# 148 NAGLE SITE

**148 NAGLE AVENUE**
**NEW YORK, NEW YORK**
**Block 2174 Lot 70**

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# REMEDIAL INVESTIGATION WORK PLAN

April 2019
*REVISED MAY 2019*

*Prepared for:*
Dyckman Crestview Realty, LLC
279 West 231st Street
Bronx, New York, 10463

*Prepared By:*
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**ENVIRONMENTAL BUSINESS CONSULTANTS**
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# TABLE OF CONTENTS
# REMEDIAL INVESTIGATION WORK PLAN
# 148 NAGLE AVENUE

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**CERTIFICATION**

# TABLE OF CONTENTS
# REMEDIAL INVESTIGATION WORK PLAN
# 148 NAGLE AVENUE

## *TABLES*

## *FIGURES*

## *ATTACHMENTS*

# CERTIFICATION

I, Charles B. Sosik, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Charles Sosik 5/21/19
Name Date

## 1.0 INTRODUCTION

This Remedial Investigation Work Plan (RIWP) was prepared on behalf of Dyckman Crestview Realty, LLC for the property located at 148 Nagle Avenue, New York, New York. An application for acceptance into the New York State Brownfield Cleanup Program (BCP) was approved/executed on December 14, 2018.

The purpose of this Remedial Investigation Work Plan is to collect data of sufficient quality and quantity to characterize the nature and extent of residual contamination associated with historic operations at the Site and to complete a qualitative exposure assessment for future occupants of the proposed building and the surrounding community and to evaluate alternatives to remediate the contamination.

The overall objectives of the project are to prepare the Site for mixed residential and commercial use and to remediate known and unknown environmental conditions at the site to the satisfaction of the DEC and the New York State Department of Health (NYSDOH).

### 1.1 Site Location and Description

The street address for the Site is 148 Nagle, New York, NY (**Figure 1**). The Site is located in the Inwood section of New York County and is comprised of a single tax parcel (**Figure 2**) totaling 10,000 square feet (0.175 acres). The Site is located in the City of New York and Borough of Manhattan . The Site is square in shape with 100 feet of frontage along Nagle Avenue and 100 feet of frontage along Thayer Street.

The north side of the property is bordered by a multi-family residential building. The east side of the property is bordered by a commercial building. The south side of the property is bordered by Nagle Avenue. The west of the property is bordered by Thayer Street.

The Site is currently improved with a 1- story 2,000 square foot commercial building occupied by a laundromat. Previously, a one-story 6,000 square foot retail building which housed a dry cleaner was also present on the property. The 6,000 sf building was destroyed in a fire. The cellar level of the 6,000 sf building was filled in following the fire and subsequent building demolition. The concrete cellar slab remains at a depth of approximately 10 feet below grade.

### 1.2 Redevelopment Plans

The BCP Applicant intends to redevelop the property with a new mixed-use commercial retail and residential building with a cellar level at an approximate depth of 12 feet below grade.

### 1.3 Site History

Prior to demolition in January 2017 as the result of a fire, the property was developed with a 1-story 8,000 sf commercial retail building. 6,000 sf of that building was destroyed in a fire, leaving a 2,000 sf building remaining. According to DOB records the building was constructed in 1910 and used for commercial retail space. A dry cleaner occupied a portion of the building which was destroyed from 1996 – 2017.

## 1.4 Summary of Previous Investigations

Environmental investigations performed at the Site include the following:

- NYSDEC Spill No. 1707910 – Clean Harbors (November 2017)
- Limited Phase II Subsurface Investigation - EBC (July 2018)

### *1.4.1 November 2017 – NYSDEC Spill No. 1707910 Investigation (Clean Harbors)*

On November 17, Clean Harbors personnel called in a spill of unknown contaminants following the demolition of the 6,000 sf building which had been destroyed by a fire. DEC assigned spill No. 1707910 to the Site. Subsequent testing of fill materials at the Site by Clean Harbors on December 4, 2017, identified tetrachloroethene (PCE) at concentrations of 23,000 to 46,000 ug/kg in two of four soil samples collected from the basement area. The remaining two samples were non-detect for VOCs.

A copy of the Spill Investigation Report is provided in digital form in **Attachment A**.

### *1.4.2 July 2018 – Limited Phase II Subsurface Investigation Report (EBC)*

Following discussions with DEC Spills and the Division of Hazardous Waste, it was suggested that given the site conditions and the potential for further contamination of the site, the most appropriate way to confirm that contamination had impacted the Site was to collect groundwater samples at the property line immediately downgradient of the Site.

Three soil borings were advanced in the sidewalk along Nagle Avenue in front of the Site. At each location samples were collected in 5-foot intervals from 5 feet below grade to 20 ft below grade, approximately 8 feet below the water table. Soil samples were collected from two locations at the 10-12 foot interval and from the 8-10 and 12-14 foot interval from the third location. Groundwater samples were collected from all three locations at a depth of approximately 17-20 ft. All soil and groundwater samples were analyzed for VOCs by EPA Method 8260. With the exception of acetone which was reported above its unrestricted soil cleanup objective (SCO) in each of the samples there were no detections of VOCs above SCOs. Tetrachloroethene (PCE) was reported above the standard of 5 ug/L in all three groundwater samples ranging from 59 ug/L to 740 ug/L. Trichloroethene (TCE) was reported above the standard in two of the three locations ranging from 11 to 20 ug/L.

A copy of the Limited Phase II Investigation Report is provided in digital form in **Attachment A.**

## 1.5 Site Geology / Hydrogeology

Soil at the site is described as historic fill materials to a depth of approximately 10 feet below the surface followed by native silty-sand and clay. According to the USGS topographic map for the area (Central Park Quadrangle), the elevation of the property is approximately 14 feet above the National Geodetic Vertical Datum (NGVD). The area topography gradually slopes to the northeast.

Groundwater at the Site is present under water table conditions at a depth of approximately 12 feet below grade. Based on regional water table elevation maps, groundwater flow is expected to be southeast (**Figure 4**).

## 1.6 Site Conceptual Model

VOC contamination at the Site consists of chlorinated solvents in the backfill materials within the cellar of the retail building unit which was occupied by the dry cleaner before the building was destroyed by fire. Groundwater samples collected in the sidewalk south of the property along Nagle Avenue also identified dissolved chlorinated VOCs.

It is not known how many dry cleaning machines were located in the unit or if virgin or waste solvent was stored on-site. Based on the size of unit (approximately 1,000 sf) and assuming a generation 4 machine, on site storage of PCE would be limited to 100-120 gallons stored in two reservoirs inside the machine. A dry cleaner of this size < 1,000 sf is limited to one dry cleaning machine. Since current generation machines recycle solvent through distillation there would be no waste PCE stored on site. However, it is common to temporarily store a drum of spent filters, lint and sludge containing PCE. The solvent reservoirs are designed to be resistant to rupture and fires though lint and sludge within the machine would contain PCE and would be more easily released.

Therefore, the release of PCE would have been released in one of two ways and possibly both. During the fire and efforts to put it out and demolish the building, the reservoirs in the machine were ruptured and released PCE in solvent form. The other possibility is that water used to put out the fire came in contact with PCE contaminated materials (waste sludge, filters, lint, etc.) contaminating the water with dissolved PCE.

Since it is common practice for NYCFD to crack a cellar slab to allow drainage in a situation like this, dissolved PCE from water used to put out the fire and from precipitation would have migrated though the slab to the groundwater below at a depth of approximately 15 ft (4-5 ft below the cellar slab). Impacted groundwater would then be expected to migrate south with groundwater flow.

The concentrations reported in groundwater (<1,000 ug/L) suggest that the release was of the second type as opposed to that related to rupture of the reservoirs.

## 2.0 SAMPLING AND ANALYIS PLAN

The purpose of this work plan will be to determine the nature and extent of the on-site contamination and identify all sources of contamination (horizontal/vertical) that may be present at the Site. Potential off-site contaminant migration and potential impacts to the surrounding community will also be evaluated. The investigation must produce data of sufficient quality and quantity to allow NYSDEC and NYSDOH to complete a Significant Threat Determination as per Part 375-2.7 and enable the performance of a qualitative human health exposure assessment as per DER-10, 3.3(c) 4.

The subsurface investigation will consist of the following elements:

- Installation of 1 soil boring beneath the existing building, which is to remain and 9 soil borings across the remainder of the Site to characterize the fill material, delineate the extent of soil impact and to obtain additional information on soil quality with respect to Soil Cleanup Objective (SCOs);

- Installation of 1 temporary well point beneath the existing building, which is to remain, and 7 monitoring wells across the remainder of the Site and the collection of groundwater samples to delineate groundwater impacts; and

- Installation of 3 subslab soil vapor probes beneath the existing building, which is to remain, 1 indoor air sample, 1 outdoor air sample, and 6 soil gas implants beneath the proposed new development across the remainder of the Site to assess vapor phase VOCs.

### 2.1 Soil Sampling

Ten soil borings (19SB1 through 19SB10) will be advanced across the Site. Borings 19SB1 through 19SB5 will be advanced using a sonic drill rig to penetrate the existing concrete cellar slab. Borings 19SB6 through 19SB9 will be advanced with either a sonic drill rig or a probe rig. Both drilling methods will retain 5 ft soil cores through a double cased borehole. Soil borings will be advanced to the extent of contamination. If no contamination is encountered then all borings will be advanced to a minimum depth of 20 ft. Based upon previous groundwater sampling, the depth to groundwater beneath the Site is approximately 12 feet below existing grade.

Due to accessibility limitations within the existing building (laundromat), boring 19SB10 will be advanced using a Geoprobe 54LT drill rig. Soil samples will be collected every in four foot intervals at this location to a depth of 15 ft.

Collected soil samples will be characterized by an experienced environmental professional and field screened for the presence of volatile organic compounds (VOCs) using a photo-ionization detector (PID). All observations will be recorded in a bound project dedicated field book which will be used to prepare a boring log for each soil boring location. Recorded observations will include sample depth, sample recovery, soil type evidence of water (if encountered), PID reading and physical evidence of contamination (odor, staining, sheen, etc.).

Three samples will be retained for laboratory analysis from each boring including one sample from the fill layer, one sample from the interval exhibiting the highest PID reading, and one sample from the termination depth. The fill and termination samples will be analyzed for VOCs, SVOCs, metals, pesticides, PCBs, PFAS compounds and 1,4 dioxane for comparison to NYSDEC Part 375.6 Unrestricted Use SCOs. The sample with the highest PID readings will be analyzed for VOCs only.

A sample matrix showing the number, type and analysis of samples collected during the Remedial Investigation is provided as **Table 1**. The proposed location of the soil borings is shown on **Figure 3**.

## 2.2 Groundwater Sampling

To evaluate groundwater quality, seven groundwater samples will be collected from six monitoring wells (19MW1 – 19MW6) installed across the Site and one temporary well point (TWP1) installed beneath the existing building.

### *2.2.1 Monitoring Wells*

The monitoring wells will be constructed of 1-inch diameter pvc casing and 0.010 inch slotted pvc well screen. The wells will have 15 feet of screen set 8 to 10 feet below the water table. A No. 00 Morie or equivalent filer sand will be placed in the borehole to within 2 feet above the top of the screen. A 1-foot hydrated bentonite seal will be placed on top of the filter sand and the remainder of the borehole will be backfilled to grade.

Groundwater samples will be collected from the newly installed monitoring wells through the use of a peristaltic pump and polyethylene tubing. The proposed locations of the monitoring wells are shown on **Figure 4**.

All groundwater sampling activities will be recorded in the project dedicated field book. This will include a description of:

- Date and time of sample collection
- Sample location
- Purging time, duration and volume;
- Sample appearance
- Analytical methodology:

Groundwater samples will be collected using a peristaltic pump in accordance with standard low-flow sampling procedures as follows:

- Record pump make & model on sampling form.
- Wear appropriate health and safety equipment as outlined in the Health and Safety Plan
- Inspect each well for any damage or evidence of tampering and note condition in field logbook.
- Remove the well cap

- Lay out plastic sheeting and place the monitoring, purging and sampling equipment on the sheeting.
- To avoid cross-contamination, do not let any downhole equipment touch the ground.
- Measure well headspace with a PID or FID and record the reading in the field logbook.
- A synoptic water level measurement round should be performed (in the shortest possible time) before any purging and sampling activities begin. Measure and record the depth to water using a water level meter or interface probe to the nearest 0.01 ft. Record the measurement in the field logbook. Do not measure the depth to the bottom of the well at this time (to avoid disturbing any sediment that may have accumulated). Obtain depth to bottom information from installation information in the field logbook or soil boring logs.
- Collect samples in order from wells with lowest contaminant concentration to highest concentration.
- Connect the polyethylene tubing to the pump and lower the pump into the well to approximately the middle of the screen. The pump should be a minimum of 2 feet above the bottom of the well as this may cause mobilization of any sediment present in the bottom of the well.
- Start the pump at its lowest speed setting and slowly increase the speed until discharge occurs. Check water level. Adjust pump speed until there is little or no water level drawdown (less than 0.3 feet). If the minimal drawdown that can be achieved exceeds 0.3 feet but remains stable, continue purging until indicator field parameters stabilize.
- There should be at least 1 foot of water over the end of the tubing / pump so there is no risk of entrapment of air in the sample. Pumping rates should be reduced to the minimum capabilities of the pump, if needed, to avoid purging the well dry. However, if the recharge rate of the well is very low and the well is purged dry, then wait until the well has recharged to a sufficient level and collect the appropriate volume of sample.
- During well purging, monitor indicator field parameters (temperature, specific conductance and pH) every three to five minutes (or less frequently, if appropriate). Note: during the early phase of purging emphasis should be put on minimizing and stabilizing pumping stress, and recording those adjustments. Purging is considered complete and sampling may begin when all the above indicator field parameters have stabilized. Stabilization is considered to be achieved when three consecutive readings, taken at three (3) to five (5) minute intervals, are within the following limits:
  - specific conductance (3%),
  - temperature (3%),
  - pH (± 0.1 unit)
  - If stability is not reached within a reasonable time period purging may be stopped and the sample collected. This should be noted on the sampling log.
- VOC samples should be collected directly into pre-preserved sample containers. Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence. Fill each container with sample to just overflowing so that no air bubbles are entrapped inside. Cap each bottle as it is filled.
- Label the samples, and record them on the chain of custody form. Place immediately into a cooler for shipment and maintain at $4^{o}$C.
- Remove the tubing from the well. The polyethylene tubing must either be dedicated to each well or discarded. If dedicated the tubing should be placed in a large plastic garbage

bag, sealed, and labeled with the appropriate well identification number. The silicone pump tubing must also be dedicated or disposed of between sampling locations.
- Close and lock the well.

Samples will be collected in pre-cleaned laboratory supplied glassware, stored in a cooler with ice and submitted to a New York State ELAP certified environmental laboratory. Groundwater samples from each monitoring well will be submitted for laboratory analysis of VOCs, SVOCs, pesticides / PCBs, metals, PFAS compounds and 1,4 dioxane.

All monitoring wells will be surveyed to determine relative casing elevation to the nearest 0.01 ft and horizontal position to the nearest 0.1ft. Survey data will be used to determine the direction and gradient of groundwater flow at the Site.

### *2.2.2 Temporary Well Point*

A temporary well point, constructed of 1-inch diameter 0.010 inch slotted pvc well screen will be installed, sampled for groundwater, and subsequently removed.

The sample will be collected in pre-cleaned laboratory supplied glassware, stored in a cooler with ice and submitted to a New York State ELAP certified environmental laboratory. The groundwater sample from the temporary well point will be submitted for laboratory analysis of VOCs, SVOCs, pesticides / PCBs, metals, PFAS compounds and 1,4 dioxane.

## 2.3 Soil Vapor Sampling

Soil vapor and subslab air samples will be collected in accordance with the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH 10/2006, revised 2015, revised 2017) to determine if the medium is contaminated with VOCs. If VOCs are present, the results will be used to evaluate current off-site human exposures and future human exposures within the planned building. The evaluation of current off-site exposure will be useful in determining if further off-site investigation of the exposure pathway is warranted. The evaluation of future on-site exposure will determine whether or not the use of control measures will be necessary to prevent exposure by residents of the new building.

To determine the vapor quality in the soil beneath the Site, soil vapor samples will be taken from six soil gas implants (SG1 through SG6) to be installed across the Site and three subslab soil vapor points (SS1 through SS3) to be installed beneath the existing building as shown on **Figure 5**. All soil gas implants will be set at a depth of approximately 10 feet below grade. All sub-slab soil vapor points will be set approximately 1 to 3 inches below the slab.

### *2.3.1 Soil Gas Sampling Procedure*

The soil gas implants (SG1 through SG6) will be installed with either a probe rig or sonic drill rig and constructed in the same manner at all locations to minimize possible discrepancies. The implants will be pre-manufactured 6-inch stainless steel mesh tubes fitted with 1/4 inch polyethylene tubing which will extend to the surface. Coarse sand will be added to create a sampling zone of one foot in length and sealed above with hydrated bentonite powder for a minimum distance of 3 feet. The tubing at all locations will be sealed at the surface with hydrated granular bentonite and a 6" x 6" (approximate) plastic sheet.

After installation of the soil gas probes, one to three volumes (i.e., the volume of the sample probe and tube) will be purged prior to collecting the samples to ensure samples collected are representative. Flow rates for both purging and collecting will not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling. Samples will be collected in Summa® canisters which have been certified clean by the laboratory and analyzed by using USEPA Method TO-15. All soil gas samples will be collected over a 2-hour period of time and submitted to a NYSDOH certified laboratory for analysis.

A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, identity of samplers, sampling methods and devices, soil vapor purge volumes, volume of soil vapor extracted, vacuum of canisters before and after samples are collected, apparent moisture content of the sampling zone, and chain of custody protocols.

As part of the vapor intrusion evaluation, a tracer gas will be used in accordance with NYSDOH protocols to serves as a quality assurance/quality control (QA/QC) device to verify the integrity of the soil vapor probe seal. Helium will be used as the tracer gas and a box will serve to keep it in contact with the probe during the testing. A portable monitoring device will be used to analyze a sample of soil vapor for the tracer prior to sampling. If tracer sample results show a significant presence of the tracer, the probe seals will be adjusted to prevent infiltration.

After the collection of the analytical sample, a field reading will be recorded at each sampling points utilizing a photoionization detector capable of detecting organic compounds in the parts per billion range.

### *2.3.2 Sub-Slab Soil Vapor Procedures*

The sub-slab soil vapor implants (SS1 through SS3) will be installed by drilling a ½-inch hole through the concrete slab with a handheld drill and inserting ¼-inch polyethylene tubing to no more than 3 inches below the base of the slab. The tubing will then be sealed at the surface with hydrated granular bentonite and a 6" x 6" (approximate) plastic sheet.

After installation, one to three volumes (i.e., the volume of the sample tube) will be purged prior to collecting the samples to ensure samples collected are representative. Flow rates for both purging and collecting will not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling. Samples will be collected in Summa® canisters which have been certified clean by the laboratory and analyzed by using USEPA Method TO-15. All samples will be collected over an 8-hour period of time and submitted to a NYSDOH certified laboratory.

A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, identity of samplers, sampling methods and devices, soil vapor purge volumes, volume of soil vapor extracted, vacuum of canisters before and after samples are collected, apparent moisture content of the sampling zone, and chain of custody protocols.

As part of the vapor intrusion evaluation, a tracer gas will be used in accordance with NYSDOH protocols to serves as a quality assurance/quality control (QA/QC) device to verify the integrity of the soil vapor probe seal. Helium will be used as the tracer gas and a box will serve to keep it in contact with the probe during the testing. A portable monitoring device will be used to analyze a sample of soil vapor for the tracer prior to sampling. If tracer sample results show a significant presence of the tracer, the probe seals will be adjusted to prevent infiltration.

### *2.3.3 Air Sampling Procedures*

One indoor air sample (IA1) placed approximately 3 ft above the ground will be collected concurrent with and co-located with the sub slab soil vapor samples. One outdoor air sample (OA1) placed approximately 3 ft above the ground and in the upwind direction will also be collected. Samples will be collected in Summa® canisters which have been certified clean by the laboratory and analyzed by using USEPA Method TO-15. All subslab and indoor/outdoor air samples will be collected over a 6-hour period of time and submitted to a NYSDOH certified laboratory for analysis.

## 2.4 Laboratory Analysis

Samples will be submitted to the laboratory for a standard turnaround time, which is estimated to be one to two weeks. The proposed sampling program is summarized in **Table 1**.

### *2.4.1 Analysis of Soil and Groundwater Samples*

Collected soil and groundwater samples will be placed in pre-cleaned laboratory supplied glassware, and placed in a cooler packed with ice for transport to the laboratory. Sample analysis will be provided by a New York State certified environmental laboratory; either York Analytical Laboratories of Stratford, Connecticut (NYSDOH Lab I.D. No. 10854) or Phoenix Environmental Laboratories of Manchester, Connecticut (NYSDOH Lab I.D. No. 11301) with the PFAS analysis subcontracted to Alpha Analytical of Westborough, Massachusetts. Soil and groundwater samples will be analyzed for one or more or the following parameters depending on location and sampling depth.

- Target Compound List (TCL) Volatile Organic Compounds (VOCs) by EPA Method 8260 (soil, groundwater):
- Per- and Polyfluoroalkyl Substances (PFAS) compounds by EPA Method 537 (soil, groundwater)
- TCL Semi-Volatile Organic Compounds (SVOCs) (soil, groundwater) and 1,4-dioxane (soil, groundwater) by EPA Method 8270
- Target Analyte List (TAL) metals (soil, groundwater), and
- Pesticides/PCBs by Method 8081/8082 (soil, groundwater).

### *2.4.2 Analysis of Soil Vapor and Air Samples*

Analytical procedures and corresponding reporting limits will be identified when reporting the sampling results. Samples will be analyzed for volatile organic compounds (VOCs) by USEPA Method TO-15. All samples will be analyzed by a New York State ELAP-certified environmental laboratory: either York or Phoenix.

## 2.5 Management of Investigation Derived Wastes

Investigation derived waste includes contaminated soil, groundwater and disposable sampling equipment generated during the remedial investigation.

Soil from borings will be returned to their original location. Excess soil from the installation of monitoring wells will be placed in U.S. Department of Transportation (DOT) – approved drums. This material will either be disposed at an appropriate off-site disposal facility or will be disposed along with other soil during subsequent remedial activities to be implemented under the RAWP. Purge water generated during groundwater sampling will be containerized in drums and analyzed for VOCs. Final classification and disposal of purge water will be based on the results of this analysis and upon approval of the NYSDEC Project Manager.

Disposable sampling equipment (gloves, tubing, acetate liners, etc.) will be placed in heavy-duty plastic bags and disposed of properly.

## 3.0 QUALITY ASSURANCE PROJECT PLAN (QAPP)

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or cold-pak(s) to maintain a temperature of $4^{o}$C.

Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory. Laboratory reports will include ASP category B deliverables for use in the preparation of a data usability report (DUSR). The DUSR will be applicable to all samples collected during the RI. The QAPP prepared for the Site is provided in **Attachment B**.

### 3.1 Soil Samples

Dedicated disposable sampling materials will be used for soil samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable soil sampling equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected.

Decontamination of non-dedicated soil sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil;
- Rinse with tap water;
- Wash with alconox® detergent solution and scrub ;
- Rinse with tap water;
- Rinse with distilled or deionized water.

Prepare field blanks by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers.

### 3.2 Groundwater Samples

Groundwater samples will be collected either using a bladder pump or a low flow submersible pump. If using a bladder pump the bladder and sample tubing will be changed between sampling locations and the external portion of the pump decontaminated using an alcox and distilled water rinse. Field equipment rinsate samples will be collected by running distilled water over the exterior of the pump and retaining the water for analysis.

Submersible pumps will be decontaminated by pumping 1 gallon of tap water followed by one gallon of alconox solution followed by one gallon of distilled water. A sample of the final distilled water rinse will be retained for analysis. Trip blanks will accompany samples each time they are transported to the laboratory.

### 3.3 Soil Vapor and Air Samples

Extreme care will be taken during all aspects of sample collection to ensure that sampling error is minimized and high quality data are obtained. The sampling team members will avoid actions (e.g., using permanent marker pens and wearing freshly dry-cleaned clothes or personal fragrances) which can cause sample interference in the field. A tracer gas, helium, will be used in accordance with NYSDOH sampling protocols to serve as a QA/QC device to verify the integrity of the soil vapor probe seals. QA/QC protocols will be followed for sample collection and laboratory analysis, such as use of certified clean sample devices, meeting sample holding times and temperatures, sample accession, and chain of custody.

Samples will be delivered to the analytical laboratory as soon as possible after collection. The laboratory analyzes QC samples with each analytical batch, including a Method Blank (MB), Laboratory Control Sample (LCS), and a Laboratory Control Sample Duplicate (LCSD). Internal standards are added to all calibration standards, samples, and blanks to verify that the analytical system is in control.

### 3.4 Reporting of Results

Sample analysis will be provided by a New York State certified environmental laboratory. Laboratory reports will include ASP category B deliverables for use in the preparation of a data usability summary report (DUSR). All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format (EQuIS).

### 3.5 DUSR

The DUSR provides a thorough evaluation of analytical data without third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use. Verification and/or performance monitoring samples collected under this RIWP will be reviewed and evaluated in accordance with the Guidance for the Development of Data Usability Summary Reports as presented in Appendix 2B of DER-10. The completed DUSR for verification/performance samples collected during implementation of this RIWP will be included in the Remedial Investigation Report prior to its formal approval.

## 4.0 HEALTH AND SAFETY PLAN

The Health and Safety Plan (HASP) takes into account the specific hazards inherent in conducting the RI, and presents the minimum requirements which are to be met by Environmental Business Consultants (EBC), its subcontractors, and other personnel in order to avoid and, if necessary, protect against health and/or safety hazards. A HASP has been prepared and is provided in **Attachment C** of this work plan.

Sub-contractors will have the option of adopting this HASP or developing their own site-specific document. If a subcontractor chooses to prepare their own HASP, it must meet the minimum requirements as detailed in the RI HASP prepared by EBC and must be made available to EBC and the NYSDEC.

Activities performed under the HASP will comply with applicable parts of OSHA Regulations, primarily 29 CFR Parts 1910 and 1926. Modifications to the HASP may be made with the approval of the EBC Site Safety Manager (SSM) and/or Project Manager (PM).

## 5.0 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan (CAMP) provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site commercial workers) from potential airborne contaminant releases resulting from investigation activities.

The action levels specified require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the investigation work did not spread contamination off-site through the air.

The primary concerns during the investigation are odors from VOCs. The CAMP for this investigation is provided as **Attachment D**.

## 6.0 REMEDIAL INVESTIGATION REPORT

Following completion of the investigation and receipt of the analytical data, EBC will prepare a Remedial Investigation Report (RIR) in accordance with DER10. The RIR will which will include the following:

1. A description of the work which was performed under the RI.
2. Any modification from this work scope and the reason for the modifications
3. The nature and extent of contaminants in all media (soil, groundwater, soil vapor) and the potential for off-site migration
4. Soil, and groundwater conditions that were observed
5. Analytical data in tabular form comparing soil results to part 375-6 SCOs
6. Cross sections and data figures
7. Laboratory analytical data, sampling logs and well completion logs for all samples and areas covered by the investigation
8. Scaled drawings showing the locations of temporary sampling points and, monitoring well locations
9. A Qualitative Human Health Exposure Assessment

## 7.0 SCHEDULE

The estimated duration of the full RI activity is three weeks total field time. The anticipated schedule for completing the RI activities is as follows:

| Schedule Task | Estimated Date |
|---|---|
| NYSDEC Approval of RIWP | Week of June 24, 2019 |
| Mobilize equipment to the Site (begin) | Within 3 weeks of approval of RIWP |
| Complete Field Work | Within 3 weeks of mobilization date |
| Receive all Laboratory Reports | Within 2 weeks of completion of field work |
| Receive all Laboratory Deliverables | Within 4 weeks of completion of field work |
| Receive DUSR | Within 8 weeks of completion of field work |
| Submit Remedial Investigation Report | Within 3 weeks of Receipt of DUSR |
| Distribute Fact Sheet on RI Results and Comment period on RAWP (if submitted with RIR) | Within 20 weeks of completion of field work - Subject to DEC / DOH Approval |

# ***RESUMES***

# Charles B. Sosik, PG, PHG, Principal

## Professional Experience

28 years

## Education

MS, Hydrogeology, Adelphi University, NY
BS, Geology, Northern Arizona University, AZ

## Areas of Expertise

- Brownfields Redevelopment
- Hazardous Waste Site Investigations
- Pre-purchase Site Evaluations and Support
- Regulatory Negotiations
- Remedial Planning and “Cost to Cure” Analysis
- Strategic Planning
- Real Estate Transactions
- NYC “E” Designations

## Professional Certification

- Professional Geologist, NH
- Professional Geologist, Hydrogeologist, WA
- OSHA 40-hr HAZMAT
- OSHA 8-hr. Supervisor
- NYC OER Qualified Environmental Professional

## Professional Affiliation / Committees

- NYS Council of Professional Geologists (NYSCPG)
- Association of Groundwater Scientists & Engineers (AGSE)
- NYS RBCA Advisory Committee
- Massachusetts LSP Association
- New Hampshire Association of Professional Geologists
- Interstate Technology Regulatory Council/MTBE Team
- Environmental Business Association, Brownfields Task Force
- Part 375 Working Group

## PROFILE

Mr. Sosik has 28 years of experience in environmental consulting. He specializes in advising clients on managing environmental compliance with federal, state, and municipal agencies and has successfully directed numerous investigation and remediation projects involving petroleum, pesticides, chlorinated solvents, heavy metals and radiologically activated media. His work included extensive three-dimensional investigations on MTBE, which have been used effectively to help shape public policy. He also has experience in applying models to groundwater related problems and has completed several large-scale projects to determine fate and transport of contaminants, establish spill scenarios, and closure criteria. His experience and expertise in the area of contaminant hydrogeology has resulted in requests from environmental attorneys, property owners and New York State to serve as an expert witness and technical advisor on a variety of legal disputes.

For the past 15 years Mr. Sosik has been primarily engaged in providing environmental consulting to developers responding to the extensive re-zoning of former industrial and commercial properties, which is currently taking place throughout New York City. These services include everything from pre-purchase evaluations and contract negotiations to gaining acceptance in and moving projects through the NYS Brownfields Program. Mr. Sosik has taken a pro-active role in the continued development of the NYS Brownfields Program and related policy, by attending numerous working seminars, active participation in work groups and task forces and by providing commentary to draft versions of new guidance documents. Throughout his professional career, Mr. Sosik has remained committed to developing innovative cost- efficient solutions to environmental issues, specifically tailored to the needs of his clients.

## SELECTED PROJECTS

### Scavenger Waste Treatment Facility (SWTF), Suffolk County, NY

**Water Treatment Plant EIS - Focused EIS** - In response to requests from the Suffolk County Council on Environmental Quality and the Brookhaven Conservation Advisory Council, Mr. Sosik prepared a focused EIS to evaluate the potential impacts to an important surface water resource from the proposed facility including cumulative and synergistic effects with established contaminant plumes in the area.

### Advanced Residential Communities, Rockville Centre, NY

**Brownfield Project** – As the senior project manager on this large scale, high profile redevelopment project, Mr. Sosik was asked to develop a plan to accelerate the regulatory process in the face of general community opposition. Through numerous discussions with the BCP management team, He was able to condense the schedule and review period, through the submission of supporting documents (Investigation Report, Remedial Work Plan) with the BCP application package. Community opposition, which focused on the environmental condition of the site as a means to block the project, was used to advantage in expediting approval of the aggressive interim remedial plan. This will allow the developer to begin remedial work approximately 5 months ahead of schedule.

### Former Temco Uniform site, West Haverstraw, NY

**Brownfield Project** – Mr. Sosik took over management of this project from another consultant following transition of this VCP site to the BCP. Mr. Sosik used the opportunity to renegotiate and revise the scope of work to allow a more cost effective and focused investigation plan without re-writing or resubmitting the RIWP. During the NYSDEC’s review of the transition package, he met with and coordinated changes with the NYSDEC Project Manager to gain approval. The result saved the client a significant amount of money, but perhaps more importantly in this case, did so without loss of time.

### Grovick Properties, Jackson Heights, NY

**Brownfield Project** – This Brownfield property is somewhat unique in that it had been investigated and partially remediated by the NYSDEC through the petroleum spill fund. The client was interested in purchasing the property and redeveloping it as office and retail space. Mr. Sosik reviewed the NYSDEC investigation and developed a supplemental plan to meet the requirements of an RI under the BCP program. By performing this limited amount of field work "up-front" he was able to complete an RI Report and Remedial Plan and submit both with the BCP application package. The NYSDEC and NYSDOH approved the RI Report and the Remedial Plan with minor changes. This cut 120 days from the review process and allowed the client to arrange financing and move his project forward knowing what the clean-up costs would be at the outset.

### Metro Management, Bronx, NY

**Brownfield Project** – The site of a former gas station, the developer had planned to construct a 12-story affordable housing apartment complex with first floor retail space. Since the site was located in an Environmental zone, potential tax credits of 22% for site development, remediation and tangible property could be realized under the BCP. In a pre-application meeting with the NYSDEC, Mr. Sosik realized that the department did not believe the site was eligible for the BCP, since it had been previously investigated and closed under the spills program.

Mr. Sosik assisted the developer in securing financing, and due to the demands of an aggressive construction schedule developed an Interim Remedial Measure (IRM), based on chemical oxidation treatment. Working closely with the clients environmental counsel, Mr. Sosik was able to get the IRM approved without a public comment period. Implementation of the IRM is currently underway.

The project was awarded the 2009 NYC Brownfield Award for Innovation.

### Brandt Airflex, NY

**Technical Consulting Services** - Mr. Sosik provided senior level technical advice and strategic planning in developing an off-site RI/FS for the site, in negotiating a tax reduction for the property due to the environmental condition and in preparing a cost to cure estimate for settlement between business partners. After achieving a favorable tax consideration and settlement agreement for his client

### Allied Aviation Services, Dallas, Fort Worth, Airport, Dallas, TX

**Jet Fuel Investigation** - Mr. Sosik developed and managed an investigative plan to quickly identify the extent and source of jet fuel which was discharging from the Airport's storm drain system to a creek a mile away. Through the use of a refined conceptual model, accelerated investigative techniques and a flexible work plan, he was able to identify the source of the fuel and the migration route within a single week. He then identified remedial options and successfully negotiated a risk based plan with the Texas regulatory agency that had issued a notice of enforcement action against the facility.

### KeySpan – Former LILCO Facilities, Various NY Locations

**Pesticide Impact Evaluation** - Mr. Sosik developed, negotiated and implemented a site screening procedure to evaluate impact to public health and the environment as the result of past herbicide use at 211 utility sites. Using an unsaturated zone leaching model (PRZM) on a small subset of the sites, he was able to establish mass loading schedules for the remaining sites. This was combined with public well data in a GIS environment to perform queries with respect to mass loading, time transport and proximity to vunerable public supply wells. Using this approach Mr. Sosik was able to show that there were no concerns for future impact. This effort satisfied the public health and resource concerns of the state environmental agency and county health department in a reasonable amount of time and at a fraction of the cost of a full scale investigation.

### Former Computer Circuits (Superfund) Site, Hauppauge, NY

**CERCLA RI/FS** - As Senior Project Manager for the site, he played a major role in regaining control of the investigation activites for the PRP. This action prevented the USEPA from initiating an extensive investigation at the site using a RAC II contractor allowing the client to perform a more efficient investigation. He was involved in all negotiations with EPA and was the project lead in developing a revised site characterization plan (work plan, field sampling plan, quality assurance plan, etc.). By carefully managing all phases of the investigation and continued interaction with each of the three regulatory agencies involved, Mr. Sosik was able to keep the project focused and incrementally reinforce the clients position. The estimated cost of the revised investigation is expected to save the client 1.5 to 2 million dollars.

### Sun Oil, Seaford, NY

**Remediation Consuliting Services & Project Management** - Under an atmosphere of regulatory distrust, political pressure and mounting public hostility toward the client, Mr. Sosik conducted an off-site 3-D investigation to define the extent of contamination and the potential impact on public health. By designing and implementing an aggressive source area remediation program and personal interaction with the public and regulatory agencies, he was able to successfully negotiate a limited off-site remediation favorable to the client. Source area remediation was completed within 6 months and the project successfully closed without damage to the client's public image or working relationship with the regulatory agencies.

### Con Edison, Various Locations, NY

**Hydrogeologic Consulting Services** - Under a general consulting contract, Mr. Sosik conducted detailed subsurface hydrogeologic investigations at five locations to assist in the development of groundwater contingency planning. He also developed and implemented work plans to investigate and remediate existing petroleum, cable fluid, and PCB releases at many of the generating facilities and substations. An important aspect of his role was in assisting the client in strategic planning and negotiations with the regulatory agency.

### Keyspan - Tuthill Substation, Aqueboque, NY

**Accelerated Site Characterization** - Using accelerated site characterization techniques, Mr. Sosik presented the project as a case study in establishing the transport of an herbacide and its metobolites aplied at utility sites in the 1980's The results were then used to establish a screening method for evaluating 211 similar sites controlled by the client in a reasonable and eficient manner.

### NYSDEC Spill, East Moriches, NY

**Spill Release Analysis** - With recognized expertise in the area of gasoline plume development on Long Island, Mr. Sosik was asked by

## Charles B. Sosik, PG, PHG, Principal

the State to establish the release date (and principal responsible party) of an extensive petroleum spill, which impacted a residential neighborhood. He used multiple lines of evidence, and a new EPA model (HSSM), which he has helped to refine, to reconstruct the release scenario and spill date, in support of the State Attorney General's cost recovery effort from the PRP.

Minmilt Realty, Farmingdale, NY

**Fate & Transport Modeling** - He completed an RI/FS at this location for a PCE plume that had been in transit for over 30 years. Mr. Sosik applied a conservative model to evaluate time/concentration impacts under a variety of transport scenarios to a municipal wellfield located 13,000 feet away. Through the use of the model and careful interpretation of an extensive data set compiled from several sources, Mr. Sosik was able to propose a plan which was both acceptable to the regulator and favorable to the client.

Sebonack Golf Course Project, Town of Southampton, NY

**IPM Pesticide Study** - Provided professional hydrogeologic services in support of the EIS prepared for the development of the site. The proposed development included an 18-hole golf course, clubhouse, dormitory facility, cottages, associated structures, and a 6,000 square foot research station for Southampton College. Mr. Sosik performed an extensive evaluation (using a pesticide-leaching model) on the effects of pesticide and nitrogen loading to groundwater as part of the projects commitment to an Integrated Pest Management (IPM) approach.

NYSDEC, Spills Division, Regions 1 – 4

**Petroleum Spills Investigation & Remediation** - As a prime contractor/consultant for the NYSDEC in Regions 1-4, Mr. Sosik has managed the investigation and remediation of numerous petroleum spills throughout the State. Many of these projects required the development of innovative investigation and remediation techniques to achieve project goals. He was also involved in many pilot projects and research studies to evaluate innovative investigation techniques such as accelerated site characterization, and alternative approaches to remediation such as monitored natural attenuation and risk based corrective action.

Sun Oil, E. Meadow, NY

**Exposure Assessment** - Performed to seek closure of the spill file, despite the presence of contaminants above standards, Mr. Sosik determined after the extended assessment that the level of remaining contamination would not pose a future threat to human health or the environment. He used multiple lines of evidence, and a fate and transport model to show that degradation processes would achieve standards within a reasonable time.

Sand & Gravel Mine, NY

**Property Development** - As part of the development of a sand and gravel mine, Mr. Sosik provided environmental consulting services to assist in obtaining a mining permit, which would result in the construction of a 150-acre lake. Specifically, Mr. Sosik investigated if the proposed lake would reduce groundwater quantity to domestic and public well fields, and/or accelerate the migration of potential surface contaminants to the lower part of the aquifer. After assuming the lead role in negotiations with the regulatory agency, Mr. Sosik was able to obtain a permit for the client by adequately addressing water quality and quantity issues, and by preparing a monitoring plan and spill response plan, acceptable to all parties.

NYSDEC, Mamaroneck, NY

**Site Characterization / Source Identification** - In a complex hydrogeologic setting consisting of contaminant transport through fractured metomorphic bedrock and variable overburden materials, Mr. Sosik was able to develop and implement a sub-surface investigation to differentiate and separate the impact associated with each of two sources. The results of this investigation were successful in encouraging the spiller to accept responsibility for the release.

Riverhead Municipal Water District, NY

**Site Characterization / Remedial Planning** - Using accelerated characterization techniques, he implemented a 3-D site investigation to identify two service stations 4,000 ft. away as the source of contamination impacting a municipal wellfield. In accordance with the strict time table imposed by the need to return the wellfield to production by early spring, he designed and implemented a multi-point (9 RW, 6 IW) recovery and injection well system using a 3-d numerical flow model, and completed the project on time. Using a contaminant transport model, Mr. Sosik developed clean-up goals which were achieved in 9 months of operation, well below the projected 3 to 5 year project duration.

Montauk Fire Department, NY

**Site Assessment** - Mr. Sosik performed a limited investigation and used a 2-D flow model to demonstrate that the property could not have been the source of contamination which had impacted an adjacent wellfield as per the results of a previous investigation. This small focused effort successfully reversed a $500,000, and rising, claim against the department by the water district and the NYSDEC.

### PREVIOUS EXPERIENCE

P.W. Grosser Consulting, Bohemia, NY
Senior Project Manager, 1999-2006

Environmental Assessment & Remediation, Patchogue, NY
Senior Project Manager, 1994-1999

Miller Environmental Group, Calverton, NY
Project Manager, 1989-1994

DuPont Biosystems, Aston, PA
Hydrogeologist, 1988-1989

## Charles B. Sosik, PG, PHG, Principal

### EXPERT WITNESS TESTIMONY AND DEPOSITIONS

**Fact Witness** -Testimony on relative age of petroleum spill based on nature and extent of residual and dissolved components at the Delta Service Station in Uniondale, NY Fall/1999

**Expert Witness / Expert Report** for defendant in cost recovery case by NYS Attorney General regarding a Class II Inactive Hazardous Waste (State Superfund) project by the NYSDEC (October 2004 – present, Report: March 2005, Deposition: April 2005, 2nd Report: Aug. 2013, 2nd Deposition Nov. 2013, Bench Trial: December 2013 - qualified as expert in Federal Court),

**Expert Witness / Fact Witness** for plaintiff seeking compensation for partial expenses incurred during the investigation and remediation of a USEPA CERCLA site due to the release and migration of contaminants from an "upgradient" industrial property. (Deposition May 2005, case settled April 2007).

**Expert Witness / Fact Witness** for NYS Attorney General with respect to cost recovery for a NYSDEC petroleum spill site in Holtzville, NY (Deposition April 2005 - case settled).

**Expert Witness** – Statement of opinion and expert testimony at trial for plaintiff seeking damages from a major oil corporation for contamination under a prior leasing agreement in Rego Park, NY. Case decided in favor of plaintiff. Trial July 2007, in favor of Plaintiff. Qualified as Expert.

**Expert Witness / Fact Witness** for NYS Attorney General with respect to cost recovery for a NYSDEC petroleum spill site in Lindenhurst, NY (Trial date Dec. 2009, in favor of plaintiff. Qualified as Expert State Supreme Court.

**Expert Witness** - for NYS Attorney General regarding NYSDEC cost recovery for a petroleum spill site at Riverhead, NY. Case settled July 2008.

**Expert Witness** for plaintiffs in class action case with respect to damages from chlorinated plume impact to residences in Dayton, OH. (Draft Report – May 2013).

**Expert Witness / Fact Witness** for defendant with respect to cost recovery and third party responsibility for a NYSDEC petroleum spill site in Lindenhurst, NY (Expert Statement of Fact – October 2005).

**Expert Witness** for plaintiff seeking damages related to a petroleum spill from the previous owner/operator of a gas station in College Point, NY. Case settled 2009.

**Expert Witness** for plaintiff (municipal water supply purveyor) seeking damages from major oil companies and manufacturer of MTBE at various locations in Suffolk County, NY. Expert reports July 2007, August 2007 and October 2007, Case settled August, 2008.

**Expert Witness** - Deposition for NYS Attorney General regarding NYSDEC cost recovery for a petroleum spill site at Sag Harbor, NY. August 2002

**Expert Witness** for defendant responding to a claim from adjacent commercial property owner on the origin of chlorinated solvents on plaintiff's property located in Cedarhurst, NY. Expert opinion submitted to lead counsel on March 6, 2009, case settled April 2009.

**Expert Report** - for Attorney General on modeling performed to determine the spill release scenario at a NYSDEC petroleum spill site in East Moriches, NY. June 2000.

**Expert Witness** - for plaintiff in case regarding impact to private wells from a spill at adjacent Town and County properties with open gasoline spill files in Goshen, NY. Expert report submitted August 2013.

**Expert Witness** for defendant with respect to cost recovery from Sunoco for a NYSDEC petroleum spill site. (Declaration – January 2013).

**Expert Witness** - for plaintiff (municipal water supply purveyor) seeking damages from Dow Chemical for PCE impact at various locations in Suffolk County, NY. Affidavit submitted 2011.

### MODELING EXPERIENCE (PARTIAL LISTING)

| PROJECT | MODEL | APPLICATION |
|---|---|---|
| Riverhead Water District, Riverhead, NY | MODFLOW, MODPATH | Remediation system design to intercept MTBE plume and prevent continued impact to municipal well field. |
| NYSDEC - Region 1, Holbrook, NY | MODFLOW, MODPATH | Simulate transport of MTBE plume to predict future impact. |
| NYSDEC - Region 1, East Moriches, NY | HSSM | Evaluate release scenario and start date of petroleum spill in support of cost recovery by NYS AG office. |
| AMOCO, Deer Park, NY | HSSM | Estimate release amount, start date and spill scenario to evaluate the potential for mass unaccounted for |
| Keyspan Energy, Nassau/Suffolk Counties Substations | PRZM | Estimate mass load of simazine used at 211 electric substations and screen sites according to potential for human health and ecological impacts. |
| Saboneck Golf Club, Southampton NY | PRZM | Estimate mass load of proposed pesticides on new golf course to evaluate acceptability under an IPM program. |
| Suffolk County Department of Public Works (SCDPW) Scavenger Waste Treatment Plant, Yaphank, NY | DYNFLOW, DYNTRAC | Evaluate time-transport and nitrogen impact on local river system. |
| SCDPW SUNY Waste Water Treatment Plant, Stony Brook, NY | DYNFLOW, DYNTRAC | Determine outfall location and time-transport of nitrogen from proposed upgrades to an existing wastewater treatment plant |
| Water Authority of Great Neck North Great Neck, NY | MODFLOW, MODPATH, MT3D | Review of modeling study performed by EPA to evaluate potential future impact to Well field from PCE plume. Identified serious flaws in model construction and implementation, which invalidated conclusions |

### PUBLICATIONS / PROFESSIONAL PAPERS

**Smart Pump & Treat Strategy for MTBE Impacting a Public Water Supply** (14th Annual Conference on Contaminated Soils Proceedings, 1998)
**Transport & Transformation of BTEX & MTBE in a Sand Aquifer** (Groundwater Monitoring & Remediation 05/1998)
**Characteristics of Gasoline Releases in the Water Table Aquifer of Long Island** (Petroleum Hydrocarbons Conference Proceedings, 1999)
**Field Applications of the Hydrocarbon Spill Screening Model (HSSM)** (USEPA Interactive Modeling Web Course www.epa.gov/athens/software/training/webcourse Authored module on model application and applied use of calculators, 02/2000)
**Comparative Evaluation of MTBE Sites on Long Island, US EPA Workshop on MTBE Bioremediation** (Cincinnati, 02/2000)
**Comparison of Four MTBE Plumes in the Upper Glacial Aquifer of Long Island** (American Geophysical Union, San Francisco, 12/1996)
**Analysis and Simulation of the Gasoline Spill at East Patchogue, New York** (American Geophysical Union, San Francisco, 12/1998)

# Christine Beaver, Senior Project Manager

**Professional Experience**
EBC: April 2019
Prior: 23 years

**Education**
Bachelor of Science, Environmental Sciences and Resource Management, Lehigh University, PA

**Areas of Expertise**
- Phase I Environmental Site Assessments, Property Condition Assessments
- Third Party Due Diligence Review
- Remedial Investigation Work Plans, Remedial Investigation Reports
- Soil, Groundwater and Soil Vapor Investigations
- Laboratory Data Validation
- CEQR Environmental Assessment Statements, Noise Studies
- Asbestos Surveys

**Professional Certification**
- OSHA 40-hr HAZWOPER
- OSHA 8-hr HAZWOPER Supervisor
- OSHA 10-hr Construction Health and Safety
- NYS Asbestos Inspector
- NYS Mold Assessor
- NYS Erosion and Sediment Control Qualified Inspector

## PROFILE

Ms. Beaver has 23 years of experience as an environmental consultant and has worked on and managed a wide range of environmental projects for private clients and public agencies. Key projects included work related to schools, transportation, infrastructure and utility companies.

Ms. Beaver's experience includes working as an Independent Consultant on a contract basis for several other consulting firms in addition to the experience highlighted below.

## PREVIOUS EXPERIENCE

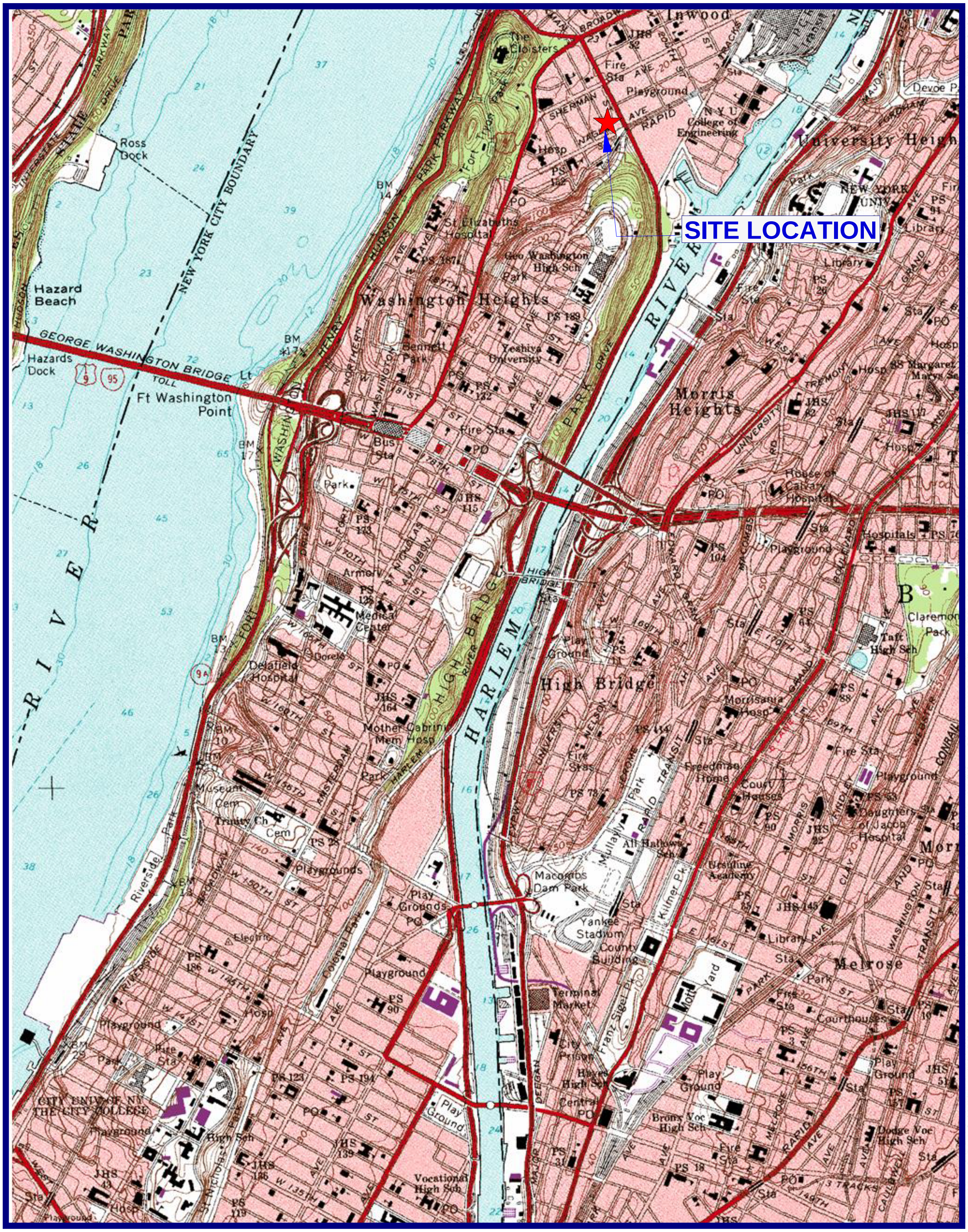
Hillmann Consulting, 2014-2019
PS&S Engineering, 2012-2013
Parsons Brinkerhoff, 2009
Dvirka & Bartilucci Consulting Engineers, 2005-2009
Ethan C. Eldon Associates, 2002-2005
Environmental Planning & Management, Inc., 1999-2002
H2M, 1997-1998
ATC, 1996-1997
ERM, 1995-1996

# ***TABLES***

# TABLE 1
# SUMMARY OF
# SAMPLING PROGRAM RATIONALE AND ANALYSIS

| Matrix | Location | Approximate Number of Samples | Rationale for Sampling | Laboratory Analysis |
|---|---|---|---|---|
| Subsurface soil (20 ft or Extent of contamination) | From 7 borings throughout the site. | 14 | To evaluate historic fill materials and native soil at the planned excavation depth with respect to SCOs | VOCs EPA Method 8260B, PFAS Compounds EPA Method 537, SVOCs and 1,4 dioxane EPA Method 8270, pesticide / PCBs EPA Method 8081/8082, TAL metals EPA 6010. |
| Subsurface soil (below observed contamination) | From any borings with contamination. | 4 | To evaluate the extent of soil impact and delineate source areas | VOCs EPA Method 8260B. |
| **Total (Soils)** | | 18 | | |
| Groundwater (water table) | From 4 monitoring wells across the Site. | 4 | To assess groundwater quality at the Site | VOCs EPA Method 8260B, PFAS Compounds EPA Method 537, SVOCs and1,4-dioxane EPA Method 8270, pesticide / PCBs EPA Method 8081/8082, metals EPA 6010 dissolved and total |
| **Total (Groundwater)** | | 4 | | |
| Soil Gas (11 ft below existing grade) | 6 soil gas implants to be installed in the existing slab on grade buildings and parking area. | 7 | Evaluate soil vapor beneath the existing building slab and evaluate soil gas at the Site beneath any proposed foundation for future development. | VOCs EPA Method TO15 |
| **Total (Soil Gas)** | | 7 | | |
| MS/MSD | Matrix spike and Matrix spike duplicates at the rate 5% | 2 | To meet requirements of QA / QC program | 1 soil and 1 groundwater MS/MSD for VOCs EPA Method 8260B, PFAS Compounds EPA Method 537, SVOCs and 1,4 dioxane EPA Method 8270, pesticide / PCBs EPA Method 8081/8082, TAL metals EPA 6010. Soil for VOCs EPA Method 8260B, PFAS Compounds EPA Method 537, SVOCs and 1,4 dioxane EPA Method 8270, pesticide / PCBs EPA Method 8081/8082 and TAL metals EPA 6010. |
| Trip Blanks | One laboratory prepared trip blank to accompany samples each time they are delivered to the laboratory. | 3 | To meet requirements of QA / QC program | VOCs EPA Method 8260B |
| **Total (QA / QC Samples)** | | 5 | | |

# ***FIGURES***



USGS Central Park Quadrangle 1995, Contour Interval = 10 feet

EBC

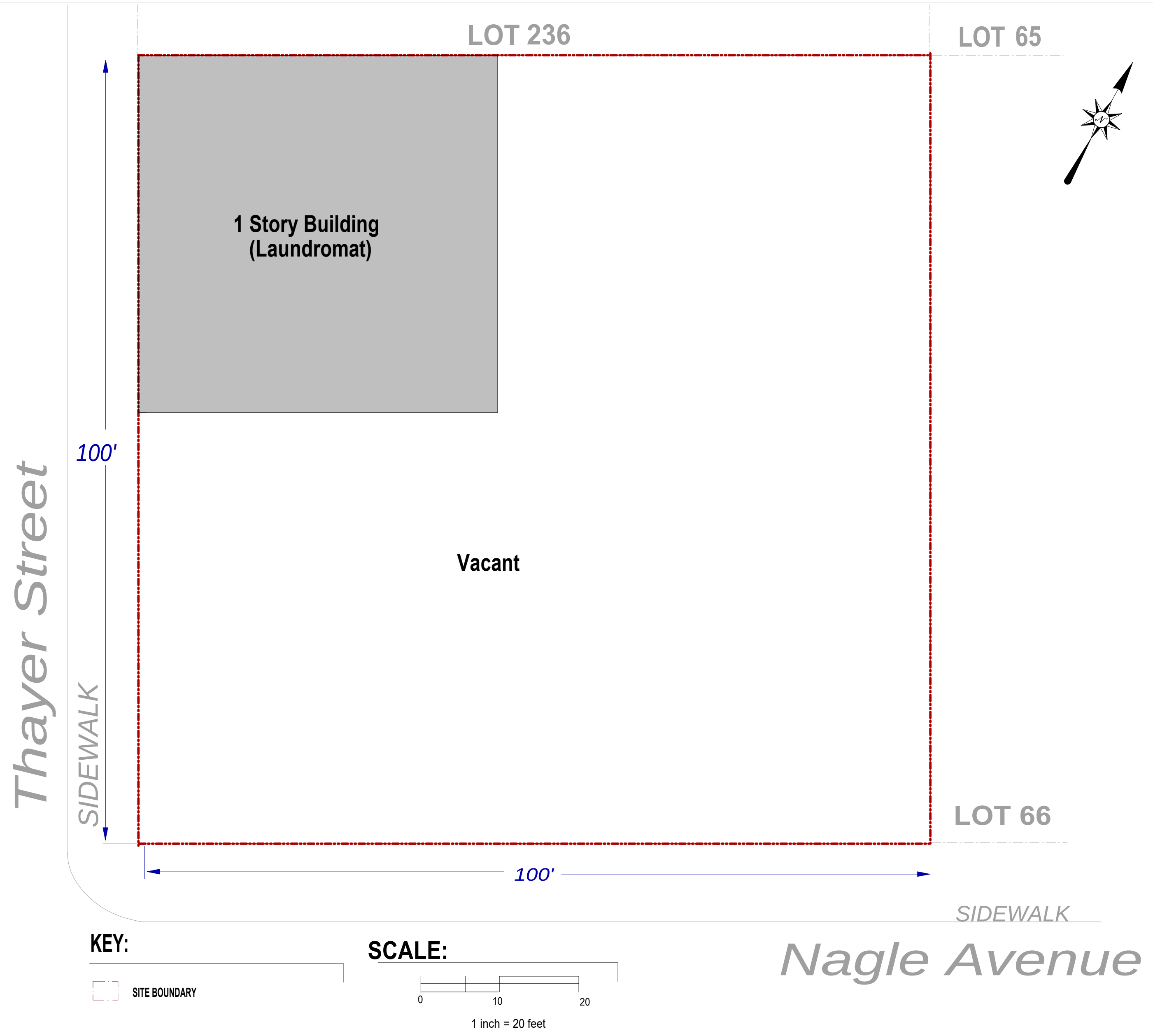
**Environmental Business Consultants**

*Phone* *631.504.6000*
*Fax* *631. 924 .2870*

148 Nagle Avenue
New York, NY

**FIGURE 1**

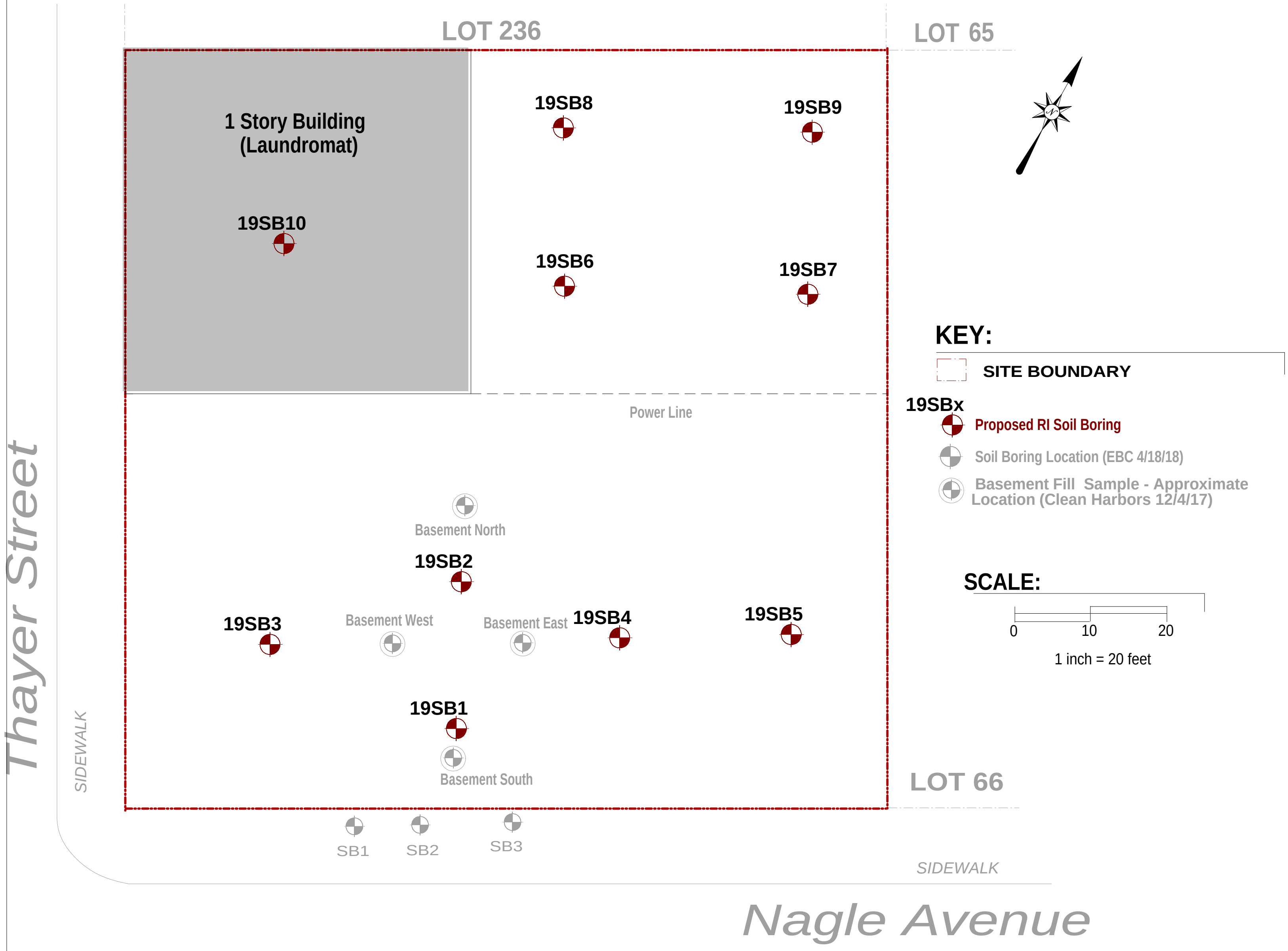
Site Location Map



EBC
Phone 631.504.6000
Fax 631.924.2780
Environmental Business Consultants
1808 Middle Country Road. Ridge. NY 11961

Figure
2

Site Name: 148 Nagle
Site Address: 148 Nagle Avenue, Manhattan, NY
Drawing Title: Site Plan



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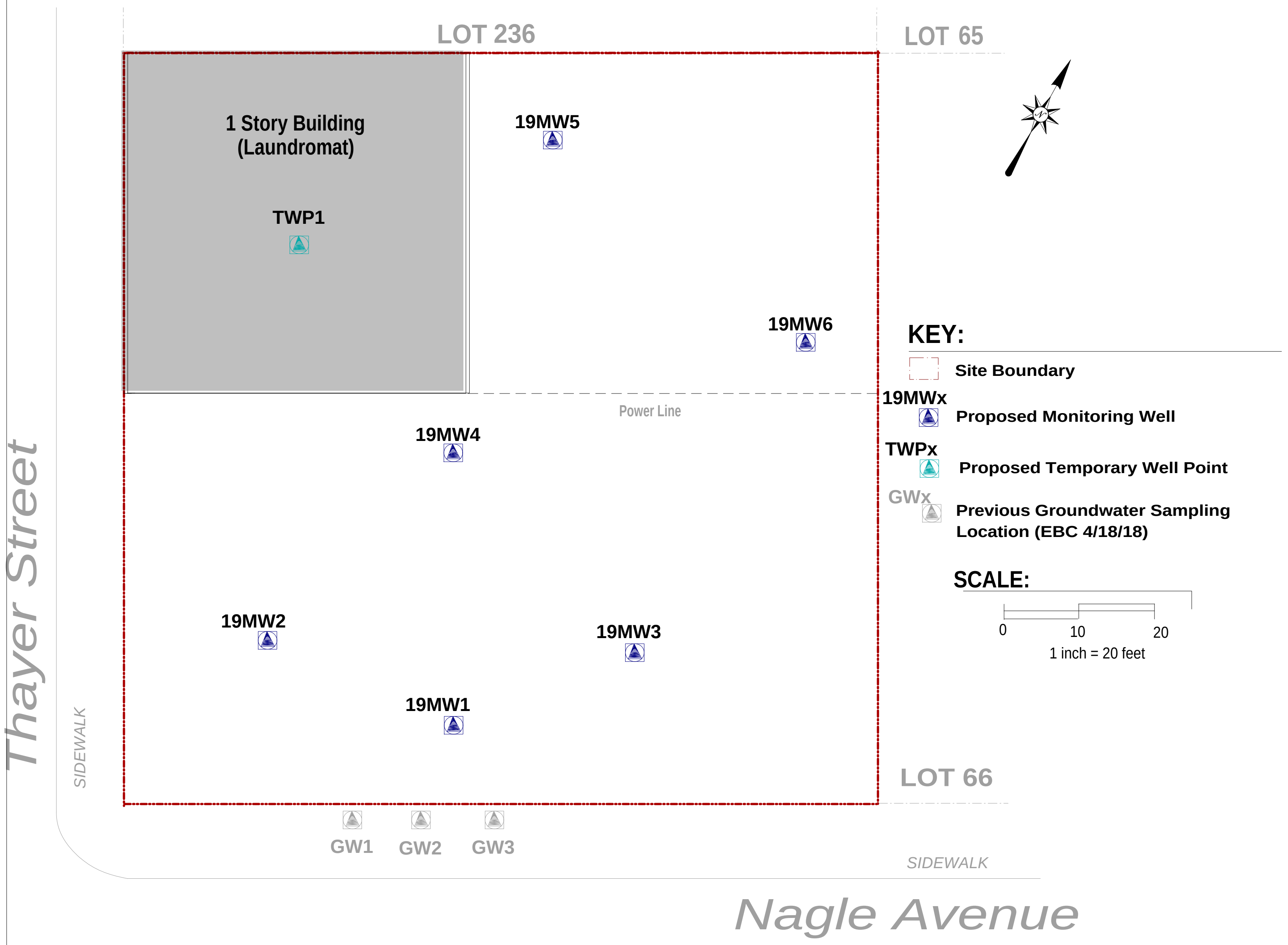
*Phone 631.504.6000*
*Fax 631.924.2780*

***ENVIRONMENTAL BUSINESS CONSULTANTS***
1808 MIDDLE COUNTRY ROAD. RIDGE. NY 11961

*Figure No.*
**3**

Site Name: 148 NAGLE
Site Address: 148 NAGLE AVENUE, MANHATTAN, NY
Drawing Title: PROPOSED SOIL BORING LOCATIONS



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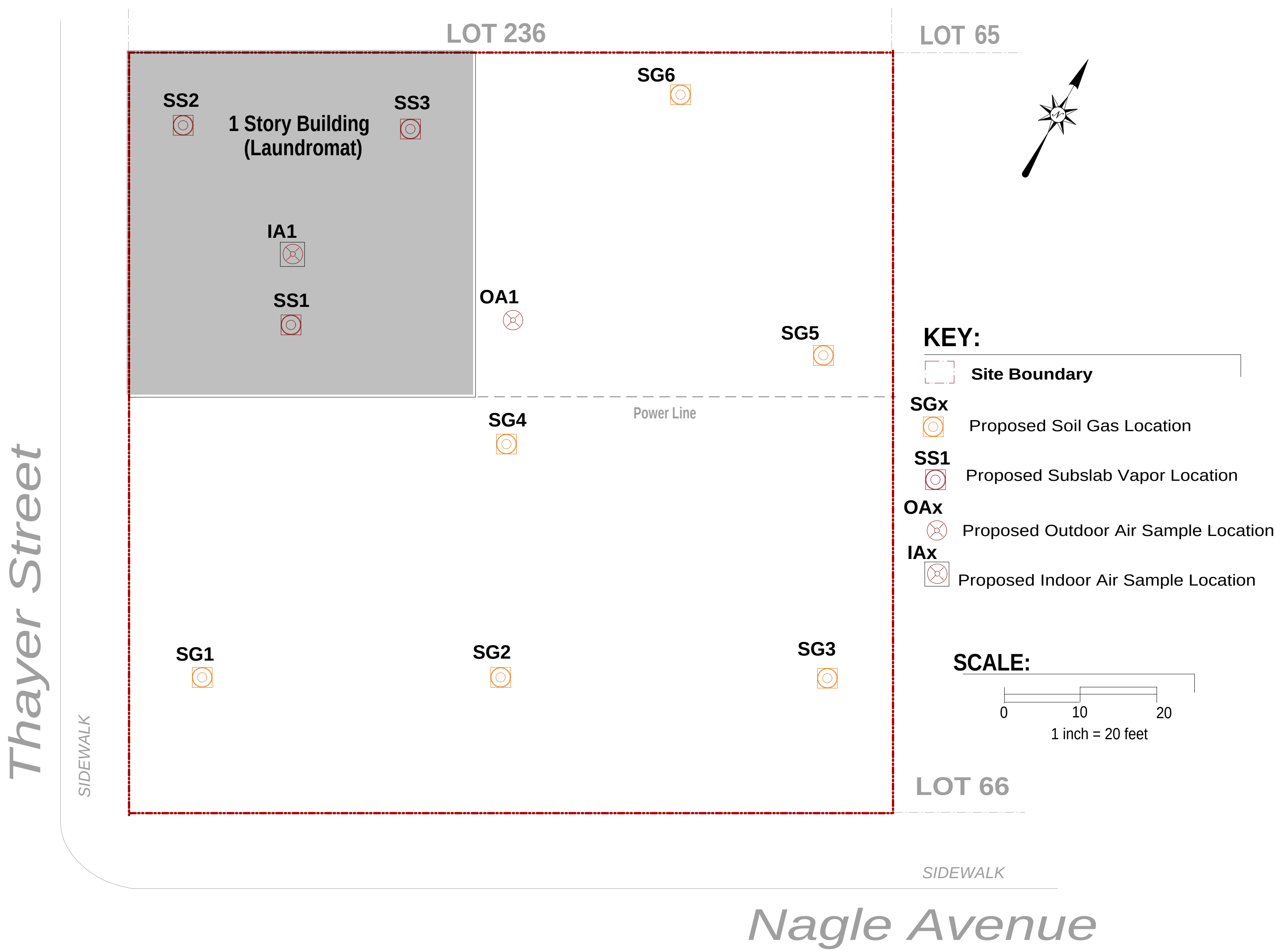
*Fax 631.924.2780*

Figure No.
4

Site Name: 148 NAGLE

Site Address: 148 NAGLE AVENUE, MANHATTAN, NY

Drawing Title: PROPOSED GROUNDWATER SAMPLING LOCATIONS



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**ENVIRONMENTAL BUSINESS CONSULTANTS**
1808 MIDDLE COUNTRY ROAD. RIDGE. NY 11961

*Figure No.*
**5**

Site Name: 148 NAGLE
Site Address: 148 NAGLE AVENUE, MANHATTAN, NY
Drawing Title: PROPOSED AIR SAMPLING LOCATIONS

# ATTACHMENT A
# PREVIOUS REPORTS – DIGITAL FILE

# ***ATTACHMENT B***
# ***QUALITY ASSURANCE PROJECT PLAN***

# QUALITY ASSURANCE PROJECT PLAN
## 148 Nagle Avenue, New York, NY

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**Prepared on behalf of:**

Dyckman Crestview Realty, LLC
279 West 231st Street
Bronx, New York, 10463

APRIL 2019
*REVISED MAY 2019*

**Prepared by:**

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
RIDGE, NY 11961

# TABLE OF CONTENTS

## QUALITY ASSURANCE PROJECT PLAN

148 Nagle Avenue
New York, NY

***TABLES***

***APPENDICES***

# 1.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This Quality Assurance Project Plan (QAPP) has been prepared in accordance with DER-10 to detail procedures to be followed during the course of the sampling and analytical portion of the project, as required by the approved work plan.

To ensure the successful completion of the project each individual responsible for a given component of the project must be aware of the quality assurance objectives of his / her particular work and of the overall project. The EBC Project Director, Charles Sosik will be directly responsible to the client for the overall project conduct and quality assurance/quality control (QA/QC) for the project. The Project Director will be responsible for overseeing all technical and administrative aspects of the project and for directing QA/QC activities. As Project Director, Mr. Sosik will also serve as the Quality Assurance Officer (QAO) and in this role may conduct:

- conduct periodic field and sampling audits;
- interface with the analytical laboratory to resolve problems; and
- interface with the data validator and/or the preparer of the DUSR to resolve problems.

Christine Beaver will serve as the Project Manager and will be responsible for implementation of the Remedial Investigation and coordination with field sampling crews and subcontractors. Reporting directly to the Project Manager will be the Field Operations Officer, Tom Gallo; who will serve as the on-Site qualified environmental professional who will record observations, direct the drilling crew and be responsible for the collection and handling of all samples.

## 1.1 Organization

Project QA will be maintained under the direction of the Project Manager, in accordance with this QAPP. QC for specific tasks will be the responsibility of the individuals and organizations listed below, under the direction and coordination of the Project Manager
.

| GENERAL RESPONSIBILITY | SCOPE OF WORK | RESPONSIBILITY OF QUALITY CONTROL |
|---|---|---|
| Field Operations | Supervision of Field Crew, sample collection and handling | T. Gallo, EBC |
| Project Manager | Implementation of the RI according to the RIWP. | C. Beaver, EBC |
| Laboratory Analysis | Analysis of soil, groundwater and soil vapor samples by NYSDEC ASP methods | NYSDOH-Certified Laboratory |
| Data review | Review for completeness and compliance | 3rd party validation |

# 2.0 QUALITY ASSURANCE PROJECT PLAN OBJECTIVES

## 2.1 Overview

Overall project goals are defined through the development of Data Quality Objectives (DQOs), which are qualitative and quantitative Statements that specify the quality of the data required to support decisions; DQOs, as described in this section, are based on the end uses of the data as described in the work plan.

In this plan, Quality Assurance and Quality Control are defined as follows:

- Quality Assurance - The overall integrated program for assuring reliability of monitoring and measurement data.

- Quality Control - The routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process.

## 2.2 QA / QC Requirements for Analytical Laboratory

Samples will be analyzed by a New York State Department of Health (NYSDOH) certified laboratory that is certified in the appropriate categories. Data generated from the laboratory will be used to evaluate contaminants such as chlorinated and other volatile organic compounds (VOCs) in soil, groundwater and soil vapor. The QA requirements for all subcontracted analytical laboratory work performed on this project are described below. QA elements to be evaluated include accuracy, precision, sensitivity, representativeness, and completeness. The data generated by the analytical laboratory for this project are required to be sensitive enough to achieve required quantification limits as specified in NYSDEC Analytical Services Protocol (NYSDEC ASP, 07/2005) and useful for comparison with clean-up objectives. The analytical results meeting the required quantification limits will provide data sensitive enough to meet the data quality objectives of this remedial program as described in the work plan. Reporting of the data must be clear, concise, and comprehensive. The QC elements that are important to this project are completeness of field data, sample custody, sample holding times, sample preservation, sample storage, instrument calibration and blank contamination.

### *2.2.1 Instrument Calibration*

Calibration curves will be developed for each of the compounds to be analyzed. Standard concentrations and a blank will be used to produce the initial curves. The development of calibration curves and initial calibration response factors must be consistent with method requirements presented in the most recent version of NYSDEC ASP 07/2005).

### *2.2.2 Continuing Instrument Calibration*

The initial calibration curve will be verified every 12 hrs by analyzing one calibration standard. The standard concentration will be the midpoint concentration of the initial calibration curve. The calibration check compound must come within 25% relative percent difference (RPD) of the average response factor obtained during initial calibration. If the RPD is greater than 25%, then corrective action must be taken as provided in the specific methodology.

### *2.2.3 Method Blanks*

Method blank or preparation blank is prepared from an analyte·free matrix which includes the same reagents, internal standards and surrogate standards as the related samples. It is carried through the entire sample preparation and analytical procedure. A method blank analysis will be performed once for each 12 hr period during the analysis of samples for volatiles. An acceptable method blank will contain less than two (2) times the CRQL of methylene chloride, acetone and 2-butanone. For all other target compounds, the method blank must contain less than or equal to the CRQL of any single target compound. For non-target peaks in the method blank, the peak area must be less than 10 percent of the nearest internal standard. The method blank will be used to demonstrate the level of laboratory background and reagent contamination that might result from the analytical process itself.

### *2.2.4 Trip Blanks.*

Trip blanks consist of a single set of sample containers filled at the laboratory with deionized laboratory-grade water. The water used will be from the same source as that used for the laboratory method blank. The containers will be carried into the field and handled and transported in the same way as the samples collected that day. Analysis of the trip blank for VOCs is used to identify contamination from the air, shipping containers, or from other items coming in contact with the sample bottles. (The bottles holding the trip blanks will not be opened during this procedure.) A complete set of trip blanks will be provided with each shipment of samples to the certified laboratory.

### *2.2.5 Surrogate Spike Analysis*

For organic analyses, all samples and blanks will be spiked with surrogate compounds before purging or extraction in order to monitor preparation and analyses of samples. Surrogate spike recoveries shall fall within the advisory limits in accordance with the NY5DEC ASP protocols for samples falling within the quantification limits without dilution.

### *2.2.6 Matrix Spike / Matrix Spike Duplicate / Matrix Spike Blank (MS/MSD/MSB) Analysis*

MS, MSD and MSB analyses will be performed to evaluate the matrix effect of the sample upon the analytical methodology along with the precision of the instrument by measuring recoveries. The MS / MSD / MSB samples will be analyzed for each group of samples of a similar matrix at a rate of 5% (one for every 20 field samples). The RPD will be calculated from the difference between the MS and MSD. Matrix spike blank analysis will be performed to indicate the appropriateness of the spiking solution(s) used for the MS/MSD. 10% of the samples of each matrix should be sampled and analyzed as Duplicates.

## 2.3 Accuracy

Accuracy is defined as the nearness of a real or the mean (x) of a set of results to the true value. Accuracy is assessed by means of reference samples and percent recoveries. Accuracy includes both precision and recovery and is expressed as percent recovery (% REC). The MS sample is used to determine the percent recovery. The matrix spike percent recovery (% REC) is calculated by the following equation:

$$\%REC = \frac{SSR - SR}{SA} \times 100$$

Where:
SSR = spike sample results
SR = sample results
SA = spike added from spiking mix

## 2.4 Precision

Precision is defined as the measurement of agreement of a set of replicate results among themselves without a Precision is defined as the measurement of agreement of a set of replicate results among themselves without assumption of any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analyses.

Analytical precision is expressed in terms of RPD. The RPD is calculated using the following formula:

$$\text{RPD} = \frac{D^1 - D^2}{(D^1 + D^2)/2} \times 100$$

Where:
RPD = relative percent difference
$D^1$ = first sample value
$D^2$ = second sample value (duplicate)

## 2.5 Sensitivity

The sensitivity objectives for this plan require that data generated by the analytical laboratory achieve quantification levels low enough to meet the required detection limits specified by NYSDEC ASP and to meet all site-specific standards, criteria and guidance values (SGCs) established for this project.

## 2.6 Representativeness

Representativeness is a measure of the relationship of an individual sample taken from a particular site to the remainder of that site and the relationship of a small aliquot of the sample (i.e., the one used in the actual analysis) to the sample remaining on site. The representativeness of samples is assured by adherence to sampling procedures described in the Remedial Investigation Work Plan.

## 2.7 Completeness

Completeness is a measure of the quantity of data obtained from a measurement system as compared to the amount of data expected from the measurement system. Completeness is defined as the percentage of all results that are not affected by failing QC qualifiers, and should be between 70 and 100% of all analyses performed. The objective of completeness in laboratory reporting is to provide a thorough data support package. The laboratory data package provides documentation of sample analysis and results in the form of summaries, QC data, and raw analytical data. The laboratory will be required to submit data packages that follow NYSDEC ASP Category B reporting format which, at a minimum, will include the following components:

1. All sample chain-of-custody forms.
2. The case narrative(s) presenting a discussion of any problems and/or procedural changes required during analyses. Also presented in the case narrative are sample summary forms.
3. Documentation demonstrating the laboratory's ability to attain the contract specified detection limits for all target analytes in all required matrices.
4. Tabulated target compound results and tentatively identified compounds.
5. Surrogate spike analysis results (organics).
6. Matrix spike/matrix spike duplicate/matrix spike blank results.
7. QC check sample and standard recovery results
8. Blank results (field, trip, and method).
9. Internal standard area and RT summary.

## 2.8 Laboratory Custody Procedures

The following elements are important for maintaining the field custody of samples:

- Sample identification
- Sample labels
- Custody records
- Shipping records
- Packaging procedures

Sample labels will be attached to all sampling bottles before field activities begin; each label will contain an identifying number. Each number will have a suffix that identifies the site and where the sample was taken. Approximate sampling locations will be marked on a map with a description of the sample location. The number, type of sample, and sample identification will be entered into the field logbook. A chain-of-custody form, initiated at the analytical laboratory will accompany the sample bottles from the laboratory into the field. Upon receipt of the bottles and cooler, the sampler will sign and date the first received blank space. After each sample is collected and appropriately identified, entries will be made on the chain-of-custody form that will include:

- Site name and address
- Samplers' names and signatures

## 2.9 Sample Handling and Decontamination Procedures

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or cold-pak(s) to maintain a temperature of $4^{o}$C.

Dedicated disposable sampling materials will be used for soil, groundwater and soil vapor samples (if collected), eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of one for every eight samples collected. No field filtering will be conducted; any required filtration will be completed by the laboratory.

Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil;
- Rinse with tap water;
- Wash with alconox® detergent solution and scrub ;
- Rinse with tap water;
- Rinse with distilled or deionized water.

Prepare field blanks by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory and duplicate samples will be collected at a rate of one per ten samples submitted to the laboratory.

# 3.0 ANALYTICAL PROCEDURES

## 3.1 Laboratory Analysis

Samples will be analyzed by the NYSDOH ELAP laboratory for one or more of the following parameters: VOCs in soil / groundwater by USEPA Method 8260C, SVOCs and 1,4 dioxane in soil / groundwater by USEPA Method 8270D, Target Analyte List (TAL) Metals in soil / groundwater by USEPA Method 6010, pesticides / PCBs in soil / groundwater by USEPA Method 8081B/8082A, PFAS compounds in soil /groundwater by USEPA Method 537 and VOCs in air by USEPA Method TO15 (Table 2). If any modifications or additions to the standard procedures are anticipated and if any nonstandard sample preparation or analytical protocol is to be used, the modifications and the nonstandard protocol will be explicitly defined and documented. Prior approval by EBC's PM will be necessary for any nonstandard analytical or sample preparation protocol used by the laboratory, i.e., dilution of samples or extracts by greater than a factor of five (5).

# 4.0 DATA REDUCTION, VALIDATION, REVIEW, AND REPORTING

## 4.1 Overview

The process of data reduction, review, and reporting ensures the assessments or a conclusion based on the final data accurately reflects actual site conditions. This plan presents the specific procedures, methods, and format that will be employed for data reduction, review and reporting of each measurement parameter determined in the laboratory and field. Also described in this section is the process by which all data, reports, and work plans are proofed and checked for technical and numerical errors prior to final submission.

## 4.2 Data Reduction

Standard methods and references will be used as guidelines for data handling, reduction, validation, and reporting. All data for the project will be compiled and summarized with an independent verification at each step in the process to prevent transcription/typographical errors. Any computerized entry of data will also undergo verification review.

Laboratory QA/QC information required by the method protocols will be compiled, including the application of data QA/QC qualifiers as appropriate. In addition, laboratory worksheets, laboratory notebooks, chains-of-custody, instrument logs, standards records, calibration records, and maintenance records, as applicable, will be provided in the laboratory data packages to determine the validity of data. Specifics on internal laboratory data reduction protocols are identified in the laboratory's SOPs.

Following receipt of the laboratory analytical results by EBC, the data results will be compiled and presented in an appropriate tabular form. Where appropriate, the impacts of QA/QC qualifiers resulting from laboratory or external validation reviews will be assessed in terms of data usability.

## 4.3 Laboratory Data Reporting

Sample analysis will be provided by a New York State certified environmental laboratory. All sample data packages submitted by the analytical laboratory will be required to be reported in conformance to the NYSDEC ASP (7/2005), Category B data deliverable requirements as applicable to the method utilized. All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format. Note that waste characterization samples, if analyzed, will be in results only format and will not be evaluated in the DUSR.

## 5.0 CORRECTIVE ACTION

Review and implementation of systems and procedures may result in recommendations for corrective action. Any deviations from the specified procedures within approved project plans due to unexpected site-specific conditions shall warrant corrective action. All errors, deficiencies, or other problems shall be brought to the immediate attention of the EBC PM, who in turn shall contact the Quality Assurance/Data Quality Manager or his designee (if applicable).

Procedures have been established to ensure that conditions adverse to data quality are promptly investigated, evaluated and corrected. These procedures for review and implementation of a change are as follows:

- Define the problem.
- Investigate the cause of the problem.
- Develop a corrective action to eliminate the problem, in consultation with the personnel who defined the problem and who will implement the change.
- Complete the required form describing the change and its rationale (see below for form requirements).
- Obtain all required written approvals.
- Implement the corrective action.
- Verify that the change has eliminated the problem.

During the field investigation, all changes to the sampling program will be documented in field logs/sheets and the EBC PM advised.

If any problems occur with the laboratory or analyses, the laboratory must immediately notify the PM, who will consult with other project staff. All approved corrective actions shall be controlled and documented.

All corrective action documentation shall include an explanation of the problem and a proposed solution which will be maintained in the project file or associated logs. Each report must be approved by the necessary personnel (e.g., the PM) before implementation of the change occurs. The PM shall be responsible for controlling, tracking, implementing and distributing identified changes.

## TABLE 1
## SUMMARY OF
## SAMPLING PROGRAM RATIONALE AND ANALYSIS

| Matrix | Location | Approximate Number of Samples | Rationale for Sampling | Laboratory Analysis |
|---|---|---|---|---|
| Surficial fill (0 to 10 ft maximum) and subsurface soil (20 ft or Extent of contamination) | From 10 borings throughout the site. | 20 | To evaluate historic fill materials and native soil at the planned excavation depth with respect to SCOs | VOCs EPA Method 8260B, PFAS Compounds EPA Method 537, SVOCs and 1,4 dioxane EPA Method 8270, pesticide / PCBs EPA Method 8081/8082, TAL metals EPA 6010. |
| Subsurface Soil (bottom of boring) | From 10 borings throughout the site. | 10 | To meet DEC requirements to test soil for emerging contaminants | PFAS Compounds EPA Method 537, and 1,4 dioxane EPA Method 8270 |
| Subsurface soil (exhibiting elevated PID readings | From any borings exhibiting elevated PID readings or other indications of CVOC contamination. | 5 | To evaluate the extent of soil impact and delineate source areas | VOCs EPA Method 8260B. |
| **Total (Soils)** | | 35 | | |
| Groundwater (water table) | From 6 monitoring wells and 1 temporary well point across the Site. | 7 | To assess groundwater quality at the Site | VOCs EPA Method 8260B, PFAS Compounds EPA Method 537, SVOCs and1,4-dioxane EPA Method 8270, pesticide / PCBs EPA Method 8081/8082, metals EPA 6010 dissolved and total |
| **Total (Groundwater)** | | 7 | | |
| Soil Gas (11 ft below existing grade) | 6 soil gas implants to be installed throughout the site. | 6 | Evaluate soil gas at the Site beneath any proposed foundation for future development. | VOCs EPA Method TO15 |
| Subslab Soil Vapor (11 ft below existing grade) | 3 subslab soil vapor points to be installed in the existing slab on grade building. | 3 | Evaluate soil vapor beneath the existing building slab. | VOCs EPA Method TO15 |
| Ambient air and Outdoor air | 2 air samples collected concurrent with subslab soil vapor samples | 2 | For use in evaluating soil vapor samples using NYSDOH decision matrices | VOCs EPA Method TO15 |
| **Total (Soil Gas and Air)** | | 11 | | |
| MS/MSD | Matrix spike and Matrix spike duplicates at the rate 5% | 2 | To meet requirements of QA / QC program | 1 soil and 1 groundwater MS/MSD for VOCs EPA Method 8260B, PFAS Compounds EPA Method 537, SVOCs and 1,4 dioxane EPA Method 8270, pesticide / PCBs EPA Method 8081/8082, TAL metals EPA 6010. |
| Trip Blanks | One laboratory prepared trip blank to accompany samples each time they are delivered to the laboratory. | 2 | To meet requirements of QA / QC program | VOCs EPA Method 8260B |
| **Total (QA / QC Samples)** | | 5 | | |

# TABLE 2
# SAMPLE COLLECTION AND ANALYSIS PROTOCOLS

| Sample Type | Matrix | Sampling Device | Parameter | Sample Container | Sample Preservation | Analytical Method# | CRQL / MDL | Holding Time |
|---|---|---|---|---|---|---|---|---|
| Grab | Soil | Scoop Direct into Jar | VOCs | (1) 2 oz Jar | Cool to 4º C | EPA Method 8260C | Compound specific (1-5 ug/kg) | 14 days |
| Grab | Soil | Scoop Direct into Jar | SVOCs | (1) 8 oz jar | Cool to 4º C | EPA Method 8270D | Compound specific (1-5 ug/kg) | 14 day ext/40 days |
| Grab | Soil | Scoop Direct into Jar | Pest/PCBs | from 8oz jar above | Cool to 4º C | EPA Method 8081B/8082A | Compound specific (1-5 ug/kg) | 14 day ext/40 days |
| Grab | Soil | Scoop Direct into Jar | Metals | from 8oz jar above | Cool to 4º C | TAL Metals 6010 | Compound specific (01-1 mg/kg) | 6 months |
| Grab | Soil | Scoop Direct into Jar | 1,4 – dioxane | (1) 4 oz jar | Cool to 4º C | Method 8270 SIM | Compound specific (0.1 mg/kg) | 14 days |
| Grab | Soil | Scoop Direct into Jar | PFAS Target Analyte List | (1) 250 ml HDPE bottle, no Teflon liner | Cool to 4º C | EPA Method 537 | Compound specific (1 ug/kg) | 14 days |
| Grab | Water | Pump tubing | VOCs | (3) 40 ml vials | Cool to 4º C 1:1 HCL | EPA Method 8260C | Compound specific (1-5 ug/L) | 14 days |
| Grab | Water | Pump tubing | SVOCs | (1) 1 Liter Amber Bottle | Cool to 4º C | EPA Method 8270D | Compound specific (1-5 ug/L) | 14 days |
| Grab | Water | Pump tubing | Pesticides and PCBs | (2) 1 Liter Amber Bottle | Cool to 4º C | EPA Method 8081B / 8082A | Compound specific (1-5 ug/L) | 14 days |
| Grab | Water | Pump tubing | Total Metals | (1) 100 ml | $HNO_3$ | TAL Metals 6010 | Compound specific (1-5 mg/L) | 6 months |
| Grab | Water | Pump tubing | Dissolved Metals | (1) 100 ml | None | TAL Metals 6010 | Compound specific (1-5 mg/L) | 6 months |
| Grab | Water | Pump tubing | 1,4 – dioxane | (1) 1 Liter Amber Bottle | None | Method 8270 SIM | Compound specific (0.28 µg/l) | 14 days |
| Grab | Water | Pump tubing | PFAS Target Analyte List | (1) 250 ml HDPE bottle, no Teflon liner | None | EPA Method 537 | Compound specific (2 ng/L) | 14 days |
| 2 hr Avg | Soil Gas | 6-Liter Summa Canister | VOCs | 6-Liter Summa Canister | None | EPA Method TO15 | <0.5 ppbv | 30 days if pressure difference between sampling and analysis is <5psi |

*Notes*:
All holding times listed are from Verified Time of Sample Receipt (VTSR) unless noted otherwise. * Holding time listed is from time of sample collection.
The number in parentheses in the "Sample Container" column denotes the number of containers needed.
Triple volume required when collected MS/MSD samples
The number of trip blanks are estimated.
CRQL / MDL = Contract Required Quantitation Limit / Method Detection Limit
NA = Not available or not applicable.

# ***<u>APPENDIX A</u>***

# ***PFAS Sampling and Analysis***

March 2019

# Sampling for 1,4-Dioxane and Per- and Polyfluoroalkyl Substances (PFAS) Under DEC's Part 375 Remedial Programs

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## Objective

The Department of Environmental Conservation (DEC) is requiring sampling of all environmental media and subsequent analysis for the emerging contaminants 1,4-Dioxane and PFAS as part of all remedial programs implemented under 6 NYCRR Part 375, as further described in the guidance below.

## Sample Planning

The number of samples required for emerging contaminant analyses is to be the same number of samples where "full TAL/TCL sampling" would typically be required in an investigation or remedial action compliance program.

Sampling of all media for ECs is required at all sites coming into or already in an investigative phase of any DER program. In other words, if the sampling outlined in the guidance hasn't already been done or isn't part of an existing work plan to be sampled for in the future, it will be necessary to go back out and perform the sampling prior to approving a SC report or issuing a decision document.

PFAS and 1,4-dioxane shall be incorporated into the investigation of potentially affected media, including soil, groundwater, surface water, and sediment as an addition to the standard "full TAL/TCL sampling." Biota sampling may be necessary based upon the potential for biota to be affected as determined pursuant to a Fish and Wildlife Impact analysis. Soil vapor sampling for PFAS and 1,4-dioxane is not required.

Upon an emerging contaminant being identified as a contaminant of concern (COC) for a site, those compounds must be assessed as part of the remedy selection process in accordance with Part 375 and DER-10 and included as part of the monitoring program upon entering the site management phase.

Soil imported to a site for use in a soil cap, soil cover, or as backfill must be sampled for 1,4-dioxane and PFAS contamination in general conformance with DER-10, section 5.4(e). Assessment of the soil data will be made on a site-specific basis to determine appropriateness for use.

The work plan should explicitly describe analysis and reporting requirements, including laboratory analytical procedures for modified methods discussed below.

## Analysis and Reporting

Labs should provide a full category B deliverable, and a DUSR should be prepared by an independent 3rd party data validator. QA/QC samples should be collected as required in DER-10, Section 2.3(c). The electronic data submission should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html.

PFAS analysis and reporting: DEC has developed a *PFAS Analyte List* (below) for remedial programs. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any compounds, the DEC project manager, in consultation with the DEC remedial program chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site.

Currently, ELAP does not offer certification for PFAS compounds in matrices other than finished drinking water. However, laboratories analyzing environmental samples (e.g., soil, sediments, and groundwater) are required by DER to hold ELAP certification for PFOA and PFOS in drinking water by EPA Method 537 or ISO 25101. Labs must also adhere to the requirements and criteria set forth in the Laboratory Guidance for Analysis of PFAS in Non-Potable Water and Solids.

Modified EPA Method 537 is the preferred method to use for environmental samples due to its ability to achieve very low detection limits. Reporting limits for PFAS in groundwater and soil are to be 2 ng/L (ppt) and 1 ug/kg (ppb), respectively. If contract labs or work plans submitted by responsible parties indicate that they are not able to achieve these reporting limits for the entire list of 21 PFAS, site-specific decisions will need to be made by the DEC project manager in consultation with the DEC remedial program chemist. Note: Reporting limits for PFOA and PFOS in groundwater should not exceed 2 ng/L.

Additional laboratory methods for analysis of PFAS may be warranted at a site. These methods include Synthetic Precipitation Leaching Procedure (SPLP) by EPA Method 1312 and Total Oxidizable Precursor Assay (TOP Assay).

SPLP is a technique for determining the potential for chemicals in soil to leach to groundwater and may be helpful in determining the need for addressing PFAS-containing soils or other solid material as part of the remedy. SPLP sampling need not be considered if there are no elevated PFAS levels in groundwater. If elevated levels of PFAS are detected in water, and PFAS are also seen in soil, then an SPLP test should be considered to better understand the relationship between the PFAS in the two media.

The TOP Assay can assist in determining the potential PFAS risk at a site. For example, some polyfluoroalkyl substances may transform to form perfluoroalkyl substances, resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from the site. To conceptualize the amount and type of oxidizable perfluoroalkyl substances which could be liberated in the environment, a “TOP Assay” analysis can be performed, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized.

PFAS-containing materials can be made up of per- and polyfluoroalkyl substances that are not analyzable by routine analytical methodology (LC-MS/MS). The TOP assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by current analytical methodology. Please note that analysis of highly contaminated samples, such as those from an AFFF site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. Please consult with a DEC remedial program chemist for assistance interpreting the results.

1,4-Dioxane analysis and reporting: The reporting limit for 1,4-dioxane in groundwater should be no higher than 0.35 µg/L (ppb) and no higher than 0.1 mg/kg (ppm) in soil. Although ELAP offers certification for both EPA Method 8260 SIM and EPA Method 8270 SIM in waters, DER is advising the use of Method 8270 SIM because it provides a more robust extraction procedure, uses a larger sample volume, and is less vulnerable to interference from chlorinated solvents. The analysis currently performed for SVOCs in soil is adequate for evaluation of 1,4-dioxane in soil, which already has an established SCO.

Refinement of sample analyses

As with other contaminants that are analyzed for at a site, the emerging contaminant analyte list may be refined for future sampling events based on investigative findings. Initially, however, sampling using this PFAS Analyte List and 1,4-dioxane is needed to understand the nature of contamination.

## PFAS Analyte List

| Group | Chemical Name | Abbreviation | CAS Number |
|---|---|---|---|
| Perfluoroalkyl sulfonates | Perfluorobutanesulfonic acid | PFBS | 375-73-5 |
| | Perfluorohexanesulfonic acid | PFHxS | 355-46-4 |
| | Perfluoroheptanesulfonic acid | PFHpS | 375-92-8 |
| | Perfluorooctanessulfonic acid | PFOS | 1763-23-1 |
| | Perfluorodecanesulfonic acid | PFDS | 335-77-3 |
| Perfluoroalkyl carboxylates | Perfluorobutanoic acid | PFBA | 375-22-4 |
| | Perfluoropentanoic acid | PFPeA | 2706-90-3 |
| | Perfluorohexanoic acid | PFHxA | 307-24-4 |
| | Perfluoroheptanoic acid | PFHpA | 375-85-9 |
| | Perfluorooctanoic acid | PFOA | 335-67-1 |
| | Perfluorononanoic acid | PFNA | 375-95-1 |
| | Perfluorodecanoic acid | PFDA | 335-76-2 |
| | Perfluoroundecanoic acid | PFUA/PFUdA | 2058-94-8 |
| | Perfluorododecanoic acid | PFDoA | 307-55-1 |
| | Perfluorotridecanoic acid | PFTriA/PFTrDA | 72629-94-8 |
| | Perfluorotetradecanoic acid | PFTA/PFTeDA | 376-06-7 |
| Fluorinated Telomer Sulfonates | 6:2 Fluorotelomer sulfonate | 6:2 FTS | 27619-97-2 |
| | 8:2 Fluorotelomer sulfonate | 8:2 FTS | 39108-34-4 |
| Perfluorooctane-sulfonamides | Perfluroroctanesulfonamide | FOSA | 754-91-6 |
| Perfluorooctane-sulfonamidoacetic acids | N-methyl perfluorooctanesulfonamidoacetic acid | N-MeFOSAA | 2355-31-9 |
| | N-ethyl perfluorooctanesulfonamidoacetic acid | N-EtFOSAA | 2991-50-6 |

# EPA 537 (PFAS) Field Sampling Guidelines

PLEASE READ INSTRUCTIONS ENTIRELY PRIOR TO SAMPLING EVENT

Sampling for PFAS via EPA 537 can be challenging due to the prevalence of these compounds in consumer products. The following guidelines are strongly recommended when conducting sampling.

Reference-NHDES https://www.des.nh.gov/organization/divisions/waste/hwrb/documents/pfc-stakeholder-notification-20161122.pdf

## FIELD CLOTHING and PPE

- No clothing or boots containing Gore-Tex®
- All safety boots made from polyurethane and PVC
- No materials containing Tyvek®
- Do not use fabric softener on clothing to be worn in field
- Do not used cosmetics, moisturizers, hand cream, or other related products the morning of sampling
- Do not use unauthorized sunscreen or insect repellant (see reference above for acceptable products)

## SAMPLE CONTAINERS

- All sample containers made of HDPE or polypropylene
- Caps are unlined and made of HDPE or polypropylene (no Teflon®-lined caps)

## WET WEATHER (AS APPLICABLE)

Wet weather gear made of polyurethane and PVC only

## EQUIPMENT DECONTAMINATION

- "PFAS-free" water on-site for decontamination of sample equipment. No other water sources to be used
- Only Alconox and Liquinox can be used as decontamination materials

## FOOD CONSIDERATIONS

No food or drink on-site with exception of bottled water and/or hydration drinks (i.e., Gatorade and Powerade) that is available for consumption only in the staging area

## OTHER RECOMMENDATIONS

Sample for PFAS first! Other containers for other methods may have PFAS present on their sampling containers

## FIELD EQUIPMENT

- Must not contain Teflon® (aka PTFE) or LDPE materials
- All sampling materials must be made from stainless steel, HDPE, acetate, silicon, or polypropylene
- No waterproof field books can be used
- No plastic clipboards, binders, or spiral hard cover notebooks can be used
- No adhesives (i.e. Post-It® Notes) can be used
- Sharpies and permanent markers not allowed; regular ball point pens are acceptable
- Aluminum foil must not be used
- Keep PFC samples in separate cooler, away from sampling containers that may contain PFAS
- Coolers filled with regular ice only - Do not use chemical (blue) ice packs

# EPA 537 (PFAS) Field Sampling Guidelines

PLEASE READ INSTRUCTIONS ENTIRELY PRIOR TO SAMPLING EVENT

*Sampler must wash hands before wearing nitrile gloves in order to limit contamination during sampling. Each sample set* requires a set of containers to comply with the method as indicated below. **Sample set is composed of samples collected from the same sample site and at the same time.*

| Container Count | Container Type | Preservative |
|---|---|---|
| 3 Sampling Containers - Empty | 250 mL container | Pre preserved with 1.25 g Trizma |
| 1 Reagent Water for Field Blank use | 250 mL container | Pre preserved with 1.25 g Trizma |
| P1 Field Blank (FRB) - Empty | 250 mL container | Unpreserved |

***Sampling container <u>must be filled to the neck.</u> For instructional purposes a black line has been drawn to illustrate the required fill level for each of the 3 Sample containers***

Field blanks are recommended and the containers have been provided, please follow the instructions below.

Field Blank Instructions:

1. Locate the Reagent Water container from the bottle order. The Reagent Water container will be pre-filled with PFAS-free water and is preserved with Trizma.
2. Locate the empty container labeled "Field Blank".
3. Open both containers and proceed to transfer contents of the "Reagent Water" container into the "Field Blank" container.
4. If field blanks are to be analyzed, they need to be noted on COC, and will be billed accordingly as a sample.

Both the <u>empty</u> Reagent Water container and the <u>filled</u> Field Blank container must be returned to the lab along with the samples taken.

Sampling Instructions:

1. Each sampling event requires 3 containers to be filled to the neck of the provided containers for each sampling location.
2. Before sampling, remove faucet aerator, run water for 5 min, slow water to flow of pencil to avoid splashing and fill sample containers to neck of container (as previously illustrated) and invert 5 times.
3. Do not overfill or rinse the container.
4. Close containers securely. Place containers in sealed ZipLoc® bags, and in a separate cooler (no other container types).
5. Ensure Chain-of-Custody and all labels on containers contain required information. Place sample, Field Blank and empty Reagent Blank containers in ice filled cooler (do not use blue ice) and return to the laboratory. Samples should be kept at 4°C ±2. Samples must not exceed 10°C during first 48 hours after collection. Hold time is 14 days.

Please contact your Alpha Analytical project manager with additional questions or concerns.

**DOC ID:** 27517 **Published:** 9/21/2018 4:36:38 PM

**Revision:** 1 Page 1 of 1

# PFAS Sampling Instructions for non-Drinking Water (non-SDWA) for EPA Method 537 and/or LC/MS/MS Incorporating the Isotope Dilution Technique

Please read instructions entirely prior to sampling event.

It should be noted that there is considerable information available from the US EPA as well as a multitude of state regulatory agencies regarding the potential for PFAS cross-contamination during sampling. It is recommended that samplers consult the applicable regulatory guidance prior to sampling. For additional information, please refer to "METHOD 537. Version 1.1, September 2009, EPA Document #: EPA/600/R-08/092".

The sample handler should wash their hands before sampling and wear nitrile gloves while filling and sealing the sample bottles. PFAS contamination during sampling can occur from a number of common sources, such as food packaging and certain foods and beverages. Proper hand washing and wearing nitrile gloves will aid in minimizing this type of accidental contamination of the samples.

| Container Count | Container Type | Preservative |
|---|---|---|
| 2 Sampling Containers - Empty | 275 mL container | Unpreserved |
| Reagent Water for Field Blank use | 275 mL container | Unpreserved |
| 1 Field Blank (FRB) Container - Empty | 275 mL container | Unpreserved |

**** Sampling container <u>must be filled to the neck</u>. For instructional purposes a black line has been drawn to illustrate the required fill level for each of the 2 Sample containers****

Sample containers for field blanks are included with your container order. If you wish to submit field blanks (billable samples) in addition to your field samples, please prepare them as instructed below:

**Field Blank Instructions:**

1. Locate the Reagent Water container from the bottle order. The Reagent Water container is prefilled with PFAS-free water and preserved with Trizma.
2. Locate the empty container labeled "Field Blank".
3. Open both containers and proceed to transfer contents of the "Reagent Water" container into the "Field Blank" container.

**Both the <u>empty</u> Reagent Water container and the <u>filled</u> Field Blank container must be returned to the laboratory along with the samples taken.**

**Sampling Instructions:**

1. Each sampling event requires 2 containers to be filled to the neck of the provided containers for each sampling location.
2. Fill sample containers to neck of container (as previously illustrated) and invert 5 times.
3. Do not overfill or rinse the container.
4. Close containers securely.
5. Ensure Chain-of-Custody and all labels on containers contain required information.
   Place sample, Field Blank and empty Reagent Blank containers in ice filled cooler and return to the laboratory. Samples should be kept at 4°C ±2. Samples must not exceed 10°C during first 48 hours after collection. Hold time is 14 days.

Please contact your project manager with additional questions or concerns.

# ***ATTACHMENT C***
# ***HEALTH AND SAFETY PLAN***

*UNDER SEPERATE COVER*

# 148 NAGLE SITE

148 NAGLE AVENUE
NEW YORK, NEW YORK
Block 2174 Lot 70

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# INVESTIGATION
# HEALTH AND SAFETY PLAN

APRIL 2019

*Prepared By:*

EBC
**ENVIRONMENTAL BUSINESS CONSULTANTS**
1808 Middle Country Road
Ridge, NY 11961

# HEALTH AND SAFETY PLAN

## Table of Contents

# Table of Contents (Continued)

## *FIGURES*

## *APPENDICES*

# STATEMENT OF COMMITMENT

This Health and Safety Plan (HASP) has been prepared to ensure that workers are not exposed to risks from hazardous materials during the planned Subsurface Investigation at the Site.

This HASP, which applies to persons present at the site actually or potentially exposed to hazardous materials, describes emergency response procedures for actual and potential chemical hazards. This HASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy by signing off on receipt of their individual copy of the document. Contractors and suppliers are retained as independent contractors and are responsible for ensuring the health and safety of their own employees.

## 1.0 INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed by Environmental Business Consultants (EBC) for the subsurface investigation to be performed to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes during subsurface investigation activities. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this HASP, including the attachments, addresses safety and health hazards related to subsurface sample collection activities and is based on the best information available. The HASP may be revised by EBC at the request of the client and/or a regulatory agency upon receipt of new information regarding site conditions. Changes will be documented by written amendments signed by EBC's project manager, site safety officer and/or the EBC health and safety consultant.

### 1.1 Training Requirements

Personnel entering the exclusion zone or decontamination zone are required to be certified in health and safety practices for hazardous waste site operations as specified in the Federal OSHA Regulations CFR 1910.120e (revised 3/6/90).

Paragraph (e - 3) of the above referenced regulations requires that all on-site management personnel directly responsible for or who supervise employees engaged in hazardous waste operations, must initially receive 8 hours of supervisor training related to managing hazardous waste work.

Paragraph (e - 8) of the above referenced regulations requires that workers and supervisors receive 8 hours of refresher training annually on the items specified in Paragraph (e-1) and/or (e-3).

Additionally all on-site personnel must receive adequate site-specific training in the form of an on-site Health and Safety briefing prior to participating in field work with emphasis on the following:

- Protection of the adjacent community from hazardous vapors and / or dust which may be released during intrusive activities.
- Identification of chemicals known or suspected to be present on-site and the health effects and hazards of those substances.
- The need for vigilance in personnel protection, and the importance of attention to proper use, fit and care of personnel protective equipment.
- Decontamination procedures.
- Site control including work zones, access and security.
- Hazards and protection against heat or cold.
- The proper observance of daily health and safety practices, such as entry and exit of work zones and site. Proper hygiene during lunch, break, etc.
- Emergency procedures to be followed in case of fire, explosion and sudden release of hazardous gases.

Health and Safety meetings will be conducted on a daily basis and will cover protective clothing and other equipment to be used that day, potential and chemical and physical hazards, emergency procedures, and conditions and activities from the previous day.

### 1.2 Site Safety Plan Acceptance, Acknowledgment and Amendments

The project superintendent and the site safety officer are responsible for informing personnel (EBC employees and/or owner or owner's representatives) entering the work area of the contents of this plan and ensuring that each person signs the safety plan acknowledging the on-site hazards and procedures required to minimize exposure to adverse effects of these hazards. A copy of the Acknowledgement Form is included in **Appendix A**.

Site conditions may warrant an amendment to the HASP. Amendments to the HASP are acknowledged by completing forms included in **Appendix B**.

### 1.3 Key Personnel - Roles and Responsibilities

Personnel responsible for implementing this Health and Safety Plan are:

| Name | Title | Address | Contact Numbers |
|---|---|---|---|
| Ms. Christine Beaver | EBC<br>Project Manager | 1808 Middle Country Road<br>Ridge, NY 11961 | (631) 504-6000 |
| Mr. Tom Gallo | EBC<br>Site Safety Officer | 1808 Middle Country Road<br>Ridge, NY 11961 | (631) 504-6000 |

The project manager is responsible for overall project administration and, with guidance from the site safety officer, for supervising the implementation of this HASP. The site safety officer will conduct daily (tail gate or tool box) safety meetings at the project site and oversee daily safety issues. Each subcontractor and supplier (defined as an OSHA employer) is also responsible for the health and safety of its employees. If there is any dispute about health and safety or project activities, on-site personnel will attempt to resolve the issue. If the issue cannot be resolved at the site, then the project manager will be consulted.

The site safety officer is also responsible for coordinating health and safety activities related to hazardous material exposure on-site. The site safety officer is responsible for the following:

1. Educating personnel about information in this HASP and other safety requirements to be observed during site operations, including, but not limited to, decontamination procedures, designation of work zones and levels of protection, air monitoring, fit testing, and emergency procedures dealing with fire and first aid.

2. Coordinating site safety decisions with the project manager.

3. Designating exclusion, decontamination and support zones on a daily basis.

4. Monitoring the condition and status of known on-site hazards and maintaining and

implementing the air quality monitoring program specified in this HASP.

5. Maintaining the work zone entry/exit log and site entry/exit log.
6. Maintaining records of safety problems, corrective measures and documentation of chemical exposures or physical injuries (the site safety officer will document these conditions in a bound notebook and maintain a copy of the notebook on-site).

The person who observes safety concerns and potential hazards that have not been addressed in the daily safety meetings should immediately report their observations/concerns to the site safety officer or appropriate key personnel.

# 2.0 SITE BACKGROUND AND SCOPE OF WORK

A Remedial Investigation is being conducted at the site to identify and characterize known and potential chlorinated (VOC) contaminants within the surface/subsurface soils, groundwater and soil vapor at the site.

The results from this investigation will help determine what actions may be required, if any, to prevent exposure to contaminants from the redevelopment/change in use of the site. The work will be conducted in accordance with the procedures as required by the New York State Brownfield Cleanup Program (NYSBCP) as administered by the New York State Department of Environmental Conservation (NYSDEC).

## 2.1 Remedial Investigation Scope

The subsurface investigation will include the installation of soil borings, groundwater monitoring wells and soil vapor implants. Site sampling locations are shown on **Figures 3-5** of the Remedial Investigation Work Plan.

Soil borings will be advanced primarily with Sonic drilling equipment and sampled with a 5 foot macro core sampler to depths of approximately 20 feet. Additional shallower borings may be installed by hand methods in areas inaccessible to the Sonic drilling equipment. Soil will be characterized by an environmental professional and field screened for the presence of volatile organic compounds (VOCs) using a photo-ionization detector (PID).

Groundwater samples will be collected by installing monitoring wells approximately 10 feet below the water table.

Soil vapor samples will be collected primarily with Sonic drilling equipment through the installation of temporary soil vapor probes to depths of approximately 11 feet. An additional shallower soil vapor samples will be collected by a core drill and hand methods within the existing building.

## 3.0 SITE HAZARD EVALUATION

This section identifies the hazards associated with the proposed scope of work, general physical hazards that can be expected at most sites; and presents a summary of documented or potential chemical hazards at the site. Every effort must be made to reduce or eliminate these hazards. Those that cannot be eliminated must be guarded against using engineering controls and/or personal protective equipment.

This HASP has been developed for work performed at the site in association with a Phase II subsurface investigation. The primary hazards to the field crew will be physical hazards related to sample collection procedures and equipment, and chemical exposures to the sampling crew from exposure to potential contaminants which may be present at the site.

### 3.1 Physical Hazards

#### *3.1.1 Tripping Hazards*

An area of risk associated with on-site activities are presented by uneven ground, concrete, curbstones or equipment which may be present at the site thereby creating a potential tripping hazard. During intrusive work, care should be taken to mark or remove any obstacles within the exclusion zone.

#### *3.1.2 Cuts and Lacerations*

Field activities that involve drilling and boring equipment may result in cuts or lacerations from machinery and tools used in collecting samples, cutting disposable tubing and opening acetate sleeves and liners. A first aid kit approved by the American Red Cross will be available during all subsurface investigative activities.

#### *3.1.3 Lifting Hazards*

Improper lifting by workers is one of the leading causes of industrial injuries. Field workers and drillers may be required to lift heavy objects such as drilling tools, buckets of decontamination water, cement, etc. Therefore, all members of the field crew should be trained in the proper methods of lifting heavy objects. All workers should be cautioned against lifting objects too heavy for one person.

#### *3.1.4 Utility Hazards*

Before conducting any subsurface boring or sampling, the drilling contractor will be responsible for locating and verifying all existing utilities at each excavation.

#### *3.1.5 Traffic Hazards*

All traffic, vehicular and pedestrian, shall be maintained and protected at all times consistent with local, state and federal agency regulations regarding such traffic and in accordance with NYCDOT guidelines. The drilling contractor shall carry on his operations without undue interference or delays to traffic. The drilling contractor shall furnish all labor, materials, guards, barricades, signs, lights, and anything else necessary to maintain traffic and to protect his work and the public, during operations.

## 3.2 Work in Extreme Temperatures

Work under extremely hot or cold weather conditions requires special protocols to minimize the chance that employees will be affected by heat or cold stress.

### *3.2.1 Heat Stress*

The combination of high ambient temperature, high humidity, physical exertion, and personal protective apparel, which limits the dissipation of body heat and moisture, can cause heat stress.

The following prevention, recognition and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress and to apply the appropriate treatment.

1. Prevention
   a. Provide plenty of fluids. Available in the support zone will be a 50% solution of fruit punch and water or plain water.
   b. Work in Pairs. Individuals should avoid undertaking any activity alone.
   c. Provide cooling devices. A spray hose and a source of water will be provided to reduce body temperature, cool protective clothing and/or act as a quick-drench shower in case of an exposure incident.
   d. Adjustment of the work schedule. As is practical, the most labor-intensive tasks should be carried out during the coolest part of the day.

2. Recognition and Treatment
   a. Heat Rash (or prickly heat):
      Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.
      Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.
      Treatment: Remove source or irritation and cool skin with water or wet cloths.

   b. Heat Cramps (or heat prostration)
      Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.
      Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.

      Treatment: Perform the following while making arrangement for transport to a medical facility. Remove the worker to a contamination reduction zone. Remove protective clothing. Lie worker down on back in a cool place and raise feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of salt-water solution, using one teaspoon of salt in 12 ounces of water. Transport to a medical facility.

   c. Heat Stroke
      Cause: Same as heat exhaustion. This is also an extremely serious condition.

| | |
|---|---|
| Symptoms: | Dry and hot skin, dry mouth, dizziness, nausea, headache and rapid pulse. |
| Treatment: | Cool worker immediately by immersing or spraying with cool water or sponge bare skin after removing protective clothing. Transport to hospital. |

### *3.2.2 Cold Exposure*

Exposure to cold weather, wet conditions and extreme wind-chill factors may result in excessive loss of body heat (hypothermia) and /or frostbite. To guard against cold exposure and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be readily available, rest periods should be adjusted as needed, and the physical conditions of on-site field personnel should be closely monitored. Personnel and supervisors working on-site will be made aware of the signs and symptoms of frost bite and hypothermia such as shivering, reduced blood pressure, reduced coordination, drowsiness, impaired judgment, fatigue, pupils dilated but reactive to light and numbing of the toes and fingers.

## 3.3 Chemical Hazards

There is documented chlorinated VOC contamination at the Site related to a former drycleaner.

Urban fill, present throughout the New York City area, typically contain elevated levels of semi-volatile organic compounds and metals. These "contaminants" are not related to a chemical release occurring on the site, but are inherent in the reworked fill material in the area which contains ash bits or tar and asphalt.

Based on the findings of previous investigations performed at the Site and the inherent properties of urban fill, the following compounds are considered for the site as potential contaminants: volatile organic compounds (VOCs) such as tetrachloroethylene and trichloroethylene related to drycleaning operations and heavy metals such as arsenic, chromium, lead and mercury related to historic fill materials.

The primary routes of exposure to these contaminants are inhalation, ingestion and absorption. **Appendix C** includes information sheets for suspected chemicals that may be encountered at the site.

### *3.3.1 Respirable Dust and Direct Contact with Soil and Groundwater*

Dust may be generated from drilling activities. If visible observation detects elevated levels of dust, a program of wetting will be employed by the site safety officer. If elevated dust levels persist, the site safety office will employ dust monitoring using a particulate monitor (Miniram or equivalent). If monitoring detects concentrations greater than the OSHA action level of 100 $\mu g/m^3$ over daily background, the site safety officer will take corrective actions as defined herein, including the use of water for dust suppression and if this is not effective, requiring workers to wear APRs with efficiency particulate air (HEPA) cartridges.

Absorption pathways for dust and direct contact with soil and groundwater will be mitigated with the implementation of latex gloves, hand washing and decontamination exercises when necessary.

### *3.3.2 Organic Vapors*

Considering the past use of the site, VOCs may be encountered at the site in soil and/or groundwater. Therefore, soil boring activities may cause the release of organic vapors to the atmosphere. The site safety officer will periodically monitor organic vapors with a Photoionization Detector (PID) during drilling activities to determine whether organic vapor concentrations exceed action levels shown below.

| PID Response | Action |
|---|---|
| Sustained readings of 5 ppm or greater | Shut down equipment and allow area to vent. Resume when readings return to background |
| Sustained readings of 5 ppm or greater that do not subside after venting | Implement Vapor Release Plan (Section 6.8). Re-evaluate respiratory protection as upgrade may be required. |

## 4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) shall be selected in accordance with the site air monitoring program, OSHA 29 CFR 1910.120(c), (g), and 1910.132. Protective equipment shall be NIOSH approved and respiratory protection shall conform to OSHA 29 CFR Part 1910.133 and 1910.134 specifications; head protection shall conform to 1910.135; eye and face protection shall conform to 1910.133; and foot protection shall conform to 1910.136. The only true difference among the levels of protection from D thru B is the addition of the type of respiratory protection. **It is anticipated that work will be performed in Level D PPE.**

### 4.1 Level D

Level D PPE shall be donned when the atmosphere contains no known hazards and work functions preclude splashes, immersion, or the potential for inhalation of, or contact with, hazardous concentrations of harmful chemicals. Level D PPE consists of:

- standard work uniform, coveralls, or tyvek, as needed;
- steel toe and steel shank work boots;
- high visibility safety vest;
- hard hat;
- gloves, as needed;
- safety glasses;
- hearing protection;
- equipment replacements are available as needed.

### 4.2 Level C

Level C PPE shall be donned when the concentrations of measured total organic vapors in the breathing zone exceed background concentrations (using a portable OVA, or equivalent), but are less than 5 ppm. The specifications on the APR filters used must be appropriate for contaminants identified or expected to be encountered. Level C PPE shall be donned when the identified contaminants have adequate warning properties and criteria for using APR have been met. Level C PPE consists of:

- chemical resistant or coated tyvek coveralls;
- steel-toe and steel-shank workboots;
- high visibility safety vest;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves (surgical gloves);
- disposable outer gloves;
- full face APR fitted with organic vapor/dust and mist filters or filters appropriate for the identified or expected contaminants;
- hard hat;
- splash shield, as needed; and,
- ankles/wrists taped with duct tape.

The site safety officer will verify if Level C is appropriate by checking organic vapor concentrations using compound and/or class-specific detector tubes.

The exact PPE ensemble is decided on a site-by-site basis by the Site Safety Officer with the intent to provide the most protective and efficient worker PPE.

### 4.3 Activity-Specific Levels of Personal Protection

The required level of PPE is activity-specific and is based on air monitoring results (Section 4.0) and properties of identified or expected contaminants. **It is expected that site work will be performed in Level D.** If air monitoring results indicate the necessity to upgrade (i.e dust above 5,000 $\mu g/m^3$ or sustained VOCs above 5 ppm in the breathing zone) the level of protection engineering controls (i.e. Facing equipment away from the wind and placing site personnel upwind of excavations, active venting, etc.) will be implemented before requiring the use of respiratory protection.

# 5.0 SITE CONTROL

## 5.1 Work Zones

The primary purpose of site controls is to establish the perimeter of a hazardous area, to reduce the migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by unauthorized persons. When operations are to take place involving hazardous materials, the site safety officer will establish an exclusion zone, a decontamination zone, and a support zone. These zones "float" (move around the site) depending on the tasks being performed on any given day. The site safety officer will outline these locations before work begins and when zones change. The site safety officer records this information in the site log book. **It is expected that for soil boring and sampling activities, identification of an exclusion zone, decontamination zone, and support zone will not be necessary.**

Tasks requiring OSHA 40-hour Hazardous Waste Operations and Emergency Response Operations training are carried out in the exclusion zone. The exclusion zone is defined by the site safety officer but will typically be a 50-foot area around work activities. Gross decontamination (as determined by the site Health and Safety Officer) is conducted in the exclusion zone; all other decontamination is performed in the decontamination zone or trailer.

Protective equipment is removed in the decontamination zone. Disposable protective equipment is stored in receptacles staged in the decontamination zone, and non-disposable equipment is decontaminated. All personnel and equipment exit the exclusion zone through the decontamination zone. If a decontamination trailer is provided the first aid equipment, an eye wash unit, and drinking water are kept in the decontamination trailer.

The support zone is used for vehicle parking, daily safety meetings, and supply storage. Eating, drinking, and smoking are permitted only in the support zone. When a decontamination trailer is not provided, the eye wash unit, first aid equipment, and drinking water are kept at a central location designated by the site safety officer.

## 6.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

Site personnel must be prepared in the event of an emergency. Emergencies can take many forms: illnesses, injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather.

Emergency telephone numbers and a map to the hospital will be posted in the command post. Site personnel should be familiar with the emergency procedures, and the locations of site safety, first aid, and communication equipment.

### 6.1 Emergency Equipment On-site

| | |
|---|---|
| Private telephones: | Site personnel. |
| Two-way radios: | Site personnel where necessary. |
| Emergency Alarms: | On-site vehicle horns*. |
| First aid kits: | On-site, in vehicles or office. |
| Fire extinguisher: | On-site, in office or on equipment. |

* Horns: Air horns will be supplied to personnel at the discretion of the project superintendent or site safety officer.

### 6.2 Emergency Telephone Numbers

| | |
|---|---|
| General Emergencies | 911 |
| New York City Police | 911 |
| New York Presbyterian/The Allen Hospital | 1-212-932-4000 |
| NYSDEC Spills Division | 1-800-457-7362 |
| NYSDEC Division of Env. Remediation | 1-718-482-4900 |
| NYCDEP | 1-718-699-9811 |
| NYC Department of Health | 1-212-788-4711 |
| NYC Fire Department | 911 |
| National Response Center | 1-800-424-8802 |
| Poison Control | 1-212-340-4494 |
| Site Safety Officer | 1-631-504-6000 |
| Alternate Site Safety Officer | 1-631-504-6000 |

### 6.3 Personnel Responsibilities During an Emergency

The project manager is primarily responsible for responding to and correcting any emergency situations. However, in the absence of the project manager, the site safety officer shall act as the project manager's on-site designee and perform the following tasks:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, evacuate and secure the site, or upgrade/downgrade the level of protective clothing and respiratory protection;

- Ensure that appropriate federal, state, and local agencies are informed and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. If toxic materials are released to the air, the local authorities should be informed in order to assess the need for evacuation;

- Ensure appropriate decontamination, treatment, or testing for exposed or injured personnel;

- Determine the cause of incidents and make recommendations to prevent recurrence; and,

- Ensure that all required reports have been prepared.

The following key personnel are planned for this project:

| | |
|---|---|
| • Project Manager | Ms. Christine Beaver (631) 504-6000 |
| • Site Safety Officer | Mr. Tom Gallo (631) 504-6000 |
| • Alternate | Mr. Anthony Balado (631) 504-6000 |

## 6.4 Medical Emergencies

A person who becomes ill or injured in the exclusion zone will be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination will be completed and first aid administered prior to transport. First aid will be administered while waiting for an ambulance or paramedics. A Field Accident Report (**Appendix D**) must be filled out for any injury.

A person transporting an injured/exposed person to a clinic or hospital for treatment will take the directions to the hospital (**Appendix D**) and information on the chemical(s) to which they may have been exposed (**Appendix C**).

## 6.5 Fire or Explosion

In the event of a fire or explosion, the local fire department will be summoned immediately. The site safety officer or his designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on-site. If it is safe to do so, site personnel may:

- use fire fighting equipment available on site; or,
- remove or isolate flammable or other hazardous materials that may contribute to the fire.

### 6.6 Evacuation Routes

Evacuation routes established by work area locations for each site will be reviewed prior to commencing site operations. As the work areas change, the evacuation routes will be altered accordingly, and the new route will be reviewed.

Under extreme emergency conditions, evacuation is to be immediate without regard for equipment. The evacuation signal will be a continuous blast of a vehicle horn, if possible, and/or by verbal/radio communication. When evacuating the site, personnel will follow these instructions:

- Keep upwind of smoke, vapors, or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation through the decontamination corridor is not possible, personnel should remove contaminated clothing once they are in a safe location and leave it near the exclusion zone or in a safe place.
- The site safety officer will conduct a head count to ensure that all personnel have been evacuated safely. The head count will be correlated to the site and/or exclusion zone entry/exit log.
- If emergency site evacuation is necessary, all personnel are to escape the emergency situation and decontaminate to the maximum extent practical.

## 6.7 Spill Control Procedures

Spills associated with site activities may be attributed to project equipment and include gasoline, diesel and hydraulic oil. In the event of a leak or a release, site personnel will inform their supervisor immediately, locate the source of spillage and stop the flow if it can be done safely. A spill containment kit including absorbent pads, booms and/or granulated speedy dry absorbent material will be available to site personnel to facilitate the immediate recovery of the spilled material. Daily inspections of site equipment components including hydraulic lines, fuel tanks, etc. will be performed by their respective operators as a preventative measure for equipment leaks and to ensure equipment soundness. In the event of a spill, site personnel will immediately notify the NYSDEC (1-800-457-7362), and a spill number will be generated.

## 6.8 Vapor Release Plan

If work zone organic vapor (excluding methane) exceeds 5 ppm, then a downwind reading will be made either 200 feet from the work zone or at the property line, whichever is closer. If readings at this location exceed 5 ppm over background, the work will be stopped.

If 5 ppm of VOCs are recorded over background on a PID at the property line, then an off-site reading will be taken within 20 feet of the nearest residential or commercial property, whichever is closer. If efforts to mitigate the emission source are unsuccessful for 30 minutes, then the designated site safety officer will:

- contact the local police;
- continue to monitor air every 30 minutes, 20 feet from the closest off-site property. If two successive readings are below 5 ppm (non-methane), off-site air monitoring will be halted.

- All property line and off site air monitoring locations and results associated with vapor releases will be recorded in the site safety log book.

# *APPENDIX A*

# *SITE SAFETY ACKNOWLEDGEMENT FORM*

## DAILY BREIFING SIGN-IN SHEET

Date:______________________________ Person Conducting Briefing:______________________

Project Name and Location:_______________________________________________________

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc…):

_______________________________________________________________________________

_______________________________________________________________________________

_______________________________________________________________________________

_______________________________________________________________________________

2. OTHER ISSUES (HASP changes, attendee comments, etc…):

_______________________________________________________________________________

_______________________________________________________________________________

_______________________________________________________________________________

3. ATTENDEES (Print Name):

| | |
|---|---|
| 1. | 11. |
| 2. | 12. |
| 3. | 13. |
| 4. | 14. |
| 5. | 15. |
| 6. | 16. |
| 7. | 17. |
| 8. | 18. |
| 9. | 19. |
| 10. | 20. |

# APPENDIX B

# SITE SAFETY PLAN AMENDMENTS

## SITE SAFETY PLAN AMENDMENT FORM

**Site Safety Plan Amendment #:**________________________________________

**Site Name:** ________________________________________

**Reason for Amendment:**________________________________________

**Alternative Procedures:**________________________________________

**Required Changes in PPE:**________________________________________

| | |
|---|---|
| ________________________<br>**Project Superintendent (signature)** | ________________<br>**Date** |
| ________________________<br>**Health and Safety Consultant (signature)** | ________________<br>**Date** |
| ________________________<br>**Site Safety Officer (signature)** | ________________<br>**Date** |

# *APPENDIX C*

# *CHEMICAL HAZARDS*

## CHEMICAL HAZARDS

The attached International Chemical Safety Cards are provided for contaminants of concern that have been identified in soils and/or groundwater at the site.

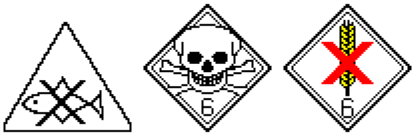
# International Chemical Safety Cards

## TETRACHLOROETHYLENE

ICSC: 0076

1,1,2,2-Tetrachloroethylene
Perchloroethylene
Tetrachloroethene
$C_2Cl_4$ / $Cl_2C=CCl_2$
Molecular mass: 165.8

ICSC # 0076
CAS # 127-18-4
RTECS # KX3850000
UN # 1897
EC # 602-028-00-4
April 13, 2000 Validated



| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Not combustible. Gives off irritating or toxic fumes (or gases) in a fire. | | In case of fire in the surroundings: use appropriate extinguishing media. |
| **EXPLOSION** | | | |
| **EXPOSURE** | | STRICT HYGIENE! PREVENT GENERATION OF MISTS! | |
| **•INHALATION** | Dizziness. Drowsiness. Headache. Nausea. Weakness. Unconsciousness. | Ventilation, local exhaust, or breathing protection. | Fresh air, rest. Artificial respiration may be needed. Refer for medical attention. |
| **•SKIN** | Dry skin. Redness. | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | Redness. Pain. | Safety goggles , face shield . | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Abdominal pain. (Further see Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours. | Separated from metals ,( see Chemical Dangers ), food and feedstuffs . Keep in the dark. Ventilation along the floor. | Do not transport with food and feedstuffs.<br>Marine pollutant.<br>Xn symbol<br>N symbol<br>R: 40-51/53<br>S: (2-)23-36/37-61<br>UN Hazard Class: 6.1<br>UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0076**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## TETRACHLOROETHYLENE

**ICSC: 0076**

### IMPORTANT DATA

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
The vapour is heavier than air.

**CHEMICAL DANGERS:**
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride, phosgene, chlorine). The substance decomposes slowly on contact with moisture producing trichloroacetic acid and hydrochloric acid. Reacts with metals such as aluminium, lithium, barium, beryllium.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 25 ppm as TWA, 100 ppm as STEL; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).
MAK: skin absorption (H);
Carcinogen category: 3B;
(DFG 2004).
OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3-hours)
NIOSH REL: Ca Minimize workplace exposure concentrations. See Appendix A
NIOSH IDLH: Ca 150 ppm See: 127184

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation and by ingestion.

**INHALATION RISK:**
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is irritating to the eyes , the skin and the respiratory tract . If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure at high levels may result in unconsciousness.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys. This substance is probably carcinogenic to humans.

### PHYSICAL PROPERTIES

Boiling point: 121°C
Melting point: -22°C
Relative density (water = 1): 1.6
Solubility in water, g/100 ml at 20°C: 0.015
Vapour pressure, kPa at 20°C: 1.9
Relative vapour density (air = 1): 5.8
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.09
Octanol/water partition coefficient as log Pow: 2.9

### ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

### NOTES

Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-61S1897

NFPA Code: H2; F0; R0;

### ADDITIONAL INFORMATION

**ICSC: 0076** **TETRACHLOROETHYLENE**

**IMPORTANT LEGAL NOTICE:**

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| | modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values. |

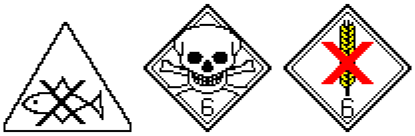
# International Chemical Safety Cards

## TRICHLOROETHYLENE

ICSC: 0081

1,1,2-Trichloroethylene
Trichloroethene
Ethylene trichloride
Acetylene trichloride
$C_2HCl_3$ / $ClCH=CCl_2$
Molecular mass: 131.4

ICSC # 0081
CAS # 79-01-6
RTECS # KX4550000
UN # 1710
EC # 602-027-00-9
April 10, 2000 Validated



| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Combustible under specific conditions. See Notes. | | In case of fire in the surroundings: all extinguishing agents allowed. |
| **EXPLOSION** | | Prevent build-up of electrostatic charges (e.g., by grounding). | In case of fire: keep drums, etc., cool by spraying with water. |
| **EXPOSURE** | | PREVENT GENERATION OF MISTS! STRICT HYGIENE! | |
| **•INHALATION** | Dizziness. Drowsiness. Headache. Weakness. Nausea. Unconsciousness. | Ventilation, local exhaust, or breathing protection. | Fresh air, rest. Artificial respiration may be needed. Refer for medical attention. |
| **•SKIN** | Dry skin. Redness. | Protective gloves. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | Redness. Pain. | Safety spectacles, or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Abdominal pain. (Further see Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Rest. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Ventilation. Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. | Separated from metals ( see Chemical Dangers ), strong bases, food and feedstuffs . Dry. Keep in the dark. Ventilation along the floor. Store in an area without drain or sewer access. | Do not transport with food and feedstuffs.<br>Marine pollutant.<br>T symbol<br>R: 45-36/38-52/53-67<br>S: 53-45-61<br>UN Hazard Class: 6.1<br>UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the

**ICSC: 0081** OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## TRICHLOROETHYLENE

**ICSC: 0081**

**IMPORTANT DATA**

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
The vapour is heavier than air. As a result of flow, agitation, etc., electrostatic charges can be generated.

**CHEMICAL DANGERS:**
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes ( phosgene , hydrogen chloride ). The substance decomposes on contact with strong alkali producing dichloroacetylene , which increases fire hazard. Reacts violently with metal powders such as magnesium, aluminium, titanium, and barium. Slowly decomposed by light in presence of moisture, with formation of corrosive hydrochloric acid.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 50 ppm as TWA; 100 ppm as STEL; A5; BEI issued; (ACGIH 2004).
MAK:
Carcinogen category: 1; Germ cell mutagen group: 3B; (DFG 2007).
OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)
NIOSH REL: Ca See Appendix A See Appendix C
NIOSH IDLH: Ca 1000 ppm See: 79016

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation and by ingestion.

**INHALATION RISK:**
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is irritating to the eyes and the skin . Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system , resulting in respiratory failure . Exposure could cause lowering of consciousness.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the central nervous system , resulting in loss of memory. The substance may have effects on the liver and kidneys (see Notes). This substance is probably carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: 87°C
Melting point: -73°C
Relative density (water = 1): 1.5
Solubility in water, g/100 ml at 20°C: 0.1
Vapour pressure, kPa at 20°C: 7.8
Relative vapour density (air = 1): 4.5
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.3
Auto-ignition temperature: 410°C
Explosive limits, vol% in air: 8-10.5
Octanol/water partition coefficient as log Pow: 2.42
Electrical conductivity: 800pS/m

**ENVIRONMENTAL DATA**

The substance is harmful to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

### NOTES

Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert.

Transport Emergency Card: TEC (R)-61S1710

NFPA Code: H2; F1; R0;
Card has been partially updated in October 2004: see Occupational Exposure Limits, EU Classification, Emergency Response.
Card has been partially updated in April 2010: see Occupational Exposure Limits, Ingestion First Aid, Storage.

### ADDITIONAL INFORMATION

| **ICSC: 0081** | **TRICHLOROETHYLENE** |
|---|---|

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|---|---|
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# International Chemical Safety Cards

## ACETONE

ICSC: 0087

2-Propanone
Dimethyl ketone
Methyl ketone
$C_3H_6O$ / $CH_3COCH_3$
Molecular mass: 58.1

ICSC # 0087
CAS # 67-64-1
RTECS # AL3150000
UN # 1090
EC # 606-001-00-8
April 22, 1994 Validated
Fi, review at IHE: 10/09/89

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Highly flammable. | NO open flames, NO sparks, and NO smoking. | Powder, alcohol-resistant foam, water in large amounts, carbon dioxide. |
| **EXPLOSION** | Vapour/air mixtures are explosive. | Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. | In case of fire: keep drums, etc., cool by spraying with water. |
| **EXPOSURE** | | | |
| **•INHALATION** | Sore throat. Cough. Confusion. Headache. Dizziness. Drowsiness. Unconsciousness. | Ventilation, local exhaust, or breathing protection. | Fresh air, rest. Refer for medical attention. |
| **•SKIN** | Dry skin. | Protective gloves. | Remove contaminated clothes. Rinse skin with plenty of water or shower. |
| **•EYES** | Redness. Pain. Blurred vision. Possible corneal damage. | Safety spectacles or face shield . Contact lenses should not be worn. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Nausea. Vomiting. (Further see Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Personal protection: self-contained breathing apparatus. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Then wash away with plenty of water. | Fireproof. Separated from strong oxidants. Store in an area without drain or sewer access. | F symbol<br>Xi symbol<br>R: 11-36-66-67<br>S: 2-9-16-26<br>UN Hazard Class: 3<br>UN Packing Group: II |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0087**

# International Chemical Safety Cards

## ACETONE

**ICSC: 0087**

### IMPORTANT DATA

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
The vapour is heavier than air and may travel along the ground; distant ignition possible.

**CHEMICAL DANGERS:**
The substance can form explosive peroxides on contact with strong oxidants such as acetic acid, nitric acid, hydrogen peroxide. Reacts with chloroform and bromoform under basic conditions, causing fire and explosion hazard. Attacks plastic.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 500 ppm as TWA, 750 ppm as STEL; A4 (not classifiable as a human carcinogen); BEI issued; (ACGIH 2004).
MAK: 500 ppm 1200 mg/m$^3$
Peak limitation category: I(2); Pregnancy risk group: D; (DFG 2006).
OSHA PEL†: TWA 1000 ppm (2400 mg/m$^3$)
NIOSH REL: TWA 250 ppm (590 mg/m$^3$)
NIOSH IDLH: 2500 ppm 10%LEL See: 67641

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation and through the skin.

**INHALATION RISK:**
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The vapour irritates the eyes and the respiratory tract. The substance may cause effects on the central nervous system , liver , kidneys and gastrointestinal tract .

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the blood and bone marrow .

### PHYSICAL PROPERTIES

Boiling point: 56°C
Melting point: -95°C
Relative density (water = 1): 0.8
Solubility in water: miscible
Vapour pressure, kPa at 20°C: 24
Relative vapour density (air = 1): 2.0
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2
Flash point: -18°C c.c.
Auto-ignition temperature: 465°C
Explosive limits, vol% in air: 2.2-13
Octanol/water partition coefficient as log Pow: -0.24

### ENVIRONMENTAL DATA

### NOTES

Use of alcoholic beverages enhances the harmful effect.

Transport Emergency Card: TEC (R)-30S1090

NFPA Code: H 1; F 3; R 0;
Card has been partially updated in July 2007: see Occupational Exposure Limits.
Card has been partially updated in January 2008: see Storage.

### ADDITIONAL INFORMATION

**ICSC: 0087** **ACETONE**

**IMPORTANT LEGAL NOTICE:**

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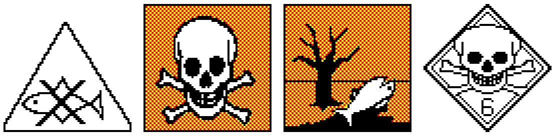
# International Chemical Safety Cards

## ARSENIC

**ICSC: 0013**

Grey arsenic
As
Atomic mass: 74.9

ICSC # 0013
CAS # 7440-38-2
RTECS # CG0525000
UN # 1558
EC # 033-001-00-X
October 18, 1999 Peer reviewed



| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Combustible. Gives off irritating or toxic fumes (or gases) in a fire. | NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces. | Powder, water spray, foam, carbon dioxide. |
| **EXPLOSION** | Risk of fire and explosion is slight when exposed to hot surfaces or flames in the form of fine powder or dust. | Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting. | |
| **EXPOSURE** | | PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN! | IN ALL CASES CONSULT A DOCTOR! |
| **•INHALATION** | Cough. Sore throat. Shortness of breath. Weakness. See Ingestion. | Closed system and ventilation. | Fresh air, rest. Artificial respiration may be needed. Refer for medical attention. |
| **•SKIN** | Redness. | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse skin with plenty of water or shower. |
| **•EYES** | Redness. | Face shield or eye protection in combination with breathing protection if powder. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Abdominal pain. Diarrhoea. Nausea. Vomiting. Burning sensation in the throat and chest. Shock or collapse. Unconsciousness. | Do not eat, drink, or smoke during work. Wash hands before eating. | Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. | Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed. | Do not transport with food and feedstuffs.<br>Marine pollutant.<br>T symbol<br>N symbol<br>R: 23/25-50/53<br>S: 1/2-20/21-28-45-60-61<br>UN Hazard Class: 6.1<br>UN Packing Group: II |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0013**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## ARSENIC

**ICSC: 0013**

**IMPORTANT DATA**

**PHYSICAL STATE; APPEARANCE:**
ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 0.01 mg/m$^3$ as TWA A1 (confirmed human carcinogen); BEI issued (ACGIH 2004).
MAK:
Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004).

OSHA PEL: 1910.1018 TWA 0.010 mg/m$^3$

NIOSH REL: Ca C 0.002 mg/m$^3$ 15-minute See Appendix A

NIOSH IDLH: Ca 5 mg/m$^3$ (as As) See: 7440382

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly, when dispersed.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is irritating to the eyes the skin and the respiratory tract. The substance may cause effects on the gastrointestinal tract cardiovascular system central nervous system kidneys , resulting in severe gastroenteritis, loss of fluid, and electrolytes, cardiac disorders shock convulsions and kidney impairment Exposure above the OEL may result in death. The effects may be delayed. Medical observation is indicated.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the mucous membranes, skin, peripheral nervous system liver bone marrow , resulting in pigmentation disorders, hyperkeratosis, perforation of nasal septum, neuropathy, liver impairment anaemia This substance is carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

**PHYSICAL PROPERTIES**

Sublimation point: 613°C
Density: 5.7 g/cm$^3$

Solubility in water:
none

**ENVIRONMENTAL DATA**

The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.

**NOTES**

The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Refer also to cards for specific arsenic compounds, e.g., Arsenic pentoxide (ICSC 0377), Arsenic trichloride (ICSC 0221), Arsenic trioxide (ICSC 0378), Arsine (ICSC 0222).

Transport Emergency Card: TEC (R)-61GT5-II

**ADDITIONAL INFORMATION**

**ICSC: 0013** **ARSENIC**

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

## BARIUM SULFATE

**ICSC: 0827**

Barium sulphate
Blanc fixe
Artificial barite
$BaSO_4$
Molecular mass: 233.43

ICSC # 0827
CAS # 7727-43-7
RTECS # CR0600000
October 20, 1999 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Not combustible. Gives off irritating or toxic fumes (or gases) in a fire. | | In case of fire in the surroundings: use appropriate extinguishing media. |
| **EXPLOSION** | | | |
| **EXPOSURE** | | PREVENT DISPERSION OF DUST! | |
| **•INHALATION** | | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | | Protective gloves. | Remove contaminated clothes. Rinse skin with plenty of water or shower. |
| **•EYES** | | Safety spectacles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. | Rinse mouth. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P1 filter respirator for inert particles. | | R:<br>S: |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0827**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## BARIUM SULFATE

**ICSC: 0827**

**I M P O R T A N T D A T A**

**PHYSICAL STATE; APPEARANCE:**
ODOURLESS TASTELESS, WHITE OR YELLOWISH CRYSTALS OR POWDER.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
Reacts violently with aluminium powder.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 10 mg/m³ as TWA; (ACGIH 2004).
MAK: (Inhalable fraction) 4 mg/m³; (Respirable fraction) 1.5 mg/m³; (DFG 2004).
OSHA PEL†: TWA 15 mg/$m^3$ (total) TWA 5 mg/$m^3$ (resp)
NIOSH REL: TWA 10 mg/$m^3$ (total) TWA 5 mg/$m^3$ (resp)
NIOSH IDLH: N.D. See: IDLH INDEX

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation of its aerosol.

**INHALATION RISK:**
Evaporation at 20°C is negligible; a nuisance-causing concentration of airborne particles can, however, be reached quickly.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
Lungs may be affected by repeated or prolonged exposure to dust particles , resulting in baritosis (a form of benign pneumoconiosis).

| | | |
|---|---|---|
| **PHYSICAL PROPERTIES** | Melting point (decomposes): 1600°C<br>Density: 4.5 g/cm³ | Solubility in water: none |
| **ENVIRONMENTAL DATA** | | |

**N O T E S**

Occurs in nature as the mineral barite; also as barytes, heavy spar. Card has been partly updated in October 2005. See section Occupational Exposure Limits.

**ADDITIONAL INFORMATION**

**ICSC: 0827** **BARIUM SULFATE**

| | |
|---|---|
| **IMPORTANT LEGAL NOTICE:** | Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values. |

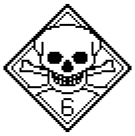
# International Chemical Safety Cards

## CADMIUM

**ICSC: 0020**

Cd
Atomic mass: 112.4

ICSC # 0020
CAS # 7440-43-9
RTECS # EU9800000
UN # 2570
EC # 048-002-00-0
April 22, 2005 Peer reviewed



| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Flammable in powder form and spontaneously combustible in pyrophoric form. Gives off irritating or toxic fumes (or gases) in a fire. | NO open flames, NO sparks, and NO smoking. NO contact with heat or acid(s). | Dry sand. Special powder. NO other agents. |
| **EXPLOSION** | Finely dispersed particles form explosive mixtures in air. | Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting. | |
| **EXPOSURE** | | PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! | IN ALL CASES CONSULT A DOCTOR! |
| **•INHALATION** | Cough. Sore throat. | Local exhaust or breathing protection. | Fresh air, rest. Refer for medical attention. |
| **•SKIN** | | Protective gloves. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | Redness. Pain. | Safety goggles or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Abdominal pain. Diarrhoea. Headache. Nausea. Vomiting. | Do not eat, drink, or smoke during work. | Rest. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place. | Fireproof. Dry. Keep under inert gas. Separated from igntion sources, oxidants acids, food and feedstuffs | Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs.<br>Note: E<br>T+ symbol<br>N symbol<br>R: 45-26-48/23/25-62-63-68-50/53<br>S: 53-45-60-61<br>UN Hazard Class: 6.1 |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0020**

# International Chemical Safety Cards

## CADMIUM

**ICSC: 0020**

**IMPORTANT DATA**

**PHYSICAL STATE; APPEARANCE:**
SOFT BLUE-WHITE METAL LUMPS OR GREY POWDER. MALLEABLE. TURNS BRITTLE ON EXPOSURE TO 80°C AND TARNISHES ON EXPOSURE TO MOIST AIR.

**PHYSICAL DANGERS:**
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**
Reacts with acids forming flammable/explosive gas (hydrogen - see ICSC0001.) Dust reacts with oxidants, hydrogen azide, zinc, selenium or tellurium , causing fire and explosion hazard.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: (Total dust) 0.01 $mg/m^3$
(Respirable fraction)
0.002 $mg/m^3$ as TWA A2 (suspected human carcinogen); BEI issued (ACGIH 2005).
MAK: skin absorption (H);
Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004).
OSHA PEL*: 1910.1027 TWA 0.005 $mg/m^3$ *Note: The PEL applies to all Cadmium compounds (as Cd).
NIOSH REL*: Ca See Appendix A *Note: The REL applies to all Cadmium compounds (as Cd).
NIOSH IDLH: Ca 9 $mg/m^3$ (as Cd) See: IDLH INDEX

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

**INHALATION RISK:**
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The fume is irritating to the respiratory tract Inhalation of fume may cause lung oedema (see Notes). Inhalation of fumes may cause metal fume fever. The effects may be delayed. Medical observation is indicated.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
Lungs may be affected by repeated or prolonged exposure to dust particles. The substance may have effects on the kidneys , resulting in kidney impairment This substance is carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: 765°C
Melting point: 321°C
Density: 8.6 g/cm3

Solubility in water: none
Auto-ignition temperature: (cadmium metal dust) 250°C

**ENVIRONMENTAL DATA**

**NOTES**

Reacts violently with fire extinguishing agents such as water,foam,carbon dioxideand halons. Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Do NOT take working clothes home. Cadmium also exists in a pyrophoric form (EC No. 048-011-00-X), which bears the additional EU labelling symbol F, R phrase 17, and S phrases 7/8 and 43. UN numbers and packing group will vary according to the physical form of the substance.

**ADDITIONAL INFORMATION**

**ICSC: 0020** **CADMIUM**

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

## CHROMIUM

**ICSC: 0029**

Chrome
Cr
Atomic mass: 52.0
(powder)

ICSC # 0029
CAS # 7440-47-3
RTECS # GB4200000
October 27, 2004 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Combustible under specific conditions. | No open flames if in powder form. | In case of fire in the surroundings: use appropriate extinguishing media. |
| **EXPLOSION** | | Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting. | |
| **EXPOSURE** | | PREVENT DISPERSION OF DUST! | |
| **•INHALATION** | Cough. | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | | Protective gloves. | Remove contaminated clothes. Rinse skin with plenty of water or shower. |
| **•EYES** | Redness. | Safety goggles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. | Rinse mouth. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles. | | R:<br>S: |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0029**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## CHROMIUM

**ICSC: 0029**

| | | |
|---|---|---|
| **I**<br>**M**<br>**P** | **PHYSICAL STATE; APPEARANCE:**<br>GREY POWDER<br><br>**PHYSICAL DANGERS:**<br>Dust explosion possible if in powder or granular form, mixed with air. | **ROUTES OF EXPOSURE:**<br><br>**INHALATION RISK:**<br>A harmful concentration of airborne particles can be reached quickly when dispersed. |

| | | |
|---|---|---|
| O<br>R<br>T<br>A<br>N<br>T<br><br>D<br>A<br>T<br>A | **CHEMICAL DANGERS:**<br>Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances , causing fire and explosion hazard.<br><br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m$^3$ as TWA A4 (ACGIH 2004).<br>MAK not established.<br>OSHA PEL*: TWA 1 mg/m$^3$ See Appendix C *Note: The PEL also applies to insoluble chromium salts.<br>NIOSH REL: TWA 0.5 mg/m$^3$ See Appendix C<br>NIOSH IDLH: 250 mg/m$^3$ (as Cr) See: 7440473 | **EFFECTS OF SHORT-TERM EXPOSURE:**<br>May cause mechanical irritation tothe eyesandthe respiratory tract.<br><br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** |
| **PHYSICAL PROPERTIES** | Boiling point: 2642°C<br>Melting point: 1900°C<br>Density: 7.15 g/cm$^3$ | Solubility in water: none |
| **ENVIRONMENTAL DATA** | | |

| **N O T E S** |
|---|
| The surface of the chromium particles is oxidized to chromium(III)oxide in air. See ICSC 1531 Chromium(III) oxide. |

| **ADDITIONAL INFORMATION** | |
|---|---|
| | |

| | |
|---|---|
| **ICSC: 0029** | **CHROMIUM** |

| | |
|---|---|
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# LEAD

**ICSC: 0052**

Lead metal
Plumbum
Pb
Atomic mass: 207.2
(powder)

ICSC # 0052
CAS # 7439-92-1
RTECS # OF7525000
October 08, 2002 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Not combustible. Gives off irritating or toxic fumes (or gases) in a fire. | | In case of fire in the surroundings: use appropriate extinguishing media. |
| **EXPLOSION** | Finely dispersed particles form explosive mixtures in air. | Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting. | |
| **EXPOSURE** | See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE. | PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN! | |
| **•INHALATION** | | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | | Protective gloves. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | | Safety spectacles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Abdominal pain. Nausea. Vomiting. | Do not eat, drink, or smoke during work. Wash hands before eating. | Rinse mouth. Give plenty of water to drink. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles. | Separated from food and feedstuffs incompatible materials See Chemical Dangers. | R:<br>S: |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0052**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# LEAD

**ICSC: 0052**

**I M P O R T A N T D A T A**

**PHYSICAL STATE; APPEARANCE:**
BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.

**PHYSICAL DANGERS:**
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**
On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 0.05 mg/$m^3$ A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004).
MAK:
Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004).
EU OEL: as TWA 0.15 mg/$m^3$ (EU 2002).
OSHA PEL*: 1910.1025 TWA 0.050 mg/$m^3$ See Appendix C *Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH REL*: TWA 0.050 mg/$m^3$ See Appendix C *Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH IDLH: 100 mg/$m^3$ (as Pb) See: 7439921

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation and by ingestion.

**INHALATION RISK:**
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The substance may have effects on the blood bone marrow central nervous system peripheral nervous system kidneys , resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.

| **PHYSICAL PROPERTIES** | | |
|---|---|---|
| | Boiling point: 1740°C<br>Melting point: 327.5°C | Density: 11.34 g/cm3<br>Solubility in water: none |

**ENVIRONMENTAL DATA**

Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.

## NOTES

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-51S1872

## ADDITIONAL INFORMATION

**ICSC: 0052** **LEAD**

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

## MERCURY

**ICSC: 0056**

Quicksilver
Liquid silver
Hg
Atomic mass: 200.6

ICSC # 0056
CAS # 7439-97-6
RTECS # OV4550000
UN # 2809
EC # 080-001-00-0
April 22, 2004 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Not combustible. Gives off irritating or toxic fumes (or gases) in a fire. |  | In case of fire in the surroundings: use appropriate extinguishing media. |
| **EXPLOSION** | Risk of fire and explosion. |  | In case of fire: keep drums, etc., cool by spraying with water. |
| **EXPOSURE** |  | STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN! | IN ALL CASES CONSULT A DOCTOR! |
| **•INHALATION** | Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature. | Local exhaust or breathing protection. | Fresh air, rest. Artificial respiration if indicated. Refer for medical attention. |
| **•SKIN** | MAY BE ABSORBED! Redness. | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. |
| **•EYES** |  | Face shield, or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** |  | Do not eat, drink, or smoke during work. Wash hands before eating. | Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus. | Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed. | Special material. Do not transport with food and feedstuffs.<br>T symbol<br>N symbol<br>R: 23-33-50/53<br>S: 1/2-7-45-60-61<br>UN Hazard Class: 8<br>UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0056**

# International Chemical Safety Cards

## MERCURY

**ICSC: 0056**

### IMPORTANT DATA

**PHYSICAL STATE; APPEARANCE:**
ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 0.025 mg/$m^3$ as TWA (skin) A4 BEI issued (ACGIH 2004).
MAK: 0.1 mg/$m^3$ Sh
Peak limitation category: II(8) Carcinogen category: 3B (DFG 2003).
OSHA PEL†: C 0.1 mg/$m^3$
NIOSH REL: Hg Vapor: TWA 0.05 mg/$m^3$ skin
Other: C 0.1 mg/$m^3$ skin
NIOSH IDLH: 10 mg/$m^3$ (as Hg) See: 7439976

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation of its vapour and through the skin , also as a vapour!

**INHALATION RISK:**
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous systemandkidneys. The effects may be delayed. Medical observation is indicated.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The substance may have effects on the central nervous system kidneys , resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

### PHYSICAL PROPERTIES

Boiling point: 357°C
Melting point: -39°C
Relative density (water = 1): 13.5
Solubility in water:
none
Vapour pressure, Pa at 20°C: 0.26
Relative vapour density (air = 1): 6.93
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.009

### ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.

### NOTES

Depending on the degree of exposure, periodic medical examination is indicated. No odour warning if toxic concentrations are present. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-80GC9-II+III

### ADDITIONAL INFORMATION

**ICSC: 0056** **MERCURY**

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

## SELENIUM

**ICSC: 0072**

Se
Atomic mass: 79.0
(powder)

ICSC # 0072
CAS # 7782-49-2
RTECS # VS7700000
EC # 034-001-00-2
April 26, 1993 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Combustible. Gives off irritating or toxic fumes (or gases) in a fire. | NO open flames. NO contact with oxidants. | Powder, AFFF, foam, carbon dioxide. NO water |
| **EXPLOSION** | Risk of fire and explosion on contact with oxidants. | | |
| **EXPOSURE** | | PREVENT DISPERSION OF DUST! STRICT HYGIENE! | |
| **•INHALATION** | Irritation of nose. Cough. Dizziness. Headache. Laboured breathing. Nausea. Sore throat. Vomiting. Weakness. Symptoms may be delayed (see Notes). | Ventilation, local exhaust, or breathing protection. | Fresh air, rest. Refer for medical attention. |
| **•SKIN** | Redness. Skin burns. Pain. Discolouration. | Protective gloves. Protective clothing. | Rinse skin with plenty of water or shower. Refer for medical attention. Remove and isolate contaminated clothes. |
| **•EYES** | Redness. Pain. Blurred vision. | Safety spectacles or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Metallic taste. Diarrhoea. Chills. Fever. (Further see Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Do NOT wash away into sewer. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles. | Fireproof. Separated from strong oxidants, strong acids, food and feedstuffs Dry. | Airtight. Do not transport with food and feedstuffs.<br>T symbol<br>R: 23/25-33-53<br>S: 1/2-20/21-28-45-61 |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0072**

# SELENIUM

**ICSC: 0072**

## IMPORTANT DATA

**PHYSICAL STATE; APPEARANCE:**
ODOURLESS SOLID IN VARIOUS FORMS. DARK RED-BROWN TO BLUISH-BLACK AMORPHOUS SOLID OR RED TRANSPARENT CRYSTALS OR METALLIC GREY TO BLACK CRYSTALS.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
Upon heating, toxic fumes are formed. Reacts violently with oxidants strong acids Reacts withwater at 50°C forming flammable/explosive gas (hydrogen - see ICSC0001) and selenious acids. Reacts with incandescence on gentle heating with phosphorous and metals such as nickel, zinc, sodium, potassium, platinum.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 0.2 mg/m$^3$ as TWA (ACGIH 2004).
MAK: (Inhalable fraction) 0.05 mg/m$^3$
Peak limitation category: II(4); Carcinogen category: 3B; Pregnancy risk group: C;
(DFG 2004).

OSHA PEL*: TWA 0.2 mg/m$^3$ *Note: The PEL also applies to other selenium compounds (as Se) except Selenium hexafluoride.

NIOSH REL*: TWA 0.2 mg/m$^3$ *Note: The REL also applies to other selenium compounds (as Se) except Selenium hexafluoride.

NIOSH IDLH: 1 mg/m$^3$ (as Se) See: 7782492

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is irritating to the eyes and the respiratory tract Inhalation of dust may cause lung oedema (see Notes). Inhalation of fume may cause symptoms of asphyxiation, chills and fever and bronchitis. The effects may be delayed.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the respiratory tract, gastrointestinal tract, and skin , resulting in nausea, vomiting, cough, yellowish skin discolouration, loss of nails, garlic breath and bad teeth.

## PHYSICAL PROPERTIES

Boiling point: 685°C
Melting point: 170-217°C
Relative density (water = 1): 4.8

Solubility in water:
none
Vapour pressure, Pa at 20°C: 0.1

## ENVIRONMENTAL DATA

## NOTES

Do NOT take working clothes home.

## ADDITIONAL INFORMATION

**ICSC: 0072** **SELENIUM**

**IMPORTANT LEGAL NOTICE:**

# International Chemical Safety Cards

## SILVER

**ICSC: 0810**

Argentium
C.I. 77820
Ag

ICSC # 0810
CAS # 7440-22-4
RTECS # VW3500000
September 10, 1997 Validated

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Not combustible, except as powder. | | |
| **EXPLOSION** | | | |
| **EXPOSURE** | | PREVENT DISPERSION OF DUST! | |
| **•INHALATION** | | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | | Protective gloves. | Rinse skin with plenty of water or shower. |
| **•EYES** | | Safety spectacles, or eye protection in combination with breathing protection if powder. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. | |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. | Separated from ammonia, strong hydrogen peroxide solutions, strong acids. | |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0810**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## SILVER

**ICSC: 0810**

**I**

**M**

**P**

**O**

**R**

**PHYSICAL STATE; APPEARANCE:**
WHITE METAL, TURNS DARK ON EXPOSURE TO OZONE, HYDROGEN SULFIDE OR SULFUR.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
Shock-sensitive compounds are formed with acetylene.

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation and by ingestion.

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

|  |  |  |
|---|---|---|
| **T<br>A<br>N<br>T<br>D<br>A<br>T<br>A** | Reacts with acids causing fire hazard. Contact with strong hydrogen peroxide solution will cause violent decomposition to oxygen gas. Contact with ammonia may cause formation of compounds that are explosive when dry.<br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV (metal): 0.1 mg/m$^3$ (ACGIH 1997).<br>EU OEL: 0.1 mg/m$^3$ as TWA (EU 2000).<br>OSHA PEL: TWA 0.01 mg/m$^3$<br>NIOSH REL: TWA 0.01 mg/m$^3$<br>NIOSH IDLH: 10 mg/m$^3$ (as Ag) See: IDLH INDEX | **EFFECTS OF SHORT-TERM EXPOSURE:**<br>Inhalation of high amounts of metallic silver vapours may cause lung damage with pulmonary oedema.<br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**<br>The substance may cause a grey-blue discoloration of the eyes, nose, throat and skin (argyria/argyrosis). |
| **PHYSICAL PROPERTIES** | Boiling point: 2212°C<br>Melting point: 962°C | Relative density (water = 1): 10.5<br>Solubility in water: none |
| **ENVIRONMENTAL DATA** | This substance may be hazardous to the environment; special attention should be given to aquatic organisms. |  |

**N O T E S**

Card has been partially updated in March 2008: see Occupational Exposure Limits.

**ADDITIONAL INFORMATION**

**ICSC: 0810** **SILVER**

|  |  |
|---|---|
| **IMPORTANT LEGAL NOTICE:** | Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values. |

# APPENDIX D

# HOSPITAL INFORMATION AND MAP

# FIELD ACCIDENT REPORT

## FIELD ACCIDENT REPORT

This report is to be filled out by the designated Site Safety Officer after EVERY accident.

PROJECT NAME ______________________________ PROJECT. NO.____________

Date of Accident __________________ Time _______ Report By _______________

Type of Accident (Check One):

( ) Vehicular ( ) Personal ( ) Property

Name of Injured ______________________________________ DOB or Age ________

How Long Employed _____________________________________________________

Names of Witnesses _________________________________________________________

_________________________________________________________

Description of Accident ___________________________________________________

______________________________________________________________________________

______________________________________________________________________________

Action Taken ____________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

Did the Injured Lose Any Time? _______ How Much (Days/Hrs.)? __________________

Was Safety Equipment in Use at the Time of the Accident (Hard Hat, Safety Glasses, Gloves, Safety Shoes, etc.)? __________________________________________________________

______________________________________________________________________________

(If not, it is the EMPLOYEE'S sole responsibility to process his/her claim through his/her Health and Welfare Fund.)

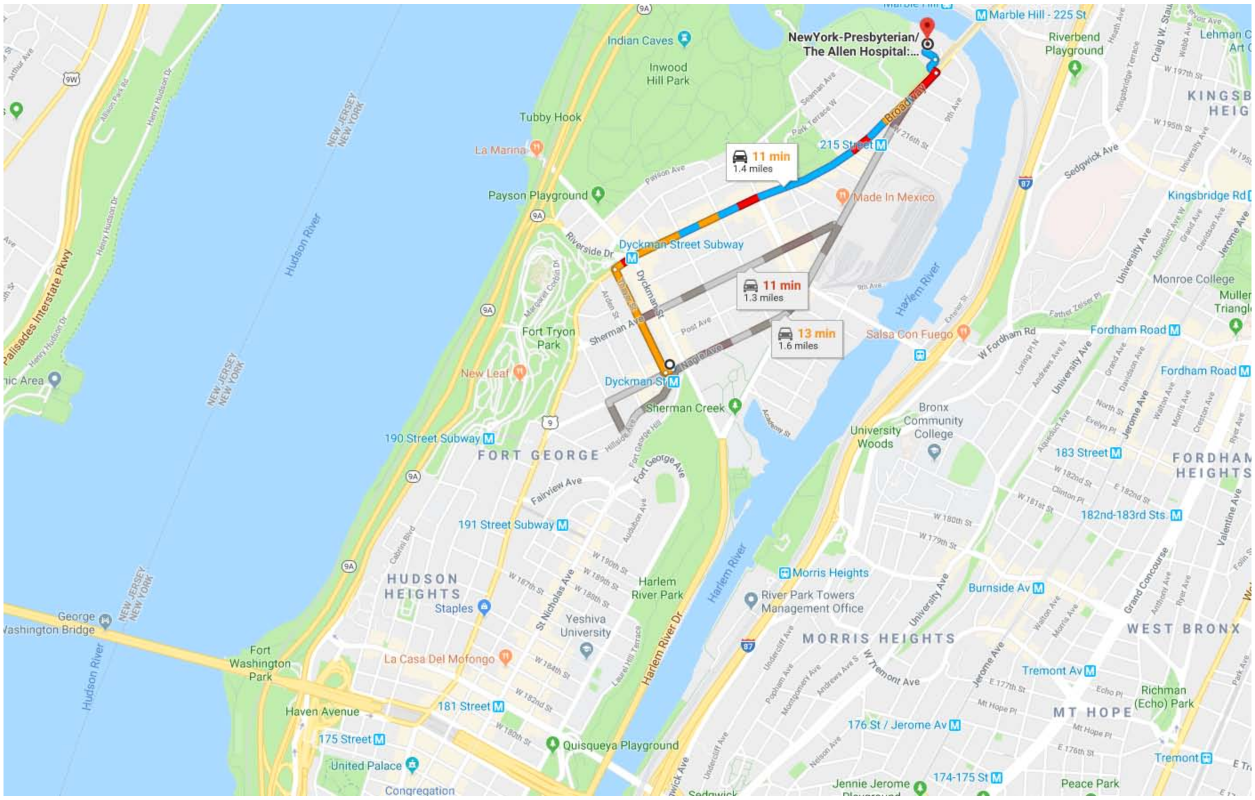
INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW

# HOSPITAL INFORMATION AND MAP

The hospital nearest the site is:

**New York Presbyterian The Allen Hospital - Emergency room**
**5141 Broadway**
**New York, NY 10034**
**(212) 932-4000**

1.4 Miles – About 11 Minutes



1. Exit site on west side on to Thayer St and head northwest (away from Nagle Ave)
2. Turn right onto Broadway
3. Turn left onto West 220th St.
4. Destination will be on the right.

# ATTACHMENT D
# COMMUNITY AIR MONITORING PLAN

# COMMUNITY AIR MONITORING PLAN

## 148 NAGLE AVENUE
## NEW YORK, NY

MAY 2019

**Prepared on behalf of:**

Dyckman Crestview Realty, LLC
279 West 231st Street
Bronx, New York, 10463

**Prepared by:**

EBC
*Environmental Business Consultants*
Ridge, NY 11961

# COMMUNITY AIR MONITORING PLAN
# TABLE OF CONTENTS

## *APPENDICES*

# 1.0 INTRODUCTION

This Community Air Monitoring Plan (CAMP) has been prepared for the drilling and sampling activities to be performed under a Remedial Investigation Work Plan (RIWP) at the 148 Nagle Avenue Site. The CAMP provides measures for protection for the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the investigation activities) from potential airborne contaminant releases resulting from investigative activities at the site.

Compliance with this CAMP is required during all activities associated with drilling and sampling activities that have the potential to generate airborne particulate matter and volatile organic compounds (VOCs). These activities include drilling and soil, groundwater and soil vapor sampling. This CAMP has been prepared to ensure that investigation activities do not adversely affect passersby, residents, or workers in the area immediately surrounding the Site and to preclude or minimize airborne migration of investigation-related contaminants to off-site areas.

## 1.1 Regulatory Requirements

This CAMP was established in accordance with the following requirements:

- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan as presented in DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC May 3, 2010). This guidance specifies that a community air-monitoring program shall be implemented to protect the surrounding community and to confirm that the work does not spread contamination off-site through the air;

## 2.0 AIR MONITORING

Chlorinated VOCs, particularly tetrachloroethylene (PCE) and trichloroethylene (TCE) are the constituents of concern at the Site along with metals in historic fill. The appropriate method to monitor air for these constituents during investigation activities is through real-time VOC and air particulate (dust) monitoring.

### 2.1 Meteorological Data

At a minimum, wind direction will be evaluated at the start of each workday, noon of each workday, and the end of each workday. These readings will be utilized to position the monitoring equipment in appropriate upwind and downwind locations.

### 2.2 Community Air Monitoring Requirements

To establish ambient air background concentrations, air will be monitored at several locations around the site perimeter before activities begin. These points will be monitored periodically in series during the site work. When the drilling area is within 20 feet of potentially exposed populations or occupied structures, the perimeter monitoring points will be located to represent the nearest potentially exposed individuals at the downwind location.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor (or equivalent). Air will be monitored for VOCs with a portable Ionscience 3000 photoionization detector (PID), or equivalent. All air monitoring data will be documented in a site log book by the designated site safety officer (SSO). The SSO or delegate must ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. All instruments will be zeroed daily and checked for accuracy. A daily log will be kept. If additional monitoring is required, the protocols will be developed and appended to this plan.

## 3.0 VOC MONITORING, RESPONSE LEVELS, AND ACTIONS

Volatile organic compounds (VOCs) will 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.

All readings will be recorded and made available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report, as shown in **Appendix A**, will be completed.

### 3.1 Potential Corrective Measures and VOC Suppression Techniques

If the 15-minute integrated VOC level at the downwind location persists at a concentration that exceeds the upwind level by more than 5 ppm but less than 25 ppm during remediation activities, then vapor suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive organic vapors:

- Collection of purge water in covered containers;
- storage of excess sample and drill cuttings in drums or covering with plastic

## 4.0 PARTICULATE MONITORING

Air monitoring for particulates (i.e., dust) will be performed continuously during drilling activities using both air monitoring equipment and visual observation at upwind and downwind locations. Monitoring equipment capable of measuring particulate matter smaller than 10 microns ($PM_{10}$) and capable of integrating (averaging) over periods of 15 minutes or less will be set up at upwind (i.e., background) and downwind locations, at heights approximately four to five feet above land surface (i.e., the breathing zone). Monitoring equipment will be MIE Data Ram monitors, or equivalent. The audible alarm on the particulate monitoring device will be set at 90 micrograms per cubic meter ($\mu g/m_3$). This setting will allow proactive evaluation of worksite conditions prior to reaching the action level of 100 $\mu g/m^3$ above background. The monitors will be calibrated at least once per day prior to work activities and recalibrated as needed thereafter. In addition, fugitive dust migration will be visually assessed during all intrusive work activities.

The following summarizes particulate action levels and the appropriate responses:

- If the downwind PM-10 particulate level is 100 $\mu g/m^3$ 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 $\mu g/m^3$ 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 $\mu g/m^3$ above the upwind level, work must be stopped and an evaluation of activities initiated. Work can resume provided that dust suppression measures (as described in Section 4.1 below) and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report as shown in **Appendix A** will be completed.

### 4.1 Potential Particulate Suppression Techniques

If the integrated particulate level at the downwind location exceeds the upwind level by more than 100 $\mu g/m_3$ at any time during drilling activities, then dust suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive dusts:

- Placement of drill cuttings in drums or covering stockpiles with plastic;
- Misting of the drilling area with a fine water spray from a hand-held spray bottle

Work may continue with dust suppression techniques provided that downwind $PM_{10}$ levels are not more than 150 $\mu g/m^3$ greater than the upwind levels.

There may also be situations where the dust is generated by drilling activities and migrates to downwind locations, but is not detected by the monitoring equipment at or above the action level. Therefore, if dust is observed leaving the working area, dust suppression techniques such as those listed above will be employed.

If dust suppression techniques do not lower particulates to below 150 $\mu g/m^3$, or visible dust persists, work will be suspended until appropriate corrective measures are identified and implemented to remedy the situation.

All air monitoring readings will be recorded in the field logbook and will be available for the NYSDEC and NYSDOH personnel to review.

# 5.0 DATA QUALITY ASSURANCE

## 5.1 Calibration

Instrument calibration shall be documented on instrument calibration and maintenance sheets or in the designated field logbook. All instruments shall be calibrated as required by the manufacturer. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

## 5.2 Operations

All instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on-site by the SSO for reference.

## 5.3 Data Review

The SSO will interpret all monitoring data based on the established criteria and his/her professional judgment. The SSO shall review the data with the Project Manager (PM) to evaluate the potential for worker exposure, upgrades/downgrades in level of protection, comparison to direct reading instrumentation and changes in the integrated monitoring strategy.

Monitoring and sampling data, along with all sample documentation will be periodically reviewed by the PM.

# 6.0 RECORDS AND REPORTING

All air readings must be recorded on daily air monitoring log sheets and made available for review by personnel from NYSDEC and NYSDOH.

The Daily Status Report will provide a summary of the intrusive activities conducted and the daily air monitoring log.

In the event of a CAMP exceedance, the NYSDEC and NYSDOH Project Managers will be notified of the exceedance and corrective measures implemented on the date of occurrence.

# ***APPENDIX A***
# ***ACTION LIMIT REPORT***

# CAMP
# ACTION LIMIT REPORT

Project Location:____________________________________________________________

Date: __________________________ Time:_____________________

Name:__________________________

Contaminant:______________________ PM-10: _________ VOC: ____________________

Wind Speed:_______________________ Wind Direction: _____________

Temperature:______________________ Barometric Pressure: ________

**DOWNWIND DATA**

Monitor ID #: _____________________ Location: ________ Level Reported: _____________

Monitor ID#: _____________________ Location: ________ Level Reported: _____________

**UPWIND DATA**

Monitor ID #: _____________________ Location: ________ Level Reported: _____________

Monitor ID#: _____________________ Location: ________ Level Reported: _____________

**BACKGROUND CORRECTED LEVELS**

Monitor ID #: Location: _____________ Level Reported: Level Reported: _________________

**ACTIONS TAKEN**

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