Remedial Investigation/ Feasibility Study & Interim Remedial Measures (RI/FS/IRM) Work Plan

October 2008
Revised December 2008

0109-001-104

SB-18 AREA
NYSDEC SITE No. 915049

3773 LAKE SHORE ROAD
BLASDELL, NEW YORK

Prepared By:

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

726 Exchange Street, Suite 624, Buffalo, New York | phone: (716) 856-0599 | fax: (716) 856-0583

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY & INTERIM REMEDIAL MEASURES WORK PLAN

SB-18 AREA

SITE NUMBER 915049

3773 LAKE SHORE ROAD
BLASDELL, NEW YORK

October 2008 0109-001-104
Revised December 2008

Prepared for:

3773 Lake Shore Road, Inc.

RI/FS & IRM WORK PLAN

SB-18 Area
3773 Lake Shore Road
Blasdell, New York

CERTIFICATION:

_____ 12-1-08

Thomas H. Forbes, P.E. **Date**

License No.: 070950-1

Registration State: New York

SEAL:

RI/FS & IRM WORK PLAN

SB-18 Area
3773 Lake Shore Road
Blasdell, New York

Table of Contents

LIST OF FIGURES

LIST OF TABLES

APPENDICES

1.0 INTRODUCTION

This document presents the proposed scope of work and implementation procedures for completion of a Remedial Investigation and Feasibility Study (RI/FS) and an Interim Remedial Measure (IRM) for the SB-18 Area within Area C (the Site), located at 3773 Lake Shore Road in the Village of Blasdell, New York (see Figures 1 and 2). The current owner of the Site, 3773 Lake Shore Road, Inc., elected to implement the RI/FS and IRM under Consent Order (#B9-0750-07-06) with the New York State Department of Environmental Conservation (NYSDEC).

The RI/FS and IRM work will be completed by Benchmark Environmental Engineering & Science, PLLC (Benchmark) in accordance with NYSDEC DER-10 guidelines (Ref. 1).

1.1 Background

A November 2006 Phase II report prepared by Hazard Evaluations, Inc. (HEI) reported that during the course of a Phase II investigation on the subject property a soil boring identified as SB-18 (see Figure 1) was found to contain toluene and 1,1,1-trichloroethane above Technical Assistance and Guidance Memorandum (TAGM) 4046 Recommended Soil Cleanup Objectives (RSCOs). The HEI report also indicated the presence of bedding sands potentially associated with an underground storage tank (UST) near the SB-18 boring.

As the areal extent of the soil/fill impacts had not been determined through HEI's work, Benchmark prepared a Site Investigation Work Plan on behalf of the property owner to better determine the quantity of soil/fill potentially requiring remediation and to characterize groundwater at existing downgradient monitoring well GW-1 installed in the upper weathered bedrock. The soil/fill investigation involved the installation of direct-push test borings in the area surrounding boring SB-18. The advancement of borings continued outward based on visual/olfactory observations and PID screening until the approximate area of impact was delineated.

The results of the site investigation indicated no detectable volatile organic compounds (VOCs) in downgradient well GW-1. The extent of the soil/fill impact was identified as a cone-shaped area encompassing SB-18, with an areal extent of approximately 40 feet long by 25 wide. Based on PID readings collected in February 2008, the soil/fill

impact begins at approximately 2 feet below ground surface (fbgs) and extends, at its deepest point, to bedrock at a depth of approximately 14.5 fbgs.

1.2 Purpose and Scope

This RI/FS & IRM Work Plan was prepared to fulfill the requirements of Item II.B of Consent Order B9-0750-07-06. Accordingly, this Work Plan identifies the scope of planned RI/FS and IRM activities and the means by which they will be completed, including sampling and reporting requirements, and the planned steps for identification and evaluation of remedial options to address groundwater and residual soil/fill impacts following IRM activities, if necessary.

This Work Plan proposes the following activities to address the impacted soil/fill and investigate groundwater impacts at the Site:

- Installation of two monitoring wells downgradient of the SB-18 Area, with collection and analysis of representative groundwater samples from these locations and an existing monitoring well to check for potential impacts from historic leaching of constituents from impacted soil/fill.
- Collection of groundwater elevation data to verify flow direction.
- Excavation and off-site disposal of VOC-impacted soil/fill in the SB-18 Area
- Analysis of representative post-excavation soil/fill sample(s) to verify conformance with IRM remedial goals.
- Identification and evaluation of remedial measures, beyond those undertaken by the IRM, if necessary to address residual soil/fill and/or groundwater impacts.

2.0 SITE DESCRIPTION

2.1 General

The SB-18 Area is located at 3773 Lakeshore Road, between an existing warehouse building referred to as "Plant 1" and Hoover Road, in a light industrial area of the Village of Blasdell, New York (see Figure 2).

2.2 Site Topography and Drainage

The Site is generally flat and adjacent to a light industrial/warehouse building. The surface is predominately covered with asphalt. Precipitation (i.e., rain or melting snow) generally moves toward 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 Brockport silty-clay loam, indicating level to gently sloping land.

2.3.2 Bedrock

The Site is located in the Erie-Ontario Lake Plain Physiographic Province of Western New York. The geology of the Erie-Niagara Basin is described as consisting of unconsolidated deposits (predominantly of glacial origin) overlying Silurian- and Devonian-age sedimentary bedded or layered bedrock. The naturally occurring unconsolidated deposits in the area generally consist of the following three types: alluvial silt, sand, and gravel deposited during comparatively recent geologic time; lacustrine sediments composed primarily of silt, sand, and clay; and glacial till, a heterogeneous mixture of particles (i.e., clay, silt, sand, gravel, and cobbles). Relief in the area is generally flat and the result of pre-glacial erosion of bedrock and subsequent topographic modification by glaciation.

The bedrock formations in the region dip to the south at approximately 30 to 40 feet per mile and exhibit only very gentle folding. In the Erie-Niagara Basin, the major areas of

groundwater are within glacial sand and gravel deposits and limestone and shale bedrock. The main sources of groundwater within the bedrock are fractures and solution cavities (Ref. 3).

2.3.3 Hydrogeology

Based on site and regional topography, local and regional groundwater likely flows in a west-northwest direction toward Lake Erie.

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. 4) 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. 4). 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 Village of Blasdell is located within the Town of Hamburg, NY. The Town of Hamburg encompasses 41.31 square miles and has a population of approximately 56,300 persons (2000 U.S. Census Bureau). Hamburg is primarily zoned residential with commercial use mixed in along major roads. The Site is located in Census Tract 130.01, and is zoned light industrial. Hamburg has a population density of 8,301 to 12,625 per square mile.

The surrounding lands are mixed use, comprising primarily commercial, industrial and vacant parcels.

2.6 Utilities and Groundwater Use

The subject property has access to major public and private utilities, including water, sanitary and storm sewers, electric, and natural gas. Currently, there are no 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. Currently, there are no permanent groundwater monitoring wells on the Site; however, groundwater monitoring well GW-1 is located northwest of the Site on a parcel currently owned by 3773 Lake Shore Road, Inc.

2.7 Wetlands and Floodplains

There are no State or Federal wetlands or floodplains on the Site.

2.8 Previous Investigations

A summary of the investigations that have occurred relative to the SB-18 Area are presented below. Data from these investigations has been previously submitted to the New York State Department of Environmental Conservation. Figure 3 shows the historic sample locations.

2.8.1 August 2005 – Phase I Environmental Site Assessment

In August 2005, Great Lakes Environmental & Safety Consultants, Inc. (Great Lakes) completed a Phase I Environmental Site Assessment (ESA) to determine possible environmental impacts at the former Snyder Tank Corporation, which encompasses the Site. The report indicated that Snyder Tank Corporation's former operations as well as field observations warranted further investigation.

2.8.2 November 2006 – Phase II Environmental Site Assessment

In November 2006, Hazard Evaluations, Inc. (HEI) completed a Phase II ESA to address the potential existence of impacted soil and/or groundwater at the former Snyder Tank Corporation facility. According to the HEI Phase II report soil boring SB-18 exhibited elevated levels of toluene and 1,1,1-trichloroethane, as well as headspace VOC readings greater than 7,000 parts per million (ppm).

2.8.3 March 2008 – Phase II Investigation

In March 2008, Benchmark completed a Supplemental Phase II Investigation at 3773 Lakeshore Road. The investigation involved completion of a one-day soil boring investigation program employing a truck mounted Geoprobe® rig to advance twelve soil borings, identified as C-B1 through C-B12 in the vicinity of SB-18 (see Figure 2). The final depth of

the borings ranged from 11 to 14.5 fbgs with refusal likely due to encountering top of bedrock. Field PID readings ranged from 0.0 ppm to 3879 ppm (C-B4 at 11-12 fbgs). Soil boring C-B6 exhibited elevated PID readings beginning at two feet below grade surface (fbgs) and continuing until approximately 11 fbgs. The surrounding borings with elevated PID readings generally exhibited impact at four feet or deeper, suggesting a surface release at or near C-B6. No evidence of an underground storage tank, product or other forms of continuing source loadings was found at any of the boring locations. Based on the PID readings, four representative soil/fill samples were collected for analysis. Specifically, samples were collected from C-B4 (4-6), C-B5 (4-6), C-B11 (10-11), and C-B12 (8-11). These locations were selected to correlate varying PID readings to analytical results. VOC concentrations were well below commercial and industrial soil cleanup objectives (SCOs) per 6NYCRR Part 375 in all four samples (and in fact were below residential SCOs as well). One groundwater sample was collected from existing well GW-1 using low-flow sampling procedures and analyzed for VOCs; no VOCs were detected.

2.9 Primary Constituents of Potential Concern (COPCs)

Based on findings of the investigations, the Constituents of Potential Concern (COPCs) are VOCs in soil/fill, primarily toluene and 1,1,1-trichloroethane.

3.0 INTERIM REMEDIAL MEASURES

An IRM is proposed to mitigate risks to public health and the environment attributable to contamination in the SB-18 Area, and to expedite the remedial schedule. Based on the nature and extent of contamination as indicated by prior investigations, the most applicable remedial measure is source removal via excavation with off-site disposal. The proposed IRM will be conducted concurrent with Remedial Investigation activities described in Section 5.0. The proposed IRM work will include:

- Excavation and on-site staging of an estimated 75 cubic yards of non-impacted surface soil/fill within the excavation limits as shown on Figure 2.
- Excavation of approximately 500 tons of VOC-impacted soil/fill within the excavation limits as shown on Figure 2.
- Off-site transportation and disposal of impacted soil/fill at a permitted t disposal facility.
- Placement and compaction of non-impacted on-site soil and approved structural backfill material from an off-site source.
- Surface restoration (asphalt patch)

Implementation of the remedial activities outlined in this Work Plan will be conducted on a design-build basis, with Benchmark serving as Design-Build Engineer. A qualified remediation contractor will be retained to assist in carrying out the work in accordance with the activities described herein. IRM construction will be supervised and documented per the Work Plan.

3.1 Utility Clearance

Dig Safely New York (Call 811) will be contacted by the remediation contractor a minimum of four 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 impacted soil removal, 3773 Lake Shore Rd, Inc. and the NYSDEC will be contacted to discuss mitigating measures.

3.2 Removal of Impacted Soils

Previous studies have indicated that VOC-impacted soil is present on-site in the vicinity of SB-18. Impacted soil will be excavated and loaded into dump trailers for off-site disposal at a permitted TSDF. A PID will be used to screen soil/fill materials and assist in verifying removal of VOC-impacted soil/fill. Based on PID readings, the upper 2 feet of soil/fill is not impacted and will therefore be set aside for use as backfill. All excavation work will be directed by an experienced Benchmark scientist to minimize the amount of non-impacted soil/fill removed. A PID screening criteria of 25 parts per million (ppm) and absence of significant visual or olfactory evidence of impact will generally be employed as guidance for determining the limits of the excavation. Verification samples will be collected to confirm that individual soil concentrations are below Part 375 commercial SCOs for protection of public health. Since the area of impact is immediately adjacent to a Site structure, excavation will occur in stages of 10-12 foot lengths, followed by immediate backfilling.

3.3 Groundwater Management

Based on previous field observations and the anticipated groundwater elevation, groundwater management is not expected to be necessary during soil/fill removal activities. However, if significant groundwater is encountered during the excavation work, it will be pumped to a temporary tank and treated on-site prior to discharge to the sanitary sewer (with permission from the Erie County DEP and Southtowns Sewage Treatment Plant). In general, water removed from excavation will be stored/settled in a portable tank and 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 with the impacted soil/fill. The tank will be decontaminated via pressure washing, and wash waters will be processed through the GAC. Spent GAC will be characterized and regenerated off-site, or disposed at a permitted disposal facility in accordance with applicable federal and state regulations.

3.4 Excavation Confirmation Sampling

Confirmatory samples will be collected from the excavation sidewalls and bottom (excluding areas where bottom samples extend to bedrock). 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. Discrete grab samples will be collected and transported under chain-of-custody to a New York State Department of Health (NYSDOH) ELAP-certified analytical laboratory and analyzed for USEPA Target Compound List (TCL) VOCs in accordance with USEPA SW-846 Methodology with an equivalent Category B deliverables package.

3.5 Impacted Soil Disposal

Based on the results of previous studies and applicable NYSDEC policy, the impacted soil/fill from the SB-18 Area appears suitable for disposal at a permitted NY State sanitary landfill facility per NYSDEC TAGM 3028 entitled "Contained-In Criteria for Environmental Media." This guidance is applicable for situations where environmental media impacted with listed hazardous waste will be remediated pursuant to a State or Federal Order, and the impacted media meets certain chemical quality requirements per the guidance. Specifically, soil/fill needs to conform to Soil/Sediment Action Levels provided in the TAGM, and must not exhibit hazardous waste characteristics based on leachability per 6NYCRR Part 371. As indicated on Table 1, attached, impacted soil/fill sample data from Benchmark's March 2008 investigation fall well below the TAGM 3028 Soil/Sediment Action Levels. In addition, the detected concentrations are below 20 times the Toxicity Characteristic Leaching Procedure (TCLP) thresholds, and as such a TCLP test (which involves a 1:20 ratio of soil to extract solution) would produce leachate concentrations below the characteristic hazardous waste thresholds.

Benchmark will pursue approval for sanitary landfill disposal from the NYSDEC Division of Solid and Hazardous Materials in Albany headquarters and the receiving facility prior to implementing IRM excavation work. If additional sampling is required to secure the approvals, the samples will be collected via soil borings during the RI monitoring well installation work described in Section 5.0. If approval for sanitary landfill disposal is not received, the material will be disposed at a RCRA-permitted treatment, storage and disposal facility (TSDF).

The impacted soil will be directly loaded to dump trailers or tandems with covers and transported to the disposal facility by a licensed hauler.

3.6 Excavation Backfill

As discussed in Section 3.2, excavation will occur in stages followed closely by backfilling. Poly sheeting or other demarcation may be placed to differentiate backfilled areas from unexcavated areas designated for removal. The excavation will be conducted in a manner to minimize introduction of clean backfill material into the impacted soil/fill, but will conservatively favor over-excavation of backfilled material in lieu of allowing impacted soil/fill to remain in the excavation.

In addition, depending on encountered soil conditions and potential for safety hazards (e.g., open excavation near Hoover Road) it likely will be necessary to place some or all of the backfill material prior to receipt of confirmatory sample results. Field screening with the PID will therefore serve as primary criteria for establishing the excavation limits. Backfill material will be placed into the excavation and compacted with the excavator/backhoe bucket in 2-foot lifts to match the existing grade of the Site.

It has been assumed that the upper two feet of soil/fill has not been impacted and, therefore, it will be used as backfill. The remainder of the excavation will be backfilled with imported structural fill material. Backfill must meet the following criteria:

- Excavated, on-site soil/fill, including soils excavated for the purpose of accessing impacted soils (e.g., shallow soils overlying deeper impacted soils), may be used on-site as subgrade backfill provided that it does not exhibit evidence of staining, odor, discoloration, or PID readings above 5 ppm.
- Off-site backfill will originate from known sources having no evidence of disposal or releases of hazardous substances, hazardous, toxic or radioactive wastes, or petroleum, and will conform to the requirements of 6NYCRR Part 375-6.7(d).
- 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.
- Beneficial Use Determination (BUD)–approved structural fill material, including slag or crushed concrete, from an NYSDEC-approved source is considered acceptable for use as backfill.

3.7 Surface Restoration

Upon completion of the backfill work the excavation area will be restored with a minimum 2-inch asphalt binder course to match surrounding grade.

4.0 COMMUNITY AIR MONITORING

Real-time community air monitoring will be performed during IRM activities at the Site. Particulate and VOC monitoring will be performed along the downwind perimeter of the work area during excavating and backfilling activities in accordance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP) included as Appendix A. The CAMP is designed to prevent the surrounding community from adverse exposures due to potential release/migration of airborne particulates or vapors. The community as referenced herein includes potential receptors located off-site (e.g., neighboring residents or businesses) as well as on-site receptors not directly involved in remedial activities. The Generic CAMP will be implemented during IRM work involving disturbance or handling of Site soil/fill.

5.0 REMEDIAL INVESTIGATION SCOPE OF WORK

The Remedial Investigation scope of work is focused on defining the nature and extent of groundwater impacts from the SB-18 Area, if any, 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 remedial alternatives evaluation.

Field team personnel will collect environmental samples in accordance with the Field Operating Procedures (FOPs) presented in Appendix B. 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.

5.1 Field Investigation Activities

5.1.1 Supplemental Groundwater Investigation

Previous investigations indicated that SB-18 Area soil/fill has been impacted by VOCs. Two new on-site groundwater monitoring wells (MW-C1 and MW-C2) and an upgradient groundwater monitoring well (MW-C3) will be installed at the proposed locations shown on Figure 3. The new monitoring wells will provide downgradient groundwater quality information to determine if leaching of soil/fill constituents from the SB-18 Area has impacted groundwater quality. Monitoring well installation, well development, and groundwater sample collection are discussed in the following sections.

5.1.1.1 Monitoring Well Installation

Based upon site geology and observations during prior site investigations, the first water bearing zone is expected to be located within the upper bedrock unit (i.e., Lockport Dolomite). As such, each boring will be advanced through unconsolidated overburden soil/fill material using 4¼-inch hollow stem augers to competent bedrock (i.e., auger refusal). Continuous 2-inch diameter split-spoon samples will be collected at 2-foot intervals and described on stratigraphic field borehole logs by a qualified geologist. Each 2-foot split-spoon soil sample will be scanned for total volatile organic vapors with a Photovac 2020

PID equipped with a 10.2 eV lamp, and any visual and/or olfactory observations will be noted. Soil descriptions, PID scan results, and visual/olfactory observations will be recorded on Field Borehole Logs and in the Project Field Book. Soil cuttings will be hand-carted to a location on the south side of Hoover Road near the SB-18 Area and covered with poly sheeting for disposal at the time of IRM soil/fill removal.

Upon auger refusal, the augers will be seated into the bedrock and temporarily left in place during rock coring activities to prevent sloughing of the overburden soils. However, if perched groundwater is encountered, overburden casing will be installed to prevent downhole migration and mixing of perched overburden and bedrock groundwater. Once the augers or casing are set, a double-tube, swivel-type core barrel will be used to obtain an NX core sample of the upper 10 feet of competent bedrock. Rock coring will continue until the first saturated zone (i.e., fractured zone) is encountered. Each bedrock borehole will be advanced a minimum of 10 feet into the bedrock groundwater zone to accommodate well installation. Following coring activities, a 3⅞-inch tri-cone roller bit will be used to ream the borehole to the desired depth to facilitate well installation. Potable water obtained from a known source will be used as the drilling fluid. Water return will be monitored during bedrock drilling and zones of significant water loss to the formation will be noted on the drilling logs.

All permanent monitoring wells will be constructed of 2-inch I.D. flush-joint Schedule 40 PVC riser and screen (0.010-inch slot size). The monitoring well screen will be approximately 10 feet in length. Each well screen and riser will be set at the bottom of the borehole and a sand pack will be placed in the borehole annulus to a level of 2 to 3-feet above the top of the well screen. A bentonite seal of 2 to 3-feet in thickness will be installed immediately above the sand layer. The bentonite seal will be constructed with medium bentonite chips or 3/8-inch bentonite pellets hydrated in place. The remainder of the borehole annulus will be filled utilizing a pressure-tremied cement/bentonite grout to approximately 1 fbgs. The top of each well riser will be cut approximately 2-inches below grade and fitted with a locking J-plug. Each well will be protected by a flush-mount road box with a bolted cover anchored in a concrete surface pad.

5.1.1.2 Well Development

The newly installed monitoring wells will be developed following installation. Both wells will be left undisturbed for a minimum of 72 hours before development to ensure that

the cement/bentonite grout has set. Prior to development, the static water level and well depth will be measured. Development will be accomplished using a suction-lift pump, air-displacement pump, bottom-discharging bailer, or a Waterra™ hand pump and surge block via surge and purge methodology. Development will be recorded on appropriate field forms and considered completed when: the pH, specific conductivity and temperature have stabilized; the turbidity is below 50 NTU or has stabilized above 50 NTU; and a minimum of 10 well volumes or two times the estimated volume of lost drill water during borehole advancement, whichever is greater, has been removed. Stability is defined as variation between measurements of 10 percent or less and no overall upward or downward trend in the measurements. Water removed during well development will be discharged through activated carbon to ground surface a minimum of 50 feet away from each monitoring well. A detailed description of well development procedures, including the field forms, and calibration and maintenance of field instruments used to measure stability parameters are presented in the FOPs (Appendix B).

5.1.1.3 Groundwater Sample Collection

Prior to sample collection, static water levels will be measured and recorded from the newly-installed monitoring wells and existing well GW-1. Following water level measurement, Benchmark personnel will purge and sample the newly-installed wells and existing monitoring well GW-1 following low-flow/minimal drawdown purge and sample collection procedures (see Appendix B). Groundwater will be evacuated (purged) from the well at a low-flow rate (typically less than 0.1 L/min). Field measurements for pH, specific conductance, temperature, turbidity, 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 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.

Prior to and immediately following collection of groundwater samples, field measurements for pH, specific conductance, temperature, turbidity, dissolved oxygen, 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 Test America for analysis

5.1.1.4 Groundwater Sample Analyses

Groundwater samples will be analyzed for Target Compound List (TCL) organics (VOCs via method 8260B, SVOCs via method 8270C, pesticides via method 8081, PCBs via method 8082, and herbicides via method 8151) and Target Analyte List (TAL) metals (methods 6010/7471) with an equivalent NYSDEC Category B deliverables package to allow for independent third-party data usability assessment.

5.1.2 Supplemental Soil Investigation

As discussed in Section 5.1.1.1, each boring will be advanced through unconsolidated overburden soil/fill material using 4¼-inch hollow stem augers to competent bedrock, with continuous split-spoon samples collected from the overburden at 2-foot intervals. A representative composite sample of the overburden soil/fill will be collected from each of the three well borings. Well boring samples will be biased toward any 2-foot interval exhibiting field evidence of impact (staining, elevated PID readings, odors, etc.). In the absence of such findings the well boring sample will be prepared as a composite across the depth of the overburden. The three well boring samples will be analyzed for TCL organics and Target Analyte List (TAL) metals as per the groundwater samples.

5.1.3 Site-Specific Quality Assurance/Quality Control Samples

In addition to the samples described above, site-specific quality assurance/quality control (QA/QC) samples will be collected and analyzed to ensure the reliability of the generated data and to support the required third-party data usability assessment effort. Site-specific soil and groundwater QA/QC samples will include a matrix spike, matrix spike duplicate, and blind duplicate. A trip blank will be submitted and analyzed when aqueous samples are shipped.

5.2 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. Benchmark 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. Well casing elevations will be surveyed against a common reference datum to allow for relative measurement of groundwater elevation. Maps will be provided with the RI report.

6.0 FIELD QUALITY ASSURANCE/QUALITY CONTROL PROTOCOLS

Project quality assurance during RI and IRM activities will be attained through adherence to Benchmark's standard field operating procedures (FOPs) contained in Appendix B. These FOPs will identify methods for sample collection, decontamination, handling, and shipping, thereby improving the accuracy and precision of data collection.

7.0 HEALTH AND SAFETY PROTOCOLS

Benchmark 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 A, 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 Benchmark's 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.

8.0 REPORTING AND SCHEDULE

Upon completion of the IRM and RI fieldwork, a comprehensive RI/FS & IRM report will be prepared summarizing the IRM and RI tasks completed.

8.1 IRM Reporting

An experienced Benchmark representative will be on-site on a full-time basis during soil/fill removal to document IRM activities. Such documentation will include, at minimum, daily reports of IRM activities, community air monitoring results, photographs and sketches.

8.1.1 Construction Monitoring

Standard daily reporting procedures will include preparation of a daily report and, when appropriate, problem identification and corrective measures reports. Appendix C 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 completed reports will be available on-site and will be submitted to the NYSDEC as part of the Final Engineering Report (FER). The NYSDEC will be promptly notified of problems requiring modifications to this Work Plan prior to proceeding or completing the construction item.

Photo documentation of the IRM activities will be prepared by the Engineer throughout the duration of the project to convey typical work activities and whenever changed conditions or special circumstances arise.

8.1.2 IRM Construction Closeout

A summary of the IRM construction will be included in the RI/FS & IRM report, which will be submitted to the NYSDEC. At a minimum, the IRM section of the report will include:

- A Site or area planimetric map showing the parcel remediated, the lateral limits of excavation, the grade before excavation, the grade when excavation is complete, and grade following backfill where soil/fill is excavated.
- Tabular 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 6NYCRR Part 375 SCOs and TAGM 4046 Recommended Soil Cleanup Objectives (RSCOs) for total VOCs.
- Copies of daily inspection reports and, if applicable, problem identification and corrective measure reports.
- Text describing the excavation activities performed; a description of any deviations from the Work Plan and associated corrective measures taken; and other pertinent information necessary to document that the site activities were carried out in accordance with this Work Plan.

Additional IRM details will be included in the FER.

8.2 Remedial Investigation Reporting

The RI section of the RI/FS & IRM report will include the following information and documentation, consistent with the NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (Ref. 1).

- 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. This will include geochemical data, field measurements, etc.

- Comparative criteria that may be used to qualify the extent of contamination during the Feasibility Study (FS) process, such as NYSDEC Class GA groundwater quality standards and guidance.
- 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.
- Supporting materials for RI data. These will include boring logs, monitoring well construction diagrams, laboratory analytical reports, and similar information.

In addition, Benchmark 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 draft DER-10 guidance. The DUSR and any necessary qualifications to the data will be appended to the RI report.

8.3 Feasibility Study

A Feasibility Study (FS) will be developed to provide a forum for evaluating and selecting a recommended remedial approach. A list of remedial action objectives will be developed based on findings of the RI and the requirement for the selected remedial measures to be protective of human health and the environment under the proposed future use scenario. Based on the remedial action objectives and SCOs, volumes and areas of media potentially requiring 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

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.

8.4 Project Schedule

A project schedule for the major tasks to be performed in support of the RI/FS & IRM will be developed following approval of the Work Plan.

9.0 REFERENCES

1. New York State Department of Environmental Conservation. *Draft DER-10; Technical Guidance for Site Investigation and Remediation.* December 2002.

2. United States Department of Agriculture (USDA), Soil Conservation Service. *Soil Survey of Erie County, New York.* 1972.

3. Buehler, E.J., & Tesmer, I.H. *Geology of Erie County, New York: Buffalo Society of Natural Sciences Bulletin v. 21, no. 3.* 1963.

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

TABLES

BENCHMARK ENVIRONMENTAL ENGINEERING SCIENCE, PLLC

TABLE 1
COMPARISON OF SB -18 AREA SOIL ANALYTICAL RESULTS TO
NON-HAZAROUS DISPOSAL CRITERIA
3773 Lakeshore Road Site
Hamburg, New York

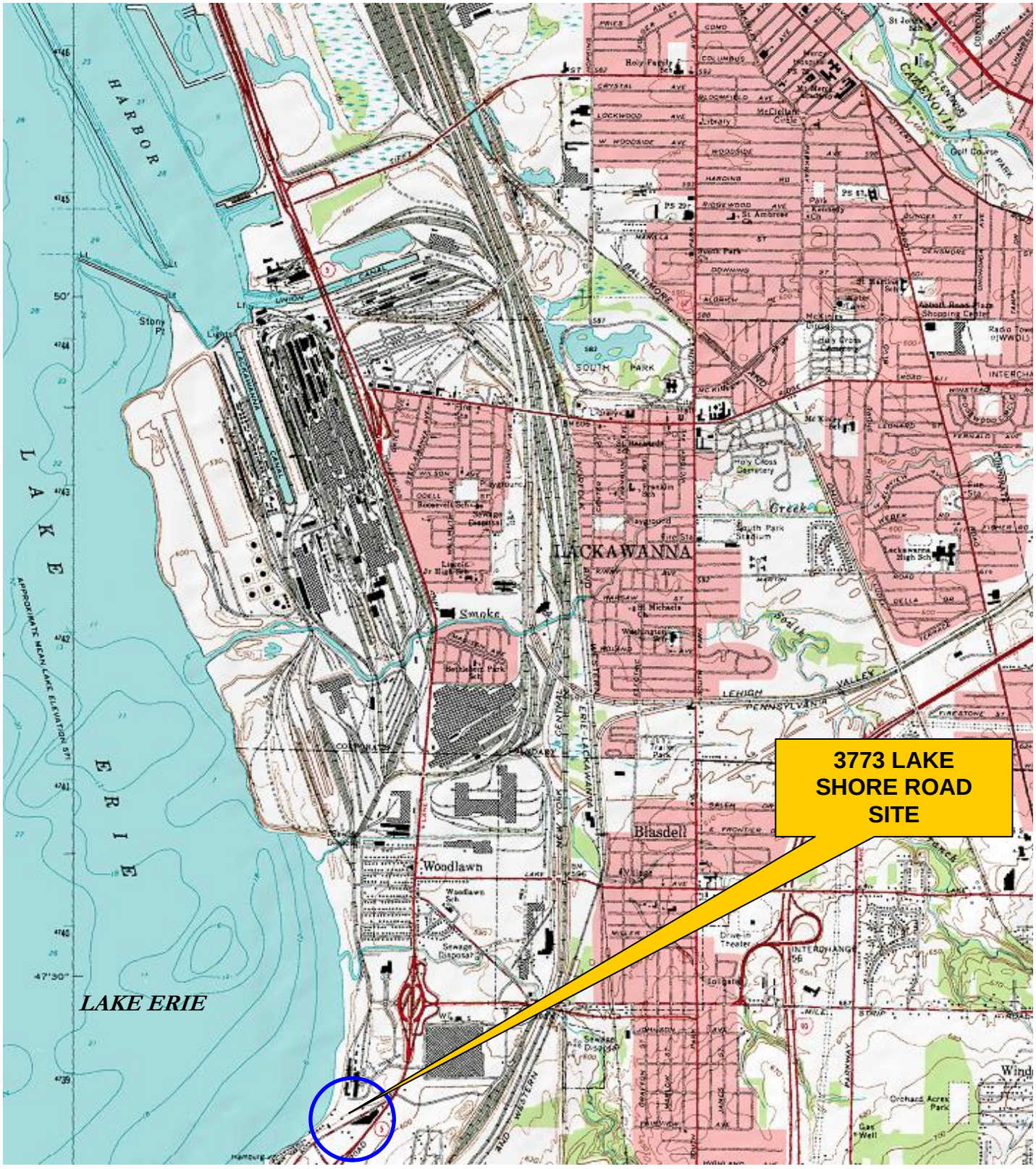
Parameter [1]	Soil Boring Locations				Soil/Sediment Action Level (mg/kg)[2]	TCLP trigger Limit (mg/kg)[3]
	C-B4 (4-6)	C-B5 (4-6)	C-B11 (10-11)	C-B12 (8-11)		
TCL Volatile Organic Compounds (VOCs) - mg/kg [3]						
Acetone	0.042	0.058	0.034	0.022 J	**8000**	
Benzene	ND	0.009	ND	0.002 J	**24**	**10**
2-Butanone (MEK)	0.008 J	0.018 J	ND	0.013 J	**4000**	**4000**
Carbon disulfide	0.001 J	0.002 J	ND	0.006	**8000**	
Chloroethane	0.017	ND	ND	ND	**540**	
1,1-Dichloroethane	ND	0.19	ND	0.17	**8000**	
1,1-Dichloroethene	ND	ND	ND	0.003 J	**12**	**14**
cis-1,2-Dichloroethene	ND	0.002 J	ND	0.002 J	**800**	
trans-1,2-Dichloroethene	ND	ND	ND	0.001 J	**2000**	
Ethylbenzene	0.006	0.037	ND	ND	**8000**	
Isopropylbenzene	0.001 J	0.002 J	ND	ND	**3000**	
Methylcyclohexane	0.006	0.004 J	ND	ND		
Methylene chloride	0.015	0.013 B	0.033 B	0.023	**93**	
Tetrachloroethene	0.001 J	0.014	ND	0.002 J	**14**	**14**
Toluene	0.052	42 D	0.003 J	8.4 D	**20000**	
1,1,1-Trichloroethane	ND	0.24 E	ND	1.8 D	**7000**	
1,1,2-Trichloroethane	ND	ND	ND	0.005	**120**	
Trichloroethene	ND	0.024	ND	ND	**64**	**10**
Total Xylene	0.056	0.15	ND	0.005 J	**200000**	

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 3028 "Contained-In" Criteria for Environmental Media.
3. TCLP Trigger Limits = 20X tocicity characteristic hazardous waste thresholds per 6NYCRR Part 371.

Definitions:
ND = Parameter not detected above laboratory detection limit.
"--" = No SCO available.
J = Estimated value; result is less than the sample quantitation limit but greater than zero.
B = Indicates a value greater than or equal to the instrument detection limit, but less than the quantitation limit.
D = All compounds were identified in an analyisis at the secondary dilution factor.
E = Indicates compound whose concentration eceeds calibration range of the instrument

FIGURES

FIGURE 1



FILEPATH=g:\cad\benchmark\horter, secrest, & emery\3773 lake shore road\figure 1; site location and vicinity map.dwg

BENCHMARK
ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0599

PROJECT NO.: 0109-001-104

DATE: OCTOBER 2008

DRAFTED BY: JCT

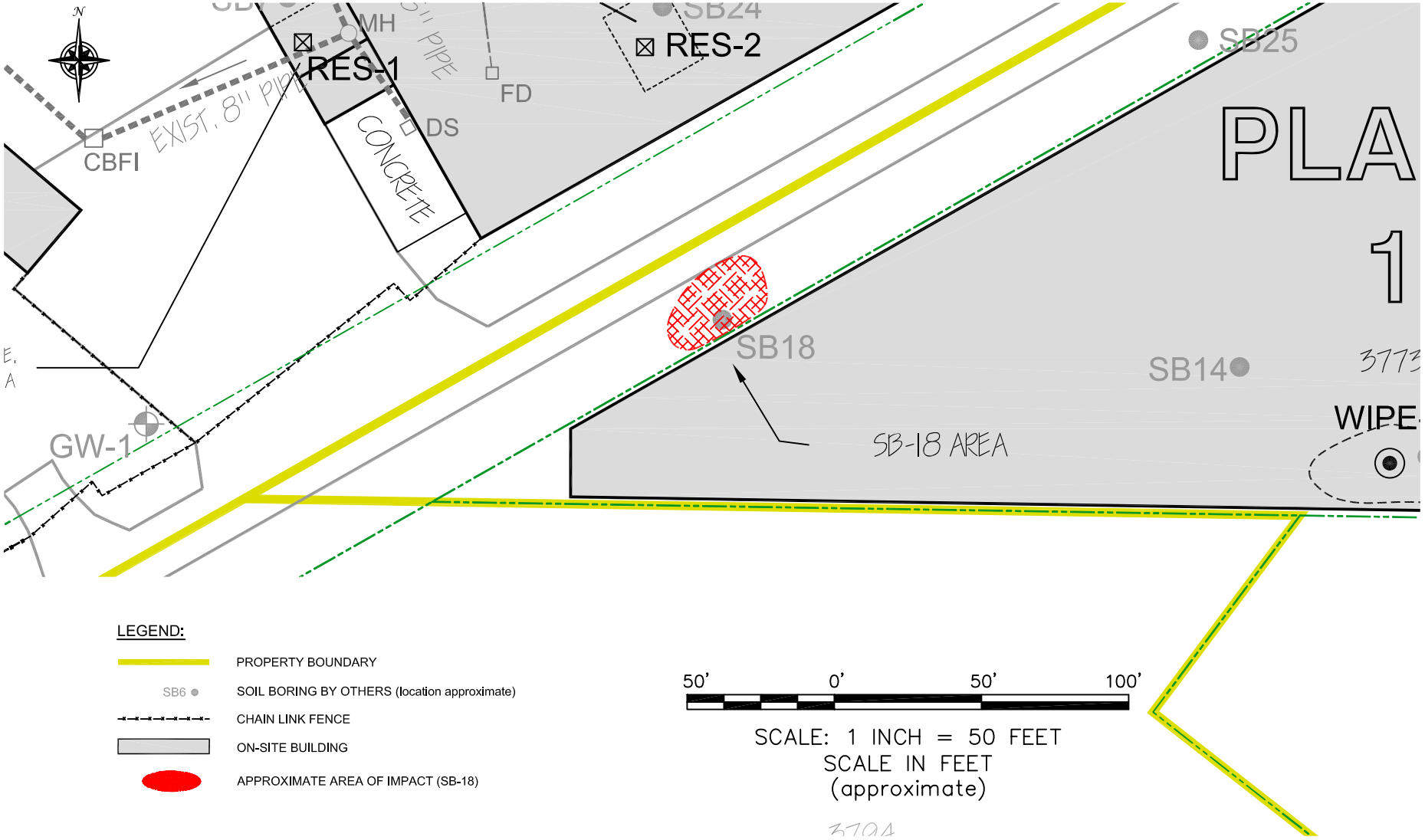
SITE LOCATION AND VICINITY MAP

SB-18 AREA

3773 LAKE SHORE ROAD
HAMBURG, NEW YORK

PREPARED FOR

3773 LAKE SHORE ROAD, INC.



BENCHMARK
ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0599

PROJECT NO.: 0109-001-104

DATE: OCTOBER 2008

DRAFTED BY: NTM

SITE PLAN

SB-18 AREA

3773 LAKESHORE ROAD SITE

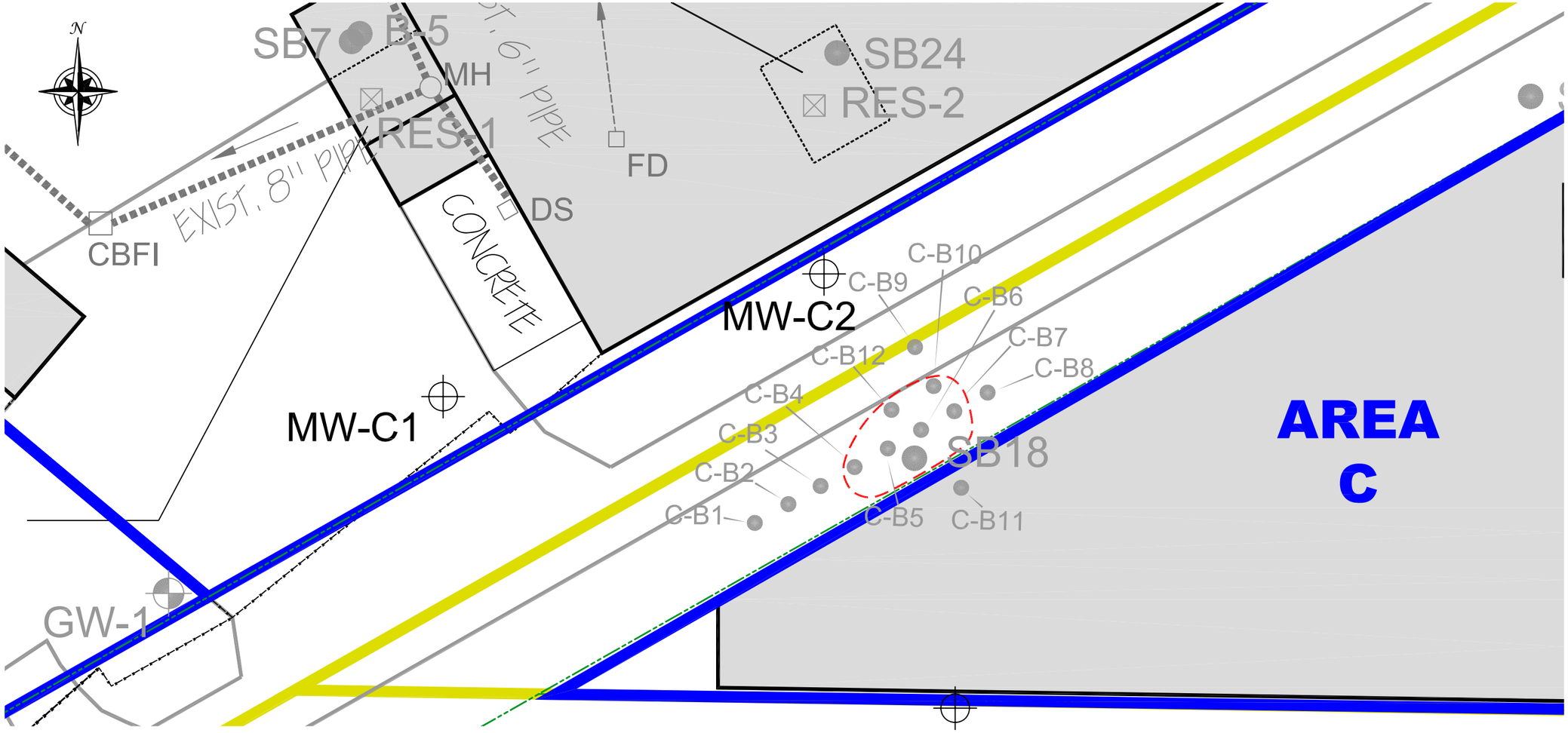
HAMBURG, NEW YORK

PREPARED FOR

3773 LAKESHORE ROAD, INC.

FIGURE 2

F:\Benchmark\Clients\Harter, Secrest, & Emery\3773 Lake Shore Road\Area C\RI-AAR-IRM Work Plan\Figures\Figure 3; SB18 Lakeshore Rd.dwg



LEGEND:

- INVESTIGATION AREAS
- PROPERTY BOUNDARY
- SB6 ● SOIL BORING BY OTHERS (location approximate)
- CHAIN LINK FENCE
- ON-SITE BUILDING
- C-B1 ● AREA C - PHASE II SOIL BORINGS (BM)
- GW-1 ⊕ EXISTING WELL BY OTHERS
- APPROXIMATE AREA OF IMPACT
- MW-C1 ⊕ PROPOSED GROUNDWATER MONITORING WELLS

30' 0' 30' 60'

SCALE: 1 INCH = 30 FEET
SCALE IN FEET
(approximate)

DATE: MARCH 2008
DRAFTED BY: NTM

BENCHMARK
ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0599

JOB NO.: 0109-001-104

REMEDIAL INVESTIGATION
GROUNDWATER MONITORING WELL LOCATIONS

SB-18 AREA INVESTIGATION

3773 LAKESHORE ROAD
BLASDELL, NEW YORK

PREPARED FOR
3773 LAKE SHORE ROAD, INC.

FIGURE 3

APPENDIX A

SITE-SPECIFIC HEALTH AND SAFETY PLAN

Health and Safety Plan for Remedial Investigation Activities and Interim Remedial Measures

3773 Lakeshore Road Site
Blasdell, New York

October 2008

0109-001-104

Prepared For:

3773 Lake Shore Road, Inc.

Prepared By:

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

726 Exchange Street, Suite 624, Buffalo, New York | phone: (716) 856-0599 | fax: (716) 856-0583

SITE HEALTH AND SAFETY PLAN
for
RI/IRM ACTIVITIES

3773 LAKE SHORE ROAD SITE (SB-18 AREA)
BLASDELL, NEW YORK

October 2008 0109-001-104

Prepared for:

3773 Lake Shore Road, Inc.

3773 LAKE SHORE 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: Thomas H. Forbes, P.E.

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

3773 LAKE SHORE ROAD SITE
HEALTH AND SAFETY PLAN FOR RI/IRM ACTIVITIES

TABLE OF CONTENTS

TABLE OF CONTENTS

3773 LAKE SHORE ROAD SITE
HEALTH AND SAFETY PLAN FOR RI/IRM ACTIVITIES

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

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 3773 Lakeshore Road Site located at 3773 Lakeshore Road in the Village of Blasdell, 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 HASP 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 approximate 30-foot by 60-foot area located on the southeast corner of 3773 Lakeshore Road (Hoover Road), in a light industrial area of Blasdell, NY. The Site is generally flat and is adjacent to a light industrial building (see Figure 2). The surface is predominately covered with asphalt.

1.3 Known and Suspected Environmental Conditions

A November 2006 Phase II report prepared by Hazard Evaluations, Inc. (HEI) reported that during the course of the Phase II investigation work a soil boring identified as SB-18 (see Figure 1) was discovered to contain toluene and 1,1,1-trichloroethane above

Technical Assistance and Guidance Memorandum (TAGM) 4046 Recommended Soil Cleanup Objectives (RSCOs). The HEI report also indicated the presence of bedding sands potentially associated with an underground storage tank near the SB-18 boring.

As the aerial extent of the soil/fill impacts had not been determined through HEI's work, Benchmark prepared a Site Investigation Work Plan to better determine the quantity of soil potentially requiring remediation, and to characterize groundwater at an existing downgradient monitoring well (i.e. GW-1, installed to a depth of approximately 24 feet below ground surface in the upper weathered bedrock). The soil/fill investigation proposed direct-push test borings in the area surrounding HEI's boring SB-18. Borings were slated to continue outward based on visual/olfactory evidence or PID screening until the approximate area of impact was delineated (see Figure 2). VOC concentrations were well below 6NYCRR Part 375 restricted-commercial soil cleanup objectives (SCOs) in all four samples, and no VOCs were detected in the groundwater sample collected from monitoring well GW-1.

1.4 Parameters of Interest

Based on the environmental investigation findings, constituents of potential concern (COPCs) at the Site include:

- **Volatile Organic Compounds (VOCs)** – VOCs present in soil at elevated concentration may include toluene and 1,1,1-trichloroethane.

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. Planned RI/IRM activities are more fully described in the RI/AAR & IRM Work Plan for the Site (Ref. 1).

Remedial Investigation Activities

1. **Monitoring Well Installation/Development and Sampling:** TurnKey-Benchmark will observe the installation of two 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.

Potential IRM Activities

1. **Soil/Fill Excavation:** The remediation contractor would excavate impacted soil and coordinate off-site disposal.

2. **Backfilling:** The remediation contractor would coordinate and perform backfilling activities.

3. **Verification Sampling:** The remediation contractor would collect soil samples from the side-walls and bottom of the excavation using a backhoe to verify that cleanup objectives have been met.

4. **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 chapter 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***. 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. Thomas H. Forbes***. 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. Richard L. Dubisz.*** 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 and groundwater. Table 1 identifies maximum concentrations for COPCs detected during previous investigations at the Site. Table 2 lists exposure limits for airborne concentrations of the COPCs identified in Section 1.4 of this HASP. Provided below are brief descriptions of the toxicology of the prevalent COPCs, and related health and safety guidance and criteria.

- **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.
- **1,1,1-Trichloroethane (CAS #71-55-6)** is a used as a solvent and degreasing agent in industry and is a component of paints, glues, and cleaning products. Routes of exposure include inhalation, ingestion, and skin and/or eye contact. Symptoms of acute inhalation exposure include dizziness, nausea, vomiting, diarrhea, loss of consciousness, and decreased blood pressure. Exposure at high

levels may result in cardiac dysrhythmia.

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 3. 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 3773 Lake Shore 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 ADP Screening & Selection Services, an occupational health care provider under contract with TurnKey-Benchmark. ADP's local facility is Health Works WNY, 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 purpose of the medical evaluation is to determine an employee's fitness for duty on hazardous waste sites; and to establish baseline medical data. 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.

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 4.

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 2), 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), combustible gas meter and a particulate meter. Observed values will be recorded and maintained as part of the permanent field record.

Additional air monitoring measurements may be made by TurnKey-Benchmark personnel to verify field conditions during subcontractor oversight activities. Monitoring instruments will be protected from surface contamination during use. Additional monitoring instruments may be added if the situations or conditions change. Monitoring instruments will be calibrated in accordance with manufacturer's instructions before use.

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 substantial 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 (Ref. 2) 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. Combustible gas will be monitored with the "combustible gas" option on the combustible gas meter or other appropriate instrument(s). In addition, fugitive dust/particulate concentrations will be monitored during major soil intrusion (e.g., 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 will 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 $\mu g/m^3$ - Continue field operations.
- 50-150 $\mu g/m^3$ - Don dust/particulate mask or equivalent
- Greater than 150 $\mu g/m^3$ - Don dust/particulate mask or equivalent. Initiate engineering controls to reduce respirable dust concentration (e.g., 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):

- **ORGANIC VAPOR PERIMETER MONITORING:**
  - If the sustained ambient air concentration of organic vapors at the downwind perimeter of the exclusion zone exceeds 5 ppm above background, work activities will be halted and monitoring continued. If the sustained 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 sustained ambient air concentration of organic vapors at the downwind perimeter of the exclusion zone are greater than 5 ppm over background but less than 25 ppm, 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 sustained organic vapor level is above 25 ppm at the perimeter of the exclusion zone, 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.

- **ORGANIC VAPOR CONTINGENCY MONITORING PLAN:**
  - If the sustained organic vapor level is greater than 5 ppm 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, sustained organic levels persist above 5 ppm 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. The zone will be delineated by flagging tape. 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.

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 a 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

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

Decontamination of all tools used for sample collection purposes will be conducted by TurnKey-Benchmark personnel. 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. Benchmark Environmental Engineering & Science, PLLC. 2008. *Remedial Investigation/Feasibility Study & Interim Remedial Measures Work Plan, 3773 Lake Shore Road Site (SB-18 Area), Blasdell, New York*. October.

2. 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

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

TABLE 1

CONSTITUENTS OF POTENTIAL CONCERN

3773 Lakeshore Road Site
Blasdell, New York

Parameter	CAS No.	Maximum Detected Concentration [1]	
		Groundwater (ug/L)	Soil/Fill (mg/kg)
Volatile Organic Compounds (VOCs):			
Toluene	108-88-3	ND	42 D
1,1,1-Trichloroethane	71-55-6	ND	1.8 D

Notes:

1. Supplemental Phase II Investigation, March 2008.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 2

TOXICITY DATA FOR CONSTITUENTS OF POTENTIAL CONCERN

3773 Lakeshore Road Site
Blasdell, New York

Parameter	Synonyms	CAS No.	Code	Concentration Limits [1]		
				PEL	TLV	IDLH
Volatile Organic Compounds (VOCs): ppm						
Toluene	Methyl benzene, Methyl benzol	108-88-3	C-300	200	50	500
1,1,1-Trichloroethane	Chloroethene, Methyl chloroform	71-55-6	*none*	350	350	700

Notes:

1. Concentration limits as reported by NIOSH Pocket Guide to Chemical Hazards, February 2004 (NIOSH Publication No. 97-140, fourth printing with changes 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); = max. exposure conc. allowable for 8 hr/day @ 40 hr/wk.
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-STEL or Short Term Exposure Limits are 15 minute exposures that should not be exceeded for even an instant. It is not a stand alone value but is accompanied by the TLV-TWA.
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 max. exposure conconcentration allowable for 8 hr/day @ 40 hr/week

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 3

POTENTIAL ROUTES OF EXPOSURE TO THE CONSTITUENTS OF POTENTIAL CONCERN

3773 Lake Shore Road Site
Blasdell, New York

Activity [1]	Direct Contact with Soil/Fill	Inhalation of Vapors or Dust	Direct Contact with Groundwater
Remedial Investigation Tasks			
1. Monitoring Well Installation/Development and Sampling	**x**	**x**	**x**
Interim Remedial Measures Tasks			
1. Soil/Fill 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.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 4

REQUIRED LEVELS OF PROTECTION
FOR RI/IRM TASKS

3773 Lake Shore Road Site
Blasdell, New York

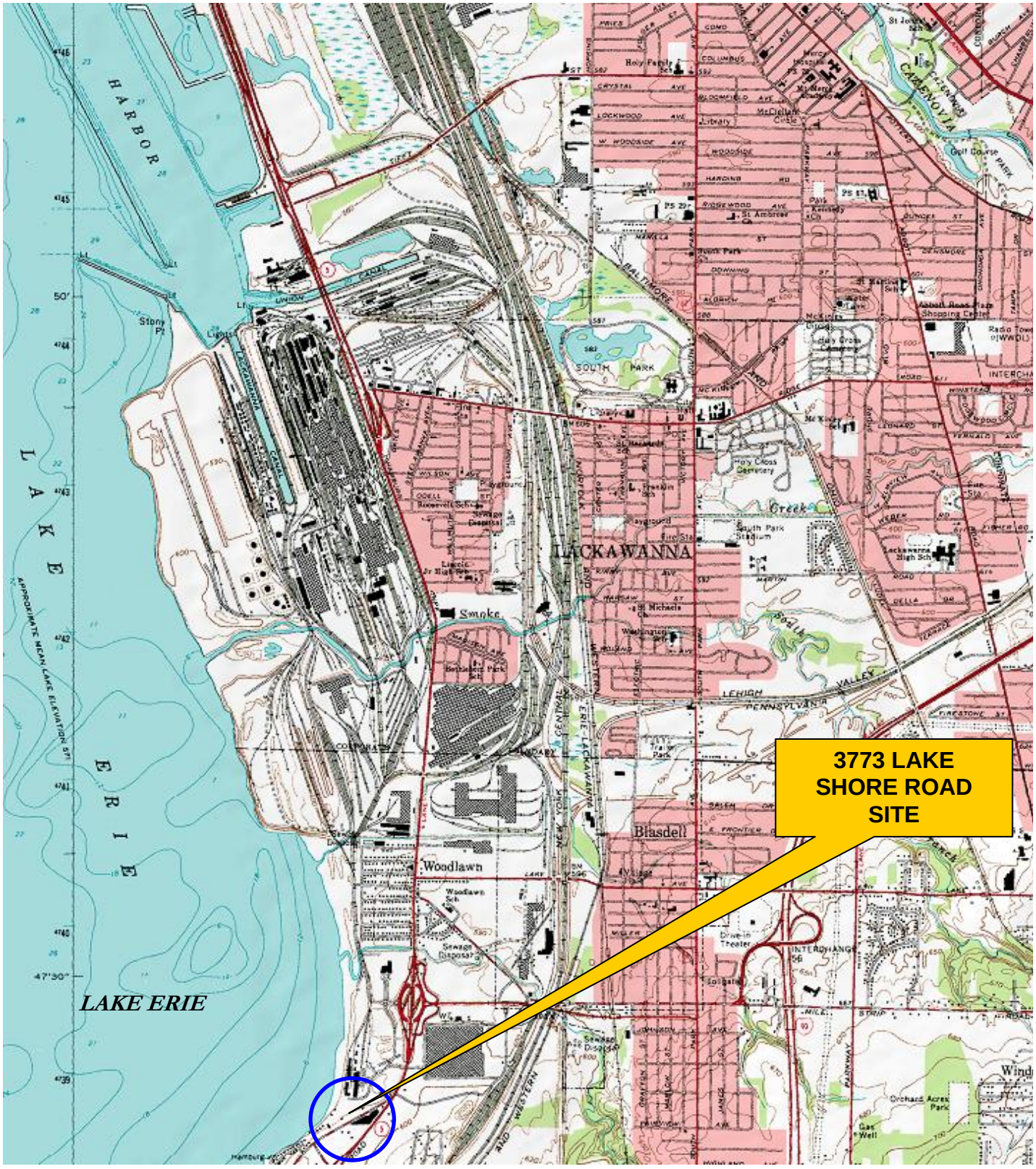
Activity	Respiratory Protection [1]	Clothing	Gloves [2]	Boots [2, 3]	Other Required PPE/Modifications [2, 4]
Remedial Investigation Tasks					
1. Monitoring Well Installation/Development and Sampling	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	SGSS
Interim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



FILEPATH=g:\cad\benchmark\horter, secrest, & emery\3773 lake shore road\figure 1; site location and vicinity map.dwg

BENCHMARK
ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0599

PROJECT NO.: 0109-001-104

DATE: OCTOBER 2008

DRAFTED BY: JCT

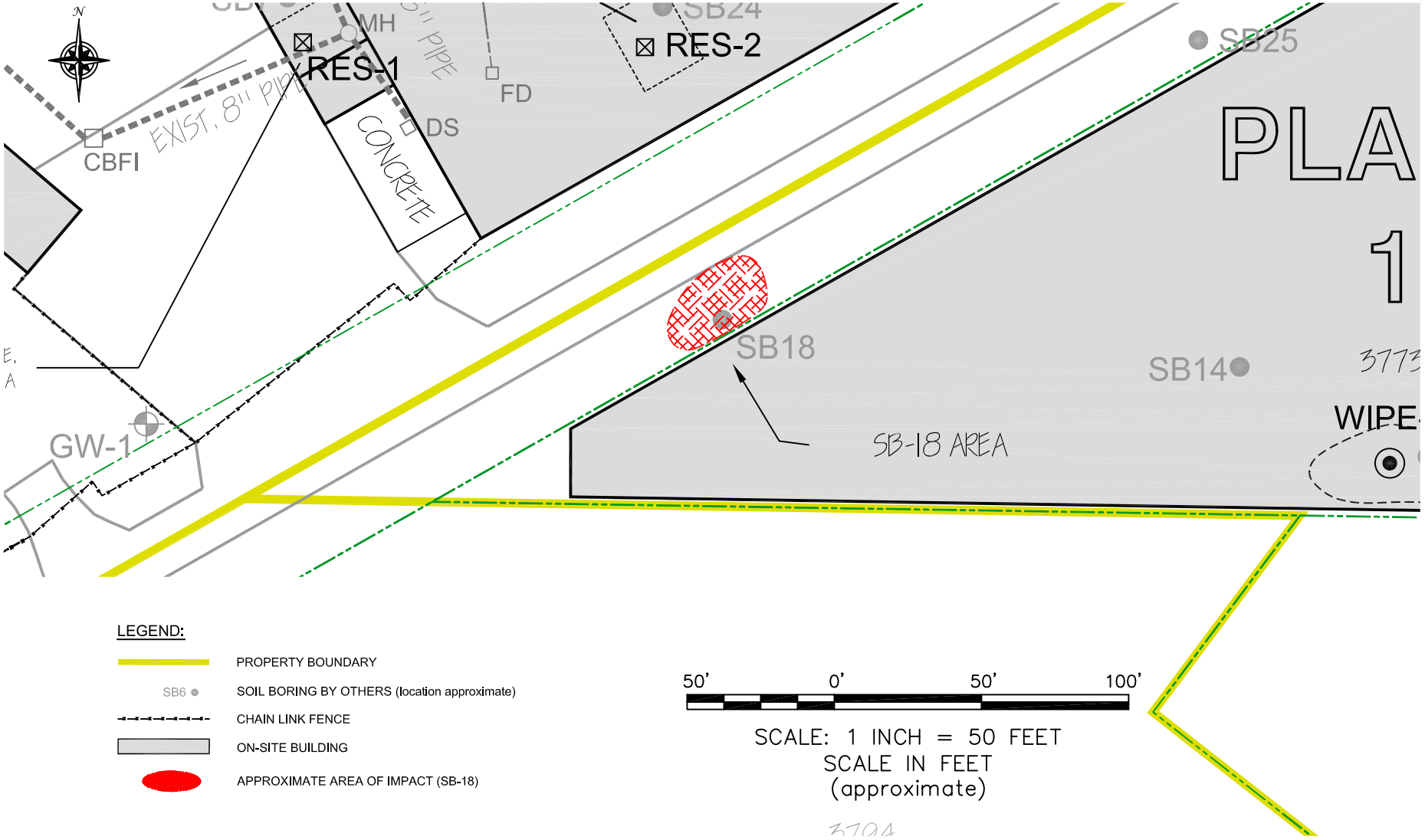
SITE LOCATION AND VICINITY MAP

SB-18 AREA

3773 LAKE SHORE ROAD
HAMBURG, NEW YORK

PREPARED FOR

3773 LAKE SHORE ROAD, INC.



BENCHMARK
ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0599

PROJECT NO.: 0109-001-104

DATE: OCTOBER 2008

DRAFTED BY: NTM

SITE PLAN

SB-18 AREA

3773 LAKESHORE ROAD SITE

HAMBURG, NEW YORK

PREPARED FOR

3773 LAKESHORE ROAD, INC.

FIGURE 2

APPENDIX A

EMERGENCY RESPONSE PLAN

EMERGENCY RESPONSE PLAN
for
RI/IRM ACTIVITIES

3773 LAKE SHORE ROAD SITE (SB-18 AREA)
BLASDELL, NEW YORK

October 2008 0109-001-104

Prepared for:

3773 Lake Shore Road, Inc.

3773 LAKE SHORE 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 3773 Lake Shore Road Site located in Blasdell, 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
2. Fire

Source of Emergency:

1. Slip/trip/fall
2. Fire

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-Benchmark personnel field vehicle.

5.0 EMERGENCY CONTACTS

The following identifies the emergency contacts for this ERP.

Emergency Telephone Numbers:

Project Manager: ***Thomas H. Forbes***
Work: (716) 856-0599
Mobile: (716) 864-1730

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: ***Richard L. Dubisz***
Work: (716) 856-0635
Mobile: (716) 998-4334

MERCY HOSPITAL (ER):	(716) 826-7000
FIRE:	911
AMBULANCE:	911
HAMBURG 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:
3773 Lake Shore Road
Blasdell, New York
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 an adequate method of internal communication is understood by all personnel entering the site. 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 ***Richard Dubisz***) 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 Mercy Hospital.
- Inhalation: Move to fresh air and, if necessary, transport to Mercy Hospital.
- Ingestion: Decontaminate and transport to Mercy 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 Mercy 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 (see Figure A-1):

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

- From Hoover Road
- Turn left on Hamburg Turnpike (Rte. 5)
- Stay on Turnpike and take Tifft Street Exit, turn right onto Tifft Street
- Cross South Park Avenue then cross McKinley Parkway
- Bear left on Edgewood Avenue
- Turn right on Abbott Road
- Hospital is on the right

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:

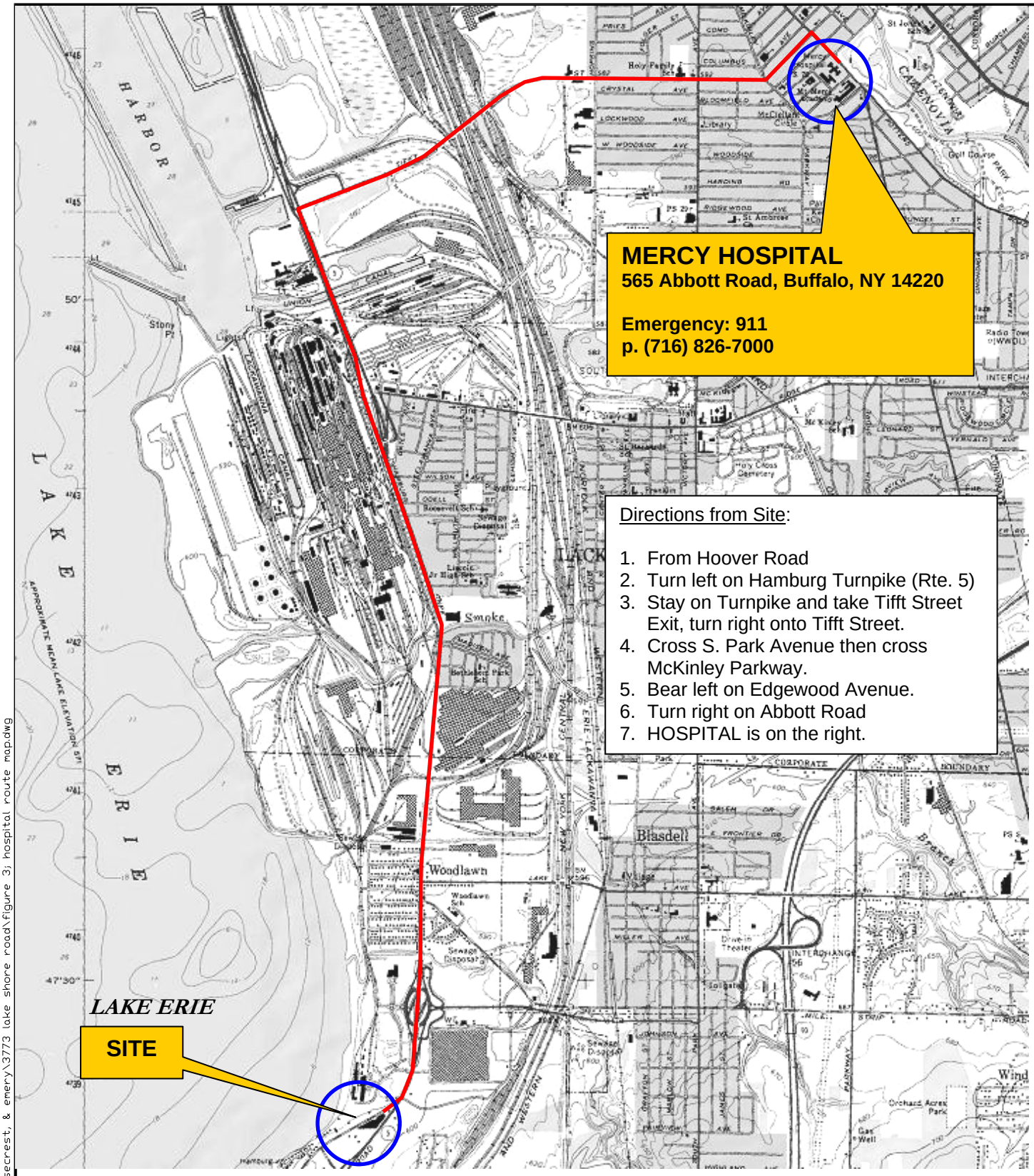
- Occupational injuries and illnesses.
- Accident investigations.
- Reports to insurance carrier or State compensation agencies.
- Reports required by the client.
- Records and reports required by local, state, federal and/or international agencies.
- Property or equipment damage.
- Third party injury 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

FIGURE A-1



BENCHMARK
ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0599

PROJECT NO.: 0109-001-104

DATE: OCTOBER 2008

DRAFTED BY: JCT

HOSPITAL ROUTE MAP

SB-18 AREA

3773 LAKE SHORE ROAD
HAMBURG, NEW YORK

PREPARED FOR

3773 LAKE SHORE ROAD, INC.

FILEPATH=g:\cad\benchmark\harter, secrest, & emery\3773 lake shore road\figure 3; hospital route map.dwg

APPENDIX B

HOT WORK PERMIT FORM

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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:

APPENDIX C

NYSDOH GENERIC COMMUNITY AIR MONITORING PLAN

APPENDIX 1A

New York State Department of Health
Generic Community Air Monitoring Plan

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 volatile organic compounds (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 NYSDEC/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. 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.

- 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.

- 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.

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

All 15-minute readings must be recorded and be available for State (DEC and DOH) 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.

- 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.

- 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.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

APPENDIX B

FIELD OPERATING PROCEDURES

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

FIELD OPERATING PROCEDURES

Hollow Stem Auger Drilling Procedures

FOP 026.0

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 Benchmark'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 Benchmark'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 Benchmark'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 Benchmark field supervisor.

10. Collect soil samples via split spoon sampler in accordance with Benchmark'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 bit (not center plug) in place.

13. Plug and abandon boreholes not used for well installation in accordance with Benchmark'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 Benchmark 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 Benchmark field supervisor.

ATTACHMENTS

Drilling Safety Checklist (sample)
Tailgate Safety Meeting Form (sample)

REFERENCES

Benchmark 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*

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

DRILLING SAFETY CHECKLIST

Project: **Supplemental Phase II RFI/ICMs**	Date:
Project No.: **0041-009-500**	Drilling Company:
Client: **RealCo., Inc.**	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?		
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?		

ITEMS TO CHECK	OK	ACTION NEEDED

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

DRILLING SAFETY CHECKLIST

Project: **Supplemental Phase II RFI/ICMs**	Date:
Project No.: **0041-009-500**	Drilling Company:
Client: **RealCo., Inc.**	Drill Rig Type:

ITEMS TO CHECK	OK	ACTION NEEDED
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 **Benchmark 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: _____

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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:

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

FIELD OPERATING PROCEDURES

Split-Spoon Sampling Procedures

FOP 058.0

SPLIT-SPOON SAMPLING PROCEDURES

PURPOSE

This guideline presents the methods for using a split-spoon sampler for collecting soil samples from a boring and for estimating the relative in-situ compressive strength of subsurface materials (ASTM D 1586). Representative samples for lithologic description, geochemical analysis, and geotechnical testing will be collected from the subsurface materials using the split-spoon sampler.

PROCEDURE

1. Place plastic sheeting on a sturdy surface to prevent the split-spoon and its contents from coming in contact with the surface (several layers of sheeting may be placed on the surface so that they may be removed between each sample or as needed).

2. Lower the sampling string to the base of the borehole. Measure the portion of the sampling string that extends above surrounding grade (i.e. the stickup). The depth of sampling will equal the total length of the string (sampler plus rods) minus the stickup length.

3. Measure sampling depths to an accuracy of 0.1 feet. If field measurements indicate the presence of more than 0.3 feet of disturbed materials in the base of the borehole (i.e. slough), the sampler will be used to remove this material, after which a second sampling trip will be made.

4. Select additional sampler components as required (i.e., leaf spring core retainer for clays or a sand trap for non-cohesive sands). If a retainer or trap is not used, a spacer ring will be used to hold the liners in position inside the sampler.

5. For driving samples, attach the drive head sub and hammer to the drill rods without the weight resting on the rods. For pushing samples using the rig hydraulics, skip to Step 9.

6. Mark four 6-inch intervals on the drill rods relative to a reference point on the drill rig. With the sampler resting on the bottom of the hole, drive the sampler with the 140 lb. hammer falling freely over a 30-inch fall until 24 inches have been penetrated or 50 blows applied.

7. Record the number of blows per 6 inches. Determine the "N" value by adding the blows for the 6 to 12-inch and 12 to 18-inch intervals of each sample drive.

8. After penetration is complete, remove the sampling string. Avoid removing sampling string by hitting up on the string with the hammer as this can cause the sample to fall from the bottom of the split-spoon sampler. The sampling string should be removed via cable lifting or rig hydraulics. If sample retention has been poor, let the sampling string rest in place for at least 3 minutes, then rotate clockwise at least 3 times before removing from the borehole.

9. For pushed samples (i.e., using rig hydraulics), mark four 6-inch intervals on the drill rods relative to a reference point on the rig. Use the rig pull-down to press the sampler downward until 24 inches have been penetrated or no further progress can be made with the full weight of the rig on the sampler.

10. Remove the split-spoon sampler from the sampling string and place on the plastic-covered surface.

11. Open the split-spoon sampler only when the Benchmark field geologist is prepared to describe and manage the sample.

12. Describe the sample in accordance with the Unified Soil Classification System in accordance with the Benchmark FOP: Soil Description Procedures Using the Unified Soil Classification System (USCS).

13. Record all information in accordance with Benchmark's FOP: Documentation Requirements for Drilling and Well Installation.

14. Collect a portion of the sample for field screening as described in the Benchmark FOP: Screening of Soil Samples for Organic Vapors During Drilling Activities.

15. If applicable, collect soil samples for volatile organic constituents (VOCs). If applicable, collect sample for semi-volatile, metals, geotechnical, or other off-site analysis.

16. The samples will be labeled, stored and shipped in accordance with the Benchmark's FOP: Sample Labeling, Storage and Shipment Procedures.

ATTACHMENTS

none

REFERENCES

Benchmark FOPs:

015 Documentation Requirements for Drilling and Well Installation
046 Sample Labeling, Storage and Shipment Procedures
047 Screening of Soil Samples for Organic Vapors During Drilling Activities
054 Soil Description Procedures Using the Unified Soil Classification System (USCS)

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

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 Benchmark 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 Benchmark 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 Benchmark Groundwater Well Development Log (sample attached).

ATTACHMENTS

Groundwater Well Development Log (sample)

REFERENCES

Benchmark FOPs:
040 Non-Disposable and Non-Dedicated Sampling Equipment Decontamination

MONITORING WELL DEVELOPMENT PROCEDURES

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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 [$(B)^2$ x { (A) - (C) }]	

*Use the table to the right to calculate one well volum

Volume Calculation

Well Diameter	Volume gal/ft
	.041
3"	0.
"	0.653
	1.020
6	1.469
8"	2.611

Stabilization Criteria

er	Criteria
DO	+/- 0.3 mg/L
Turbidity	+/- 10%
SC	+/- 3%
ORP	+/- 10 mV
pH	+/- 0.1 unit

Field Personnel:

EVACUATION STABILI TION A:

Time	Water Level (fbTOR)	Accumulated Volume		Tempe rees	Co tance S/cm)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor

REMARKS:

PREPARED BY:

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

FIELD OPERATING PROCEDURES

Non-Disposable and Non-Dedicated Sampling Equipment Decontamination

FOP 040.0

NON-DISPOSABLE AND NON-DEDICATED SAMPLING EQUIPMENT DECONTAMINATION

PURPOSE

This procedure is to be used for the decontamination of non-disposable and non-dedicated equipment used in the collection of environmental samples. The purpose of this procedure is to remove chemical constituents from previous samples from the sampling equipment. This prevents these constituents from being transferred to later samples, or being transported out of controlled areas.

HEALTH AND SAFETY

Nitric acid is a strong oxidizing agent as well as being extremely corrosive to the skin and eyes. Solvents such as acetone, methanol, hexane and isopropanol are flammable liquids. Limited contact with skin can cause irritation, while prolonged contact may result in dermatitis. Eye contact with the solvents may cause irritation or temporary corneal damage. Safety glasses with protective side shields, neoprene or nitrile gloves and long-sleeve protective clothing must be worn whenever acids and solvents are being used.

PROCEDURE – GENERAL EQUIPMENT

Bailers, split-spoons, steel or brass split-spoon liners, Shelby tubes, submersible pumps, soil sampling knives, and similar equipment will be decontaminated as described below.

1. Wash equipment thoroughly with non-phosphate detergent and potable-quality water, using a brush where possible to remove any particulate matter or surface film. If the sampler is visibly coated with tars or other phase-separated hydrocarbons, pre-wash with acetone or isopropanol, or by steam cleaning. Decontamination will adhere to the following procedure:

a. Rinse with potable-quality water;

b. Rinsed with 10% nitric acid (HNO_3) solution [1] ;

c. Rinse with potable-quality water;

d. Rinse with pesticide grade acetone or methanol [2];

e. Rinse with pesticide grade hexane [2];

f. Rinse with deionized water demonstrated analyte-free, such as distilled water;

g. Air dry; and

h. Store in a clean area or wrap in aluminum foil (shiny side out) or new plastic sheeting as necessary to ensure cleanliness.

2. All non-dedicated well evacuation equipment, such as submersible pumps and bailers, which are put into the well, must be decontaminated following the procedures listed above. All evacuation tubing must be dedicated to individual wells (i.e., tubing cannot be reused). However, if submersible pump discharge tubing must be reused, the tubing and associated sample valves or flow-through cells used in well purging or pumping tests will be decontaminated as described below:

[1] Omit this step if metals are not being analyzed. For carbon steel split spoon samplers, a 1% rather than 10% HNO_3 solution should be used.

[2] This solvent rinse can be omitted if organics are not being analyzed. Alternatively, if approval from the NYSDEC has been granted, use pesticide grade isopropanol as the cleaning solvent. Isopropanol is better suited as a cleaning solvent that acetone, methanol and hexane for the following reasons:

- Acetone is a parameter analyzed for on the Target Compound List (TCL); therefore the detection of acetone in samples collected using acetone rinsed equipment is suspect;
- Almost all grades of methanol contain 2-butanone (Methyl Ethyl Ketone, MEK) contamination. As for acetone, 2-butanone is a TCL compound. Thus, the detection of 2-butanone in samples collected using methanol rinsed equipment is suspect. In addition, methanol is much more hazardous than either isopropanol or acetone.
- Hexane is not miscible with water (hydrophobic) and therefore, is not an effective rinsing agent unless the sampling equipment is dry. Isopropanol is extremely miscible in water (amphoteric), making it an effective rinsing agent on either wet or dry equipment.

a. Pump a mixture of potable water and a non-phosphate detergent through the tubing, sample valves and flow cells, using the submersible pump.

b. Steam clean or detergent wash the exterior of the tubing, sample valves, flow cells and pump.

c. Pump potable water through the tubing, sample valve, and flow cell until no indications of detergent (e.g. foaming) are observed.

d. Double rinse the exterior of the tubing with potable water.

e. Rinse the exterior of the tubing with distilled water.

f. Store in a clean area or wrap the pump and tubing assembly in new plastic sheeting as necessary to ensure cleanliness until ready for use.

3. All unused sample bottles and sampling equipment must be maintained in such a manner that there is no possibility of casual contamination.

4. Manage all waste materials generated during decontamination procedures as described in the Benchmark Field Operating Procedure for Management of Investigation Derived Waste.

PROCEDURE – SUBMERSIBLE PUMPS

Submersible pumps used in well purging or purging tests will be decontaminated thoroughly each day before use as well as between well locations as described below:

Daily Decontamination Procedure:

1. Pre-rinse: Operate the pump in a basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

2. Wash: Operate the pump in 8 to 10 gallons of non-phosphate detergent solution (i.e., Alconox) for 5 minutes and flush other equipment with fresh detergent solution for 5 minutes.

3. Rinse: Operate the pump in a basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

4. Disassemble pump.

5. Wash pump parts with a non-phosphate detergent solution (i.e., Alconox). Scrub all pump parts with a test tube brush or similar device.

6. Rinse pump with potable water.

7. Rinse the inlet screen, the shaft, the suction interconnection, the motor lead assembly, and the stator housing with distilled/deionized water.

8. Rinse the impeller assembly with 1% nitric acid (HNO_3).

9. Rinse the impeller assembly with isopropanol.

10. Rinse the impeller assembly with distilled/deionized water.

Between Wells Decontamination Procedure:

1. Pre-rinse: Operate the pump in a basin containing 8 to 10 gallons of potable water for 5 minutes.

2. Wash: Operate the pump in 8 to 10 gallons of non-phosphate detergent solution (i.e., Alconox) for 5 minutes.

3. Rinse: Operate the pump in a basin of potable water for 5 minutes.

4. Final rinse the pump in distilled/deionized water.

ATTACHMENTS

None

REFERENCES

Benchmark FOPs:
032 Management of Investigation-Derived Waste

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

FIELD OPERATING PROCEDURES

Low-Flow (Minimal Drawdown) Groundwater Purging & Sampling Procedure

FOP 031.0

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 Benchmark's Groundwater Level Measurement FOP and decontaminate the e-line probe and a lower portion of cable following the procedures referenced in the Benchmark'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 Benchmark'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 Benchmark'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 Benchmark'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 Benchmark'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.*

Benchmark 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*

LOW FLOW (MINIMAL DRAWDOWN) GROUNDWATER PURGING & SAMPLING PROCEDURES

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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 (mS/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:

	WATER QUALITY MEASUREMENTS					
Appearance:	pH (units)	TEMP. (°C)	SC (uS)	TURB. (NTU)	DO (ppm)	ORP (mV)
Color:						
Odor:						
Sediment Present?						

REMARKS:

PREPARED BY:

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

FIELD OPERATING PROCEDURES

Groundwater Level Measurement

FOP 022.0

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 Benchmark 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

Benchmark FOPs:
040 Non-Disposable and Non-Dedicated Sampling Equipment Decontamination

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

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:

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

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 Benchmark 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 Benchmark 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

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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	

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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.

SAMPLE LABELING, STORAGE & SHIPMENT PROCEDURES

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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	

APPENDIX C

PROJECT DOCUMENTATION FORMS

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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.]

BENCHMARK 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	

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

INSPECTOR'S DAILY REPORT

CONTRACTOR			
CLIENT		DATE:	

LOCATION				DAY		JOB NO.	
WEATHER		TEMP	° F	START		END	

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	

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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