
- Water resistant paper.
- Pages must be pre-numbered or numbered in the field, front and back.

Notations in the field book will be in black or blue ink that will not smudge when wet. Information that may be recorded in the Field Book includes:

- Time and date of all entries.

- Name and location of project site and project job number.
- Listing of key project, client and agency personnel and telephone numbers.
- Date and time of daily arrivals and departures, name of person keeping the log, names and affiliation of persons on site, purpose of visit (if applicable), weather conditions, outline of project activities to be completed.
- Details of any variations to the procedures/protocols (i.e., as presented in the Work Plan or Field Operating Procedures) and the basis for the change.
- Field-generated data relating to implementation of the field program, including sample locations, sample descriptions, field measurements, instrument calibration, etc.
- Record of all photographs taken in the field, including date, time, photographer, site location and orientation, sequential number of photograph, and roll number.

Upon completion of the site activities, all Field Books will be photocopied and both the original and photocopied versions placed in the project files. In addition, all field notes except those presented on specific field forms will be neatly transcribed into Field Activity Daily Log (FADL) forms (sample attached).

Field Borehole/Monitoring Well Installation Log Form

Examples of the Field Borehole Log and Field Borehole/Monitoring Well Installation Log forms are attached to this Field Operating Procedure. One form will be completed for every boring by the TurnKey field person overseeing the drilling. At a minimum, these forms will include:

- Project name, location, and number.
- Boring number.

- Rig type and drilling method.
- Drilling dates.
- Sampling method.
- Sample descriptions, to meet the requirements of the Unified Soil Classification System (USCS) for soils and the Unified Rock Classification System (URCS) for rock.
- Results of photoionization evaluations (scan and/or headspace determinations).
- Blow counts for sampler penetration (Standard Penetration Test, N-Value).
- Drilling rate, rig chatter, and other drilling-related information, as necessary.

All depths recorded on Boring/Monitoring Well Installation Log forms will be expressed in increments tenths of feet, and not in inches.

Well Completion Detail Form

An example of this form is attached to this Field Operating Procedure. One form will be completed for every boring by the TurnKey field person overseeing the well installation. At a minimum, these forms will include:

- Project name, location, and number.
- Well number.
- Installation dates.
- Dimensions and depths of the various well components illustrated in the Well Completion Detail (attached). These include the screened interval, bottom caps or plugs, centralizers, and the tops and bottoms of the various annular materials.

- Drilling rate, rig chatter, and other drilling related information.

All depths recorded on Field Borehole/Monitoring Well Installation Logs will be expressed in tenths of feet, and not in inches.

Daily Drilling Report Form

An example of this form is attached to this Field Operating Procedure. This form should be used to summarize all drilling activities. One form should be completed for each rig for each day. These forms will include summaries of:

- Footage drilled, broken down by diameter (e.g. 200 feet of 6-inch diameter hole, 50 feet of 10-inch diameter hole).
- Footage of well and screen installed, broken down by diameter.
- Quantities of materials used, including sand, cement, bentonite, centralizers, protective casings, traffic covers, etc. recorded by well or boring location.
- Active time (hours), and activity (drilling, decontamination, development, well installation, surface completions, etc.)
- Down-time (hours) and reason.
- Mobilizations and other events.
- Other quantities that will be the basis for drilling invoices.

The form should be signed daily by both the TurnKey field supervisor and the driller's representative, and provided to the TurnKey Field Team Leader.

Other Project Field Forms

Well purging/well development forms, test pit logs, environmental sampling field data sheets, water level monitoring forms, and well testing (slug test or pumping test) forms. Refer to specific guidelines for form descriptions.

ATTACHMENTS

Field Activity Daily Log (FADL) (sample)
Field Borehole Log (sample)
Field Borehole/Monitoring Well Installation Log (sample)
Stick-up Well/Piezometer Completion Detail (sample)
Flush-mount Well/Piezometer Completion Detail (sample)
Daily Drilling Report (sample)

DAILY LOG				
	DATE			
	NO.			
	SHEET	OF		

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
PROJECT LOCATION:	CLIENT:
FIELD ACTIVITY SUBJECT:	
DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:	
TIME	DESCRIPTION

SAMPLE

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS:
WEATHER CONDITIONS: A.M.: P.M.:	IMPORTANT TELEPHONE CALLS:
BM/TK PERSONNEL ON SITE:	
SIGNATURE	DATE:

TurnKey Environmental Restoration, LLC

FIELD BOREHOLE LOG

PROJECT:		**Log of Boring No.:**	
BORING LOCATION:		ELEVATION AND DATUM:	
DRILLING CONTRACTOR:		DATE STARTED:	DATE FINISHED:
DRILLING METHOD:		TOTAL DEPTH:	SCREEN INTERVAL:
DRILLING EQUIPMENT:		DEPTH TO WATER: FIRST: COMPL.:	CASING:
SAMPLING METHOD:		LOGGED BY:	
HAMMER WEIGHT:	DROP:	RESPONSIBLE PROFESSIONAL:	REG. NO.

Depth (fbgs)	SAMPLES: Sample No.	Sample	Blows (per 6")	SPT N-Value	Recovery	PID Scan (ppm)	SAMPLE DESCRIPTION USCS Classification: Color, Moisture Condition, % of Soil Type, Texture, Plasticity, Fabric, Bedding, Weathering/Fracturing, Odor, Other SURFACE ELEVATION (FMSL):	REMARKS

SAMPLE

ABANDONMENT:

Volume of cement/bentonite grout required:	V = pr2 x 7.48 = gallons	borehole depth =	ft.
Volume of cement/bentonite grout installed:	gallons	borehole diameter =	ft.
Has bridging of grout occurred?	☐ yes ☐ no	borehole radius =	ft.
If yes, explain resolution:			
Method of installation:			

Project No:	**TurnKey Environmental Restoration, LLC**	Figure

TurnKey Environmental Restoration, LLC

FIELD BOREHOLE/MONITORING WELL INSTALLATION LOG

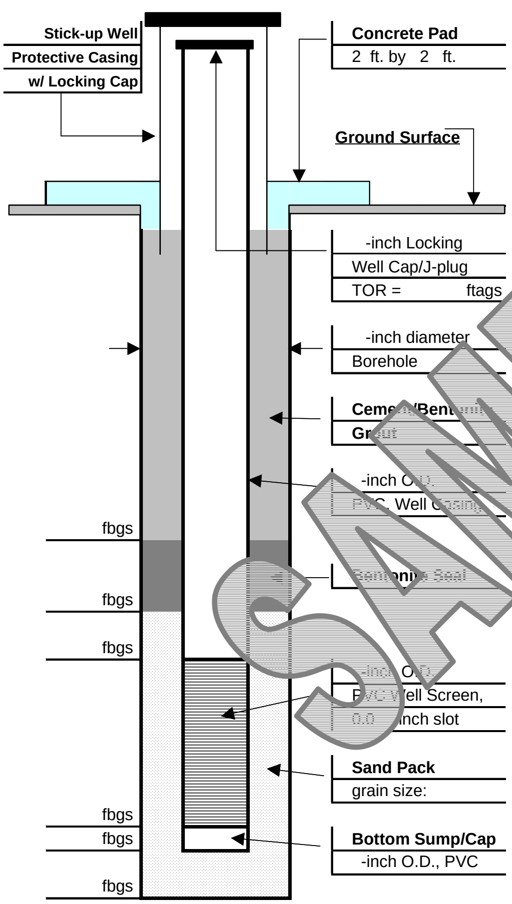
PROJECT:		**Log of Well No.:**			
BORING LOCATION:		ELEVATION AND DATUM:			
DRILLING CONTRACTOR:		DATE STARTED:			DATE FINISHED:
DRILLING METHOD:		TOTAL DEPTH:			SCREEN INTERVAL:
DRILLING EQUIPMENT:		DEPTH TO WATER:	FIRST:	COMPL.:	CASING:
SAMPLING METHOD:		LOGGED BY:			
HAMMER WEIGHT:	DROP:	RESPONSIBLE PROFESSIONAL:			REG. NO.

Depth (fbgs)	SAMPLES					PID Scan (ppm)	SAMPLE DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows (per 6")	SPT N-Value	Recovery		USCS Classification: Color, Moisture Condition, % of Soil Type, Texture, Plasticity, Fabric, Bedding, Weathering/Fracturing, Odor, Other SURFACE ELEVATION (FMSL):	

Project No:	**TurnKey Environmental Restoration, LLC**	Figure

STICK-UP MONITORING WELL COMPLETION DETAIL

Project Name:	WELL NUMBER:
Client:	Date Installed:
Boring Location:	Project Number:



Driller Information

Company:	
Driller:	
Helper:	
Permit Number:	
Drill Rig Type:	

Well Information

Land Surface Elevation:	fmsl (approximate)
Drilling Method:	
Soil Sample Collection Method:	
Drilling Fluid:	
Fluid Loss During Drilling:	gallons (approximate)

Materials of Well Construction

Casing:	
Screen:	
Sump:	
Sand Pack:	
Annular Seal:	

Well Development

Well Purpose:	
Techneque(s):	
Date Completed:	
BM/TK Personnel:	
Total Volume Purge:	gallons
Static Water Level (SWL):	fbTOR
Pump Depth: bottom of well	
Purge Duration:	minutes
Yeild:	gpm
Specific Capacity:	gpm/ft

Comments: saturated thickness: SWL - stickup = fbgs

Total Depth = fbTOR Total Depth - SWL = feet

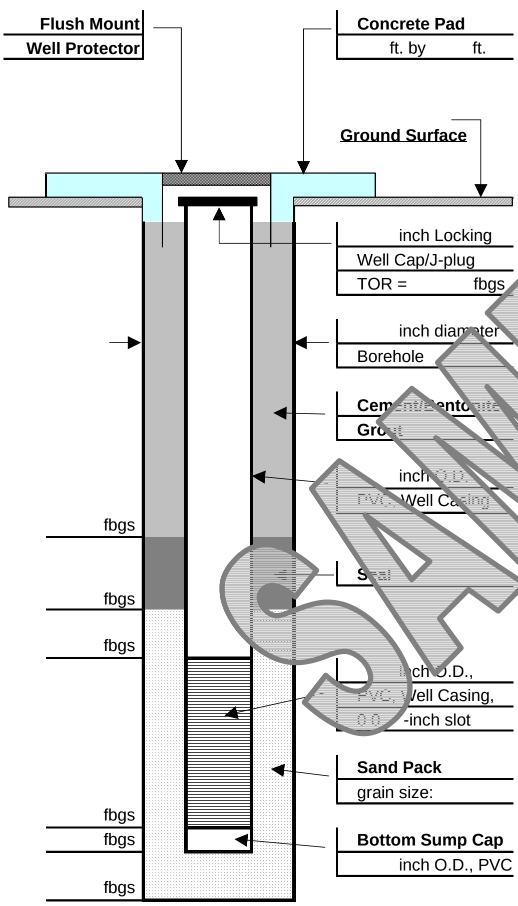
stick-up = feet

Total Depth = fbgs

PREPARED BY: DATE:

FLUSHMOUNT WELL/PIEZOMETER COMPLETION DETAIL

Project Name:	WELL NUMBER:
Client:	Date Installed:
Boring Location:	Project Number:



Driller Information

- Company:
- Driller:
- Helper:
- Permit Number:
- Drill Rig Type:

Well Information

- Land Surface Elevation: fmsl (approximate)
- Drilling Method:
- Soil Sample Collection Method:
- Drilling Fluid:
- Fluid Loss During Drilling: gallons (approximate)

Material of Well Construction

- Casing:
- Screen:
- Sump:
- Sand Pack:
- Annular Seal:

Well Development

Well Purpose:		
Techneque(s):		
Date Completed:		
BM/TK Personnel:		
Total Volume Purge:		gallons
Static Water Level:		fbTOR
Pump Depth:		
Purge Duration:		minutes
Yeild:		gpm
Specific Capacity:		gpm/ft

Comments:

PREAPRED BY: DATE:

TurnKey Environmental Restoration, LLC

DAILY DRILLING REPORT

CONTRACTOR:	DATE:
DRILLING EQUIPMENT:	PROJECT:
CREW MEMBERS:	JOB NUMBER:
SITE NAME:	BM PERSONNEL:

CATEGORY	Total Hours	a.m. 6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	a.m. 12	1	2	3	4	5	6
MOB / DEMOB																										
DRILLING																										
WELL INSTALLATION																										
DEVELOPMENT / TESTING																										
GROUTING																										
STEAM / DECON																										
DOWN TIME (explain below)																										
STANDBY (explain below)																										
CLEANUP																										
PREP FOR DRILLING																										
LUNCH																										
OTHER:																										

REMARKS:

DRILLING & WELL MATERIALS: Describe nature, quantity, size, etc.

ITEM OR SERVICE	QUANTITIES	LOCATION					TOTALS
Starting depth (fbgs)							--
Ending depth (fbgs)							--
Total footage drilled (feet)							
Drilling Method (HSA, air rotary, cable etc.)							--
Auger/Bit size							--
CSSS starting depth (fbgs)							--
CSSS ending depth (fbgs)							--
Total CSSS footage							
-inch Schedule 40 PVC screen, slot size =							
-inch Schedule 40 PVC riser							
-inch Schedule 40 PVC screen, slot size =							
-inch Schedule 40 PVC riser							
-inch Schedule 40 PVC screen, slot size =							
-inch Schedule 40 PVC riser							
Sand pack, size =							
Bentonite pellets/chips, size =							
Cement/beontonite grout							
☐ Protective casing ☐ Flushmount road box							
Lockable J-plug							
Lock							

PERSONNEL TIME LOG:

POSITION	NAME	HOURS
Observer		
Drillers		

DRILLER (optional):	BM REP.

SAMPLE

FIELD OPERATING PROCEDURES

Drill Site Selection Procedure

FOP 017.0

DRILL SITE SELECTION PROCEDURE

PURPOSE

This procedure presents a method for selecting a site location for drilling. Drill site selection should be based on the project objectives, ease of site access, freedom from obstructions and buried metallic objects (drums) and site safety (appropriate set backs from overhead and buried services).

PROCEDURE

The following procedure outlines procedures prior to drilling activities:

1. Review project objectives and tentatively select drilling locations that provide necessary information for achieving objectives (i.e., Work Plan).

2. Clear locations with property owner/operator to ensure that drilling activities will not interfere with site operations and select appropriate access routes.

3. Stake locations in the field, measure distance from locations to recognizable landmarks, such as building or fence lines and plot locations on site plan. Ensure location is relatively flat, free of overhead wires and readily accessible. Survey location if property ownership is in doubt.

4. Obtain clearances from appropriate utilities and if buried waste/metallic objects are suspected, screen location with appropriate geophysical method.

5. Establish a secure central staging area for storage of drilling supplies and for equipment decontamination. Locate a secure storage area for drilling samples, as necessary.

ATTACHMENTS

none

Field Operating Procedures

TurnKey Environmental Restoration, LLC

Drilling & Excavation Equipment Decontamination Procedures

FOP 018.0

DRILLING AND EXCAVATION EQUIPMENT DECONTAMINATION PROCEDURES

PURPOSE

This procedure is to be used for the decontamination of drilling and excavation equipment (i.e., drill rigs, backhoes, augers, drill bits, drill rods, buckets, and associated equipment) used during a subsurface investigation. The purpose of this procedure is to remove chemical constituents associated with a particular drilling or excavation location from this equipment. This prevents these constituents from being transferred between drilling or excavation locations, or being transported out of controlled areas.

PROCEDURE

The following procedure will be utilized prior to the use of drilling or excavation equipment at each location, and prior to the demobilization of such equipment from the site:

1. Remove all loose soil and other particulate materials from the equipment at the survey site.

2. Wrap augers, tools, plywood, and other reusable items with a plastic cover prior to transport from the site of use to the decontamination facility.

3. Transport equipment to the decontamination facility. All equipment must be decontaminated at an established decontamination facility. This facility will be placed within a controlled area, and will be equipped with necessary features to contain and collect wash water and entrained materials.

4. Wash equipment thoroughly with pressurized low-volume water or steam, supplied by a pressure washer or steam cleaner.

5. If necessary, use a brush or scraper to remove visible soils adhering to the equipment, and a non-phosphate detergent to remove any oils, grease, and/or hydraulic fluids adhering to the equipment. Continue pressure washing until all visible contaminants are removed.

6. Allow equipment to air dry.

7. Store equipment in a clean area or wrap the equipment in new plastic sheeting as necessary to ensure cleanliness until ready for use.

8. Manage all wash waters and entrained solids as described in the TurnKey Field Operating Procedure for Management of Investigation-Derived Waste.

ATTACHMENTS

none

Field Operating Procedures

Establishing Horizontal and Vertical Control

TurnKey Environmental Restoration, LLC

FOP 021.0

ESTABLISHING HORIZONTAL AND VERTICAL CONTROL

PURPOSE

This guideline presents a method for establishing horizontal and vertical controls at a project site. It is imperative that this procedure be performed accurately, as all topographic and site maps, monitoring well locations and test pit locations will be based on these controls.

PROCEDURE

A. Establishing Horizontal Primary and Project Control

1. Research the State Plan Coordinate, USGS or project site applicable horizontal control monuments.

2. At the project site, recover the above-mentioned monuments, two markers minimum being recovered.

3. Establish control points on the project site by bringing in the primary control points recovered in the field.

4. All control points will be tied into a closed traverse to assure the error of closure.

5. Compute closures for obtaining degree of accuracy to adjust traverse points.

B. Establishing Vertical Primary and Project Control

1. Research project or USGS datum for recovering monument(s) for vertical control if different than those previously found.

2. Recover the monuments in the field, two markers minimum being found.

3. Set the projects benchmarks.

4. Run a level line from the monuments to the set project benchmarks and back, setting turning points on all benchmarks set on site.

5. Reduce field notes and compute error of closure to adjust benchmarks set on site.

6. Prepare the recovery sketches and tabulate a list for horizontal and vertical control throughout project site.

FIELD OPERATING PROCEDURES

Groundwater Level Measurement

GROUNDWATER LEVEL MEASUREMENT

PURPOSE

This procedure describes the methods used to obtain accurate and consistent water level measurements in monitoring wells, piezometers and well points. Water levels will be measured at monitoring wells and, if practicable, in supply wells to estimate purge volumes associated with sampling, and to develop a potentiometric surface of the groundwater in order to estimate the direction and velocity of flow in the aquifer. Water levels in monitoring wells will be measured using an electronic water level indicator (e-line) that has been checked for operation prior to mobilization.

PROCEDURE

1. Decontaminate the e-line probe and a lower portion of cable following the procedures referenced in the TurnKey's Field Operating Procedure for Non-Disposable and Non-Dedicated Sampling Equipment Decontamination. Store the e-line in a protected area until use. This may include wrapping the e-line in clean plastic until the time of use.

2. Unlock and remove the well protective cap or cover and place on clean plastic.

3. Lower the probe slowly into the monitoring well until the audible alarm sounds. This indicates the depth to water has been reached.

4. Move the cable up and down slowly to identify the depth at which the alarm just begins to sound. Measure this depth against the mark on the lip of the well riser used as a surveyed reference point (typically the north side of the riser).

5. Read depth from the graduated cable to the nearest 0.01 foot. Do not use inches. If the e-line is not graduated, use a rule or tape measure graduated in 0.01-foot increments to measure from the nearest reference mark on the e-line cable.

6. Record the water level on a Water Level Monitoring Record (sample attached).

7. Remove the probe from the well slowly, drying the cable and probe with a clean paper wipe. Be sure to repeat decontamination before use in another well.

8. Replace well plug and protective cap or cover. Lock in place as appropriate.

ATTACHMENTS

Water Level Monitoring Record (sample)

REFERENCES

<u>TurnKey FOPs:</u>
040 Non-Disposable and Non-Dedicated Sampling Equipment Decontamination

WATER LEVEL MONITORING RECORD

Project Name: ______________________ Client: ______________________

Project No.: ______________________ Location: ______________________

Field Personnel: ______________________ Date: ______________________

Weather: ______________________

Well No.	Time	Top of Riser Elevation (fmsl)	Static Depth to Water (fbTOR)	Groundwater Elevation (fmsl)	Total Depth (fbTOR)	Last Total Depth Measurement (fbTOR)

Comments/Remarks:

PREAPRED BY: ______________________ DATE: ______________________

TurnKey Environmental Restoration, LLC

Field Operating Procedures

Groundwater Sample Collection Procedures

GROUNDWATER SAMPLE COLLECTION PROCEDURES

PURPOSE

This procedure describes the methods for collecting groundwater samples from monitoring wells and domestic supply wells following purging and sufficient recovery. This procedure also includes the preferred collection order in which water samples are collected based on the volatilization sensitivity or suite of analytical parameters required.

PROCEDURE

Allow approximately 3 to 10 days following well development before performing purge and sample activities at any well location. Conversely, perform sampling as soon as practical after sample purging at any time after the well has recovered sufficiently to sample, or within 24 hours after evacuation, if the well recharges slowly. If the well does not yield sufficient volume for all required laboratory analytical testing (including quality control), a decision should be made to prioritize analyses based on contaminants of concern at the site. If the well takes longer than 24 hours to recharge, the Project Manager should be consulted. The following two procedures outline sample collection activities for monitoring and domestic type wells.

Monitoring Wells

1. Purge the monitoring well in accordance with the TurnKey's FOPs for Groundwater Purging Procedures Prior to Sample Collection or Low Flow (Minimal Drawdown) Groundwater Purging & Sampling Procedures. Perform sampling as soon as practical after purging at any time after the well has recovered sufficiently to sample, or within 24 hours after evacuation, if the well recharges slowly. If the well does not yield sufficient volume for all required laboratory analytical testing (including quality control), a decision should be made to prioritize analyses based on contaminants of concern at the site. Analyses will be prioritized in the order of the parameters volatilization sensitivity. After volatile organics have been collected, field parameters

must be measured from the next sample collected. If a well takes longer than 24 hours to recharge, the Project Manager should be consulted.

2. Sampling equipment that is not disposable or dedicated to the well will be decontaminated in accordance with the TurnKey's Field Operating Procedure for Non-Disposable and Non-Dedicated Sampling Equipment Decontamination.

3. Calibrate all field meters (i.e., pH/Eh, turbidity, specific conductance, dissolved oxygen, PID etc.) in accordance with the TurnKey's Field Operating Procedure for Calibration and Maintenance of the specific field meter.

4. Prepare the electronic water level indicator (e-line) in accordance with the procedures referenced in the TurnKey's Field Operating Procedure for Groundwater Level Measurement and decontaminate the e-line probe and a lower portion of cable following the procedures referenced in the TurnKey's Field Operating Procedure for Non-disposable and Non-dedicated Sampling Equipment Decontamination. Store the e-line in a protected area until use. This may include wrapping the e-line in clean plastic until the time of use.

5. Inspect the well/piezometer for signs of vandalism or damage and record condition on the Groundwater Well Purge & Sample Collection Log (sample attached). Specifically, inspect the integrity of the following: concrete surface seal, lock, protective casing and well cover, well casing and J-plug/cap. Report any irregular findings to the Project Manager.

6. Unlock and remove the well protective cap or cover and place on clean plastic to avoid introducing foreign material into the well.

7. Calibrate the photoionization detector (PID) in accordance with the TurnKey's Field Operating Procedure for Calibration and Maintenance of Portable Photoionization Detector.

8. Monitor the well for organic vapors using a PID, as per the Work Plan. If a reading of greater than 5 ppm is recorded, the well should be allowed to vent until levels drop below 5 ppm before proceeding with purging. Record PID measurements on a well-specific Groundwater Well Purge & Sample Collection Log (sample attached).

9. Lower the e-line probe slowly into the monitoring well and record the measurement on a well-specific Groundwater Well Purge & Sample Collection Log (sample attached).

10. Groundwater samples will be collected directly from the sampling valve on the flow through cell (low-flow), discharge port of a standard pump assembly (peristaltic, pneumatic, submersible, or Waterra™ pump) or bailer (stainless steel, PVC or polyethylene) into appropriate laboratory provided containers. In low-yielding wells at which the flow through cell is not used, the samples may be collected using a disposable bailer.

11. If disposable polyethylene bailers are used, the bailer should be lowered *slowly* below the surface of the water to minimize agitation and volatilization. For wells that are known to produce turbid samples (values greater than 50 NTU), the bailer should be lowered and retrieved at a rate that limits surging of the well.

12. Sampling data will be recorded on a Groundwater Well Purge & Sample Collection Log (sample attached).

13. Pre-label all sample bottles in the field using a waterproof permanent marker in accordance with the TurnKey's Sample Labeling, Storage and Shipment FOP. The following information, at a minimum, should be included on the label:

    - Project Number;
    - Sample identification code (as per project specifications);
    - Date of sample collection (mm, dd, yy);
    - Time of sample collection (military time only) (hh:mm);
    - Specify "grab" or "composite" sample type;
    - Sampler initials;
    - Preservative(s) (if applicable); and
    - Analytes for analysis (if practicable).

14. Collect a separate sample of approximately 200 ml into an appropriate container prior to collecting the first and following the last groundwater sample collected to measure the following field parameters:

Parameter	Units
Dissolved Oxygen	parts per million (ppm)
Specific Conductance	μmhos/cm or μS or mS
pH	pH units
Temperature	^{o}C or ^{o}F
Turbidity	NTU
Eh (*optional*)	mV
PID VOCs (*optional*)	ppm

Record all field measurements on a Groundwater Well Purge & Sample Collection Log (sample attached).

15. Collect samples into pre-cleaned bottles provided by the analytical laboratory with the appropriate preservative(s) added based on the volatilization sensitivity or suite of analytical parameters required, as designated in the **Sample Collection Order** section below.

16. Lower the e-line probe slowly into the monitoring well and record the measurement on a well-specific Groundwater Well Purge & Sample Collection Log (sample attached).

17. The samples will be labeled, stored and shipped in accordance with the TurnKey's Field Operating Procedure for Sample Labeling, Storage and Shipment Procedures.

Domestic Supply Wells

1. Calculate or estimate the volume of water in the well. It is desirable to purge at least one casing volume before sampling. This is controlled, to some extent, by the depth of the well, well yield and the rate of the existing pump. If the volume of water in the well cannot be calculated, the well should be purged continuously for no less than 15 minutes.

2. Connect a sampling tap to an accessible fitting between the well and the pressure tank where practicable. A hose will be connected to the device and the hose discharge located 25 to 50 feet away. The well will be allowed to pump until the lines and one well volume is removed. Flow rate will be measured with a container of known volume and a stopwatch.

3. Place a clean piece of polyethylene or Teflon™ tubing on the sampling port and collect the samples in the order designated below and in the sample containers supplied by the laboratory for the specified analytes. ***DO NOT*** use standard garden hose to collect samples.

4. Sampling results and measurements will be recorded on a Groundwater Well Purge & Sample Collection Log (sample attached) as described in the previous section.

5. Collect samples into pre-cleaned bottles provided by the analytical laboratory with the appropriate preservative(s) added based on the volatilization sensitivity or suite of analytical parameters required, as designated in the **Sample Collection Order** section below.

6. The samples will be labeled, stored and shipped in accordance with the TurnKey's Field Operating Procedure for Sample Labeling, Storage and Shipment Procedures.

SAMPLE COLLECTION ORDER

All groundwater samples, from monitoring wells and domestic supply wells, will be collected in accordance with the following.

1. Samples will be collected preferentially in recognition of volatilization sensitivity. The preferred order of sampling if no free product is present is:

    - Field parameters
    - Volatile Organic Compounds (VOCs)
    - Purgeable organic carbons (POC)
    - Purgeable organic halogens (POH)
    - Total Organic Halogens (TOX)
    - Total Organic Carbon (TOC)

- Extractable Organic Compounds (i.e., BNAs, SVOCs, etc.)
- Total petroleum hydrocarbons (TPH) and oil and grease
- PCBs and pesticides
- Total metals (Dissolved Metals)
- Total Phenolic Compounds
- Cyanide
- Sulfate and Chloride
- Turbidity
- Nitrate (as Nitrogen) and Ammonia
- Preserved inorganics
- Radionuclides
- Unpreserved inorganics
- Bacteria
- Field parameters

2. Document the sampling procedures and related information in the Project Field Book and on a Groundwater Well Purge & Sample Collection Log (sample attached).

DOCUMENTATION

The three words used to ensure adequate documentation for groundwater sampling are accountability, controllability, and traceability. Accountability is undertaken in the sampling plan and answers the questions who, what, where, when, and why to assure that the sampling effort meets its goals. Controllability refers to checks (including QA/QC) used to ensure that the procedures used are those specified in the sampling plan. Traceability is documentation of what was done, when it was done, how it was done, and by whom it was done, and is found in the field forms, Project Field Book, and chain-of-custody forms. At a minimum, adequate documentation of the sampling conducted in the field consists of an entry in the Project Field Book (with sewn binding), field data sheets for each well, and a chain-of-custody form.

As a general rule, if one is not sure whether the information is necessary, it should nevertheless be recorded, as it is impossible to over-document one's fieldwork. Years may go by before the documentation comes under close scrutiny, so the documentation must be capable of defending the sampling effort without the assistance or translation of the sampling crew.

The minimum information to be recorded daily with an indelible pen in the Project Field Book and/or field data sheets includes date and time(s), name of the facility, name(s) of the sampling crew, site conditions, the wells sampled, a description of how the sample shipment was handled, and a QA/QC summary. After the last entry for the day in the Project Field Book, the Field Team Leader should sign the bottom of the page under the last entry and then draw a line across the page directly under the signature.

PRECAUTIONS/RECOMMENDATIONS

The following precautions should be adhered to prior to and during sample collection activities:

- Field vehicles should be parked downwind (to avoid potential sample contamination concerns) at a minimum of 15 feet from the well and the engine turned off prior to PID vapor analysis and VOC sample collection.

- Ambient odors, vehicle exhaust, precipitation, or windy/dusty conditions can potentially interfere with obtaining representative samples. These conditions should be minimized and should be recorded in the field notes. Shield sample bottles from strong winds, rain, and dust when being filled.

- The outlet from the sampling device should discharge below the top of the sample's air/water interface, when possible. The sampling plan should specify how the samples will be transferred from the sample collection device to the sample container to minimize sample alterations.

- The order of sampling should be from the least contaminated to the most contaminated well to reduce the potential for cross contamination of sampling equipment (see the Sampling Plan or Work Plan).

- Samples should not be transferred from one sampling container to another.

- Sampling equipment must not be placed on the ground, because the ground may be contaminated and soil contains trace metals. Equipment and supplies should be removed from the field vehicle only when needed.

- Smoking and eating should not be allowed until the well is sampled and hands are washed with soap and water, due to safety and possibly sample contamination concerns. These activities should be conducted beyond a 15-foot radius of the well.

- No heat-producing or electrical instruments should be within 15 feet of the well, unless they are intrinsically safe, prior to PID vapor analysis.

- Minimize the amount of time that the sample containers remain open.

- Do not touch the inside of sample bottles or the groundwater sample as it enters the bottle. Disposable gloves may be a source of phthalates, which could be introduced into groundwater samples if the gloves contact the sample.

- Sampling personnel should use a new pair of disposable gloves for each well sampled to reduce the potential for exposure of the sampling personnel to contaminants and to reduce sample cross contamination. In addition, sampling personnel should change disposable gloves between purging and sampling operations at the same well.

- Sampling personnel should not use perfume, insect repellent, hand lotion, etc., when taking groundwater samples. If insect repellent must be used, then sampling personnel should not allow samples or sampling equipment to contact the repellent, and it should be noted in the documentation that insect repellent was used.

- Complete the documentation of the well. A completed assemblage of paperwork for a sampling event includes the completed field forms, entries in the Project Field Book (with a sewn binding), transportation documentation (if required), and possibly chain-of-custody forms.

ATTACHMENTS

Groundwater Well Purge & Sample Collection Log (sample)

REFERENCES

1. Wilson, Neal. *Soil Water and Ground Water Sampling*, 1995

TurnKey FOPs:

007 Calibration and Maintenance of Portable Dissolved Oxygen Meter
008 Calibration and Maintenance of Portable Field pH/Eh Meter
009 Calibration and Maintenance of Portable Field Turbidity Meter
011 Calibration and Maintenance of Portable Photoionization Detector
012 Calibration and Maintenance of Portable Specific Conductance Meter
022 Groundwater Level Measurement
023 Groundwater Purging Procedures Prior to Sample Collection (optional)
031 Low Flow (Minimal Drawdown) Groundwater Purging & Sampling Procedures (optional)
040 Non-Disposable and Non-Dedicated Sampling Equipment Decontamination
046 Sample Labeling, Storage and Shipment Procedures

TurnKey Environmental Restoration, LLC

GROUNDWATER WELL PURGE & SAMPLE COLLECTION LOG

Project Name:	WELL NUMBER:
Project Number:	Sample Matrix:
Client:	Weather:

WELL DATA:

DATE:	TIME:
Casing Diameter (inches):	Casing Material:
Screened interval (fbTOR):	Screen Material:
Static Water Level (fbTOR):	Bottom Depth (fbTOR):
Elevation Top of Well Riser (fmsl):	Ground Surface Elevation (fmsl):
Elevation Top of Screen (fmsl):	Stick-up (feet):

PURGING DATA:

DATE:	START TIME:	END TIME:		
Method:	Is purge equipement dedicated to sample location?		yes	no
No. of Well Volumes Purged:	Was well purged to dryness?		yes	no
Standing Volume (gallons):	Was well purged below top of sand pack?		yes	no
Volume Purged (gallons):	Condition of Well:			
Purge Rate (gal/min):	Field Personnel:			

VOLUME CALCULATION:

(A) Total Depth of Well (fbTOR):	
(B) Casing Diameter (inches):	
(C) Static Water Level (fbTOR):	
One Well Volume (V, gallons): $V = 0.0408\ [\ (B)^2\ \times \{\ (A) - (C)\ \}\ ]$	

* Use the table to the right to calculate one well volume by subtracting C from A, then multiplying by the volume calculation in the table per well diamter.

Volume Calculation

Well Diameter	Volume gal/ft
1"	0.041
2"	0.163
3"	0.367
4"	0.653
5"	1.020
6"	1.469

Stabilization Criteria

Parameter	Criteria	
pH	+/-	0.1 unit
SC	+/-	3%
Turbidity	+/-	10%
DO	+/-	0.3 mg/L
ORP	+/-	10 mV

EVACUATION STABILIZATION TEST DATA:

Time	Water Level (fbTOR)	Accumulated Volume (gallons)	pH (units)	Temperature (deg. C)	Specific Conductance (uS/cm)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor
	Initial	0.0							

SAMPLING DATA:

DATE:	START TIME:	END TIME:		
Method:	Is sampling equipement dedicated to sample location?		yes	no
Initial Water Level (fbTOR):	Was well sampled to dryness?		yes	no
Final Water Level (fbTOR):	Was well sampled below top of sand pack?		yes	no
Air Temperature (^oF):	Field Personnel:			
Source and type of water used in the field for QC purposes:				

PHYSICAL & CHEMICAL DATA:

DESCRIPTION OF WATER SAMPLE		
Odor		
Color		
NAPL		
Contains Sediment?	yes	no

WATER QUALITY MEASUREMENTS

Sample	Time	pH (units)	TEMP. (^oC)	SC (uS)	TURB. (NTU)	DO (ppm)	ORP (mV)
initial							
final							

REMARKS:

PREPARED BY:

Field Operating Procedures

Hollow Stem Auger (HSA) Drilling Procedures

HOLLOW STEM AUGER (HSA) DRILLING PROCEDURES

PURPOSE

This guideline presents a method for drilling a borehole through unconsolidated materials, including soils or overburden, and consolidated materials, including bedrock.

PROCEDURE

The following procedure will be used to drill a borehole for sampling and/or well installation, using hollow-stem auger methods and equipment.

1. Follow TurnKey's Field Operating Procedure for Drill Site Selection Procedure prior to implementing any drilling activity.

2. Perform drill rig safety checks with the driller by completing the Drilling Safety Checklist form (sample attached).

3. Conduct tailgate health and safety meeting with project team and drillers by completing the Tailgate Safety Meeting Form.

4. Calibrate air-monitoring equipment in accordance with the appropriate TurnKey's Field Operating Procedures or manufacturers recommendations for calibration of field meters.

5. Ensure all drilling equipment (i.e., augers, rods, split-spoons) appear clean and free of soil prior to initiating any subsurface intrusion. Decontamination of drilling equipment should be in accordance with TurnKey's FOP: Drilling and Excavation Equipment Decontamination Procedures.

6. Mobilize the auger rig to the site and position over the borehole.

7. Level and stabilize the rig using the rig jacks, and recheck the rig location against the planned drilling location. If necessary, raise the jacks and adjust the rig position.

8. Place a metal or plywood auger pan over the borehole location to collect the auger cuttings. This auger pan will be equipped with a 12-inch nominal diameter hole for auger passage. As an alternative, a piece of polyethylene tarp may be used as a substitute.

9. Advance augers into the subsurface. For sampling or pilot-hole drilling, nominal 8-inch outside diameter (OD) augers should be used. The boring diameter will be approved by the TurnKey field supervisor.

10. Collect soil samples via split spoon sampler in accordance with TurnKey's Field Operating Procedure for Split Spoon Sampling.

11. Check augers periodically during drilling to ensure the boring is plumb. Adjust rig position as necessary to maintain plumb.

12. Continue drilling until reaching the assigned total depth, or until auger refusal occurs. Auger refusal is when the drilling penetration drops below 0.1 feet per 10 minutes, with the full weight of the rig on the auger bit, and a center <u>bit</u> (not center plug) in place.

13. Plug and abandon boreholes not used for well installation in accordance with TurnKey's Field Operating Procedure for Abandonment of Borehole.

OTHER PROCEDURAL ISSUES

- Slip rings may be used for lifting a sampling or bit string. The string will not be permitted to extend more than 15 feet above the mast crown.

- Borings will not be over drilled (rat holed) without the express permission of the TurnKey field supervisor. All depth measurements should be accurate to the nearest 0.1 foot, to the extent practicable.

- Potable water may be placed in the auger stem if critically necessary for borehole control or to accomplish sampling objectives. This will be performed only with the express permission of the TurnKey field supervisor.

ATTACHMENTS

Drilling Safety Checklist (sample)
Tailgate Safety Meeting Form (sample)

REFERENCES

TurnKey FOPs:

001 *Abandonment of Borehole Procedures*
010 *Calibration and Maintenance of Portable Flame Ionization Detector*
011 *Calibration and Maintenance of Portable Photoionization Detector*
017 *Drill Site Selection Procedure*
018 *Drilling and Excavation Equipment Decontamination Procedures*
058 *Split Spoon Sampling Procedures*

DRILLING SAFETY CHECKLIST

Project:	Date:
Project No.:	Drilling Company:
Client:	Drill Rig Type:

ITEMS TO CHECK	OK	ACTION NEEDED
“Kill switches” installed by the manufacturer are in operable condition and all workers at the drill site are familiar with their location and how to activate them?		
“Kill switches” are accessible to workers on both sides of the rotating stem? NOTE: Optional based on location and number of switches provided by the manufacturer.		
Cables on drill rig are free of kinks, frayed wires, “bird cages” and worn or missing sections?		
Cables are terminated at the working end with a proper eye splice, either swaged Coupling or using cable clamps?		
Cable clamps are installed with the saddle on the live or load side? Clamps should not be alternated and should be of the correct size and number for the cable size to which it is installed. Clamps are complete with no missing parts?		
Hooks installed on hoist cables are the safety type with a functional latch to prevent accidental separation?		
Safety latches are functional and completely span the entire throat of the hook and have positive action to close the throat except when manually displaced for connecting or disconnecting a load?		
Drive shafts, belts, chain drives and universal joints shall be guarded to prevent accidental insertion of hands and fingers or tools.		
Outriggers shall be extended prior to and whenever the boom is raised off its cradle. Hydraulic outriggers must maintain pressure to continuously support and stabilize the drill rig even while unattended.		
Outriggers shall be properly supported on the ground surface to prevent settling into the soil.		
Controls are properly labeled and have freedom of movement? Controls should not be blocked or locked in an action position.		
Safeties on any device shall not be bypassed or neutralized.		
Controls shall be operated smoothly and cables and lifting devices shall not be jerked or operated erratically to overcome resistance.		
Slings, chokers and lifting devices are inspected before using and are in proper working order? Damaged units are removed from service and are properly tagged?		
Shackles and clevises are in proper working order and pins and screws are fully inserted before placing under a load?		
High-pressure hoses have a safety (chain, cable or strap) at each end of the hose section to prevent whipping in the event of a failure?		
Rotating parts of the drill string shall be free of sharp projections or hooks, which could entrap clothing or foreign objects?		

DRILLING SAFETY CHECKLIST

Project: Date:

ITEMS TO CHECK	OK	ACTION NEEDED
Wire ropes should not be allowed to bend around sharp edges without cushion material.		
The exclusion zone is centered over the borehole and the radius is equal or greater than the boom height?		
The work area around the borehole shall be kept clear of trip hazards and walking surfaces should be free of slippery material.		
Workers shall not proceed higher than the drilling deck without a fall restraining device and must attach the device in a manner to restrict fall to less than 6 feet.		
A fire extinguisher of appropriate size shall be immediately available to the drill crew. The drill crew shall have received annual training on proper use of the fire extinguisher.		
29 CFR 1910.333 © (3) Except where electrical distribution and transmission lines have been de-energized and visibly grounded, drill rigs will be operated proximate to, under, by, or near power lines only in accordance with the following: .333 © (3) (ii) 50 kV or less -minimum clearance is 10 ft. For 50 kV or over - 10ft. Plus ½ in. For each additional kV **TurnKey Policy: Maintain 20 feet clearance**		
29 CFR 1910.333 © (3) (iii) While the rig is in transit with the boom in the down position, clearance from energized power lines will be maintained as follows: Less than 50 kV - 4 feet 50 to 365 kV - 10 feet 365 to 720 kV - 16 feet		

Name: (printed)

Signed: Date:

TAILGATE SAFETY MEETING FORM

Project Name: Date: Time:

Project Number: Client:

Work Activities:

HOSPITAL INFORMATION:

Name:

Address: *City:* *State:* *Zip:*

Phone No.: *Ambulance Phone No.*

SAFETY TOPICS PRESENTED:

Chemical Hazards:

Physical Hazards: Slips, Trips, Falls

PERSONAL PROTECTIVE EQUIPMENT:

Activity:	*PPE Level:*	A	B	C	D
Activity:	*PPE Level:*	A	B	C	D
Activity:	*PPE Level:*	A	B	C	D
Activity:	*PPE Level:*	A	B	C	D
Activity:	*PPE Level:*	A	B	C	D

New Equipment:

Other Safety Topic (s): Environmental Hazards (aggressive fauna)
Eating, drinking, use of tobacco products is prohibited in the Exclusion Zone (EZ)

ATTENDEES

Name Printed	**Signatures**

Meeting conducted by:

Field Operating Procedures

Low-Flow (Minimal Drawdown) Groundwater Purging & Sampling Procedure

LOW FLOW (MINIMAL DRAWDOWN) GROUNDWATER PURGING & SAMPLING PROCEDURES

PURPOSE

This procedure describes the methods used for performing low flow (minimal drawdown) purging, also referred to as micro-purging, at a well prior to groundwater sampling to obtain a representative sample from the water-bearing zone. This method of purging is used to minimize the turbidity of the produced water. This may increase the representativeness of the groundwater samples by avoiding the necessity of filtering suspended solids in the field prior to preservation of the sample.

Well purging is typically performed immediately preceding groundwater sampling. The sample should be collected as soon as the parameters measured in the field (i.e., pH, specific conductance, dissolved oxygen, Eh, temperature, and turbidity) have stabilized.

PROCEDURE

1. Water samples should not be taken immediately following well development. Sufficient time should be allowed to stabilize the groundwater flow regime in the vicinity of the monitoring well. This lag time will depend on site conditions and methods of installation but may exceed one week.

2. Prepare the electronic water level indicator (e-line) in accordance with the procedures referenced in the TurnKey's Groundwater Level Measurement FOP and decontaminate the e-line probe and a lower portion of cable following the procedures referenced in the TurnKey's Non-disposable and Non-dedicated Sampling Equipment Decontamination FOP. Store the e-line in a protected area until use. This may include wrapping the e-line in clean plastic until the time of use.

3. Calibrate all sampling devices and monitoring equipment in accordance with manufacturer's recommendations, the site Quality Assurance Project Plan (QAPP) and/or Field Sampling Plan (FSP). Calibration of field

instrumentation should be followed as specified in TurnKey's Calibration and Maintenance FOP for each individual meter.

4. Inspect the well/piezometer for signs of vandalism or damage and record condition on the Groundwater Well Purge & Sample Collection Log form (sample attached). Specifically, inspect the integrity of the following: concrete surface seal, lock, protective casing and well cover, well casing and J-plug/cap. Report any irregular findings to the Project Manager.

5. Unlock and remove the well protective cap or cover and place on clean plastic to avoid introducing foreign material into the well.

6. Monitor the well for organic vapors using a PID, as per the Work Plan. If a reading of greater than 5 ppm is recorded, the well should be allowed to vent until levels drop below 5 ppm before proceeding with purging.

7. Lower the e-line probe slowly into the monitoring well and record the initial water level in accordance with the procedures referenced in TurnKey's Groundwater Level Measurement FOP. Refer to the construction diagram for the well to identify the screened depth.

8. Decontaminate all non-dedicated pump and tubing equipment following the procedures referenced in the TurnKey's Non-disposable and Non-dedicated Sampling Equipment Decontamination FOP.

9. Lower the purge pump or tubing (i.e., low-flow electrical submersible, peristaltic, etc.) slowly into the well until the pump/tubing intake is approximately in the middle of the screened interval. Rapid insertion of the pump will increase the turbidity of well water, and can increase the required purge time. This step can be eliminated if dedicated tubing is already within the well.

   Placement of the pump close to the bottom of the well will cause increased entrainment of solids, which may have settled in the well over time. Low-flow purging has the advantage of minimizing mixing between the overlying stagnant casing water and water within the screened interval. The objective of low-flow purging is to maintain a purging rate, which minimizes stress (drawdown) of the water level in the well. Low-flow refers to the velocity with which water enters the pump intake and that is imparted to the formation pore water in the immediate vicinity of the well screen.

10. Lower the e-line back down the well as water levels will be frequently monitored during purge and sample activities.

11. Begin pumping to purge the well. The pumping rate should be between 100 and 500 milliliters (ml) per minute (0.03 to 0.13 gallons per minute) depending on site hydrogeology. Periodically check the well water level with the e-line adjusting the flow rate as necessary to stabilize drawdown within the well. If possible, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 feet or less). If the water level exceeds 2 feet below static and declining, slow the purge rate until the water level generally stabilizes. Record each pumping rate and water level during the event.

    The low flow rate determined during purging will be maintained during the collection of analytical samples. At some sites where geologic heterogeneities are sufficiently different within the screened interval, high conductivity zones may be preferentially sampled.

12. Measure and record field parameters (pH, specific conductance, Eh, dissolved oxygen (DO), temperature, and turbidity) during purging activities. In lieu of measuring all of the parameters, a minimum subset could be limited to pH, specific conductance, and turbidity or DO.

    Water quality indicator parameters should be used to determine purging needs prior to sample collection in each well. Stabilization of indicator parameters should be used to determine when formation water is first encountered during purging. In general, the order of stabilization is pH, temperature, and specific conductance, followed by Eh, DO and turbidity. Performance criteria for determination of stabilization should be based on water-level drawdown, pumping rate and equipment specifications for measuring indicator parameters. An in-line flow through cell to continuously measure the above parameters may be used. The in-line device should be disconnected or bypassed during sample collection.

13. Purging will continue until parameters of water quality have stabilized. Record measurements for field indicator parameters (including water levels) at regular intervals during purging. The stability of these parameters with time can be used to guide the decision to discontinue purging. Proper adjustments must be made to stabilize the flow rate as soon as possible.

14. Record well purging and sampling data in the Project Field Book or on the attached Groundwater Well Purge & Sample Collection Log (sample attached). Measurements should be taken approximately every three to five minutes, or as merited given the rapidity of change.

15. Purging is complete when field indicator parameters stabilize. Stabilization is achieved after all field parameters have stabilized for three successive readings. Three successive readings should be within ± 0.1 units for pH, ± 3% for specific conductance, ± 10 mV for Eh, and ± 10% for turbidity and dissolved oxygen. These stabilization guidelines are provided for rough estimates only, actual site-specific knowledge may be used to adjust these requirements higher or lower.

    An in-line water quality measurement device (e.g., flow-through cell) should be used to establish the stabilization time for several field parameters on a well-specific basis. Data on pumping rate, drawdown and volume required for parameter stabilization can be used as a guide for conducting subsequent sampling activities.

16. Collect all project-required samples from the discharge tubing at the flow rate established during purging in accordance with TurnKey's Groundwater Sample Collection Procedures FOP. **If a peristaltic pump and dedicated tubing is used, collect all project-required samples from the discharge tubing as stated before, however volatile organic compounds should be collected in accordance with the procedure presented in the next**

section. Continue to maintain a constant flow rate such that the water level is not drawn down as described above. Fill sample containers with minimal turbulence by allowing the ground water to flow from the tubing along the inside walls of the container.

17. If field filtration is recommended as a result of increased turbidity, an in-line filter equipped with a 0.45-micron filter should be utilized.

18. Replace the dedicated tubing down the well taking care to avoid contact with the ground surface.

19. Restore the well to its capped/covered and locked condition.

20. Upon purge and sample collection completion, slowly lower the e-line to the bottom of the well/piezometer. Record the total depth to the nearest 0.01-foot and compare to the previous total depth measurement. If a significant discrepancy exists, re-measure the total depth. Record observations of purge water to determine whether the well/piezometer had become silted due to inactivity or damaged (i.e., well sand within purge water). Upon confirmation of the new total depth and determination of the cause (i.e., siltation or damage), notify the Project Manager following project field activities.

Peristaltic Pump VOC Sample Collection Procedure

The collection of VOCs from a peristaltic pump and dedicated tubing assembly shall be collected using the following procedure.

1. Once all other required sample containers have been filled, turn off the peristaltic pump. The negative pressure effects of the pump head have not altered groundwater remaining within the dedicated tubing assembly and as such, this groundwater can be collected for VOC analysis.

2. While maintaining the pressure on the flexible tubing within the pump head assembly, carefully remove and coil the polyethylene tubing from the well; taking care to prevent the tubing from coming in contact with the ground

surface and without allowing groundwater to escape or drain from the tubing intake.

3. Once the polyethylene tubing is removed, turn the variable speed control to zero and reverse the pump direction.

4. Slowly increase the pump rate allowing the groundwater within the polyethylene tubing to be "pushed" out of the intake end (i.e., positive displacement) making sure the groundwater within the tubing is not "pulled" through the original discharge end (i.e., negative displacement). Groundwater pulled through the pump head assembly CANNOT be collected for VOC analysis.

5. Slowly fill each VOC vial by holding the vial at a 45-degree angle and allowing the flowing groundwater to cascade down the side until the vial is filled with as minimal disturbance as possible. As the vial fills, slowly rotate the vial to vertical. **DO NOT OVERFILL THE VIAL, AS THE PRESERVATIVE WILL BE LOST.** The vial should be filled only enough so that the water creates a slight meniscus at the vial mouth.

6. Cap the VOC vials leaving no visible headspace (i.e., air-bubbles). Gently tap each vial against your hand checking for air bubbles.

7. If an air bubble is observed, slowly remove the cap and repeat Steps 5 and 6.

ATTACHMENTS

Groundwater Well Purge & Sample Collection Log (sample)

REFERENCES

United States Environmental Protection Agency, 540/S-95/504, 1995. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures.*

TurnKey FOPs:

007 Calibration and Maintenance of Portable Dissolved Oxygen Meter
008 Calibration and Maintenance of Portable Field pH/Eh Meter
009 Calibration and Maintenance of Portable Field Turbidity Meter
011 Calibration and Maintenance of Portable Photoionization Detector
012 Calibration and Maintenance of Portable Specific Conductance Meter
022 Groundwater Level Measurement
024 Groundwater Sample Collection Procedures
040 Non-Disposable and Non-Dedicated Sampling Equipment Decontamination
046 Sample Labeling, Storage and Shipment Procedures

TurnKey Environmental Restoration, LLC

LOW FLOW METHOD GROUNDWATER PURGE & SAMPLE COLLECTION LOG

Project Name:	WELL LOCATION:
Project Number:	Sample Matrix: groundwater
Client:	Weather:

WELL DATA:

DATE:	TIME:

Casing Diameter (inches):	Casing Material:
Screened interval (fbTOR):	Screen Material:
Static Water Level (fbTOR):	Bottom Depth (fbTOR):
Elevation Top of Well Riser (fmsl):	Ground Surface Elevation (fmsl):
Elevation Top of Screen (fmsl):	Stick-up (feet):
Standing volume in gallons:	
[(bottom depth - static water level) x vol calculation in table per well diameter]:	

Volume Calculation

Well Diameter	Volume gal/ft
1"	0.041
2"	0.163
3"	0.367
4"	0.653
5"	1.020
6"	1.469

PURGING DATA:

Pump Type:

Is equipment dedicated to location? yes no	Is tubing dedicated to location? yes no
Depth of Sample (i.e. Level of Intake) (fbTOR):	Approximate Purge Rate (gal/min):

Time	Water Level (fbTOR)	Accumulated Volume (gallons)	pH (units)	Temperature (degrees C)	Specific Conductance (µS/cm)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor
	Initial								

SAMPLING DATA:

DATE:	START TIME:	END TIME:

Method: low-flow with dedicated tubing	Was well sampled to dryness? yes no
Initial Water Level (fbTOR):	Was well sampled below top of sand pack? yes no
Final Water Level (fbTOR):	Field Personnel:

PHYSICAL & CHEMICAL DATA:

Appearance:
Color:
Odor:
Sediment Present?

WATER QUALITY MEASUREMENTS

pH (units)	TEMP. (°C)	SC (uS)	TURB. (NTU)	DO (ppm)	ORP (mV)

REMARKS:

PREPARED BY:

FIELD OPERATING PROCEDURES

TurnKey Environmental Restoration, LLC

Management of Investigation-Derived Waste (IDW)

MANAGEMENT OF INVESTIGATION-DERIVED WASTE (IDW)

PURPOSE

The purpose of these guidelines is to ensure the proper holding, storage, transportation, and disposal of materials generated from field investigation activities that may contain hazardous wastes. Investigation-derived waste (IDW) include 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.

Because these materials may contain regulated chemical constituents, they must be managed as a solid waste. This management may be terminated if characterization analytical results indicate the absence of these constituents.

PROCEDURE

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 TurnKey Field Team Leader. 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, date of generation, using TurnKey's IDW container label (sample attached). Use indelible ink for all labeling.

7. Complete the Investigative Derived Waste Container Log (sample attached) as waste containers are labeled in order to track and inventory project waste. Leave a copy of the log with the site manager or fax copy to the owner/operator as necessary.

8. Collect samples for waste characterization purposes, or use boring/well sample analytical data for characterization.

9. For wastes determined to be hazardous in character, **be aware of accumulation time limitations**. Coordinate the disposal of these wastes with the plant manager/owner/operator, if applicable.

10. 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 the Property or otherwise treated as a non-waste material as directed by the plant manager/owner/operator or Project Manager.

- 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.

WASTE STORAGE MANAGEMENT

Hazardous materials generated on site should be temporarily stored in a secure location that is under the control of the owner/operator or does not allow for vandalism (i.e., within a locked building structure or within a locked fenced in area). A waste-staging area should be designated on-site by the Project Manager in conjunction with the owner/operator.

ATTACHMENTS

Investigation Derived Waste Container Log (sample)
Investigation Derived Waste Container Label (sample)

REFERENCES

None

INVESTIGATION DERIVED WASTE CONTAINER LOG

Project Name: Location:

Project Number: Personnel:

Container		Contents	Date		Staging Location	Date Sampled	Comments
Number	Description		Started	Ended			

Prepared By:

Signed:

IDW Container Label (sample):

TurnKey Environmental Restoration, LLC

Project Name:
Project Number:

Container I.D.:
Contents/Matrix:
Estimated Quantity:
Date of Generation:
Date of Sample Collection:

Contact Name:
Contact Phone Number:

Field Operating Procedures

Monitoring Well Construction for Hollow Stem Auger Boreholes

MONITORING WELL CONSTRUCTION FOR HOLLOW STEM AUGER BOREHOLES

PURPOSE

Wells will be installed within selected boreholes for the purpose of evaluating groundwater characteristics. Well installation procedures depend upon the drilling method. This procedure describes well construction and installation for boreholes drilled using the hollow stem auger method. Refer to the TurnKey's Hollow Stem Auger Drilling Procedures FOP. Nominal dimensions and materials for the well are shown in the attached well construction diagram.

PROCEDURE

1. Advance borehole in accordance with the TurnKey's Hollow Stem Auger Drilling Procedure FOP to the required depth. The nominal inside diameter (ID) of the auger stem used should be at least 2 inches larger than the outside diameter (OD) of the riser and screen selected for the well installation. Record the monitoring well construction on the Field Borehole/Monitoring Well Installation Log (sample attached) (see Documentation Requirements for Drilling and Well Installation FOP).

2. Remove the drill rods and center bit/plug from the auger stem and verify borehole depth using weighted measuring tape.

3. In the event of an over drill (i.e. borehole depth is more than one foot greater than desired base of screen depth), use bentonite chips poured through the auger stem to seal the over drilled portion of the borehole. Be sure to note bentonite chip thickness on Field Borehole/Monitoring Well Installation Log.

4. Add a maximum of 6 inches of filter pack material through the auger stem to the base of the borehole. (Note: This step may be avoided if dense non-aqueous phase liquids are suspected to be present and it is desirable to have the screen and/or sump at the base of the borehole.)

5. Measure the length of the well string (i.e. riser and screen), and lower the well string into the well assembly to the desired depth. All measurements during the well installation process will be accurate to 0.1 foot.

6. Surface pour filter pack material into the annulus between the well and the auger stem as the augers are gradually withdrawn from the borehole. Use a weighted tape to confirm that the level of sand is maintained within the augers at all times. Record material volumes used.

7. After filter pack materials are brought to the required level, surface pour bentonite chips or pellets into the annulus between the well and the auger stem to form the filter pack seal. If necessary to avoid bridging, delayed hydration (coated) pellets may be used. Record the volume of material used.

8. Allow the bentonite chips/pellets to adequately hydrate for approximately 30 to 45-minutes. Cap or cover the well top of riser.

9. Mix cement/bentonite grout to a smooth consistency using a centrifugal or reciprocating pump. Do not hand mix. All water used must be potable quality. Record the volume of water used.

10. Fill the remaining annulus between the well and the auger stem with grout by surface pouring or pumping, and begin withdrawal of the auger string. Periodically top the auger string off with additional grout. If groundwater is present within the annulus above the bentonite chip/pellet seal, cement/bentonite grout will be pressure tremie grouted from bottom to top in order to displace groundwater from the borehole.

11. When the auger string is withdrawn, center the upper portion of the well riser within the borehole, and place drums or barricades around the well for protection while the grout cures. Place and lock a security cap (i.e., J-plug) in the opening of the well riser.

12. Leave the well undisturbed for at least 24 hours to allow the grout to cure. If excessive grout fallback occurs, top off as necessary with bentonite chips or additional grout.

13. Construct the surface completion as shown in the attached Typical Monitoring Well Detail (Figure 1). Select flush completions for all locations in active operational or high traffic areas, or in other areas where an above grade completion would be undesirable. Use aboveground completions in all other areas.

14. Place a dedicated lock on the well or protective casing, and keep well locked when not actively attended.

15. Permanently label the well with the appropriate well identifier as determined by the Project Manager or specified in the Work Plan.

16. Permanently mark a survey location on the north side at the top of the casing with a saw cut. Survey all wells for horizontal location and elevation, using a surveyor licensed by the State of New York. Coordinates and elevations will be provided in a coordinate system consistent with previous well surveys at the Site. Information obtained will include location (*x* and *y*) of the well, and elevation (*z*) of the ground surface, the pad, and the top of riser.

17. Develop the well as described in the TurnKey's Field Operating Procedure for Monitoring Well Development.

18. Manage all waste materials generated during well installation and development as described in the TurnKey's Field Operating Procedure for Management of Investigation Derived Waste.

ATTACHMENTS

Field Borehole/Monitoring Well Installation Log (sample)
Typical Monitoring Well Detail (Figure 1)

REFERENCES

TurnKey FOPs:

015 *Documentation Requirements for Drilling and Well Installation*
026 *Hollow Stem Auger Drilling Procedures*
032 *Management of Investigation Derived Waste*
036 *Monitoring Well Development Procedures*

TurnKey Environmental Restoration, LLC

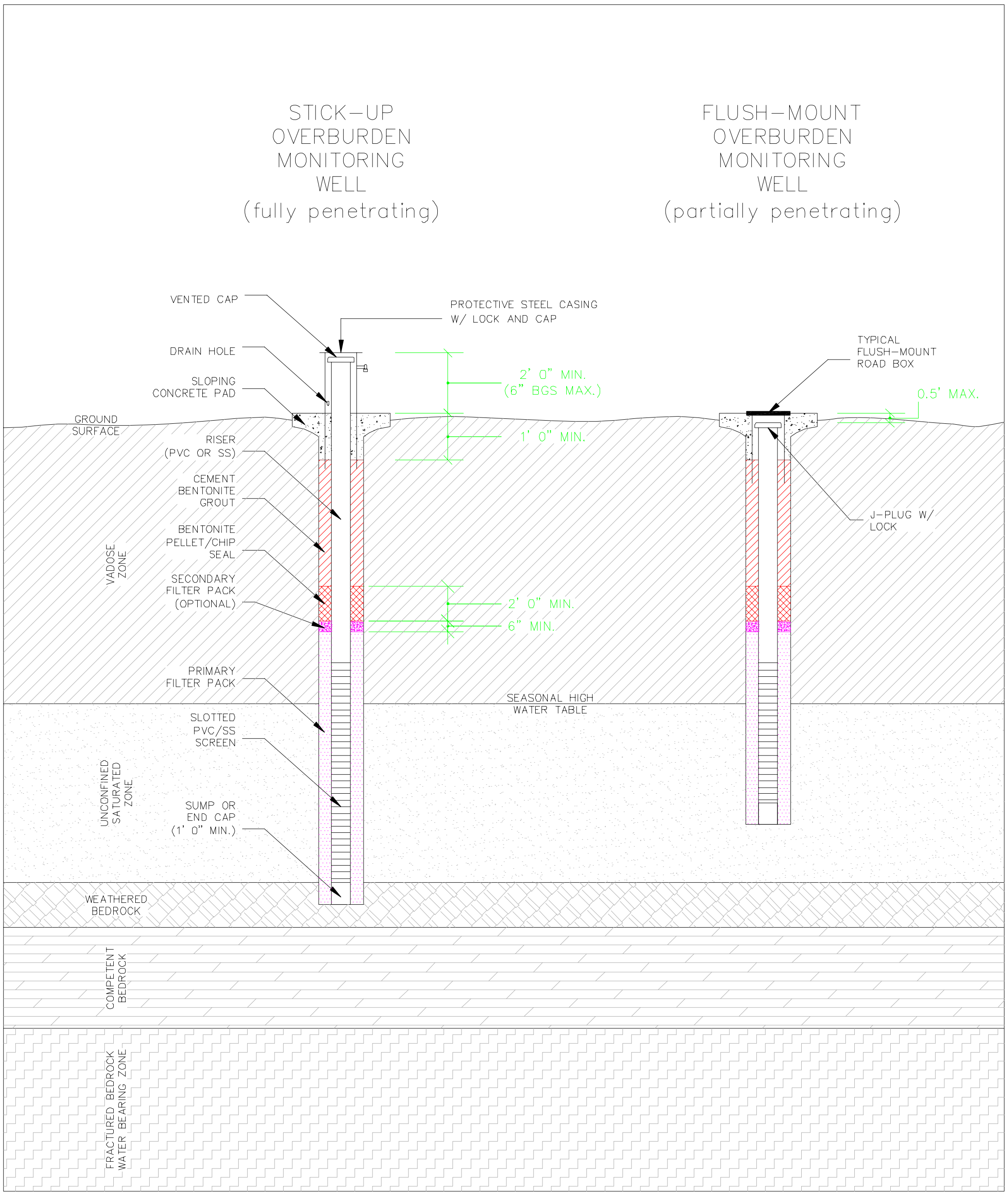
FIELD BOREHOLE/MONITORING WELL INSTALLATION LOG

PROJECT:		**Log of Well No.:**	
BORING LOCATION:		ELEVATION AND DATUM:	
DRILLING CONTRACTOR:		DATE STARTED:	DATE FINISHED:
DRILLING METHOD:		TOTAL DEPTH:	SCREEN INTERVAL:
DRILLING EQUIPMENT:		DEPTH TO WATER: FIRST: COMPL.:	CASING:
SAMPLING METHOD:		LOGGED BY:	
HAMMER WEIGHT:	DROP:	RESPONSIBLE PROFESSIONAL:	REG. NO.

Depth (fbgs)	SAMPLES: Sample No.	Sample	Blows (per 6")	SPT N-Value	Recovery	PID Scan (ppm)	SAMPLE DESCRIPTION USCS Classification: Color, Moisture Condition, % of Soil Type, Texture, Plasticity, Fabric, Bedding, Weathering/Fracturing, Odor, Other SURFACE ELEVATION (FMSL):	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

Project No:	**TurnKey Environmental Restoration, LLC**	Figure

FIGURE 1


STICK-UP OVERBURDEN MONITORING WELL (fully penetrating)
FLUSH-MOUNT OVERBURDEN MONITORING WELL (partially penetrating)
VENTED CAP
PROTECTIVE STEEL CASING W/ LOCK AND CAP
DRAIN HOLE
SLOPING CONCRETE PAD
GROUND SURFACE
RISER (PVC OR SS)
CEMENT BENTONITE GROUT
BENTONITE PELLET/CHIP SEAL
SECONDARY FILTER PACK (OPTIONAL)
PRIMARY FILTER PACK
SLOTTED PVC/SS SCREEN
SUMP OR END CAP (1' 0" MIN.)
2' 0" MIN. (6" BGS MAX.)
1' 0" MIN.
2' 0" MIN.
6" MIN.
TYPICAL FLUSH-MOUNT ROAD BOX
0.5' MAX.
J-PLUG W/ LOCK
SEASONAL HIGH WATER TABLE
VADOSE ZONE
UNCONFINED SATURATED ZONE
WEATHERED BEDROCK
COMPETENT BEDROCK
FRACTURED BEDROCK WATER BEARING ZONE

TurnKey Environmental Restoration, LLC

FIELD OPERATING PROCEDURES

Monitoring Well Development Procedures

FOP 036.0

MONITORING WELL DEVELOPMENT PROCEDURES

PURPOSE

This procedure describes the methods for the development of newly installed monitoring wells and re-development of existing monitoring wells that have been inactive for an extended period of time (i.e., one year or more). Monitoring wells are developed after installation in order to remove introduced water and drilling fluids, reduce the turbidity of the water, and improve the hydraulic communication between the well and the water-bearing formation. Well development will not commence until the annular grout seal has cured, but will be performed within ten calendar days of well installation.

PROCEDURE

1. All well development will include surge blocking or false bailing with one or more of the following fluid removal methods. Well development activities may include:

   - Bailing
   - Air Lifting
   - Submersible Pumping
   - Other methods as approved by the TurnKey Field Team Leader.
   - The appropriate water removal method will be selected based on water level depth and anticipated well productivity.

2. Assemble and decontaminate equipment (if necessary), and place in the well. Reference the TurnKey's Field Operating Procedure for Non-Disposable and Non-Dedicated Sampling Equipment Decontamination.

3. Alternate the use of agitation methods with water removal methods, using the former to suspend solids in the well water, and the latter to remove the turbid water. For example, use a vented surge block to agitate the well, moving up and down within the screened interval and then use a pump to clear the well. A bailer may be used for both purposes, by surging with the bailer (false

bailing) for a period within the screened interval, then bailing a volume of water from the well.

4. When using surging methods, initiate this activity gradually, with short (2 to 3 feet) strokes. After several passes across the screened interval, increase the speed and length of the surge strokes.

5. Continue development until the following objectives are achieved:

   - Field parameters stabilize to the following criteria:
     - Dissolved Oxygen: ± 0.3 mg/L
     - Turbidity: ± 10%
     - Specific Conductance: ± 3%
     - ORP: ± 10 mV
     - pH: ± 0.1 units
   - The well will generate non-turbid water during continued pumping typically less than 50 NTU.
   - A minimum of 10 well volumes has been evacuated from the well.
   - In the case of lost water during drilling activities, the volume of water removed exceeds twice the volume of water lost to the formation during the drilling process, as indicated by the water balance.

6. Document the development methods, volumes, field parameter measurements, and other observations on the attached Groundwater Well Development Log (sample attached).

ATTACHMENTS

Groundwater Well Development Log (sample)

REFERENCES

<u>TurnKey FOPs:</u>
040 Non-Disposable and Non-Dedicated Sampling Equipment Decontamination

GROUNDWATER WELL DEVELOPMENT LOG

Project Name:	WELL NUMBER:
Project Number:	Sample Matrix:
Client:	Weather:

WELL DATA: DATE: TIME:

Casing Diameter (inches):	Casing Material:
Screened interval (fbTOR):	Screen Material:
Static Water Level (fbTOR):	Bottom Depth (fbTOR):
Elevation Top of Well Riser (fmsl):	Datum Ground Surface: Mean Sea Level
Elevation Top of Screen (fmsl):	Stick-up (feet):

PURGING DATA: DATE: START TIME: END TIME:

VOLUME CALCULATION:

(A) Total Depth of Well (fbTOR):	
(B) Casing Diameter (inches):	
(C) Static Water Level (fbTOR):	
One Well Volume (V, gallons): $V = 0.0408 [(B)^2 \times \{ (A) - (C) \}]$	

*Use the table to the right to calculate one well volume.

Field Personnel:

Volume Calculation

Well Diameter	Volume gal/ft
1"	0.041
2"	0.163
3"	0.367
4"	0.653
5"	1.020
6"	1.469
8"	2.611

Stabilization Criteria

Parameter	Criteria
DO	+/- 0.3 mg/L
Turbidity	+/- 10%
SC	+/- 3%
ORP	+/- 10 mV
pH	+/- 0.1 unit

EVACUATION STABILIZATION TEST DATA:

Time	Water Level (fbTOR)	Accumulated Volume (gallons)	pH (units)	Temperature (degrees C)	Specific Conductance (mS/cm)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor

REMARKS:

PREPARED BY:

FIELD OPERATING PROCEDURES

TURNKEY ENVIRONMENTAL RESTORATION, LLC

NAPL Detection and Sample Collection Procedure

NON-AQUEOUS PHASE LIQUID DETECTION AND SAMPLE COLLECTION PROCEDURE

PURPOSE

This procedure describes the methods to detect the presence and sample collection of Non-Aqueous Phase Liquid (NAPL) in groundwater monitoring wells prior to purging activities. If NAPL is suspected, all activities should be performed with proper personnel protective equipment (PPE).

DETECTION PROCEDURE

Groundwater monitoring wells suspected of containing NAPL will be sounded with an interface probe, or similar device, in accordance with the following.

1. Remove the locking and protective caps from the well suspected of containing NAPL.

2. Screen the ambient air in the well headspace for organic vapors using either a photoionization detector (PID) or an organic vapor analyzer (OVA) and record measurements. The organic vapor detection device should be calibrated in accordance with the TurnKey's Field Operating Procedure for Calibration and Maintenance of Portable PIDs.

3. Slowly lower an interface probe down the well, avoiding contact with the well casing. Upon contact with the static liquid level in the well, the interface probe will signal contact with an audible tone and/or a visible light mounted inside the reel.

   Note:
   - If the signal is constant, the probe is in contact with groundwater; and
   - If the signal oscillates, the probe is in contact with NAPL.

4. Record the depth, type of liquid encountered (if applicable) and any other related information in the Project Field Book and on a Groundwater Sample Collection Log form (sample attached).

5. Slowly lower the interface probe to the well bottom. Record the depth(s) and type(s) of any additional phases encountered.

6. Slowly raise the interface probe to the surface, avoiding contact with the well casing.

7. Place the interface probe and storage reel in a plastic bag for subsequent decontamination in accordance with the TurnKey's Field Operating Procedure for Non-Disposable and Non-Dedicated Sampling Equipment Decontamination.

SAMPLE COLLECTION PROCEDURE

All NAPL samples collected from groundwater monitoring wells will be collected in accordance with the following.

1. Place plastic sheeting on the ground around the well to prevent equipment from coming in contact with soil and also to prevent the surface transmission of NAPL.

2. All sampling personnel will don the appropriate PPE in accordance with the site health and safety plan.

3. Measure the static water level and NAPL level(s) using an interface probe as described in the previous section.

4. Determine depth to NAPL layer and thickness. Record appropriate data in the Project Field Book and on a Groundwater Sample Collection Log form (sample attached).

DNAPL Sample Collection

The following procedure should be used in sampling dense, heavier than water NAPL (i.e., with a high specific gravity) (DNAPL).

1. Collect samples using a translucent double check valve bailer (i.e., a bailer with a ball valve on both the top and bottom) constructed of Teflon, polyethylene or PVC which is connected to polypropylene rope for lowering into the well. All non-dedicated equipment shall be decontaminated in accordance with the TurnKey's Field Operating Procedure for Non-Disposable and Non-Dedicated Sampling Equipment Decontamination.

2. Remove wrapping (i.e., aluminum foil, manufacturers packaging etc.), attach bailer to new polypropylene rope and slowly lower the bailer until it contacts the well bottom.

3. Slowly raise and lower the bailer to create a gentle surging action thereby inducing DNAPL into the bailer past the bottom ball valve.

4. Slowly raise the bailer to the surface. Avoid contact of the bailer line with the well casing and/or ground surface.

5. Observe the DNAPL through the translucent wall of the bailer and check if the immiscible phases have separated. If not, allow the bailer to stand upright until the phases have separated.

6. Carefully attach a bottom-emptying device with stopcock to the bottom of the bailer and discharge the DNAPL gently down the side of the sample bottle to minimize turbulence.

7. Repeat steps 2 through 6 until a sufficient sample volume is obtained.

8. Cap the sample bottle and label, preserve and ship samples in accordance with the TurnKey's Field Operating Procedure for Sample Labeling, Storage and Shipment Procedures.

9. Place the used plastic sheeting, bailer and polyethylene rope in a plastic bag for subsequent decontamination or disposal.

10. Document the sampling procedures and related information in the Project Field Book and on a Groundwater Sample Collection Log form (sample attached).

LNAPL Sample Collection

The following procedure should be used in sampling lighter than water NAPL (i.e., with a low specific gravity) (LNAPL).

1. Collect samples using a translucent double check valve bailer (i.e., a bailer with a ball valve on both the top and bottom) constructed of Teflon, polyethylene or PVC which is connected to polypropylene rope for lowering into the well. All non-dedicated equipment shall be decontaminated in accordance with the TurnKey's Field Operating Procedure for Non-Disposable and Non-Dedicated Sampling Equipment Decontamination.

2. Remove wrapping (i.e., aluminum foil, manufacturers packaging etc.), attach bailer to new polypropylene rope and slowly lower the bailer down the well into the immiscible phase of LNAPL. Care should be taken to lower the bailer just through the LNAPL layer, but not significantly down into the underlying groundwater.

3. Slowly raise the bailer to the surface. Avoid contact of the bailer line with the well casing and/or ground surface.

4. Observe the LNAPL through the translucent wall of the bailer and check if the immiscible phases have separated. If not, allow the bailer to stand upright until the phases have separated.

5. Carefully attach a bottom-emptying device with stopcock to the bottom of the bailer and decant the denser groundwater portion of the bailer contents into a DOT-approved 55-gallon drum for proper disposal.

6. Discharge the LNAPL gently down the side of the sample bottle to minimize turbulence.

7. Repeat steps 2 through 6 until a sufficient sample volume is obtained.

8. Cap the sample bottle and label, preserve and ship samples in accordance with the TurnKey's Field Operating Procedure for Sample Labeling, Storage and Shipment Procedures.

9. Place the used plastic sheeting, bailer and polyethylene rope in a plastic bag for subsequent decontamination or disposal.

10. Document the sampling procedures and related information in the Project Field Book and on a Groundwater Sample Collection Log form (sample attached).

ATTACHMENTS

Groundwater Well Purge & Sample Collection Log (sample)

REFERENCES

<u>TurnKey FOPs:</u>

010 Calibration and Maintenance of Portable Flame Ionization Detector
011 Calibration and Maintenance of Portable Photoionization Detector
040 Non-Disposable and Non-Dedicated Sampling Equipment Decontamination
046 Sample Labeling, Storage and Shipment Procedures

TurnKey Environmental Restoration, LLC

GROUNDWATER WELL
PURGE & SAMPLE COLLECTION LOG

Project Name:	WELL NUMBER:
Project Number:	Sample Matrix:
Client:	Weather:

WELL DATA:

DATE:	TIME:
Casing Diameter (inches):	Casing Material:
Screened interval (fbTOR):	Screen Material:
Static Water Level (fbTOR):	Bottom Depth (fbTOR):
Elevation Top of Well Riser (fmsl):	Ground Surface Elevation (fmsl):
Elevation Top of Screen (fmsl):	Stick-up (feet):

PURGING DATA:

DATE:	START TIME:	END TIME:		
Method:	Is purge equipement dedicated to sample location?		yes	no
No. of Well Volumes Purged:	Was well purged to dryness?		yes	no
Standing Volume (gallons):	Was well purged below top of sand pack?		yes	no
Volume Purged (gallons):	Condition of Well:			
Purge Rate (gal/min):	Field Personnel:			

VOLUME CALCULATION:

(A) Total Depth of Well (fbTOR):	
(B) Casing Diameter (inches):	
(C) Static Water Level (fbTOR):	
One Well Volume (V, gallons): $V = 0.0408 [(B)^2 \times \{ (A) - (C) \}]$	

* Use the table to the right to calculate one well volume by subtracting C from A, then multiplying by the volume calculation in the table per well diamter.

Volume Calculation

Well Diameter	Volume gal/ft
1"	0.041
2"	0.163
3"	0.367
4"	0.653
5"	1.020
6"	1.469

Stabilization Criteria

Parameter	Criteria
pH	+/- 0.1 unit
SC	+/- 3%
Turbidity	+/- 10%
DO	+/- 0.3 mg/L
ORP	+/- 10 mV

EVACUATION STABILIZATION TEST DATA:

Time	Water Level (fbTOR)	Accumulated Volume (gallons)	pH (units)	Temperature (degrees C)	Specific Conductance (mS/cm)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor
	Initial	0.0							

SAMPLING DATA:

DATE:	START TIME:	END TIME:		
Method:	Is sampling equipement dedicated to sample location?		yes	no
Initial Water Level (fbTOR):	Was well sampled to dryness?		yes	no
Final Water Level (fbTOR):	Was well sampled below top of sand pack?		yes	no
Air Temperature (^oF):	Field Personnel:			
Source and type of water used in the field for QC purposes:				

PHYSICAL & CHEMICAL DATA:

DESCRIPTION OF WATER SAMPLE		
Odor		
Color		
NAPL		
Contains Sediment?	yes	no

WATER QUALITY MEASUREMENTS

Sample	Time	pH (units)	TEMP. (^oC)	SC (uS)	TURB. (NTU)	DO (ppm)	ORP (mV)
initial							
final							

REMARKS:

PREPARED BY:

TurnKey Environmental Restoration, LLC

Field Operating Procedures

Sample Labeling, Storage, and Shipment Procedures

FOP 046.0

SAMPLE LABELING, STORAGE & SHIPMENT PROCEDURES

PURPOSE

The collection and analysis of samples of environmental media, including soils, groundwater, surface water, and sediment, are the central activities of the field investigation. These samples must be properly labeled to preserve its identity, and properly stored and shipped in a manner that preserves its integrity and chain of custody. This procedure presents methods for these activities.

SAMPLE LABELING PROCEDURE

1. Assign each sample retained for analysis a unique 9-digit alphanumeric identification code or as indicated in the Project Work Plan. Typically, this code will be formatted as follows:

Sample I.D. Example: GW051402047	
GW	**Sample matrix** GW = groundwater; SW = surface water; SUB = subsurface soil; SS = surface soil; SED = sediment; L = leachate; A = air
05	Month of sample collection
14	Day of sample collection
02	Year of sample collection
047	Consecutive sample number

2. Consecutive sample numbers will indicate the individual sample's sequence in the total set of samples collected during the investigation/sampling event. The sample number above, for example, would indicate the 47th sample retained for analysis during the field investigation, collected on May 14, 2002.

3. Affix a non-removable (when wet) label to each sample container. The following information will be written on the label with black or blue ink that will not smudge when wet:

   - Project number
   - Sample ID (see Step 1 above)
   - Date of sample collection
   - Time of sample collection (military time only)
   - Specify "grab" or "composite" sample with an "X"
   - Sampler initials
   - Preservative(s) (if applicable)
   - Analytes for analysis (if practicable)

4. Record all sample label information in the Project Field Book and on a Sample Summary Collection Log (see attached samples), keyed to the sample identification number. In addition, add information regarding the matrix, sample location, depth, etc. to provide a complete description of the sample.

SAMPLE STORAGE PROCEDURE

1. Immediately after collection, placement in the proper container, and labeling, place samples to be retained for chemical analysis into resealable plastic bags.

2. Place bagged samples into an ice chest filled approximately half-full of double bagged ice. Blue ice is not an acceptable substitute for ice.

3. Maintain samples in an ice chest or in an alternative location (e.g. sample refrigerator) as approved by the TurnKey Field Team Leader until time of shipment. Periodically drain melt-water off coolers and replenish ice as necessary.

4. Ship samples on a daily basis, unless otherwise directed by the TurnKey Field Team Leader.

5. Maintain appropriate custody procedures on coolers and other sample storage containers at all times. These procedures are discussed in detail in the Project Quality Assurance Project Plan, Monitoring Plan or Work Plan.

6. Samples shall be kept in a secure location locked and controlled (i.e., locked building or fenced area) so that only the Project Field Team Leader has access to the location or under the constant visual surveillance of the same.

SAMPLE SHIPPING PROCEDURE

1. Fill out the chain-of-custody form completely (see attached sample) with all relevant information. The white original goes with the samples and should be placed in a resealable plastic bag and taped inside the sample cooler lid; the sampler should retain the copy.

2. Place a layer of inert cushioning material such as bubble pack in the bottom of cooler.

3. Place each bottle in a bubble wrap sleeve or other protective wrap. To the extent practicable, then place each bottle in a resealable plastic bag.

4. Open a garbage bag (or similar) into a cooler and place sample bottles into the garbage bag (or similar) with volatile organic analysis (VOA) vials near the center of the cooler.

5. Pack bottles with ice in plastic bags. At packing completion, cooler should be at least 50 percent ice, by volume. Coolers should be completely filled, so that samples do not move excessively during shipping.

6. Duct tape (or similar) cooler drain closed and wrap cooler completely in two or more locations to secure lid, specifically covering the hinges of the cooler.

7. Place laboratory label address identifying cooler number (i.e., 1 of 4, 2 of 4 etc.) and overnight delivery waybill sleeves on cooler lid or handle sleeve (Federal Express).

8. Sign the custody seal tape with an indelible soft-tip marker and place over the duct tape across the front and back seam between the lid and cooler body.

9. Cover the signed custody seal tape with an additional wrap of transparent strapping tape.

10. Place "Fragile" and "This Side Up" labels on all four sides of the cooler. "This Side Up" labels are yellow labels with a black arrow with the arrowhead pointing toward the cooler lid.

11. For coolers shipped by overnight delivery, retain a copy of the shipping waybill, and attach to the chain-of-custody documentation.

ATTACHMENTS

Soil/Sediment Sample Summary Collection Log (sample)
Groundwater/Surface Water Sample Summary Collection Log (sample)
Wipe Sample Summary Collection Log (sample)
Air Sample Summary Collection Log (sample)
Chain-Of-Custody Form (sample)

REFERENCES

None

SOIL/SEDIMENT
SAMPLE COLLECTION SUMMARY LOG

Field ID	Location	QC Type	Depth (feet)		Analytical Parameters	Containers	Date	Time	Sampler Initials	Comments (e.g. problems encountered, ref. to variance, location changes, depth changes, important matrix observations or description, gravel thickness, etc.)
			from	to						

Equipment Rinsate Blanks *- Pour clean deionized water over or through decontaminated sampling equipment into sample containers. Collect at a frequency of 1 per sampling method per day. Analyze for all those parameters analyzed for in the samples collected the same day. HSL Metals can be substituted by only the Metals analyzed for that day (except Hexavalent Chromium which needs a separate container). Match equipment used for constituents of concern to rinsate analyte. Note deionized water lot # or distilled water manufacturers info & date.*

MS/MSD/MSB *- Collect at a frequency of 1 per 20 samples of each matrix per day. Analyze for all those parameters analyzed for the samples collected the same day.*

Field Blank *- Pour clean deionized water (used as final decon rinse water) into sample containers while at the sampling site. Collect field blanks at a frequency of 1 per lot of deionized water. Note water lot number and dates in use for decon in 'Comments' section.*

Investigation Derived Waste (IDW) Characterization samples *- One composited sample from all drums of decon fluids and soil. Please note number of drums and labels on collection log.*

Notes:
1. See QAPP for sampling frequency and actual number of QC samples.
2. CWM - clear, wide-mouth glass jar with Teflon-lined cap.
3. HDPE - high density polyethylene bottle.
4. MS/MSD/MSB - Matrix Spike, Matrix Spike Duplicate, Matrix Spike Blank.
5. BD - Blind Duplicate - indicate location of duplicate.

GROUNDWATER/SURFACE WATER SAMPLE COLLECTION SUMMARY LOG

Field ID	Location	QC Type	Depth (feet)		Analytical Parameters	Containers	Date	Time	Sampler Initials	Comments (e.g. problems encountered, ref. to variance, location changes, depth changes, important matrix observations or description, gravel thickness, etc.)
			from	to						

Equipment Rinsate Blanks *- Pour clean deionized water over or through decontaminated sampling equipment into sample containers. Collect at a frequency of 1 per sampling method per day. Analyze for all those parameters analyzed for in the samples collected the same day. TAL Metals can be substituted by only the Metals analyzed for that day (except Hexavalent Chromium which needs a separate container). Match equipment used for constituents of concern to rinsate analyte. Note deionized water lot # or distilled water manufacturers info & date.*

MS/MSD/MSB *- Collect at a frequency of 1 per 20 samples of each matrix per day. Analyze for all those parameters analyzed for the samples collected the same day.*

Field Blank *- Pour clean deionized water (used as final decon rinse water) into sample containers while at the sampling site. Collect field blanks at a frequency of 1 per lot of deionized water. Note water lot number and dates in use for decon in 'Comments' section.*

Investigation Derived Waste (IDW) Characterization samples *- One composited sample from all drums of decon fluids and soil. Please note number of drums and labels on collection log.*

Notes:

1. See QAPP for sampling frequency and actual number of QC samples.
2. CWM - clear, wide-mouth glass jar with Teflon-lined cap.
3. HDPE - high density polyethylene bottle.
4. FD - Field Duplicate.
5. MS/MSD/MSB - Matrix Spike, Matrix Spike Duplicate, Matrix Spike Blank.
6. BD - Blind Duplicate.

WIPE SAMPLE COLLECTION SUMMARY LOG

Field ID	Location	QC Type	Analytical Parameters	Containers	Date	Time	Sampler Initials	Comments (e.g. problems encountered, ref. to variance, location changes, important observations or descriptions, etc.)

Notes:
1. See QAPP for sampling frequency and actual number of QC samples.
2. CWM - clear, wide-mouth glass jar with Teflon-lined cap.
3. FD - Field Duplicate.
4. FB - Field Blank.
5. RS - Rinsate.
6. No Matrix Spike, Matrix Spike Duplicate or Matrix Spike Blanks for wipe samples.
7. Rinsates should be taken at a rate of 1 per day during wipe sampling. Only take when reusable equipment is used.
8. Wipe sample FB collected by wiping unused glove (and any other sampling equipment coming into contact with sampled surface) with prepared gauze pad and place in sample jar. Take at a rate of 1 FB per 20 samples.
9. Wipe sample FDs taken adjacent to original sample at a rate of 1 FD per 20 samples.
10. **EH :** Extract and Hold

AIR SAMPLE COLLECTION SUMMARY LOG

Field ID	Location	QC Type	Analytical Parameters	Containers	Date	Time	Sampler Initials	Comments (e.g. problems encountered, ref. to variance, location changes, important observations or descriptions, etc.)

Notes:
1. See QAPP for sampling frequency and actual number of QC samples.
2. SC - Summa Canister.
3. TB - Tedlar Bag (quantity).
4. No Matrix Spike, Matrix Spike Duplicate, Matrix Spike Blanks, Field Duplicates, Field Blanks or Rinsates collected for air samples.

TurnKey Environmental Restoration, LLC

CHAIN OF CUSTODY RECORD

Project No.	Project Name					Number of Containers	VOCs	SVOCs	Metals						REMARKS
Samplers (Signature)															
No.	Date	Time	comp	grab	Sample Identification										

Possible Hazard Identification:
☐ Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal:
Return to Client ☐ Disposal by Lab ☐ Archive ______________(mos.)

Turnaround Time Required:
Normal ☐ Rush ☐

QC Level:
I. ☐ II. ☐ III. ☐ Project Specific (specify):____________________

Relinquished by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	REMARKS:
Relinquished by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	

TurnKey Environmental Restoration, LLC

Field Operating Procedures

Screening of Soil Samples for Organic Vapors During Drilling Activities

SCREENING OF SOIL SAMPLES FOR ORGANIC VAPORS DURING DRILLING ACTIVITIES

PURPOSE

This procedure is used to screen soil samples for the presence of volatile organic constituents (VOCs) using a field organic vapor meter. These meters will be either photoionization detector (PID) or flame-ionization detector (FID) type. This screening is performed at the drilling and sampling location as a procedure for ensuring the health and safety of personnel at the site and to identify potentially contaminated soil samples for laboratory analysis. All soil samples will be field screened to provide a vertical profile of soil contamination by volatile organic substances.

PROCEDURE

1. Calibrate air-monitoring equipment in accordance with the appropriate TurnKey's Field Operating Procedures or manufacturers recommendations for calibration of field meters.

2. Collect split-spoon (or other sampler) samples in accordance with TurnKey's Split Spoon Sampling Procedure FOP.

3. When the split-spoon or other sampler is opened or accessed, shave a thin layer of material from the entire length of the core.

4. Scan the core visually and with the PID or FID noting stratification, visible staining, or other evidence of contamination.

5. Based on this initial scan of the sample, collect approximately 100 milliliters (ml) of soil using a decontaminated or dedicated stainless steel spatula, scoop, or equivalent. Place this soil into a labeled wide-mouth glass jar approximately ½ to ¾ full and seal with aluminum foil and a screw top cap. Alternatively, the soil may be placed into a clean, re-sealable plastic bag and sealed. Be sure to leave some headspace above the soil sample within the sealed container.

6. Place field screening sample (i.e., jar or bag) in a location where the ambient temperature is at least 70° Fahrenheit.

7. Leave the field screening sample bag for at least 30 minutes, but no more than 60 minutes.

8. Carefully remove the screw top cap from the jar and slowly insert the tip of the organic vapor meter (PID or FID) through the aluminum foil seal making the smallest hole possible. Alternatively, unseal a portion of the plastic bag just big enough to insert the probe of a calibrated PID.

9. Record the maximum reading in parts per million by volume (ppmv) on the Field Borehole Log or Field Borehole/Monitoring Well Installation Log form (see attached samples) (see Documentation Requirements for Drilling and Well Installation FOP), at the depth interval corresponding to the depth of sample collection.

ATTACHMENTS

Field Borehole Log (sample)
Field Borehole/Monitoring Well Installation Log (sample)

REFERENCES

<u>TurnKey FOPs:</u>
010 *Calibration and Maintenance of Portable Flame Ionization Detector*
011 *Calibration and Maintenance of Portable Photoionization Detector*
015 *Documentation Requirements for Drilling and Well Installation*
058 *Split Spoon Sampling Procedures*

FIELD BOREHOLE LOG

PROJECT:		**Log of Boring No.:**	
BORING LOCATION:		ELEVATION AND DATUM:	
DRILLING CONTRACTOR:		DATE STARTED:	DATE FINISHED:
DRILLING METHOD:		TOTAL DEPTH:	SCREEN INTERVAL:
DRILLING EQUIPMENT:		DEPTH TO WATER: FIRST: COMPL.:	CASING:
SAMPLING METHOD:		LOGGED BY:	
HAMMER WEIGHT:	DROP:	RESPONSIBLE PROFESSIONAL:	REG. NO.

Depth (fbgs)	SAMPLES					PID Scan (ppm)	SAMPLE DESCRIPTION	REMARKS
	Sample No.	Sample	Blows (per 6")	SPT N-Value	Recovery		USCS Classification: Color, Moisture Condition, % of Soil Type, Texture, Plasticity, Fabric, Bedding, Weathering/Fracturing, Odor, Other SURFACE ELEVATION (FMSL):	

ABANDONMENT:

Volume of cement/bentonite grout required:	V = pr2 x 7.48 =	gallons	borehole depth = ft.
Volume of cement/bentonite grout installed:		gallons	borehole diameter = ft.
Has bridging of grout occurred?	☐ yes ☐ no		borehole radius = ft.
If yes, explain resolution:			
Method of installation:			
Project No:	**TurnKey Environmental Restoration, LLC**		Figure

TurnKey Environmental Restoration, LLC

FIELD GEOPROBE BOREHOLE \ TEMPORARY WELL INSTALLATION LOG

PROJECT:		Log of Temp. Well No.:			
BORING LOCATION:		ELEVATION AND DATUM:			
DRILLING CONTRACTOR:		DATE STARTED:			DATE FINISHED:
DRILLING METHOD:		TOTAL DEPTH:			SCREEN INTERVAL:
DRILLING EQUIPMENT:		DEPTH TO WATER:	FIRST:	COMPL.:	CASING:
SAMPLING METHOD:		LOGGED BY:			
HAMMER WEIGHT:	DROP:	RESPONSIBLE PROFESSIONAL:			REG. NO.

Depth (fbgs)	SAMPLES Sample No.	Sample	Blows (per 6")	SPT N-Value	Recovery	PID Scan (ppm)	SAMPLE DESCRIPTION USCS Classification: Color, Moisture Condition, % of Soil Type, Texture, Plasticity, Fabric, Bedding, Weathering/Fracturing, Odor, Other SURFACE ELEVATION (FMSL):	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

Project No:	TurnKey Environmental Restoration, LLC	Figure

FIELD OPERATING PROCEDURES

Soil Description Procedures Using the USCS

SOIL DESCRIPTION PROCEDURES USING THE UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

PURPOSE

This guideline presents a means for insuring consistent and proper field identification and description of collected soils during a project (via, split-spoon (barrel) sampler, hand auger, test pit etc.). The lithology and moisture content of each soil sample will be physically characterized by visual observation in accordance with Bureau of Reclamation Standards as modified from the Unified Soil Classification System (USCS). This method of soil characterization describes soil types based on grain size and liquid and plastic limits and includes moisture content. This FOP is fairly consistent with ASTM Designation: D 2488 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)." When using this FOP to classify soil, the detail of description provided for a particular material should be dictated by the complexity and objectives of the project. However, more often than not, "after the fact" field information is required later in the project, therefore, every attempt to describe the soil as completely as possibly should be made.

Intensely weathered or decomposed rock that is friable and can be reduced to gravel size or smaller by normal hand pressure should be classified as a soil. The soil classification would be followed by the parent rock name in parenthesis. Projects requiring depth to bedrock determinations should always classify weathered or decomposed bedrock as bedrock (i.e., landfill siting). The project manager should always be consulted prior to making this determination.

PROCEDURE

Assemble necessary equipment and discuss program requirements with drilling contractor.

1. Calibrate air-monitoring equipment in accordance with the appropriate TurnKey's Field Operating Procedures or manufacturers recommendations for calibration of field meters.

2. Collect desired soil sample in accordance with appropriate TurnKey's FOP (i.e., split-spoon sampling, hand augering, test pitting etc.).

3. Shave a thin layer off the entire length of the sample to expose fresh sample.

4. Photograph and scan the sample with a photoionization detector (PID) at this time, if applicable, in accordance with TurnKey's Screening of Soil Samples for Organic Vapors During Drilling Activities FOP.

5. Describe the sample using terminology presented in the Descriptive Terms section below.

6. Record all pertinent information in the Project Field Book and Field Borehole Log (sample attached) or Field Borehole/Monitoring Well Installation Log (sample attached).

7. After the sample has been described, place a representative portion of the sample in new, precleaned jars for archival purposes. Label the jar with a sample identification number, sample interval, date, project number and store in a secure location.

8. If the soil is to be submitted to a laboratory for analysis, collect the soil sample with a dedicated stainless steel sampling tool, place the sample into the appropriate laboratory-supplied containers, and store in an ice-chilled cooler staged in a secure location in accordance with TurnKey's Sample Labeling, Storage and Shipment Procedures FOP.

9. All remaining soil from soil sample collection activities shall be containerized in accordance with TurnKey's Management of Investigative-Derived Waste (IDW) FOP and/or the Project Work Plan.

DESCRIPTIVE TERMS

All field soil samples will be classified in accordance with the Unified Soil Classification System (USCS) (modified from ASTM D2488) presented in Figures 1 and 2 (attached) and using the descriptive terms detailed in this section. It is desirable to supplement the USCS classification with a geologic interpretation of the soil sample that is supported by the soil descriptive terms presented in this section as well as the attached Figures.

Use the following descriptive terms when classifying soils:

- **Group Name** (USCS, see Figure 2)
- **Group Symbol** (USCS, see Figure 2)
- **Angularity** (ASTM D2488; Table 1)
  - Angular – particles have sharp edges and relatively planar sides with unpolished surfaces
  - Subangular – particles are similar to angular description but have rounded edges
  - Subrounded – particles have nearly planar sides but have well-rounded corners and edges
  - Rounded – particles have smoothly curved sides and no edges
- **Particle Shape** (ASTM D2488; Table 2)
  - Flat – particles with width/thickness > 3
  - Elongated – particles with length/width > 3
  - Flat and Elongated – particles meet criteria for both flat and elongated
- **Moisture Condition** (ASTM D2488; Table 3)
  - Dry – absence of moisture, dusty, dry to the touch
  - Moist – damp, but no visible water

  - Wet – visible free water, usually soil is below water table
- **Reaction with Hydrochloric Acid (HCl)** (ASTM D2488; Table 4)
  - None – no visible reaction
  - Weak – some reaction, with bubbles forming slowly
  - Strong – violent reaction, with bubbles forming immediately
- **Consistency of Cohesive Soils** (ASTM D2488; Table 5)
  - Very soft – squeezes between fingers when fist is closed; easily penetrated several inches by fist
  - Soft – easily molded by fingers; easily penetrated several inches by thumb
  - Firm – molded by strong pressure of fingers; can be penetrated several inches by thumb with moderate effort
  - Stiff – dented by strong pressure of fingers; readily indented by thumb but can be penetrated only with great effort
  - Very stiff – readily indented by thumbnail
  - Hard – indented with difficulty by thumbnail
- **Cementation** (ASTM D2488; Table 6)
  - Weak – crumbles or breaks with handling or slight finger pressure
  - Moderate – crumbles or breaks with considerable finger pressure
  - Strong – will not crumble or break with finger pressure
- **Structure (Fabric)** (ASTM D2488; Table 7)
  - Varved – alternating 1 mm to 12 mm (0.04 – 0.5 inch) layers of sand, silt and clay
  - Stratified – alternating layers of varying material or color with the layers less than 6 mm (0.23 inches) thick; note thickness
  - Laminated – alternating layers of varying material or color with the layers less than 6 mm (0.23 inches) thick; note thickness
  - Fissured – contains shears or separations along planes of weakness

  - Slickensided – shear planes appear polished or glossy, sometimes striated
  - Blocky – cohesive soil that can be broken down into small angular lumps which resist further breakdown
  - Lensed – inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness
  - Homogeneous – same color and appearance throughout

- **Inorganic Fine-Grained Soil Characteristics** (ASTM D2488; Table 12)
  - Dry Strength (ASTM D2488; Table 8)
    - None – the dry specimen crumbles with the slightest pressure of handling
    - Low – the dry specimen crumbles with some finger pressure
    - Medium – the dry specimen breaks into pieces or crumbles with considerable finger pressure
    - High – the dry specimen cannot be broken with finger pressure. The specimen will break into pieces between the thumb and a hard surface.
    - Very High – the dry specimen cannot be broken between the thumb and a hard surface
  - Dilatency (ASTM D2488; Table 9)
    - None – no visible change in the specimen
    - Slow – water slowly appears on the surface of the specimen during shaking and does not disappear or disappears slowly upon squeezing
    - Rapid – water quickly appears on the surface of the specimen during shaking and disappears upon squeezing
  - Toughness (ASTM D2488; Table 10)
    - Low – only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and very soft.
    - Medium – medium pressure is required to roll the thread to near the plastic limit. The thread and the lump are soft.

- High – considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump are firm.

- **Plasticity** (ASTM D2488; Table 11)
  - Nonplastic – a 3 mm (0.12 inches) thread cannot be rolled at any water content
  - Low Plasticity – the thread can barely be rolled, and crumbles easily
  - Medium Plasticity – the thread is easy to roll and not much time is required to reach the plastic limit before crumbling
  - High Plasticity – it takes considerable time rolling and kneading to reach the plastic limit; the thread can be rolled several times before crumbling
- **Relative Density of Cohesionless (Granular) Soils**
  - Very loose – easily penetrated 30 cm (1.2 inches) with 13 mm (0.5 inch) rebar pushed by hand
  - Loose – easily penetrated several cm with 13 mm (0.5 inch) rebar pushed by hand
  - Medium dense – easily to moderately penetrated with 13 mm (0.5 inch) rebar driven by 2.3 kg (6 pound) hammer
  - Dense – penetrated 0.3 m (1 foot) with difficulty using 13 mm (0.5 inch) rebar driven by 2.3 kg (6 pound) hammer
  - Very dense – penetrated only a few cm with 13 mm (0.5 inch) rebar driven by 2.3 kg (6 pound) hammer
- **Color** (use Munsel® Color System)
- **Particle Size** (see Figure 3)
  - Boulder – larger than a basketball
  - Cobble – grapefruit, orange, volleyball
  - Coarse Gravel – tennis ball, grape
  - Fine Gravel – pea
  - Coarse Sand – rock salt

  - Medium Sand – opening in window screen
  - Fine Sand – sugar, table salt
  - Fines (silt and clay) – cannot visually determine size (unaided)

- **Gradation**
  - Well Graded (GW, SW) – full range and even distribution of grain sizes present
  - Poorly-graded (GP, SP) – narrow range of grain sizes present
  - Uniformly-graded (GP, SP) – consists predominantly of one grain size
  - Gap-graded (GP-SP) – within the range of grain sizes present, one or more sizes are missing

- **Organic Material** – Organic soils usually have a dark brown to black color and may have an organic odor. Often, organic soils will change color, for example, black to brown, when exposed to the air. Some organic soils will lighten in color significantly when air-dried. Organic soils normally will not have a high toughness or plasticity. The thread of the toughness test will be spongy.
  - PEAT – 50 to 100 percent organics by volume, primary constituent
  - Organic (soil name) – 15 to 50 percent organics by volume, secondary organic constituent
  - (Soil name) with some organics – 5 to 15 percent organics by volume, additional organic constituents

- **Fill Materials** – All soils should be examined to see if they contain materials indicative of man-made fills. Man-made fill items should be listed in each of the soil descriptions. Common fill indicators include glass, brick, dimensioned lumber, concrete, pavement sections, asphalt, metal, plastics, plaster etc. Other items that could suggest fill include buried vegetation mats, tree limbs, stumps etc. The soil description for a fill material should be followed by the term "FILL", i.e., for a sandy silt with some brick fragments the description would be "SANDY SILT (ML), with brick fragments (Fill)". The size and distribution of fill indicators should be noted. The limits (depth range) of fill material should be determined and identified at each exploration location.

- **Other Constituents/Characteristics**
  - Additional constituents and/or pertinent soil characteristics not included in the previous categories should be described depending on the scope and objectives of the project. Observations that may be discussed include:
    - Oxide staining
    - Odor
    - Origin
    - Presence of root cast
    - Presence of mica
    - Presence of gypsum
    - Presence of calcium carbonate
    - Percent by volume of cobbles & boulders with size description and appropriate rock classification
  - Other pertinent information from the exploratory program should be recorded, if it would be useful from a biddability/constructability perspective. The conditions that should be listed include caving or sloughing, difficulty in drilling and groundwater infiltration.

SOIL DESCRIPTIONS

Generally, soil descriptions presented in this FOP are not intended for civil engineering (construction) purposes, but rather for hydrogeologic and contaminant transport purposes. As such, the visual-manual tests performed are somewhat limited in that they are only performed in order to indicate important information about potential hydraulic properties of a soil. Therefore, at a minimum, soil descriptions should include:

- Color (using Munsell® charts) at moist condition, include mottling
- Field moisture condition;

- Percentage estimates of various grain sizes present (fines, sand, gravel);
- Plasticity (see Descriptive Terms section of this FOP);
- Consistency/Density (see Descriptive Terms section of this FOP);
- Other important geologic information such as consolidation, gravel size and shape, visible internal structure, root holes, mica, odors, etc.

Based on these data, and in conjunction with the flow charts provided in the ASTM Standard (see Figure 2), the soil is given a USCS group name and a two-letter symbol. If fill is identified, indicate the word FILL after the soil description (parenthetically).

The first step in this FOP is to determine if the sample is predominantly fine-grained or predominantly coarse-grained (see Figure 3). Coarse-grained soils are relatively easy to identify, however descriptions of fine-grained soils can be more difficult, requiring additional field tests to assist the field geologist arrive at the proper soils classification. These tests are explained in detail in the ASTM Standard. Generally, the differentiation between silt and clay is based on plasticity and "texture". However, tests for dry strength and dilatency, along with plasticity, can be very helpful and are recommended in the ASTM Standard. If additional tests are performed, in addition to plasticity, to classify the fines, record them with the soil description on the logs. Doing this will assist the reader (i.e., Project Manager) to follow the logic used to describe a soil (e.g., medium plasticity, <u>low</u> dry strength = elastic silt [MH]; not a lean clay [CL]).

Fines described in the classification should be modified by the plasticity (e.g., nonplastic fines, low plasticity fines, etc.) reserving the words "silt" and "clay" for the USCS group name. This applies to fine-grained and coarse-grained soils.

According to a note in the ASTM Standard, percentage of grain size can be estimated in ranges using the words "few", "little", "some" and "mostly". This FOP discourages the use of these modifiers based on practical reasons: (1) the range of percentages in a given word may cross a name designation on the flow charts used for classification, and (2) these words are meaningless to someone who does not have the obscure table in front of them for reference. Accordingly, this FOP encourages estimating grain sizes in percentages or range of percentages (e.g., "about or approximately 10% fine sand"; or "20-25% nonplastic fines). When estimating percentages of grain sizes, make sure that all of the estimates add up to 100%. Keep in mind, the "break over" percentages for fines in a coarse-grained soil and for sand or gravel in a fine-grained soil (refer to Figure 2). For example, do not say "10 to 20% nonplastic fines" when the "break over" occurs into a new USCS group name at 15% fines.

In summary, adhering to the ASTM Standard and the guidelines outlined in this FOP will provide uniformity in soil descriptions of field personnel. Pertinent criteria and their appropriate order are provided at the top of each boring log field sheet. Prior to mobilization to the field, field staff should make sure to have laminated copies of the ASTM Standard flow charts and tables as well as this FOP (as necessary). Some examples of complete soil descriptions are as follows:

Coarse-grained Soil

CLAYEY GRAVEL with SAND (GC): dark olive gray (5Y 3/2), wet, about 50% fine to coarse gravel, about 30% fine sand, about 20% low plasticity fines, subrounded gravel to 2-inch diameter of greenstone and chert.

Fine-grained Soil

LEAN CLAY with SAND (CL): dark olive gray (5Y 3/2), moist, about 80% fines, about 20% fine to medium sand, trace fine gravel, medium plasticity, firm, root holes.

BORING AND MONITORING WELL INSTALLATION LOGS

One of the most important functions of a boring/monitoring well installation log, besides transmitting the soil description, is to show where the "data" (soil samples) were collected, giving the reader an idea of how reliable or representative the description is. An example of a completed boring and monitoring well installation log is attached to this FOP.

On the example and sample logs, depths of attempted and recovered or non-recovered interval are shown. Do not include the "water level" symbol (inverted triangle) on the logs; instead, indicate the depth at which groundwater was first encountered and, as necessary, the depth to water at borehole/monitoring completion in the space provided on the log header. Also shown on the example and sample logs is the symbol for samples collected for chemical analysis and PID scan measurements. Odor, if noted, will be shown on the logs in the soil description; however, odor, if noted, is subjective and not necessarily indicative of specific compounds or concentrations. Also attached to this FOP is a disclaimer and log symbols used, which should be provided with each set of logs within the project final report.

Remember: field borehole/monitoring well installation logs should be NEAT, ACCURATE, and LEGIBLE. Don't forget that the well completion diagram completed for each well requires details of the surface completion (i.e., flush-mount, stick-up etc.). It is the responsibility of the field staff to double-check each log (i.e., percentages, classifications, well construction details etc.) prior to implementing into a final report. A registered professional (i.e., professional engineer, PE or professional geologist, PG) must review each log and will be ultimately responsible for its content and accuracy.

REQUIRED EQUIPMENT

- Knife
- Engineer's rule/measuring tape
- Permanent marker
- Pre-cleaned wide-mouth sample jars (typically provided by the driller)
- Pre-cleaned wide-mouth laboratory sample jars (provided by the laboratory)
- Stainless steel sampling equipment (i.e., spoons, spatulas, bowls etc.)
- 10x hand lens
- Hydrochloric acid
- ASTM D2488 flow charts (preferably laminated)
- ASTM D2488 test procedures (Tables 1 through 12) (preferably laminated)
- Camera (disposable, 35 mm or digital)
- Munsell soil color chart
- Project Field Book/field forms

ATTACHMENTS

Figure 1; Field Guide for Soil and Stratigraphic Analysis
Figure 2; USCS Soil Classification Flow Chart (modified from ASTM D2488)
Figure 3; Illustration of Particle Sizes

Field Borehole Log Explanation
Field Borehole Log (sample)
Field Borehole Log (completed example)
Field Borehole/Monitoring Well Installation Log Explanation
Field Borehole/Monitoring Well Installation Log (sample)
Field Borehole/Monitoring Well Installation Log (completed example)

REFERENCES

American Society for Testing and Materials, 2000. *ASTM D2488: Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*.

State of California, Department of Transportation, Engineering Service Center, Office of Structural Foundations, August 1996. *Soil & Rock Logging Classification Manual (Field Guide), by Joseph C. de Larios.*

TurnKey FOPs:

010 Calibration and Maintenance of Portable Flame Ionization Detector
011 Calibration and Maintenance of Portable Photoionization Detector
015 Documentation Requirements for Drilling and Well Installation
025 Hand Augering Procedures
032 Management of Investigation-Derived Waste
046 Sample Labeling, Storage and Shipment Procedures
047 Screening of Soil Samples for Organic Vapors During Drilling Activities
058 Split-Spoon Sampling Procedures
065 Test Pit Excavation and Logging Procedures

FIGURE 1

FIELD GUIDE FOR SOIL AND STRATIGRAPHIC ANALYSIS

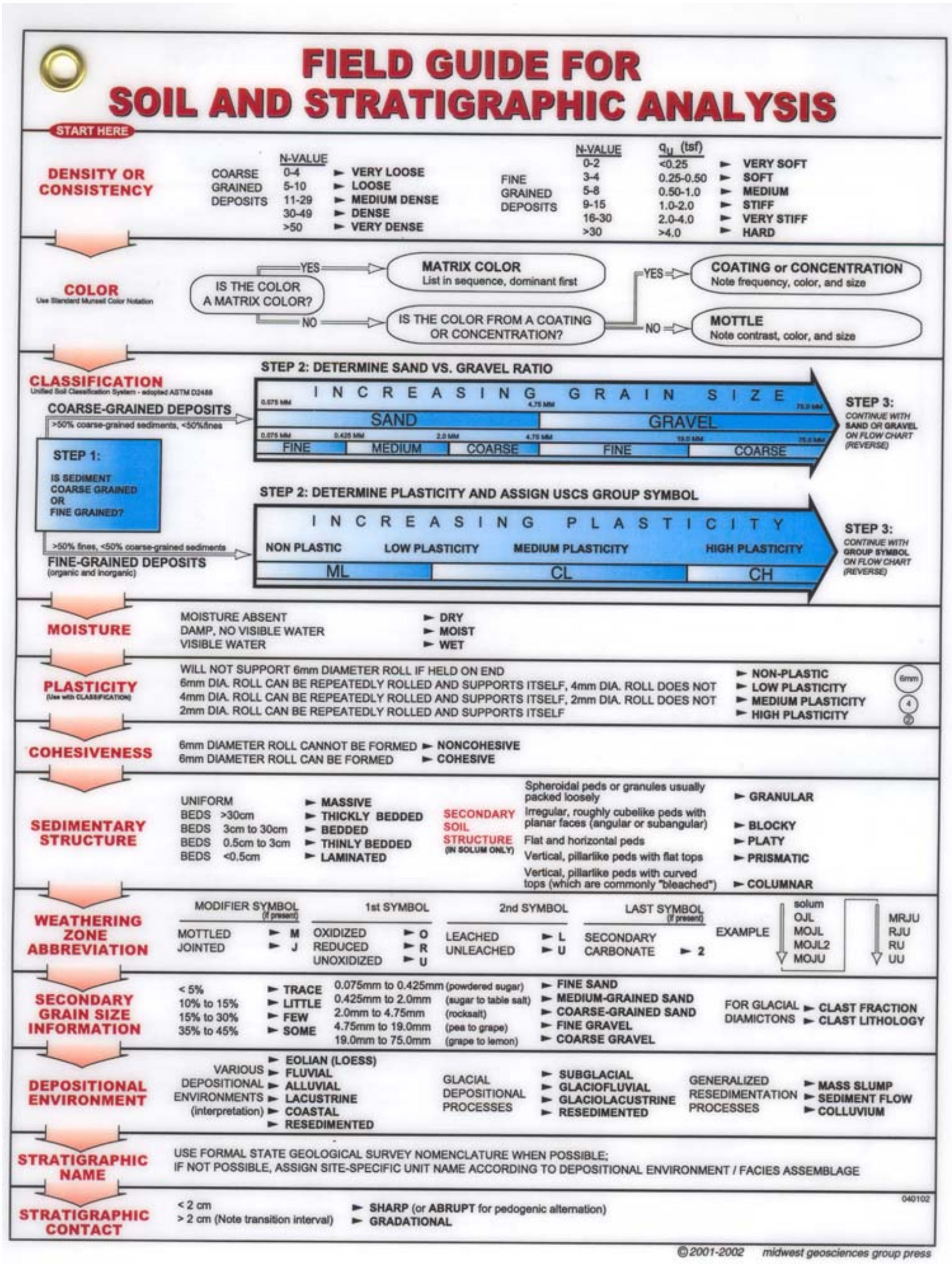


FIGURE 2

USCS SOIL CLASSIFICATION FLOW CHART
(MODIFIED FROM ASTM D2488)

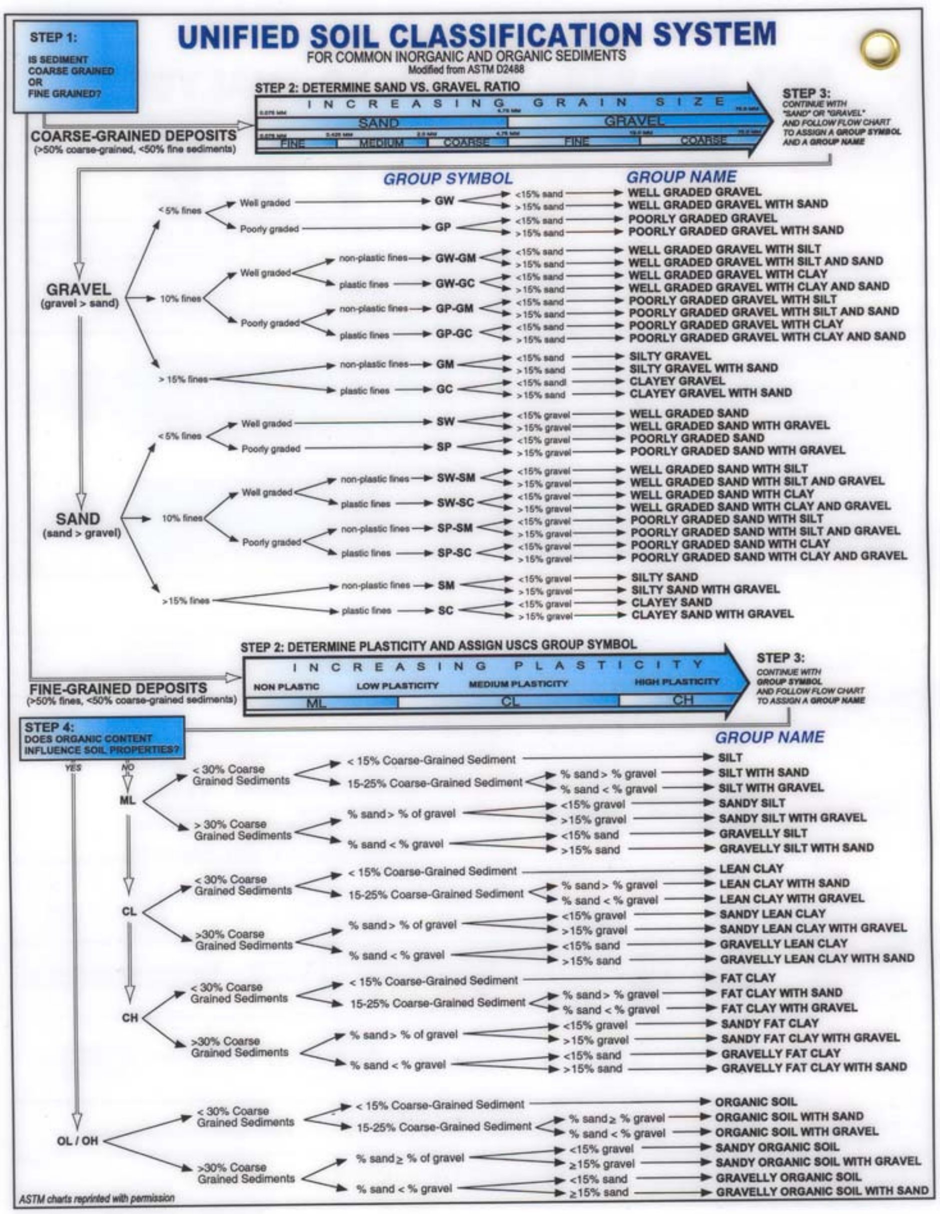
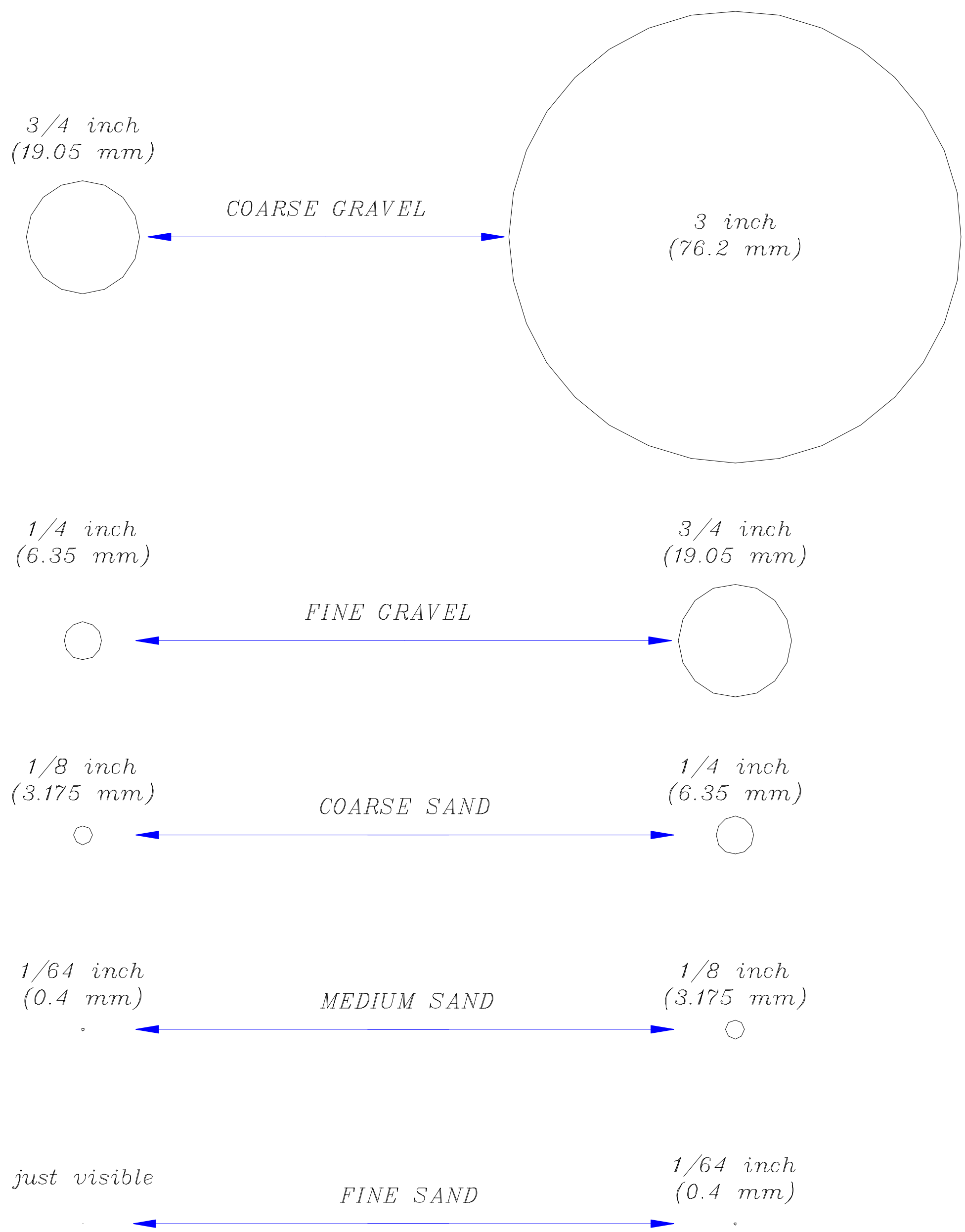


FIGURE 3

Illustration of Particle Sizes



FIELD BOREHOLE LOG

PROJECT:		**Borehole Log Explanation**	
BORING LOCATION:		ELEVATION AND DATUM:	
DRILLING CONTRACTOR:		DATE STARTED:	DATE FINISHED:
DRILLING METHOD:		TOTAL DEPTH:	SCREEN INTERVAL:
DRILLING EQUIPMENT:		DEPTH TO WATER: FIRST: COMPL.:	CASING:
SAMPLING METHOD:		LOGGED BY:	
HAMMER WEIGHT:	DROP:	RESPONSIBLE PROFESSIONAL:	REG. NO.

Depth (fbgs)	SAMPLES: Sample No.	Sample	Blows (per 6")	SPT N-Value	Recovery	PID Scan (ppm)	SAMPLE DESCRIPTION USCS Classification: Color, Moisture Condition, % of Soil Type, Texture, Plasticity, Fabric, Bedding, Weathering/Fracturing, Odor, Other SURFACE ELEVATION (FMSL):	REMARKS

Notes

1. Soil Descriptions are in accordance with the USCS as set forth by ASTM D2488 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)."
2. Soil color described according to Munsell Color Chart.
3. Dashed lines separating soil strata represent inferred boundaries between sampled intervals that may be abrubt or gradual transitions. Solid lines represent approximate boundaries observed within sample intervals.
4. PID = photoionization detector, reading in parts per million.
5. Odor, if noted, is subjective and not necessarily indicative of specific compounds or concentrations.

Interval of recovered soil core collected with split-barrel sampler

Interval of recovered soil core collected with split-spoon drive sampler

Interval of no recovery

S-1 Sample collected for chemical analysis and sample identification

ABANDONMENT:

Volume of cement/bentonite grout required:	V = pr2 x 7.48 =	gallons	borehole depth = ft.
Volume of cement/bentonite grout installed:		gallons	borehole diameter = ft.
Has bridging of grout occurred?	☐ yes ☐ no		borehole radius = ft.
If yes, explain resolution:			
Method of installation:			

Project No:	**TurnKey Environmental Restoration, LLC**	Figure

TurnKey Environmental Restoration, LLC

FIELD BOREHOLE LOG

PROJECT:		**Log of Boring No.:**		
BORING LOCATION:		ELEVATION AND DATUM:		
DRILLING CONTRACTOR:		DATE STARTED:		DATE FINISHED:
DRILLING METHOD:		TOTAL DEPTH:		SCREEN INTERVAL:
DRILLING EQUIPMENT:		DEPTH TO WATER: FIRST:	COMPL.:	CASING:
SAMPLING METHOD:		LOGGED BY:		
HAMMER WEIGHT:	DROP:	RESPONSIBLE PROFESSIONAL:		REG. NO.

Depth (fbgs)	SAMPLES: Sample No.	Sample	Blows (per 6")	SPT N-Value	Recovery	PID Scan (ppm)	SAMPLE DESCRIPTION USCS Classification: Color, Moisture Condition, % of Soil Type, Texture, Plasticity, Fabric, Bedding, Weathering/Fracturing, Odor, Other SURFACE ELEVATION (FMSL):	REMARKS

ABANDONMENT:

Volume of cement/bentonite grout required:	V = pr2 x 7.48 =	gallons	borehole depth = ft.
Volume of cement/bentonite grout installed:		gallons	borehole diameter = ft.
Has bridging of grout occurred?	☐ yes ☐ no		borehole radius = ft.
If yes, explain resolution:			
Method of installation:			

Project No:	**TurnKey Environmental Restoration, LLC**	Figure

PROJECT: Chemical, Inc.	**Log of Boring No.** B-1
BORING LOCATION: 150' SW of former UST @ Bldg 2	ELEVATION AND DATUM: ground surface
DRILLING CONTRACTOR: Gregg Drilling & Testing	DATE STARTED: 7/21/96 / DATE FINISHED: 7/21/96
DRILLING METHOD: Hollow stem auger (7¼" O.D.)	TOTAL DEPTH: 11' / MEASURING POINT: ground surface
DRILLING EQUIPMENT: Mobile Drill B-61	DEPTH TO WATER: FIRST 7' / COMPL.
SAMPLING METHOD: 18" split-spoon drive sampler (2"Φ)	LOGGED BY: Bill Bates
HAMMER WEIGHT: 140 lbs. / DROP: 30 inches	RESPONSIBLE PROFESSIONAL: Lisa Jones / REG. NO. RG 1234

DEPTH (feet)	Sample No.	Sample	Blows/Foot	OVM Reading (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	REMARKS
1					SANDY LEAN CLAY WITH GRAVEL (CL) Black (10YR 2/1), moist, 70% fines, 15% fine to coarse sand, 15% fine gravel, low plasticity, soft [FILL]	log cuttings
2			1			
3			(10) 4, 6		LEAN CLAY WITH SAND (CL) Very dark grayish brown (10YR 3/2), moist, 80% fines, 20% fine sand, trace fine gravel, medium plasticity, firm.	
4			2, (15) 7			
5	B1-5'		8, 4			
6			(15) 8, 7		color change to olive gray (5Y 5/2), oxidized root holes	
7			4, (20) 10		SILTY SAND (SM) Dark olive brown (2.5Y 3/3), wet, 85% medium sand, 15% low plasticity fines	
8			10, 5			
9			(25) 15, 10			
10			7, (30) 15		WELL GRADED SAND (SW) Very dark grayish brown (2.5Y 3/2), wet, 90% fine to coarse sand, 10% fine to coarse gravel, trace low plasticity fines, sand and gravel are subrounded.	put on sand catcher
11	B1-11'		15			
12						
13					Bottom of boring @ 11' Boring grouted to ground surface with cement-bentonite grout.	
14						
15						

EXAMPLE

B-1 (12/95)

Project No. | Figure

B-1 (Blank)

FIELD BOREHOLE/MONITORING WELL INSTALLATION LOG

PROJECT:		**Well Log Explanation**		
BORING LOCATION:		ELEVATION AND DATUM:		
DRILLING CONTRACTOR:		DATE STARTED:		DATE FINISHED:
DRILLING METHOD:		TOTAL DEPTH:		SCREEN INTERVAL:
DRILLING EQUIPMENT:		DEPTH TO WATER:	FIRST: COMPL.	CASING:
SAMPLING METHOD:		LOGGED BY:		
HAMMER WEIGHT:	DROP:	RESPONSIBLE PROFESSIONAL:		REG. NO.

Depth (fbgs)	SAMPLES: Sample No.	Sample	Blows (per 6")	SPT N-Value	Recovery	PID Scan (ppm)	SAMPLE DESCRIPTION USCS Classification: Color, Moisture Condition, % of Soil Type, Texture, Plasticity, Fabric, Bedding, Weathering/Fracturing, Odor, Other SURFACE ELEVATION (FMSL):	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

Notes

1. Soil Descriptions are in accordance with the USCS as set forth by ASTM D2488 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)."
2. Soil color described according to Munsell Color Chart.
3. Dashed lines separating soil strata represent inferred boundaries between sampled intervals that may be abrubt or gradual transitions. Solid lines represent approximate boundaries observed within sample intervals.
4. PID = photoionization detector, reading in parts per million.
5. Odor, if noted, is subjective and not necessarily indicative of specific compounds or concentrations.

Interval of recovered soil core collected with split-barrel sampler

Interval of recovered soil core collected with split-spoon drive sampler

Interval of no recovery

S-1 Sample collected for chemical analysis and sample identification

Project No:	**TurnKey Environmental Restoration, LLC**	Figure

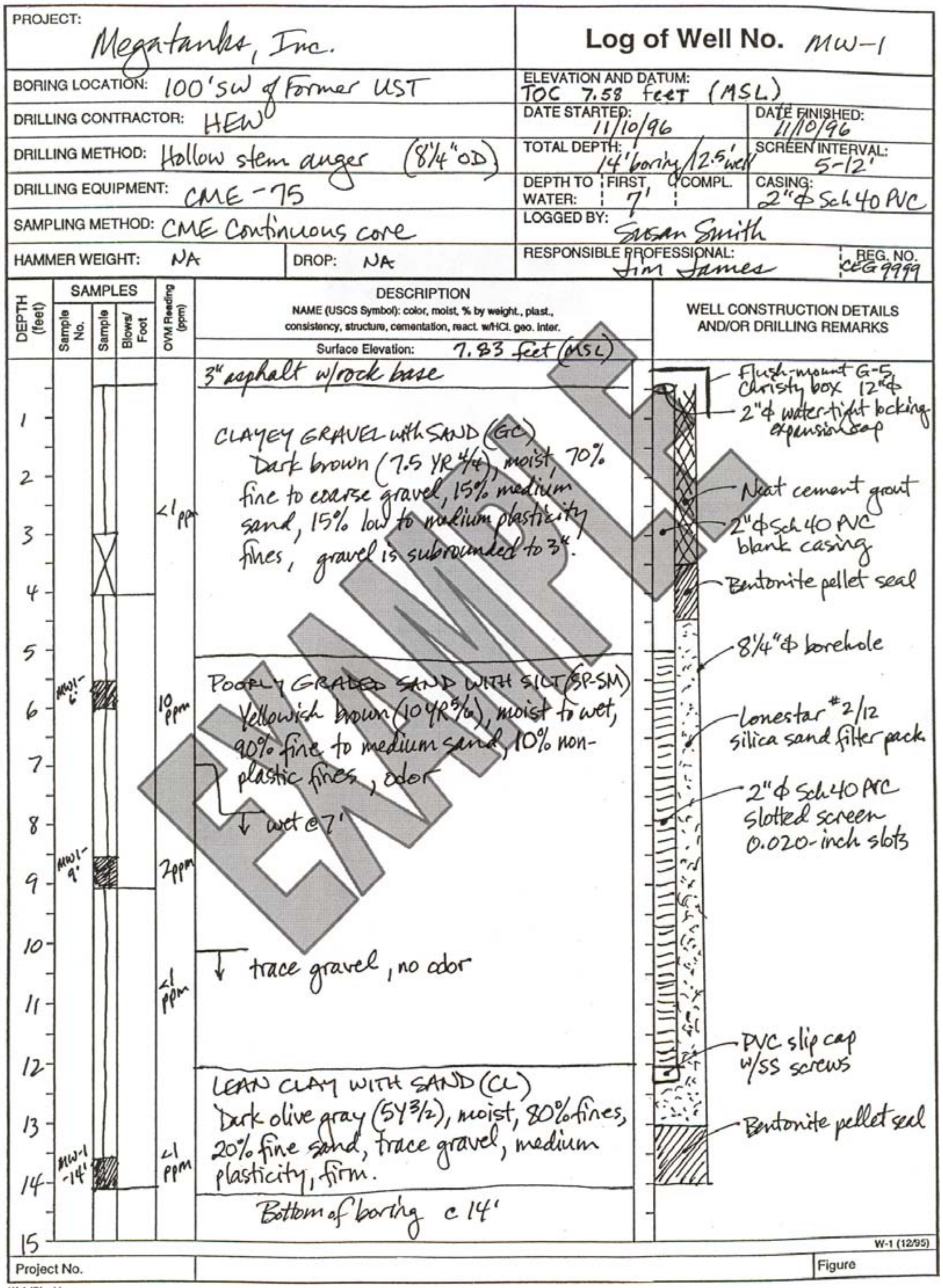
TurnKey Environmental Restoration, LLC

FIELD GEOPROBE BOREHOLE \ TEMPORARY WELL INSTALLATION LOG

PROJECT:		**Log of Temp. Well No.:**		
BORING LOCATION:		ELEVATION AND DATUM:		
DRILLING CONTRACTOR:		DATE STARTED:		DATE FINISHED:
DRILLING METHOD:		TOTAL DEPTH:		SCREEN INTERVAL:
DRILLING EQUIPMENT:		DEPTH TO WATER: FIRST:	COMPL.:	CASING:
SAMPLING METHOD:		LOGGED BY:		
HAMMER WEIGHT:	DROP:	RESPONSIBLE PROFESSIONAL:		REG. NO.

Depth (fbgs)	SAMPLES: Sample No.	Sample	Blows (per 6")	SPT N-Value	Recovery	PID Scan (ppm)	SAMPLE DESCRIPTION USCS Classification: Color, Moisture Condition, % of Soil Type, Texture, Plasticity, Fabric, Bedding, Weathering/Fracturing, Odor, Other SURFACE ELEVATION (FMSL):	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

Project No:	**TurnKey Environmental Restoration, LLC**	Figure



PROJECT: Megatanks, Inc.

Log of Well No. MW-1

BORING LOCATION: 100' SW of Former UST

ELEVATION AND DATUM: TOC 7.58 feet (MSL)

DRILLING CONTRACTOR: HEW

DATE STARTED: 11/10/96

DATE FINISHED: 11/10/96

DRILLING METHOD: Hollow stem auger (8¼" OD)

TOTAL DEPTH: 14' boring/12.5' well

SCREEN INTERVAL: 5-12'

DRILLING EQUIPMENT: CME-75

DEPTH TO WATER: FIRST 7' COMPL.

CASING: 2" Φ Sch 40 PVC

SAMPLING METHOD: CME Continuous core

LOGGED BY: Susan Smith

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: Jim James

REG. NO. CEG 9999

DEPTH (feet)	Sample No.	OVM Reading (ppm)	DESCRIPTION — NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl. geo. inter. — Surface Elevation: 7.83 feet (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0			3" asphalt w/rock base	Flush-mount G-5 Christy box 12" Φ; 2" Φ water-tight locking expansion cap
1–4		<1 ppm	CLAYEY GRAVEL with SAND (GC) Dark brown (7.5 YR 4/4), moist, 70% fine to coarse gravel, 15% medium sand, 15% low to medium plasticity fines, gravel is subrounded to 3".	Neat cement grout; 2" Φ Sch 40 PVC blank casing; Bentonite pellet seal
5–9	MW1-6'; MW1-9'	10 ppm; 2 ppm	POORLY GRADED SAND WITH SILT (SP-SM) Yellowish brown (10 YR 5/6), moist to wet, 90% fine to medium sand, 10% non-plastic fines, odor; wet @ 7'	8¼" Φ borehole; Lonestar #2/12 silica sand filter pack; 2" Φ Sch 40 PVC slotted screen 0.020-inch slots
10–12		<1 ppm	trace gravel, no odor	PVC slip cap w/SS screws
12.5–14	MW-1 -14'	<1 ppm	LEAN CLAY WITH SAND (CL) Dark olive gray (5Y 3/2), moist, 80% fines, 20% fine sand, trace gravel, medium plasticity, firm.	Bentonite pellet seal
14			Bottom of boring @ 14'	

EXAMPLE

W-1 (12/95)

Project No.

Figure

W-1 (Blank)

TurnKey Environmental Restoration, LLC

Field Operating Procedures

Surface and Subsurface Soil Sampling Procedures

SURFACE AND SUBSURFACE SOIL SAMPLING PROCEDURES

PURPOSE

This procedure describes the methods for sampling surface soil and subsurface soil samples for physical and chemical laboratory analysis during intrusive activities such as test pitting, hand augering, drilling, surface soil sampling etc. Typical health and safety related issues should be addressed in the Project Health and Safety Plan.

PRE-SAMPLING PROCEDURES

1. Review project objectives and the Project Health and Safety Plan (HASP).

2. Commence intrusive activities in accordance with specific TurnKey's FOPs (test pitting, hand augering, drilling etc.) or as directed by the Project Work Plan.

3. Conduct tailgate health and safety meeting with project team and/or subcontractor(s) by completing the Tailgate Safety Meeting Form (sample attached).

4. Calibrate air-monitoring equipment in accordance with the appropriate TurnKey's Field Operating Procedures or manufacturers recommendations for calibration of field meters.

5. Conduct air monitoring as required by the HASP, Project Work Plan or TurnKey's FOP Real-Time Air Monitoring During Intrusive Activities. Record all results on the Real Time Air Monitoring Log (sample attached).

6. Decontaminate all non-dedicated stainless steel (or Pyrex glass) equipment in accordance with TurnKey's Non-disposable and Non-dedicated Sampling Equipment Decontamination procedures.

7. Collect soil samples in accordance with the following sections.

SURFACE SOIL/FILL SAMPLING PROCEDURES

Collection of surface soil/fill samples facilitates the evaluation of potential health risks to current site receptors that may be exposed to soil/fill via direct contact, incidental ingestion, or inhalation of airborne particulates. The following procedure is in accordance with NYSDEC sampling protocol of surface soil/fill material. Volatile organic analysis of surface soil/fill utilizing this method will yield negatively biased results and should not be performed.

1. Collect all soil samples using dedicated (or decontaminated non-dedicated) sampling tools (i.e., spoons, trowels, bowls etc.), preferably constructed of stainless steel.

2. If the sample area is vegetated, then collect the surface soil sample from 0 to 2 inches below ground surface (bgs) following removal of the sod.

3. If there is no soil present within the sample area (i.e., only slag, concrete, mixed with fines), excavate an area 12 inches by 12 inches by 6 inches deep, screen the material to less than 1/8 inch (No. 4 sieve), and submit the screened material for analysis. If there is not enough material to completely fill the sample jar, then expand the excavation 3 inches in all four directions screening the additional material. Expand the excavation in this manner until sufficient sample volume is obtained.

SURFACE/SUBSURFACE SOIL SAMPLING PROCEDURES

1. Collect all soil samples using dedicated (or decontaminated non-dedicated) sampling tools (i.e., spoons, trowels, bowls etc.), preferably constructed of stainless steel.

   Surface soil samples are typically collected from 0 to 6 inches below ground surface (bgs). Subsurface soils are typically sampled from varying depths greater than 6-inches bgs based on field observations and as directed by the Project Work Plan.

2. Transfer samples for chemical (VOC, SVOC, Metals etc.) and physical (i.e., Atterberg Limits, Grain Size, Permeability etc.) analytical testing by direct grab (i.e., directly from the bucket of the excavation equipment, split-spoon sampler, hand auger etc.) using the dedicated (or decontaminated non-dedicated) sampling tools into appropriate laboratory-supplied containers and seal. The chemical or physical laboratory selected to perform the analysis should determine minimum sample volume for analysis.

3. Prepare collected samples in accordance with TurnKey's FOP: Sample Labeling, Storage and Shipment Procedures. Do not allow the chemical soil samples to freeze during storage and shipping. It should be noted, ice is not required for physical soil samples and all physical soil samples should be kept at the collected soil moisture by securing with a tight sealing lid. Do not allow physical soil samples to gain or lose moisture from the collected soil moisture prior to analysis.

4. Record all sampling details (i.e., depth and location) in the Project Field Book; appropriate TurnKey log sheets depending on method of intrusion (i.e., drilling, test pitting, hand augering etc.); and on the Soil/Sediment Sample Collection Summary Log (sample attached).

PARAMETER-SPECIFIC PROCEDURES

1. Volatile Organic Compound (VOCs): Transfer sufficient soil volume to fill the laboratory-supplied container (typically 4 ounces) by packing the soil sample with the sampling tool to the top of the container leaving no headspace. At no time should a gloved hand (i.e., latex, nitrile etc.) be used to pack the sample into the sample container as the sample may be compromised via cross-contamination.

2. All Other Parameters: All other parameters include, but are not limited to, Semi-VOCs (SVOCs), polychlorinated biphenyls (PCBs), herbicides,

pesticides, total metals etc. Transfer sufficient soil volume to fill the laboratory-supplied container by packing the soil sample with the sampling tool to the top of the container. Unless otherwise indicated by the laboratory or the Project Work Plan, the sample jar for all other parameters does not have to be packed completely leaving no headspace as with the VOC containers.

ATTACHMENTS

Tailgate Safety Meeting Form (sample)
Soil/Sediment Sample Collection Summary Log (sample)
Real Time Air Monitoring Log (sample)

REFERENCES

TurnKey FOPs:

006 *Calibration and Maintenance of Combustible Gas/Oxygen Meter*
010 *Calibration and Maintenance of Portable Flame Ionization Detector*
011 *Calibration and Maintenance of Portable Photoionization Detector*
040 *Non-disposable and Non-dedicated Sampling Equipment Decontamination*
046 *Sample Labeling, Storage and Shipment Procedures*
073 *Real-Time Air Monitoring During Intrusive Activities*

TAILGATE SAFETY MEETING FORM

Project Name: Date: Time:
Project Number: Client:
Work Activities:

HOSPITAL INFORMATION:

Name:
Address: *City:* *State:* *Zip:*
Phone No.: *Ambulance Phone No.*

SAFETY TOPICS PRESENTED:

Chemical Hazards:

Physical Hazards: Slips, Trips, Falls

PERSONAL PROTECTIVE EQUIPMENT:

Activity:	*PPE Level:*	A	B	C	D
Activity:	*PPE Level:*	A	B	C	D
Activity:	*PPE Level:*	A	B	C	D
Activity:	*PPE Level:*	A	B	C	D
Activity:	*PPE Level:*	A	B	C	D

New Equipment:

Other Safety Topic (s): Environmental Hazards (aggressive fauna)
Eating, drinking, use of tobacco products is prohibited in the Exclusion Zone (EZ)

ATTENDEES

Name Printed	**Signatures**

Meeting conducted by:

TurnKey Environmental Restoration, LLC

SOIL/SEDIMENT
SAMPLE COLLECTION SUMMARY LOG

Field ID	Location	QC Type	Depth (feet)		Analytical Parameters	Containers	Date	Time	Sampler Initials	Comments (e.g. problems encountered, ref. to variance, location changes, depth changes, important matrix observations or description, gravel thickness, etc.)
			from	to						

Equipment Rinsate Blanks *- Pour clean deionized water over or through decontaminated sampling equipment into sample containers. Collect at a frequency of 1 per sampling method per day. Analyze for all those parameters analyzed for in the samples collected the same day. HSL Metals can be substituted by only the Metals analyzed for that day (except Hexavalent Chromium which must be a separate parameter). Match equipment used for constituents of concern to rinsate analyte. Note deionzied water lot # or distilled water can be substit info & date.*

MS/MSD/MSB *- Collect at a frequency of 1 per 20 samples of each matrix per day. Analyze for all those parameters analyzed for the samples collected the same day.*

Field Blank *- Pour clean deionized water (used as final decon rinse water) into sample containers while at the sampling site. Collect field blanks at a frequency of 1 per lot of deionized water. Note water lot number and dates in use for decon in 'Comments' section.*

Investigation Derived Waste (IDW) Characterization samples *- One composite sample from all drums of decon fluids and soil. Please note number of drums and labels on collection log.*

Notes:

1. See QAPP for sampling frequency and actual number of QC samples.
2. CWM - clear, wide-mouth glass jar with Teflon-lined cap.
3. HDPE - high density polyethylene bottle.
4. MS/MSD/MSB - Matrix Spike, Matrix Spike Duplicate, Matrix Spike Blank.
5. BD - Blind Duplicate - indicate location of duplicate.

REAL TIME AI

Date:
Project Name:
Project Number:
Project Location:
Client:
Purpose of Air Monitoring:

WEATHER CONDITIONS:

Time of Day:	A.M.
Ambient Air Temp.:	
Wind Direction:	
Wind Speed:	
Precipitation:	

Date	Personnel	Time	Air Monitoring Meter Measurement (Units)							Locatio
			PID (ppm)	LEL (%)	H2S (ppm)	O2 (%)	CO (ppm)	Particulates (mg/m^3)	Other	

NOTE: SEE EQUIPMENT CALIBRATION LOG FOR DESCRIPTION OF EQUIPMENT TYPE.

Prepared By:

FIELD OPERATING PROCEDURES

TurnKey Environmental Restoration, LLC

Real-Time Air Monitoring During Intrusive Activities

FOP 073.0

REAL-TIME AIR MONITORING DURING INTRUSIVE ACTIVITIES PROCEDURE

PURPOSE

This guideline presents requirements for real-time community air monitoring and required responses during all project required intrusive activities, such as drilling, test pitting, earthwork construction etc. This procedure is consistent with the requirements for community air monitoring for all intrusive projects, including projects conducted at remediation sites, as established by the New York State Department of Health (NYSDOH) and the New York State Department of Environmental Conservation (NYSDEC). Accordingly, this Field Operating Procedure (FOP) follows procedures and practices outlined under the NYSDOH's generic Community Air Monitoring Plan dated June 20, 2000 and NYSDEC Technical Assistance and Guidance Memorandum (TAGM) 4031: Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites.

This FOP requires real-time monitoring for constituents of concern (COC) (i.e., volatile organic compounds (VOCs), lower explosive limit (% LEL), particulates (i.e., dust) etc.) at the upwind and downwind perimeter as well as the exclusion zone of a project site during all intrusive activities. This FOP is not intended for use in establishing action levels for worker respiratory protection (see Project Health and Safety Plan (HASP) for worker protection action levels). Rather, its intent is to provide a measure of protection for the surrounding community from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The community, as referenced in this document, includes any off-site residences, public buildings/grounds and commercial or industrial establishments adjacent to the project site. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, this FOP helps to confirm that work activities did not spread contamination off-site through via air transport mechanisms. Community air monitoring shall be integrated with the construction worker personal exposure-monitoring program contained in the project and site-specific HASP.

MONITORING & MITIGATION PROCEDURE

Real-time air monitoring for COC levels at the upwind and downwind perimeter as well as the exclusion zone of the project site will be required. The perimeter locations of monitoring stations will be established based on the location of the exclusion zone (i.e., immediate work area) and wind direction. Where wind direction is shifting or winds are calm, the downwind monitoring location will default to the perimeter location nearest the most sensitive receptor (i.e., residential property). All downwind receptors being equal, the downwind monitoring location will default to the perimeter location downwind of the prevailing winds at the site. Real-time air monitoring will be required for all ground intrusive activities at a minimum of 30-minute intervals. Ground intrusive activities include, but are not limited to, soil/fill excavation and handling, test pitting or trenching, borehole advancement and monitoring well installation. Although additional site specific COCs may be monitored during real-time air monitoring activities, the most common COCs are discussed in this FOP, including organic vapors (i.e., VOCs), airborne particulates (i.e., fugitive dust) and combustible gases (i.e., methane) and oxygen.

ORGANIC VAPORS

Ambient organic vapor concentrations should be measured prior to commencing intrusive activities each workday and a minimum of every 30-minutes thereafter. Air monitoring activities should be performed using equipment appropriate to measure the types of COCs known or suspected to be present. The equipment should be calibrated daily for the COCs or for an appropriate surrogate. All organic vapor readings must be recorded in the Project Field Book and/or Real-Time Air Monitoring Logs (sample attached) and, if applicable, be made available for State (DEC and DOH) personnel to review.

Mitigation upon the detection of various action levels of organic vapors are presented below:

- If the sustained ambient air concentration of total organic vapors at the downwind perimeter of the site exceeds a reading of 5 parts per million (ppm) above background, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If sustained total organic vapor levels at the downwind perimeter of the site persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions and monitoring continued. Following organic vapor mitigation, work activities can resume provided that the sustained total organic vapor level 200 feet downwind of the exclusions zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less, (but in no case less than 20 feet) is below a sustained value of 5 ppm over background.

- If the sustained organic vapor level is above 25 ppm at the downwind perimeter of the site, the designated Site Safety and Health Officer must be notified and work activities shut down. The Site Safety and Health Officer will determine when re-entry of the work zone is possible and will implement downwind air monitoring to ensure vapor emissions do not impact the nearest off-site residential or commercial structure at levels exceeding those specified under the Major Vapor Emission Monitoring program described below.

Major Vapor Emission Monitoring

- If the sustained organic vapor level is greater than 5 ppm over background 200 feet downwind from the site or half the distance to the nearest off-site receptor (residential or commercial structure), whichever is less, all work activities must be halted. If, following the cessation of the work activities or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest off-site residential or commercial structure from the site perimeter, then the air quality must be monitored within 20 feet of the perimeter of the nearest off-site receptor (20-foot zone).

- If efforts to abate the emission source are unsuccessful and if organic vapor levels approach or exceed 5 ppm above background within the 20-foot zone for more than 30 minutes, or are sustained at levels greater than 10 ppm above background for longer than one minute, then the Major Vapor Emission Response Plan will automatically be placed into effect (see next section).

Major Vapor Emission Response Plan

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

1. All Emergency Response Contacts as listed below and in the Site-Specific Health and Safety Plan will be contacted.

2. The local police authorities will immediately be contacted by the Site Safety and Health Officer and advised of the situation.

3. Frequent air monitoring will be conducted at 30-minute intervals within the 20-foot zone. If two successive readings below action levels are measured, air

monitoring may be halted or modified by the Site Safety and Health Officer.

4. The Site Safety and Health Officer will determine if site workers can safely undertake source abatement measures. Abatement measures may include covering the source area with clean fill or plastic sheeting, or consolidating contaminated materials to minimize surface area. The Site Safety and Health Officer will adjust worker personal protective equipment as necessary to protect workers from over-exposure to organic vapors.

The following personnel are to be notified by the Site Safety and Health Officer in the listed sequence if the Major Vapor Emission Response Plan is activated:

Contact	**Phone**
Police/Fire Department	911
New York State Dept. of Health	(716) 847-4502
New York State Dept. of Environmental Conservation	(716) 851-7220
State Emergency Response Hotline	(800) 457-7362

In addition, the Site Safety and Health Officer will provide these authorities with a description of the apparent source of the contamination and abatement measures being taken by the contractor, if any.

AIRBORNE PARTICULATES

Fugitive dust suppression and airborne particulate monitoring shall be performed during any intrusive activities involving disturbance or handling of site soil/fill materials. Fugitive dust suppression techniques will include the following minimum measures:

- Excavated stockpiles will be seeded or covered with clean soil or synthetic materials (e.g., tarps, membranes, etc.) whenever stockpiling activities cease for a period of longer than 90 days.

- Spraying potable water on all excessively dry work areas and roads.

- All fill materials leaving the site will be hauled in properly covered containers or haul trailers.

- Additional dust suppression efforts may be required as discussed below.

Particulate concentrations should be measured prior to commencing intrusive activities each workday and a minimum of every 30-minutes thereafter. The particulate monitoring should be performed using equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level and calibrated daily. In addition, fugitive dust migration should be visually assessed during all work activities. All air borne particulate readings must be recorded in the Project Field Book and/or Real-Time Air Monitoring Logs (sample attached) and, if applicable, be made available for State (DEC and DOH) personnel to review. Mitigation upon the detection of various action levels of airborne particulates are presented below:

- If the sustained downwind PM-10 particulate level is 100 micrograms per cubic meter (ug/m^3) greater than background (upwind perimeter) or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 ug/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, sustained downwind PM-10 particulate levels are greater than 150 ug/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures, such as those described the Supplemental Dust Suppression section below are employed and are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

Visual Assessment

In conjunction with the real-time monitoring program, TurnKey personnel and any subcontractors thereof will be responsible for visually assessing fugitive dust migration from the site. If airborne dust is observed leaving the site, the work will be stopped until supplemental dust suppression techniques are employed in those areas.

Supplemental Dust Suppression

Supplemental dust suppression techniques may include but are not necessarily limited to the following measures:

- Reducing the excavation size, number of excavations or volume of material handled.
- Restricting vehicle speeds.
- Applying water on buckets during excavation and dumping.
- Wetting equipment and excavation faces.
- Wetting haul roads.
- Restricting work during extreme wind conditions.

- Use of a street sweeper on paved haul roads, where feasible.

Work can resume using supplemental dust suppression techniques provided that the measures are successful in reducing the sustained downwind particulate concentration to below 150 ug/m^3 above background, and in preventing visible dust migration off-site.

COMBUSTIBLE GASES & OXYGEN

Ambient combustible gas and oxygen concentrations should be measured prior to commencing intrusive activities each workday and a minimum of every 30-minutes thereafter. Air monitoring activities should be performed using equipment appropriate to measure combustible gases in percent lower explosive limit (LEL) and percent oxygen and calibrated daily. All combustible gas and oxygen readings must be recorded in the Project Field Book and/or Real-Time Air Monitoring Logs (sample attached) and, if applicable, be made available for State (DEC and DOH) personnel to review.

Mitigation upon the detection of various action levels of organic vapors are presented below:

Combustible Gas:

- If the sustained ambient air concentration of combustible gas at the downwind perimeter of the site exceeds a reading of 10 to 25% LEL, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 10% LEL, work activities can resume with continued monitoring.

- If sustained combustible gas levels at the downwind perimeter of the site persist at levels in excess of 25% LEL, work activities must be halted, the source of explosion hazards identified, corrective actions taken to abate emissions and monitoring continued. Following combustible gas mitigation, work activities can resume provided that the sustained total organic vapor level 200 feet downwind of the exclusions zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less, (but in no case less than 20 feet) is below a sustained value of 10% LEL.

Oxygen:

- If the sustained ambient oxygen concentration at the downwind perimeter of the site measures a reading between 19.5% - 21% oxygen, work activities can continue with extreme caution, however attempts to determine the potential source of oxygen displacement must be conducted.

- If the sustained oxygen level readily decreases below 19.5% LEL, work activities should be discontinued and all personnel must leave the area immediately.

- If the sustained oxygen level at the downwind perimeter of the site persists at levels between 21-25%, work activities can resume with caution.

- If the sustained oxygen level at the downwind perimeter of the site persists at levels exceeding 25% (fire hazard potential), work activities should be discontinued and all personnel must leave the area immediately.

ATTACHMENTS

Real-Time Air Monitoring Log (sample)

REFERENCES

TurnKey FOPs:

006 *Calibration and Maintenance of Combustible Gas/Oxygen Meter*
010 *Calibration and Maintenance of Flame Ionization Detector*
011 *Calibration and Maintenance of Portable Photoionization Detector*
xxx *Calibration and Maintenance of Portable Particulate Meter (as per Manufacturers Specifications)*

REAL TIME AI

Date:

Project Name:

Project Number:

Project Location:

Client:

Purpose of Air Monitoring:

WEATHER CONDITIONS:

Time of Day:	A.M.
Ambient Air Temp.:	
Wind Direction:	
Wind Speed:	
Precipitation:	

Date	Personnel	Time	Air Monitoring Meter Measurement (Units)							Locatio
			PID (ppm)	LEL (%)	H2S (ppm)	O2 (%)	CO (ppm)	Particulates (mg/m^3)	Other	

NOTE: SEE EQUIPMENT CALIBRATION LOG FOR DESCRIPTION OF EQUIPMENT TYPE.

Prepared By:

Field Operating Procedures

"Before Going Into the Field" Procedure

FOP 076.0

"BEFORE GOING INTO THE FIELD" PROCEDURE

PURPOSE

This procedure describes the activities to be preformed and the checklists to be completed prior to commencing field-sampling activities. Field-sampling activities may include, but are not limited to, soil, sediment, groundwater, surface water, wipe, and/or air matrix sample collection. The goal of this procedure is to eliminate delays and unnecessary budgetary "strain" due to a lack of preparedness and knowledge of the site by the field team members.

CHECKLISTS

Checklists should be developed and used so that all of the required steps prior to going into the field are undertaken. A good checklist will include:

- Adequate review of the documents listed in this FOP
- Any documents, equipment, and supplies presented in this FOP
- Providing adequate notification to the laboratory (so that holding times are not exceeded) and to the owner of the site and the primary regulatory agency (usually in writing) that a round of sampling is to commence in order to facilitate sampling and allow for a sampling audit or split sampling.
- Specifying and documenting the equipment maintenance and calibration undertaken prior to going into the field relative to the sampling event.
- Checking and calibrating the equipment.
- Listing the documents, equipment, and supplies required to collect samples at the site as presented in this FOP.

Prior to going into the field, sampling personnel should reacquaint themselves with the sampling plan. The review is undertaken so that the required specific protocol such as sampling from the least to the most contaminated wells, knowing where quality control samples are to be taken, knowing the disposition of purge water, etc., is understood and followed.

The amount of equipment maintenance and calibration required prior to going into the field should be clearly specified in the presampling equipment maintenance and calibration checklists, which are based on the manufacturer's recommendations, sampling objectives, and prior experience. Maintenance and calibration performed before sampling must be documented to provide evidence that the equipment was adequately maintained and calibrated and to keep a permanent record of equipment servicing and performance.

A list of all the documents, equipment, and supplies required for the sampling event should be prepared and used. It can be frustrating and time consuming to forget equipment and supplies, so some up-front preparation is warranted. The following sections provide a list of the documentation, equipment, and supplies, which should assist in preparing a site-specific equipment and supply checklist. Once prepared, the checklist and project requirements should be reviewed with the Project Manager.

DOCUMENTATION

Prior to going into the field, the field team should review and understand all of the project documents including, but not limited to:

- The Health and Safety Plan (HASP)
- The Site Analytical Plan (SAP), Sampling Plan, or similar document
- The Quality Assurance Project Plan (QAPP)
- The Work Plan
- Project specific Field Operating Procedures and field forms
- Site Maps
- Equipment operation manuals
- Chain-of-Custody forms
- Shipping labels and custody seals

- Any reference materials (i.e., conversion tables, volume calculation, etc.). The Pocket Ref, Third Edition by Thomas Glover is a great source for the field.

If at any time, the field team does not understand the project required protocol, procedures, sample locations, etc.; the Project Manager should be consulted for clarification.

EQUIPMENT

Prior to going into the field, the field team should review the following equipment checklist, noting that project specific equipment may not be included in this list:

- Water level indicator
- Pumps, sample tubing, flow controllers, power cord(s), batteries, compressors, generators, etc.
- Bailers (disposable, PVC, stainless steel, glass), rope
- Flow-through cell
- Field meters with adequate calibration solutions (pH/Eh meter, conductivity meter, dissolved oxygen meter, turbidity meter, batteries, etc.)
- Garden hose
- Explosive gas meter and/or photoionization detector (PID) with calibration supplies
- Complete set of hand tools including a sharp knife, screw drivers, pliers, hacksaw, flashlight, large pipe wrench, hammer, bolt cutters, and replacement locks
- Fish hook with weight and string
- Field filtering equipment and supplies
- Decontamination supplies, such as scrub brushes, Alconox®, distilled water, potable water, 5-gallon bucket, paper towels, aluminum foil
- 5-gallon bucket(s)
- Measuring cup
- Sample bottles/containers (with extras) and preservatives
- Stainless steel spoons, trowels, shovels
- Shipping containers (i.e., coolers)
- Clipboard

- Calculator
- Water resistant clock or watch with second hand
- First aid kit

SUPPLIES

Prior to going into the field, the field team should review the following supplies checklist, noting that project specific supplies may not be included in this list:

- Laboratory grade non-phosphate detergent (Alconox®)
- Appropriate personal protective equipment appropriate to the contaminants of concern, such as nitrile gloves, Tyvek, boots, hardhat, safety glasses, hearing protection, etc.
- Bags of ice
- Plastic garbage bags
- Plastic sheeting
- Sufficient quantities of potable and laboratory grade deionized water for cleaning and equipment blanks
- Methanol
- Isopropyl alcohol
- Clean rags and paper towels
- Electrical tape, duct tape, and wide transparent tape
- Hand soap
- Regular, ballpoint, and indelible pens
- Hollow braid polyethylene rope

After providing adequate notification (lab, state and/or federal agencies), performing the presampling maintenance and calibration, obtaining the site and well keys, and packing the supplies and equipment, the field activities are ready to be performed.

REFERENCES

1. Wilson, Neal. *Soil Water and Ground Water Sampling*, 1995

APPENDIX G

ELECTRONIC COPY OF WORK PLAN