Remedial Investigation Work Plan

Former Bisonite Paint Company
2266 Military Road and 2268 Military Road
Tonawanda, New York
New York State Department of Environmental Conservation
Brownfield Cleanup Program
Site #C915010

Prepared for:

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Leader

FIGURES

TABLES

APPENDICES

ACRONYMS

ACM	ACM Northfield CR#3 LLC
CAMP	Community Air Monitoring Program
DUSR	Data Usability Summary Report
HASP	Health and Safety Plan
IHWDS	Inactive Hazardous Waste Disposal Site
IRM	Interim Remedial Measure
MRA	Military Road Associates, Inc.
NAPL	Non-Aqueous Phase Liquid
NTU	Nephelometric Units
NYSDEC	New York State Department of Environmental Conservation
PFAS	Per – and Polyfluoroalkyl Substances
PID	Photoionization Detector
PSA	Preliminary Site Assessment
PVC	Poly Vinyl Chloride
RAAR	Remedial Alternative Analysis Report
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
SCO	Soil Cleanup Objective
SER	Site Evaluation Report
TCLP	Toxicity Characteristic Leaching Procedure
TIC	Tentatively Identified Compounds
TOG	Top of Groundwater
VCP	Voluntary Cleanup Program
VOC	Volatile Organic Compounds
QAPP	Quality Assurance Project Plan

1.0 INTRODUCTION

This Remedial Investigation Work Plan ("RIWP") is completed to fulfill ACM Northfield CR#3 LLC ("ACM") commitment to enter the New York State Department of Environmental Conservation ("NYSDEC") Brownfield Cleanup Program ("BCP"). The RIWP presents the scope of work and implementation procedures required for the Remedial Investigation ("RI"). The Remedial Investigation Report ("RIR") and Remedial Alternatives Analysis Report ("RAAR") Report will be developed based on the results of the RI.

This Work Plan has been prepared for the property consisting of two tax parcels located at 2266 and 2268 Military Road in Tonawanda, Erie County, New York ("Site"). The Erie County tax map lists the two tax parcels with individual street addresses: parcel 52.12-6-16.1 is listed as 2268 Military Road and parcel 52.12-6-16.2 is listed as 2266 Military Road covering approximately 0.81of an acre of vacant land. The land is currently zoned for manufacturing.

Leader Professional Services, Inc. ("Leader") has prepared this Work Plan to document the scope of work, procedures, goals and reporting responsibilities of this project.

2.0 BACKGROUND

2.1 Property Location

The Site is located on the west side of Military Road, approximately 0.25 of a mile north of the intersection of Military Road and Interstate 290 (see Figure 1). Land use surrounding the Site includes an 84 Lumber building to the north, a railroad corridor located west of the Site and a commercial storage space facility located south of the Site. East of Military Road the land use includes retail shops, commercial property and residential properties. The nearest residential property is approximately 0.04 of a mile to the east of the Site. Figure 1 provides the location of the Site.

2.2 Site Description

The Site is actively used as a commercial storage property covering approximately 0.81of an acre and has approximately 8,843 square feet of building space that formerly was the location of the Bisonite Paint Company. The former Bisonite building is used by multiple tenants for the storage of equipment, materials, products, etc. Currently a portion of the building is vacant which will be rented as storage or light industrial uses. The Site portion of the building shares a wall, floor and roof with remaining portion of the building which extends to the south off the Site. The building has concrete block walls and a flat roof.

The on-Site portion of the building is used primarily for storage of contractor tools, equipment, and material storage (wood, pipe, paint, etc.). The remaining portion of the building is vacant but was most recently used by a fire sprinkler construction firm who used the space for material storage and offices. This portion of the building has open storage areas and an area divided into individual office spaces with wood framing and plasterboard walls and composite wood paneling. The ceilings have a tile, drop ceiling finish. The floor to drop ceiling height is approximately eight feet. The vacant space once had a gas-fired forced air heating system, but this system is no longer functioning.

Approximately 25 percent of the Site property is covered with building space. The remainder of the Site is used for parking and as a driveway for the tenants. Figure 2 is an aerial photograph of the Site and the surrounding properties. The adjacent off-site building space is used by two tenants; one tenant uses the space as a book warehouse and the other tenant stores lawn maintenance equipment. The building spaces immediately off-site to the south of the Site and in a separate building are used by approximately 10 tenants using small 8 feet by 10 feet rental spaces. One tenant occupying the western most part of the building uses the space to store gasoline powered equipment, trailer(s), and supplies. These spaces are unheated, with only a portion of the building having electrical service.

2.3 Site History

2.3.1 Site and Area Use History

Historically, the current Site was a portion of the former Bisonite Paint Company property which operated from 1947 to 1991. Bisonite was formerly located on four property parcels, two of which now form the current Site. The former Bisonite manufactured water-based paint and oil-based paints on the property. Wastewater from the manufacturing plant was believed to have flowed in an open trench to a closed settling lagoon at the west end of the Site. Periodically, solids from the lagoon or other wastes from the manufacturing operation were spread on the land surface off-site, south of the Site. The size of the lagoon is unknown, but it is suspected to have dimensions of 30 feet wide by 50 feet long and a depth of 8 to 10 feet. In 2008 NYSDEC completed a Site Evaluation Report, which recommended the Site remain a Class 3 Site on the New York State Inactive Hazardous Waste Disposal Site ("IHWDS") Registry. This classification is given to sites that present a significant threat to public health or the environment. In addition to the former Bisonite building that still exists on the Site and on the adjacent property, Bisonite operated a settling lagoon on the Site, a tank farm and landfarming area (to the south, now off-Site). The investigation was conducted in 1993 and remediation was conducted in 1996 by 2251 Military Road Associates, Inc. under the New York State Voluntary Cleanup Program ("VCP").

The area surrounding the Site has changed significantly since the 1950's. East of the Site, along Military Road, the land is vacant and has been cleared. North of the Site and adjacent to the railroad, the land is used for commercial/industrial purposes. The Tonawanda Municipal Landfill is located west of the Site.

2.3.2 Site Regulatory History

Leader reviewed the regulatory history of the Site the former operations of the Bisonite Paint Company. A summary is provided in the following.

In 1978 NYSDEC notified Bisonite to cease landfarming operations and begin hauling the waste to an approved disposal facility. The operation of the settling lagoon ("lagoon") was terminated in 1978. Over the following four years, the lagoon was decommissioned and capped; however, it is unknown if the lagoon was dredged and the waste removed. During a NYSDEC Investigation in 1985, it was noted that the lagoon was not properly covered and leachate was observed in small ponded areas at the surface. Also observed was a small 3 feet by 7 feet area of stained ground on the side of the former lagoon sloping west toward the railroad tracks. It is unknown whether an engineered cap was ever placed over the lagoon.

In July and December 1990, a Preliminary Site Assessment ("PSA") was conducted by TAMS Consultants and Dunn Engineering Company ("TAMS") for the NYSDEC. No evidence of leachate from the former lagoon was found during the PSA inspections. However, several tanks were observed along with stressed vegetation adjacent to the former drum storage pad/resin building. While conducting the PSA in April 1991 an aerial photograph of the site from 1972 was discovered. The photograph displayed poor housekeeping practices at the site and this resulted in an inspection by NYSDEC's hazardous waste division. During the RCRA inspection, waste containers with organic chemicals characterized as hazardous waste were found. An Order on Consent was issued to Bisonite in December of 1991 requiring the company to remove the wastes, debris and obvious contaminated surficial material. The treatment of groundwater was not addressed.

A PSA field investigation conducted in 1993 included the collection of soil, waste and groundwater samples. The investigation focused on areas of the Site and adjacent off-site areas to determine if surface and subsurface contamination were present and whether this posed a threat to public health or the environment. The Site's soils were found to be contaminated with PCBs, mercury, VOCs and metals. PCBs were detected in the lagoon sediments but not at levels exceeding the 6 NYCRR Part 375 soil cleanup objectives ("SCO"). Volatile organic compounds ("VOCs"), specifically acetone, ethylbenzene, methylene chloride, toluene, and total xylenes were also found to exceed the SCOs. The metals antimony, barium, chromium, lead and mercury were found to exceed the SCO. The groundwater was found to be relatively unaffected. As a result, NYSDEC classified the Site as a Class 3 IHWDS. See Figure 3 for the locations sampled in 1993.

In 1996, 2251 Military Road Associates, Inc. ("MRA") submitted a Removal Action Work Plan ("RAWP") to NYSDEC that provided a scope of work to excavate the contaminated soils from the former landfarming area and tank farm. MRA planned to "delist" portions of the property in order to redevelop the property for commercial/industrial use. Subsequent to this submission, MRA signed an Order on Consent with NYSDEC (Index #B9-0389-91). The RAWP was approved and implemented in October 1996. The removal was conducted over one day, and the confirmatory samples indicated the soil quality was consistent with the target soil cleanup goals for chromium and lead. No information is available to determine if other parameters were analyzed. MRA began remediating the adjacent tank farm and it was completed in a single day. However, MRA did not sample the soil in the tank farm to confirm if the cleanup goals were achieved. MRA instead measured the soil contaminant levels using a portable organic vapor analyzer. NYSDEC inspected the excavation and confirmed that the remediation of the tank farm was complete.

On April 20, 2017, NYSDEC reported a spill at the property (Spill No. 1700755) for a release of petroleum from improperly stored drums located off-site (to the south). A lid on a drum was not properly sealed and rainwater displaced the liquid in the drum spilling it onto the ground surface. The soil was disposed in a permitted landfill. The operator of the property was cited for dumping solid waste (tires, plant and tree waste and municipal solid waste) on the Site. NYSDEC closed the Spill file on July 13, 2017.

2.4 Previous Environmental Investigations/Reports

The following is a summary of the previous environmental investigations conducted at the Site.

In March 1993 (the report date is not consistent with dates in the report) NYSDEC's consultants TAMS prepared a PSA Report reporting on historical information obtained from various NYSDEC and municipal inspections, and field inspections, investigation findings and sampling conducted between July 1990 and October 1993. The PSA Report found VOCs, SVOCs, and PCBs exceeding residential SCOs and Metals exceeding background metal concentrations in the soil. Groundwater did not appear to have been impacted. NYSDEC concluded that hazardous waste is present as defined in 6 NYCRR Part 371 but did not appear to be a significant threat to public health or the environment as defined in 6 NYCRR Part 375.

In 1996, MRA submitted a RAWP to excavate the contaminated soils from the former landfarming area and tank farm in order to delist those portions of the property to redevelop the property for commercial/industrial purposes. Subsequent to the RAWP submission, MRA executed an Order on Consent with NYSDEC (Index #B9-0389-91). NYSDEC approved and required the implementation of the RAWP in October of 1996. However, MRA did not sample the soil in the tank farm to confirm if the cleanup goals were achieved. MRA instead measured the soil contaminant levels using a portable organic vapor analyzer. NYSDEC inspected the excavation and confirmed the remediation of the tank farm was complete. Baron & Associates, P.C. prepared a Removal Action Implementation Report in December 1996 for the project.

In December 2008, NYSDEC prepared a Site Evaluation Report ("SER") for the Bisonite Paint Company (Site No. 915010). The SER was a review of the past regulatory activities and investigations of Bisonite and it focused on an evaluation of the data associated with the former settling lagoon area. The SER indicated that as a result of sampling during the PSA, a determination could not be made that the lagoon waste was a characteristic hazardous waste since samples did not exceed TCLP levels. However, NYSDEC determined that the settling lagoon contained a listed hazardous waste based on the significant total concentrations of individual VOCs, Toluene and Xylene in the soil samples and in waste drums; the reported spills and leaks; and the discovery of raw product in an open trench drain connected to the settling lagoon. Elevated levels of barium, chromium, lead and mercury were found in the settling lagoon waste samples. Groundwater samples from monitoring wells indicated elevated levels of Antimony, Iron, Magnesium Manganese and Sodium, but the position of the monitoring wells was not hydraulically down gradient of the lagoon area. The recommendations of the SER included maintaining the Site as a Class 3 IHWDS, additional assessment was needed to characterize settling lagoon waste and recommended the installation and sampling of monitoring wells to determine shallow groundwater quality down gradient of the lagoon.

On April 20, 2017 during an inspection, NYSDEC discovered drums with petroleum waste spilling onto the ground surface off-site immediately to the south of the Site. On May 1, 2017, Leader met with NYSDEC and subsequently conducted a removal of the contaminated soil, cleanup of the adjacent concrete pad and offsite disposal of the waste materials and drums.

Additionally, NYSDEC observed a large amount of solid waste on the Site and adjacent property. Leader conducted a removal of the non-hazardous waste. Leader prepared a Closure Report dated July 10, 2017 and NYSDEC determined no further action was necessary and closed the Spill file. The verification samples collected after the soil removal indicated Indeno (1,2,3-cd) pyrene at a concentration exceeding the applicable soil cleanup objective ("SCO").

On June 22, 2017, NYSDEC, Groundwater and Environmental Services, Inc. and Applus RTD prepared a report of a geophysical study conducted on a portion of the Site, specifically the area believed to be the former settling lagoon. The study indicated several anomalies that are within the suspected lagoon area, but there was no evidence of a trench drain from the former manufacturing building to the lagoon.

3.0 SCOPE OF WORK

The goal of the proposed fieldwork is to characterize the nature and extent of historic contamination on the Site. To achieve this goal, a multiple-level investigation is recommended including: characterize the Site's geology and hydrology; determine the nature of the chemical contaminants found on the Site; determine the extent of contamination of the chemical contaminants originating from the Site; and evaluate the current conditions and any impacts to the environment and human health.

The environmental media to be sampled at the Site during the field investigation will include surface and subsurface soils, sediments, groundwater and soil vapor. Since there is no direct path to surface water or a municipal storm water conveyance, additional surface soil samples will be collected at the limits of the pavement on the Site where storm water might runoff or run-on to the property.

In addition to sampling and analysis of the various environmental media, a location and elevation survey will be conducted to locate samples and plot the Site's attributes on report figures. The attributes to be shown will include: The Site's property lines, ground surface topography, the location of buildings, driveways, roads and easements or right of ways. The ground surface elevation and each sample location's north and east coordinates will be determined relative to the latest version of the World Geodetic System of 1984 ("WGS84").

Leader's Scope of Work is presented below as individual tasks. The tasks will be conducted concurrently to make the best use of equipment and labor and to allow the facility to continue to operate efficiently. For example, a surface soil sample that is co-located with a soil boring location will be collected when the boring is installed.

3.1 Site Walk and Monitoring Well Assessment

This task will be used to verify the locations of all the samples and to ensure, to the extent possible, that the proposed locations make sense for the project's data needs. Since the Site is an active facility, conditions are not expected to have changed significantly, but as the project progresses and if conditions warrant, Leader will propose to NYSDEC modifications to the Work Plan.

In addition to reviewing the sampling and monitoring locations, a Site walk will be conducted to identify the locations of monitoring wells from previous investigations and delineate on the ground the findings of the NYSDEC's geophysical survey. If a monitoring well(s) is found, Leader will attempt to open the monitoring well and visually inspect it for defects which could compromise the integrity of future samples. The depth to ground water and the depth to the bottom of the well will be measured. Currently it is believed that there are no monitoring wells present on the Site, but there is a monitoring well identified in NYSDEC's document entitled "Work Plan – Bisonite Paint Company, Site No. 915010, Supplemental Site Characterization" as monitoring well MW-4 located off-site. A second well is located immediately to the north of MW-4 and is labeled in the NYSDEC's Work Plan as "Farm Well." Farm Well is covered with a large rock, but an electrical conduit was observed suggesting there is a pump in the well. With NYSDEC assistance, Leader will determine if the monitoring well should be retained as a sampling point or decommissioned following NYSDEC's guidance: Commissioners Policy 43 ("CP-43") "Groundwater Monitoring Well Decommissioning Policy." The decommissioning of the monitoring well will take place at the conclusion of the installation of the new monitoring wells.

If an existing monitoring well is retained as a sampling point for the current investigation, the monitoring well will be re-developed following procedures identified in Section 3.5 and in the Quality Assurance Project Plan.

3.2 __Property and Land Survey__

A survey of the property line and topography of the Site and the immediate surrounding area will be conducted so the property line can be defined. A drawing will be prepared to illustrate the Site's important features. The features include buildings; stationary equipment; buried gas, electric, and water lines; storm water catch basins and conveyances; sumps and drains; storage tanks; and sampling locations. Other important attributes to be determined are the ground surface topography and the Site features. This information is important to assist in the interpretation of surface and groundwater flow and contaminant migration. The topographic map will be drawn using one-foot contours or different contour intervals if the ground surface conditions warrant a change. Once monitoring wells and other sampling locations have been identified the ground surface elevations and northing and easting values of these locations will be determined so they can also be added to a drawing of the Site.

The ground surface elevations and northings and eastings will be calculated using latest version of the World Geodetic System of 1984 ("WGS84").

In addition to producing a suitable site map, location and elevation data, the Surveyor will prepare a metes and bounds description for the property.

3.3 __Surface Soil Investigation__

Leader's scope of work for the surface soil investigation includes the following goals: 1) the identification and the distribution of the chemical and elemental compounds in the surface soils; 2) to screen surface materials with a meter suitable to measure gamma radiation in the soil when cinder/ash like material is observed, and 3) an evaluation of how contaminant levels will influence the cleanup of the property. Since the majority of the Site is covered with asphalt, concrete or building space ("hard cover"), surface soil sampling will be restricted to the perimeter of the Site where there is no hard cover. The proposed locations for the 4 surface soil samples are shown on Figure 4.

Each surface soil sample will be analyzed for Target Compound List ("TCL") semi-volatile organic compounds ("SVOCs"), pesticides, herbicides, PCBs and Target Analyte List ("TAL") metals plus mercury and cyanide. These samples will be obtained as grab samples directly from the upper two inches of the soil. If elevated levels of gamma radiation are observed (compared to the background radiation), additional evaluation may be required.

During the collection of surface soil samples, an evaluation of the ground surface will be completed using three evaluation techniques: 1) a visual assessment of stains, possible fill material, etc; 2) the presence of volatile organic compounds VOCs using a PID; and 3) the presence of discernable odors. If the soil in any of the locations contains visible, removable pieces of metal, wood or plastic, that material will be excluded from the sample. Leader's observations, instrument readings and the presence of noticeable odors or unusual soil characteristics will be included in the sampling notes as well as location, date and time.

Leader will collect surface soil samples from the interval of zero to approximately two inches below the surface. Leader will compare the laboratory analysis results to Title 6 of the New York State Codes, Rules and Regulations ("6 NYCRR") Part 375, NYSDEC 2010 Soil Cleanup Objectives ("SCOs") for unrestricted use and industrial use.

3.4 __Subsurface Soil Investigation__

The subsurface soil sampling will be conducted concurrently with the surface soil sampling and hydrogeologic investigation. Samples will be collected at multiple levels across the Site at the sampling locations shown on Figures 4. The locations and depths of samples collected will vary across the Site, depending on evidence of contamination or to characterize the various layers of overburden, i.e. fill, waste, native soil, etc. Approximately 10 locations will be sampled and at each location approximately 3 samples will be collected.

Leader anticipates that there is a layer of fill across the Site. The occurrence of waste-like materials is also expected within the former lagoon area, which may be underlain by fill materials and native soil. The depth of these intervals is unknown, but as materials (fill and waste) run out, the adjoining materials will be of interest to determine if there is vertical or horizontal migration of contaminants. The material to be sampled includes the following:

- Fill – Leader will conduct sampling to evaluate soil/material used as fill on the Site. If cinder or ash materials are found the samples will be screened to measure the level of gamma radiation using a meter suitable for measuring gamma radiation.

- Waste-like materials – waste-like materials will be sampled to understand the composition of the potential source of contamination on the Site and the condition of the Site's groundwater and soil vapor.

- Native soil – Leader will evaluate soil conditions in the interval where contaminants from historic fill material may begin to impact native materials.

- Saturated zone – Leader will evaluate soil conditions within the water table to determine if the soils material is a source of contaminants and to understand how these materials might require remediation.

In addition to interval sampling, Leader will screen each sample core collected with the PID and our observations will be recorded. Portions of the sample that are of interest will be retained in a small plastic bag or a clean glass jar for additional headspace screening. A separate portion of the sample will be submitted for chemical analysis. If the ambient air temperatures drop below 70 degrees Fahrenheit ("F") during the sampling, the headspace sample will be warmed for approximately five minutes to elevate its temperature before it is screened with the PID. If the soil is stained, VOCs are measured by the PID, or if the sample has a noticeable odor, the sample will be retained for analysis.

If a Non-Aqueous Phase Liquid ("NAPL") is found in the sample, additional subsurface soil sampling will be conducted to attempt to define the limit of the NAPL in the soil or groundwater. Samples will be analyzed for TCL VOCs plus 10 tentatively identified compounds ("TICs"), TCL SVOCs plus 20-TICs, TCL pesticides and herbicides, TAL metals including mercury and cyanide, and PCBs. At least three soil samples, one of which from the former disposal lagoon, will be analyzed for the NYSDEC emerging contaminant list contaminants (per- and polyfluoroalkyl substances, also known as "PFAS") and 1,4-Dioxane. The results from the subsurface soil sample analysis will be compared to the SCOs for unrestricted use, the SCOs for industrial/commercial use, the SOCs for the protection of public health and the SCOs for the protection of groundwater.

During the sampling, Leader will record field notes based on our observations, instrument readings and the presence of noticeable odors or unusual soil characteristics. After the soil borings are completed and samples have been placed in the appropriate containers and the sample cooler, the location will be marked with a stake for surveying purposes.

The subsurface soil samples will be collected with direct-push sampling tools or sampling using hollow stem auger drilling equipment with split spoon samplers. During the drilling process, samples will be collected continuously by Leader's field engineer from the ground surface to a point approximately 10 feet below the water table where the monitoring wells will be screened. The anticipated depth of the monitoring wells will be less than 20 feet, since during previous investigations groundwater was found between 4 and 10 feet below the ground surface.

Leader will inspect the soil samples and describe the geology and hydrogeology of the Site. We will evaluate the deeper soil intervals for impacts from past and current operations.

3.5 Groundwater Investigation

Leader will conduct the groundwater investigation including the installation and sampling of conventional monitoring wells screened within the shallow groundwater zone. Four, two-inch monitoring wells are planned for the collection of groundwater samples and groundwater elevation data. The planned locations are shown on Figure 5.

The conventional monitoring wells will be installed using hollow stem drilling equipment. The subsurface soil will be sampled continuously from the ground surface to point approximately 10 feet below the water table where a monitoring well screen will be placed. Direct push sampling equipment will be used to collect a grab sample from either temporary PVC monitoring wells or screened drive points. Depending on the Site geology and materials, one method of grab sampling may be preferred. Based on previous on and off-Site investigations, the groundwater zone is anticipated to be encountered at a depth of approximately 4 to 10 feet below the ground surface.

The monitoring wells will be constructed from two-inch diameter PVC and use 10 feet of slotted monitoring well screen. The screen will be placed so a portion (ideally two feet) of the monitoring well screen straddles the top of the water table.

To protect the monitoring well from on-site traffic, site flooding and to facilitate locating the monitoring wells when snow is present, Leader will employ the following well completions:

- For on-site monitoring wells, a standpipe-style protective casing with either a locked lid or a locked plug inserted into the monitoring well riser will be used. The casing will be sealed in a ring of concrete extending several feet into the ground while inside the casing there will be a layer of sand extending from the former ground surface to a point below the casing, which will allow water to drain back into the soil.

- Monitoring wells placed in a driveway or parking area where vehicle traffic occurs will have a metal protective casing which will be installed flush to the ground surface to allow snow removal. These monitoring well casings will be fitted with a watertight gasket and the monitoring well will have a watertight locking plug. A layer of sand will be installed inside the casing and extend below the casing's sides to allow any storm water to flow back into the soil. The outside of the casing will be secured in concrete. The metal cap will facilitate locating the well during winter with a metal detector.

- Yellow or orange painted metal bollards will be installed, as needed, to protect the on-site monitoring wells from vehicle traffic.

Once the monitoring well has been constructed and the protective casing installed, Leader will develop the monitoring wells to remove sediment until a clear (less than or equal to 50 Nephelometric units) groundwater sample can be obtained. Approximately two weeks after the completion of the monitoring well installation and development, Leader will sample each monitoring well.

The groundwater sampling program will involve the measurement of field parameters as well as the collection of samples for chemical analysis. The field parameters measured will include: turbidity, oxidation reduction potential, dissolved oxygen, pH, temperature and conductivity. Leader will measure turbidity as the monitoring wells are purged for sampling. Turbidity measurements will be measured until a value is sustained at 50 Nephelometric units ("NTU") or below. If development and purging of the monitoring well does not result in producing a groundwater flow with a turbidity of less than 50 NTUs after a reasonable amount time, then Leader will consult with the NYSDEC and as needed filtered and unfiltered samples will be collected for selected organic and inorganic compounds. When the NTU value is reached the groundwater discharge will be directed to a flow-through cell for the measurement of the remaining field parameters. These values will be measured at 10 minute intervals until they stabilize within 20% of the preceding three values.

The samples collected for laboratory chemical analysis will be analyzed for TCL VOCs +10 TICs, TCL SVOCs +20 TICs, TCL pesticides and herbicides, TAL metals including mercury and cyanide and PCBs. Two samples will also be sampled for emerging contaminants: 1,4-Dioxane and PFAS. The two monitoring wells to be sampled for the emerging contaminants will ideally be from a hydraulically up gradient and down gradient locations. Prior to sampling Leader will review which monitoring wells will be sampled for the emerging contaminants with the NYSDEC Project Manager.

The samples from the permanent monitoring wells will be collected using a low-flow groundwater sampling technique with dedicated silicone or high density polyethylene tubing. Leader will conduct the sampling approximately two weeks after successful monitoring well development. Prior to sampling, water level measurements will be taken with an oil/water interface probe to evaluate the presence of floating NAPL layers and to obtain groundwater elevation data for groundwater surface contouring. The laboratory results will be compared to the NYSDEC Technical Operational Guidance Series document: 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations ("TOGs"), for Class GA Groundwater.

During the drilling, construction, well development and sampling field notes will be recorded including the information and data needed for preparing sample logs, geologic logs, monitoring well construction diagrams, and making interpretations. The monitoring well's location will be surveyed, and the casing elevation calculated once all monitoring wells have been installed.

3.6 ***<u>Sub-Slab Soil Vapor Sampling</u>***

Leader will conduct a sub-slab soil vapor investigation in the Site's building (see Figure 6). Six air samples will be collected from the Site. The proposed air sampling locations are shown on Figure 6. Two sub-slab sampling points and one interior air sampling point will be located within the Site building to evaluate the potential for a vapor plume to impact indoor air. Locations within the building will be biased toward locations where employees would spend most of their workday; i.e., offices. One soil vapor sample will be collected on the north side of the Site between the Site building and the neighboring property, and one sampling point will be collected from within the area of the former lagoon. One exterior ambient air sampling point outside of the building and upwind on the Site will be collected. Samples will be collected during the traditional heating season in the Buffalo area, which extends from October to March.

The soil vapor sampling points will be installed in bore holes using direct push or split spoon sampling tool. Since groundwater is anticipated at approximately 4 to 10 feet below the ground surface, the depth of the sampling inlets will be approximately 3 to 4 feet below the ground surface. The inlet will be surrounded by clean sand to a point approximately two feet below the ground surface, where the sand will be covered with a six-inch layer of granular bentonite. The bore hole will be filled with hydrated bentonite tamped into place.

The soils retrieved during the process of the borings will be visually evaluated and screened with a PID. Leader will record observations of the soil quality and the PID measurements will be recorded. As conditions are encountered that warrant the collection of soil samples for chemical analysis, samples will be collected and analyzed. Unless the soil vapor location coincides with another sampling location, no soil samples will be collected for laboratory analysis.

The sub-slab sampling points will be installed by drilling a port in the concrete floor with a one half-inch diameter drill bit to a point approximately 3 inches below the concrete floor bottom. Each sampling point will consist of a dedicated, drinking water grade polyethylene tube placed at the bottom of the port. The tube will be surrounded with clean sand to a point below the bottom of the floor. The remaining void will be filled with hydrated bentonite clay. One of the sub-slab sample locations will be co-located with an indoor air sample. These samples will be located inside the Site building where there is an office or occupied space. The inlet of the indoor air sample Summa canister will be positioned approximately 3 to 5 feet above the floor. The second sub-slab sample will be located in the building closest to the potential source of contamination (presumably the location of the former settling lagoon). The outdoor ambient air sample will be located upwind from the building on-site, away from vehicles and building equipment exhausts.

Following the placement of the sub-slab and soil vapor sampling points, the seal surrounding the collection point will be tested using Helium gas. A plastic bag or inverted container will be used to confine the Helium over the sampling location, while the sampling tube is monitored for Helium. If Helium is found in the sample tubing, it will indicate the seal surrounding the sampling point has failed and will require repair.

Leader will collect the ambient air sample, indoor air, and sub-slab vapor samples over an eight-hour period. The soil vapor samples will be collected during a one-hour period. All samples will be analyzed for USEPA Method TO-15 VOCs. Leader will compare the sample results will be compared to the New York State Department of Health guidance document “Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006” and updated in May 2016.

During the sampling, each sample location will be photographed, and field notes collected recording air temperature, humidity, wind direction and velocity, and PID measurements from the sampling point tubing. Each sampling location will be surveyed and located on the Site map.

3.10 Remedial Investigation Final Report

At the completion of the investigation and laboratory analysis of the samples, Leader will prepare a Remedial Investigation Report ("RIR") is discussed in Section 6.0. If additional phases are required to further characterize the Site conditions or if an IRM is to be conducted before issuing a final RIR, Leader will communicate this information and the preliminary Site characterization data to NYSDEC.

4.0 QUALITY ASSURANCE/QUALITY CONTROL PROTOCOLS

This section describes the protocols and procedures to be used for the collection, handling, analysis of samples and the documentation of standards of site activities. This section also provides the management of the project and the responsibilities of each person involved with the project. Leader's project Quality Assurance Project Plan ("QAPP") is provided as Appendix A.

4.1 Project Management

NYSDEC Project Manager – Joshua Vaccaro, Division of Environmental Remediation, in Buffalo, New York (716) 851-7220. Mr. Vaccaro's responsibility is to manage the project, manage the NYSDEC personnel who are assigned to the project for technical review and oversight and ensure that all aspects of the agreed upon Work Plan and RI are completed. Mr. Vaccaro will be notified prior to deviating from the protocols presented herein and if there has been a problem with the procedures or analyses because of Site-specific conditions.

Leader Professional Services, Inc. Principal-in-Charge - Michael Rumrill, 271 Marsh Road, Suite 2, Pittsford, New York 14534 (585) 248-2413. Mr. Rumrill's responsibility is for overall quality control and to ensure that adequate resources are dedicated to this project.

Leader Professional Services, Inc. Project Quality Assurance Officer and Project Manager - Peter von Schondorf, 271 Marsh Road, Suite 2, Pittsford, New York 14534 (585) 248-2413. Mr. von Schondorf's responsibility is to ensure that the Work Plan is adhered to and to enforce any corrective actions needed. Mr. von Schondorf will be notified by Leader's Site Manager or by the analytical laboratory of any field problems with implementing the procedures or analyses because of Site-specific conditions, or if there has been a deviation from the protocols presented herein.

Leader Professional Services, Inc. Project Engineer - Dixon Rollins, P.E., 271 Marsh Road, Suite 2, Pittsford, New York 14534 (585) 248-2413. Mr. Rollins' responsibility is to ensure that the Work Plan is adhered, to enforce any corrective actions needed, and to supervise all technical aspects of the project implementation and report writing. Mr. Rollins will be notified by Leader's Site Manager or Project Manager of any problems with implementing the procedures or analyses because of Site-specific conditions, or deviations from the protocols presented herein.

Leader Professional Services, Inc. Site Manager is Robert Murphy, 271 Marsh Road, Suite 2, Pittsford, New York 14534, (585) 248-2413. Mr. Murphy's responsibility is to manage the remedial investigation and to ensure that aspects of the project are completed in accordance with the Work Plan.

Mark Perriello, CIH/CSP, is Leader's Health and Safety Officer – Mr. Perriello can be reached at 271 Marsh Road, Suite 2, Pittsford, New York 14534, (585) 248-2413. Mr. Perriello's responsibility is to manage the health and safety aspects of the field investigation and provide input on the evaluation of the laboratory data and a laboratory data quality assurance review.

4.2 Procedures for the Collection of Samples

Four types of samples will be collected during the course of the remedial investigation: soil vapor samples, headspace samples, soil samples and groundwater samples. Soil samples may be collected with three different types of equipment; sampling trowels, direct push sampling tools and/or split spoon samplers. Although each of these tools are used differently, the handling of the sample is relatively the same. Procedures for the collection of soil vapor samples, soil samples and groundwater samples are provided in Appendix A.

4.3 Field Procedures

Field activities will involve the completion of tasks which have specific procedures and/or requirements. Appendix A provides individual procedures which specify those requirements.

4.4 Analytical Requirements

A New York State Department of Health - Environmental Laboratory Approval Program ("ELAP") certified laboratory will be used to analyze all samples. In general, each sample will be analyzed for the following chemical groups, with the exception of surface soil samples, soil vapor samples and selected groundwater samples: VOCs+10 TICs, SVOCs and plus 20 TICs, TCL Pesticides and Herbicides, TAL metals including mercury and cyanide, PCBs, PFAS and 1,4-Dioxane. Surface soil samples will not be analyzed for VOCs, but for the remaining listed parameters. Soil vapor samples will be analyzed for TCL VOCs using USEPA Method TO-15. Two groundwater samples will be analyzed for the listed parameters, 1,4-Dioxane and PFAS. PFAS require specialized sampling requirements that are found in NYSDEC guidance "Groundwater Sampling for Emerging Contaminants," dated April 2018. These requirements are incorporated into the project's QAPP, see Appendix A.

In general, all soil and groundwater samples will be analyzed using methods from the United States Environmental Protection Agency ("USEPA") "Test Methods for Evaluating Solid Waste" (SW-846). All laboratory results will be prepared with Category B deliverables and in an electronic format suitable for uploading into NYSDEC's EQUIS database. Table 1 (attached) is a list of analyses for each media and the anticipated number of samples to be collected.

4.5 Quality Assurance Samples

Quality assurance samples will be collected and analyzed as a part of the project to determine if cross contamination is problematic, to verify laboratory results (consistency between samples) and to evaluate if the sample matrix is causing interference with the analytical methods. To accomplish these goals, four types of quality assurance samples will be collected: trip blanks, equipment blanks, duplicates, and matrix spike samples and matrix spike duplicates. Table 2 (attached) is a list of the samples, analyses and the frequency of the sample collection.

Trip blanks are samples composed of distilled and deionized water, which have been placed into 40-milliliter vials and used for the analysis of VOCs. These samples have been historically analyzed for VOCs, because volatile organic vapors can migrate into samples. One trip blank sample will be placed into one of the sample shipment coolers with each shipment to the analytical laboratory. Coolers carrying samples for emerging contaminant analysis will not carry any other samples. Trip blanks samples used for the emerging contaminant coolers will use water provided by the laboratory and be analyzed for those emerging contaminants and VOCs.

Leader will obtain sampling tool rinse samples composed of distilled and deionized water poured over a clean sampling tool. The sample will be analyzed for all parameters, the normal sample is analyzed to evaluate the decontamination procedures and their impact on the samples. One tool rinse sample will be collected for each tool used for sampling. Also, Leader will obtain one sample from the sampling equipment used for sampling groundwater for emerging contaminants.

Leader will obtain duplicate samples. These samples collected by physically splitting the sample into equal portions or collecting a portion from the sample in a sampling device (groundwater bailer for example). The duplicate samples are collected to evaluate the homogeneity of the sample and the consistency or reproducibility of the analytical procedures.

Matrix and matrix spike duplicate samples will be collected and prepared in the field and submitted to the laboratory for analysis. The laboratory introduces a chemical spike into the samples to determine how the spike reacts with the sample media and the consistency of the analysis.

In general, duplicates and matrix spike samples will be collected and analyzed at a frequency of one sample per twenty samples submitted for analysis.

5.0 HEALTH AND SAFETY

Leader has developed a site-specific Health and Safety Plan ("HASP") in general accordance with OSHA 29 CFR 1910.120, site safety requirements and Leader's experience with similar investigation activities. A copy of the HASP is found at Appendix B. This plan will be implemented by the project's Site Manager and Health and Safety Coordinator ("H&SC"). The H&SC will provide and implement the health and safety procedures for all project employees and any subcontractors ("Team") who may be working on the site. Prior to beginning the field activities, field team members are required to read and sign this HASP. All Site contractors will be responsible for preparing a HASP in accordance with the requirements and Leader's Site HASP and their employees health and safety while on-Site.

The HASP has been developed to provide a mechanism for establishing safe working procedures and conditions during the investigation activities at the Site. The safety organization, procedures, and protective equipment have been established based upon an analysis of potential hazards. Specific hazard control methodologies have been evaluated and selected with the goal of eliminating the potential of accident or injury. The content of the HASP may change based upon additional information made available to health and safety personnel, monitoring results, or changes in the technical scope of work. Changes to the HASP will be made by adding an addendum and submitting to NYSDEC for approval.

6.0 COMMUNITY AIR MONITORING PLAN

In addition to the HASP for the project, a site-specific Community Air Monitoring Plan ("CAMP) will be implemented. The CAMP will be conducted in conjunction with the HASP during the intrusive investigation work. Leader will monitor air quality at the perimeter of the unique work areas (i.e. drilling location, test pit spot, etc.) to the perimeter of the exclusion and beyond. The goal of the CAMP is to protect air quality in areas where residents, tenants and passersby might be impacted. The CAMP for the project is found at Appendix C.

If dust exceeds the thresholds at the upwind monitoring location during the investigative activities, Leader will take appropriate corrective action. If dust from the sampling or drilling operations exceed project thresholds at the downwind monitoring location compared to the upwind monitoring location, the project's field manager will determine what is causing the problem and seek a remedy, and if needed, they will stop work until it can be corrected. Air monitoring equipment will be located up and down wind of the investigation work.

7.0 REPORTING

Leader will prepare three written reports for NYSDEC documenting the Remedial Investigation monthly reports, data usability reports and the final RIR. If requested, an interim RI report will be prepared. Data will be uploaded in an approved electronic deliverable format ("EDD") to the Environmental Information Management System ("EIMS") managed by NYSDEC.

7.1 Daily and Weekly Reports

Daily air monitoring reports will be made to NYSDEC and NYSDOH in the event exceedences to the HASP requiring work stoppage or if there are CAMP exceedances within 24-hours. Weekly CAMP results will be provided to NYSDOH on a weekly basis during the course of the Remedial Investigation field work.

7.2 Monthly Reports

Monthly reports will be prepared during the course of the Remedial Investigation and Feasibility Study, so all parties are kept informed of the project's progress, changes and schedule.

7.3 Data Usability Summary Report

A Data Usability Summary Report ("DUSR") will be prepared once all of the RI sample analysis results are received from the laboratory. The DUSR will provide a thorough evaluation of the sample analytical data with the primary objective to determine whether the data, as presented, meets the site/project specific criteria for data quality and data use. Data problems may stem from improper sample preservation, exceeding sample holding times or analytical problems such as instrument calibration problems, sample contamination or matrix interferences. These problems may cause some of the data to be unusable or qualified with special notes for their use, requiring reanalyzed or recollected samples for analysis. This report will be prepared by an experienced environmental scientist or chemist who can conduct a full data validation.

7.4 Final Report – Remedial Investigation Report and Remedial Alternatives Analysis Report

Leader will prepare a final RIR consisting of two documents: a RIR and a RAAR. The RIR, in general, will present the activities and findings of the RI. In addition to discussing the findings, the report will summarize the Site history, a site records search results, description of the physical setting of the project and the surrounding area, the potentially impacted receptors including fish and wildlife resources impact, a qualitative health risk assessment and the potential future use of the property. The RIR will provide any deviations from the Work Plan and the outcome on the project's goals.

The project's findings will be discussed in the RIR in terms of the project setting, the site history, and the Site's planned future use. During this discussion, the results will be compared to the applicable environmental quality standards, criteria and guidance values. This comparison will be used along with a comparison of results (a location-to-location comparison) to determine where contaminant source areas are located, the extent of contamination and which exposure pathways are connected. The RIR will include Leader's conclusions. All data will be presented in table format and summarized on a drawing of the site using a usable scale such as one inch equals 40 feet or less.

The primary objective of the RAAR is to evaluate and select a remedial alternative(s) to restore the Site to pre-disposal conditions to the extent possible and feasible, to eliminate or mitigate significant environmental impacts and human health threats and to make the Site suitable for continued use. To accomplish these goals, Leader will employ a decision-making matrix to develop remedial alternatives.

There are eight (8) steps in the RAAR decision making process:

1. Establish remedial goals
2. Establish remedial action objectives
3. Identify response actions to address contaminants or contaminated media
4. Identify and screen technologies for each of the response actions
5. Assemble technologies in operable units or site wide alternatives
6. Analyze the alternatives pursuant to the following specific criteria:
    a. Overall protection of health and environment
    b. Compliance with standards, criteria and guidance
    c. Long term effectiveness and performance
    d. Reduction of toxicity, mobility, or volume
    e. Short-term effectiveness
    f. Implementability
    g. Cost
    h. Community Acceptance

7. Consider the potential for natural resource damage
8. Recommend a remedy

The RAAR will include eleven (11) main sections:

1. Executive summary
2. Purpose
3. Site description and historic land use
4. Future land use
5. Summary of previous investigations, remedial activities, and exposure/risk assessment
6. Site characterization and nature and extent of impacts to receptors
7. Identification of standards, criteria and guidelines for cleanup
8. Remedial action objectives
9. Identification and screening of technologies and development of remedial alternatives
10. Detailed evaluation of remedial alternatives
11. Selection of remedy

The SC/RAAR will be signed and certified by Dixon Rollins, PE, a New York State licensed Professional Engineer.

8.0 SCHEDULE

Upon receiving NYSDEC's comments and approval of the Work Plan, Leader and ACM will schedule site activities. It is anticipated that this process will take approximately 2.5 to 3.5 weeks. The RI report will be submitted to NYSDEC approximately three weeks after receipt of all analytical data.

NORTH

Title
Site Location
2266 and 2268 Military Road
Tonawanda, NY

Prepared For
ACM Northern CR#3 LLC
3144 S. Winton Road
Rochester, NY

Leader Professional Services
271 Marsh Road, Suite 2
Pittsford, NY 14534
(585) 248-2413
FAX (585) 248-2834

Project 235.198A

Date 6/11/2019

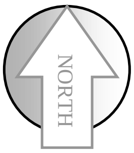
Scale NTS

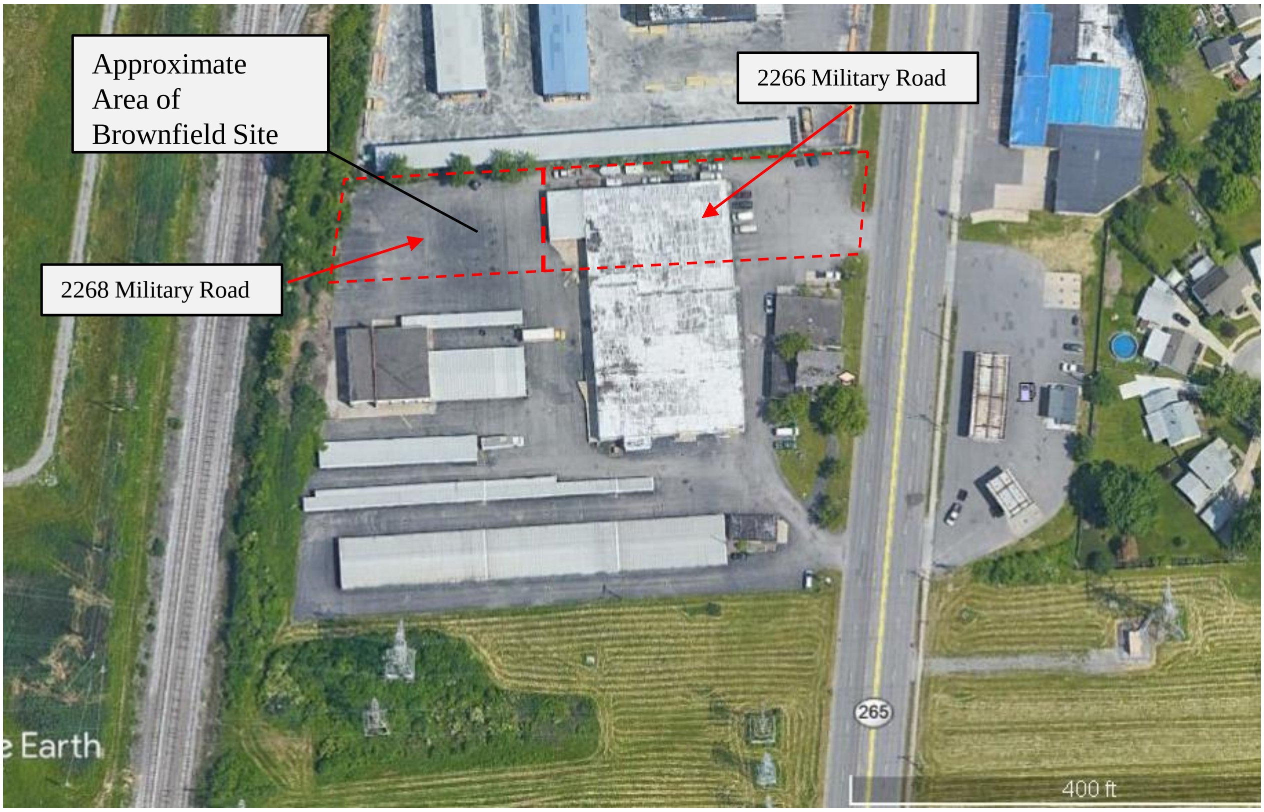
Drawn PVS

Checked MPR

File Name Site Location

Figure 1





Title	2017 Photograph of Site & Surrounding Areas 2266 and 2268 Military Road Tonawanda, NY
Prepared For	ACM Northern CR#3 LLC 3144 S. Winton Road Rochester, NY

Leader Professional Services
271 Marsh Road, Suite 2
Pittsford, NY 14534
(585) 248-2413
FAX (585) 248-2834

Project 235.198A

Date 6/11/2019

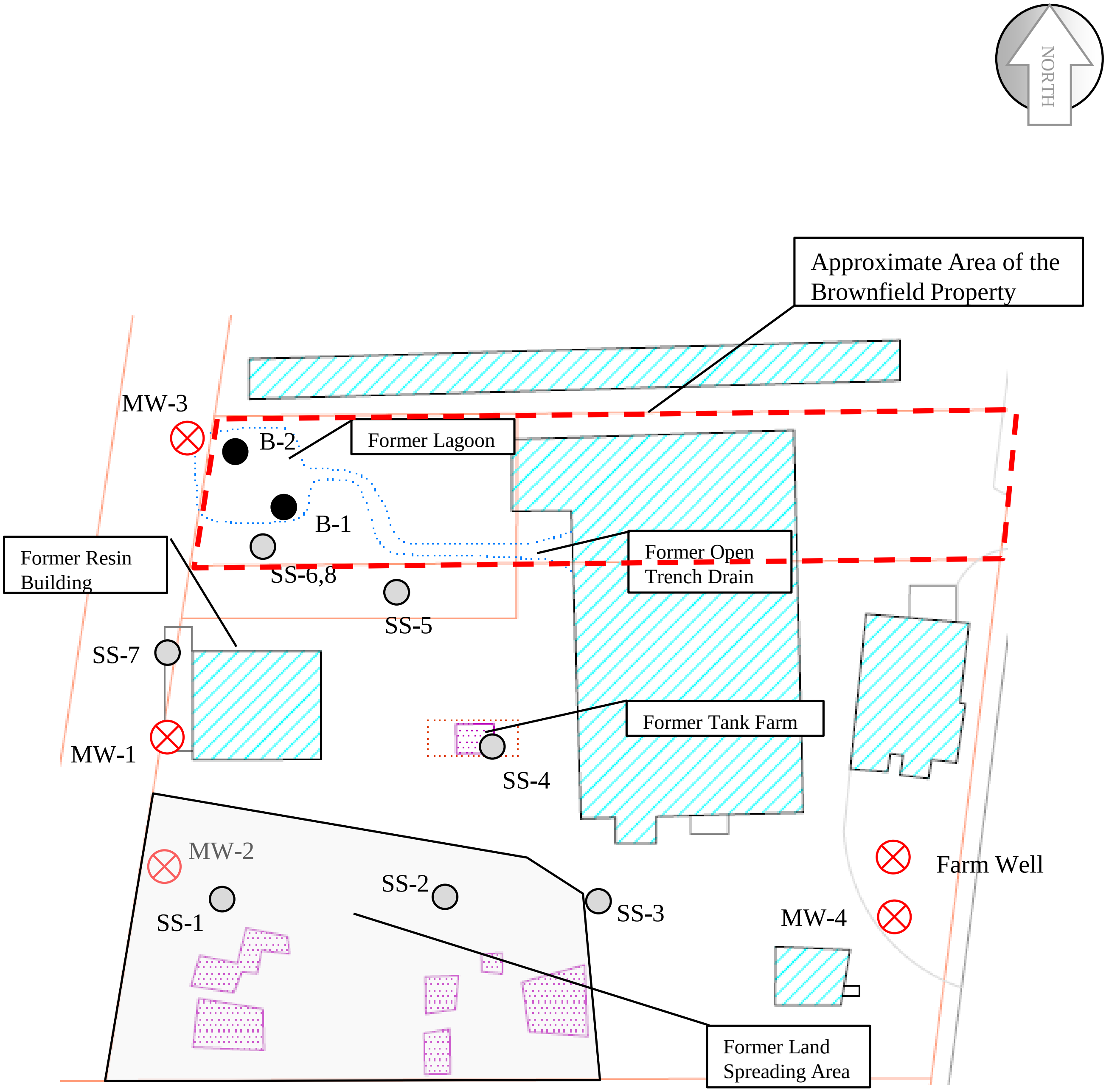
Scale As shown

Drawn PVS

Checked MPR

File Name 2017 Photo

Figure 2



⊗ 1993 MW-1 NYSDEC Monitoring Well

○ 1993 SS-1 NYSDEC Surface Soil Sampling Location

● 1993 B-1 NYSDEC Soil Boring Sampling Location

Title Waste Disposal Areas and Sample Locations
2266 and 2268 Military Road
Tonawanda, NY

Prepared For
ACM Northern CR#3 LLC
3144 S. Winton Road
Rochester, NY

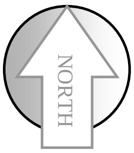
Leader

Leader Professional Services
271 Marsh Road, Suite 2
Pittsford, NY 14534
(585) 248-2413
FAX (585) 248-2834

Project 235.198A
Date 6/11/2019
Scale NTS

Drawn PVS
Checked MPR
File Name Site Map

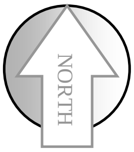
Figure 3

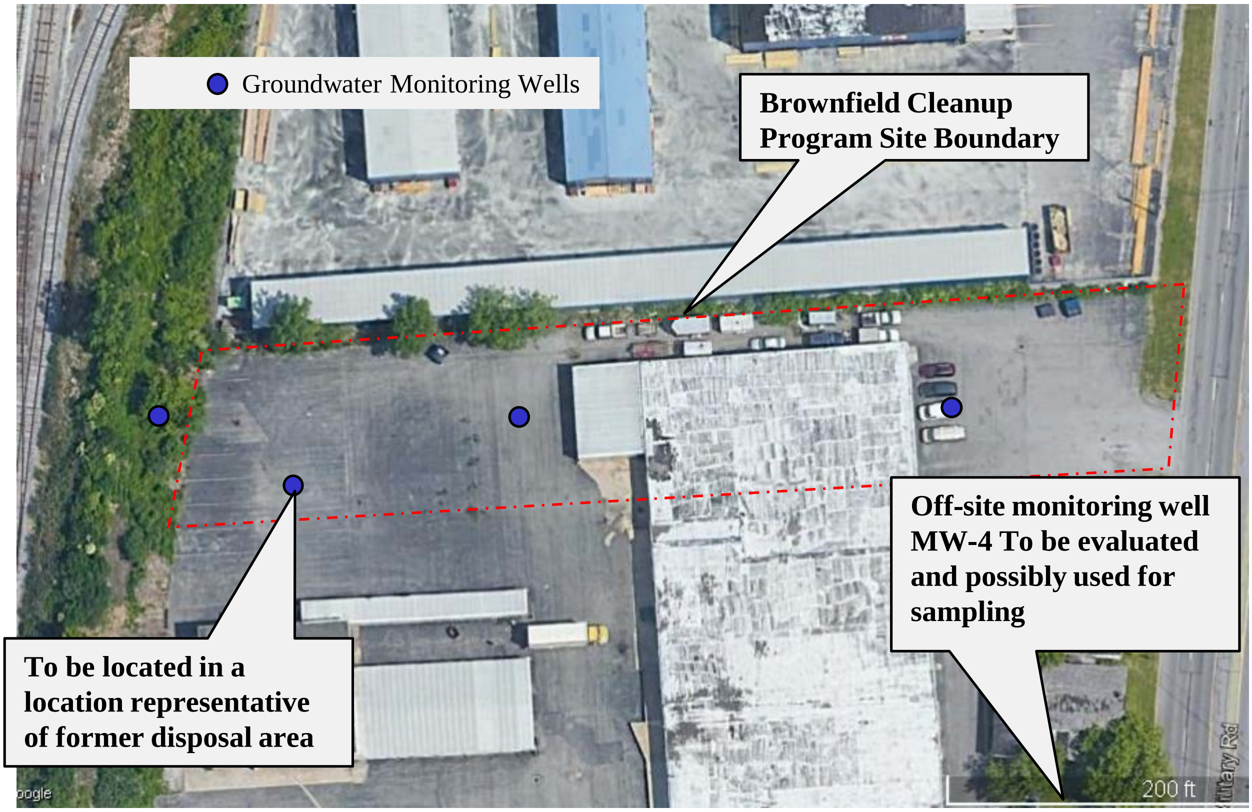


Title	Soil Sampling Locations 2266 and 2268 Military Road Tonawanda, NY
Prepared For	ACM Northern CR#3 LLC 3144 S. Winton Road Rochester, NY

Leader Professional Services
271 Marsh Road, Suite 2
Pittsford, NY 14534
(585) 248-2413
FAX (585) 248-2834

Project	235.198A
Date	10/1/2019
Scale	NTS
Drawn	PVS
Checked	MPR
File Name	Site Location
Figure	4

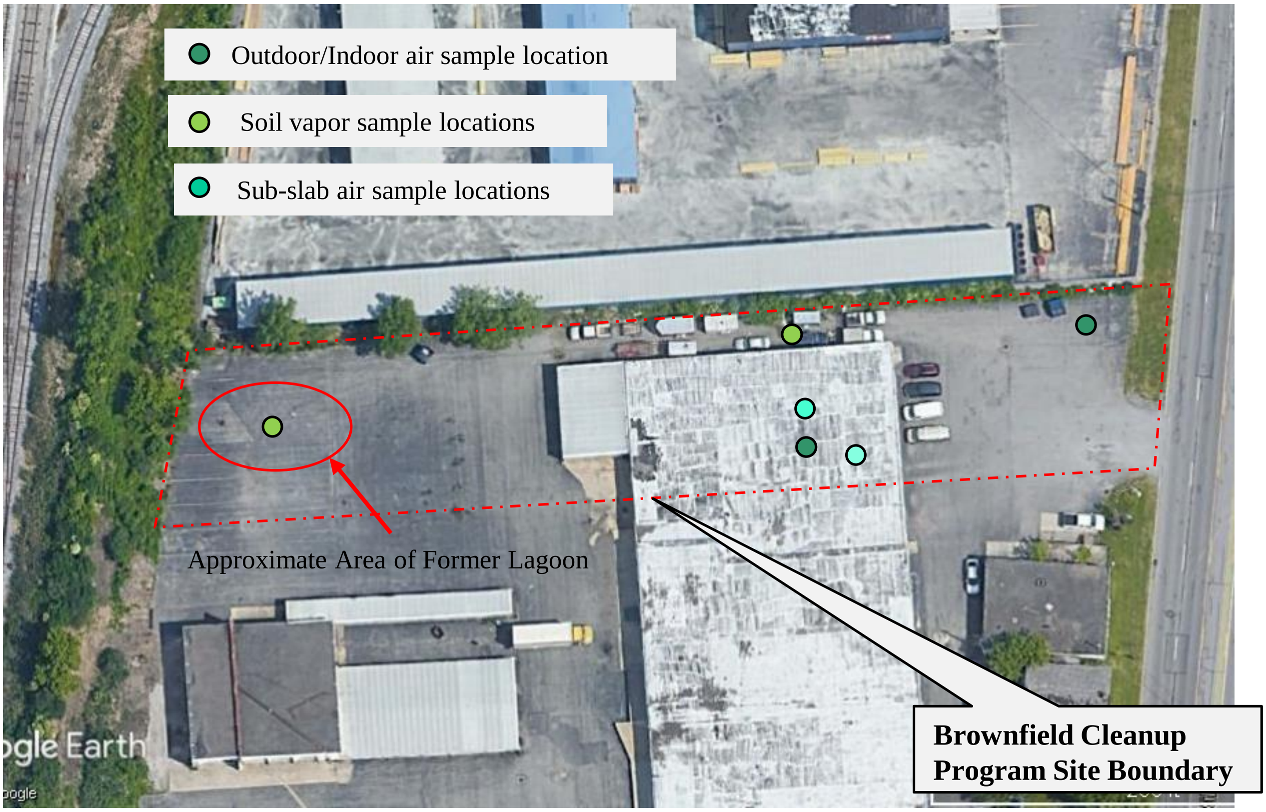




Title	Groundwater Sampling Locations 2266 and 2268 Military Road Tonawanda, NY
Prepared For	ACM Northern CR#3 LLC 3144 S. Winton Road Rochester, NY

Leader Professional Services
271 Marsh Road, Suite 2
Pittsford, NY 14534
(585) 248-2413
FAX (585) 248-2834

Project	235.198A
Date	6/11/2019
Scale	NTS
Drawn	PVS
Checked	MPR
File Name	Site Location
Figure	5



Title	Soil Vapor, Sub-slab and Indoor Air Sampling Locations 2266 and 2268 Military Road Tonawanda, NY
Prepared For	ACM Northern CR#3 LLC 3144 S. Winton Road Rochester, NY

Leader Professional Services
271 Marsh Road, Suite 2
Pittsford, NY 14534
(585) 248-2413
FAX (585) 248-2834

Project	235.198A
Date	10/1/2019
Scale	NTS
Drawn	PVS
Checked	MPR
File Name	Site Location
Figure	6

TABLE 1
Sample Analytical Requirements and Sample Numbers

Sample Types	Headspace Samples, PID	TCL VOCs, TO-15	TCL VOCS +20 TICs, SW-846 8260B	TCL SVOCS (inc. 1,4-Dioxane)+20 TICs, SW-846 8270	TCL Pesticides and Herbicides, SW-846 8081B	TAL Metals + Mercury and Cyanide SW-846 6010, 6020, 7471, 9012	PCBs, SW-846 8081	PFAS SW-846 Method 537.1 (Modified)	1,4-Dioxane SW-846 8270-SIM
Soil Vapor, Sub-slab, Indoor and Ambient Air		6							
Surface Soil									
Ground surface soil	4			4	4	4	4	0	0
Subsurface Soil									
Fill	10		10	10	10	10	10	3	3
Unsaturated zone	10		10	10	10	10	10	0	0
Saturated zone	10		10	10	10	10	10	0	0
Groundwater									
Monitoring well			4	4	4	4	4	2	2
Total Number of Samples, not including QA/QC samples	34	6	34	38	38	38	38	5	5

TABLE 2
Quality Assurance Samples

	Trip Blank[1]	Equipment Rinse Samples[2]	Duplicates Samples[2]	Matrix Spike[2]	Matrix Spike Duplicates[2]
Soil Vapor	N/A	N/A	N/A	N/A	N/A
Soil Samples	1 per sample shipment	1 per sampling tool	1:20 samples	1:20 samples	1:20 samples
Groundwater Samples[3]	1 per sample shipment[3]	1 per sampling tool	1:20 samples	1:20 samples	1:20 samples

N/A = not applicable

Notes:
1: VOCs only.
2: All analyzed parameters.
3: Groundwater samples for PFAS that are being analyzed will be shipped separately. The trip blank will be analyzed for only PFAS.

APPENDIX A

Quality Assurance Project Plan

QUALITY ASSURANCE/QUALITY CONTROL PROJECT PLAN FOR PLANNED SAMPLING ACTIVITIES

Bisonite Paint Company, LLC
2268 Military Road and 2266 Military Road
Tonawanda, New York
New York State Department of Environmental Conservation
Site #C915010

Prepared for:
ACM Northfield CR#3, LLC
3144 South Winton Road
Rochester, New York 14623

Prepared By:
Leader Professional Services, Inc.
271 Marsh Road, Suite 2
Pittsford, New York 14534

August 2019

235.198A

Leader

Figures

Tables

Appendices

1.0 INTRODUCTION

This Quality Assurance and Quality Control ("QA/QC") Project Plan contains the information pertaining to the collection, handling, analysis and documentation of standards for site activities. The sample test results will be used to prepare a Site Characterization and Remedial Alternative Analysis Report ("SC/RAAR"), a Remedial Investigation Report and Feasibility Study Report of the Bisonite Paint Company, LLC site located in Tonawanda, New York.

2.0 PROJECT DESCRIPTION

This QA/QC Project Plan was prepared to support the sampling of soil, soil vapor, groundwater samples for characterization of the physical conditions and environmental quality of the Bisonite Paint Company, LLC property located on two parcels identified on the Erie County Tax Map as parcels 51.12-6-16.1 and 52.12-6-16.2 ("Site"). The parcels are identified with the following street addresses, respectively: 2268 Military Road and 2266 Military Road in Tonawanda. This QA/QC Plan provides procedures for the collection, handling, analysis of samples and documentation standards of the Site activities.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The management of this project is presented in Figure 1 - "Project Management Organization." The responsibilities of each individual shown on Figure 1 are described below:

NYSDEC Project Manager – Joshua Vaccaro, Division of Environmental Remediation, located in Buffalo, New York (716) 851-7220. Mr. Vaccaro's responsibility is to manage the project and NYSDEC personnel who are assigned to the project for technical review and oversight, and to ensure that all aspects of the project are completed. Mr. Vaccaro will be notified prior to deviations from the protocols presented herein and if there has been a problem with the procedures or analyses because of Site-specific conditions.

Leader Professional Services, Inc. Principal-in-Charge - Michael Rumrill, 271 Marsh Road, Suite 2, Pittsford, New York 14534 (585) 248-2413. Mr. Rumrill's responsibility is for overall quality control and to ensure that adequate resources are dedicated to this project.

Leader Professional Services, Inc. Project Quality Assurance Officer/ Project Manager - Peter von Schondorf, P.G. 271 Marsh Road, Suite 2, Pittsford, New York 14534, (585) 248-2413. Mr. von Schondorf's responsibility is to ensure that the project and QA/QC Project Plan are adhered to and to enforce any corrective actions needed and be a point of contact for all technical issues regarding the project. Mr. von Schondorf will be notified by Leader's Site Manager or by the analytical laboratory of any deviations from the protocols presented herein or if there has been a problem with implementing the procedures or analyses because of Site-specific conditions.

Leader Professional Services, Inc. Project Engineer - Dixon Rollins, P.E, 271 Marsh Road, Suite 2, Pittsford, New York 14534 (585) 248-2413. Mr. Rollins' responsibility is to ensure that the Work Plan is adhered to, enforce any corrective actions needed and to supervise all technical aspects of the project implementation and report writing. Mr. Rollins will be notified by Leader's Site Manager or Project Manager of any problems with implementing the procedures or analyses because of Site-specific conditions, or deviations from the protocols presented herein.

Leader Professional Services, Inc. Project Supervisor/Site Manager –Robert Murphy, 271 Marsh Road, Suite 2, Pittsford, New York 14534, (585) 248-2413. Mr. Murphy's responsibility is to manage the project and to ensure that aspects of the project are completed in accordance with the Work Plan, and to manage the field investigation and the project budget.

4.0 SAMPLING PLAN DESIGN AND RATIONALE

The design of the sampling plan is discussed in the Work Plan and to a limited extent discussed in the following sections. The sampling plan is intended to be implemented as a series of individual and concurrent run tasks to make the best use of field time.

In general, the conceptual model for the Site's geology, hydrogeology, receptors and contaminants begins with the notion that the Site's former disposal activity was conducted using an unlined lagoon that accept liquid and solid waste from the manufacture of oil and latex based paints. In the 1990's the lagoon was capped, however, there is no documentation of the lagoon having been dredged to remove any settled waste. There are also reports of the lagoon cap having failed possibly releasing leachate. With a relatively defined source, the conceptual model will investigate the presence of waste materials in the former lagoon, and in the vicinity of possible waste conveyances from the manufacturing operation to the lagoon and evaluate the migration of contaminants across the Site. To complete this evaluation, the overburden will be investigated which will include identification and assessment of any historic fill and native soils. Surface soils will be evaluated to determine if leachate has migrated across the ground surface. Groundwater is anticipated to be at a depth of approximately four to ten feet below the ground surface. Past evaluations of the groundwater have been complicated by the presence of clay layers and unanticipated flow directions when compared to other groundwater surface elevation data from nearby monitoring well fields.

Field tasks have been proposed to characterize these overburden intervals or layers with respect to their physical characteristics (texture, thickness, extent, direction of groundwater flow, etc.) and to determine if the different media (soil, groundwater, soil vapor) have been impacted by past waste disposal activities.

Since the ground surface across much of the Site is covered with asphalt and building space, surface soils potentially exposed to contaminants whether by run off or leachate spills, exist at the edge of the Site's pavement cover. The surface soils could be a potential source of contaminant exposure for on-site and off-site workers.

The basic strategy for the investigation will be to use the NYSDEC's geophysical study and former mapping/aerial photographs of the Site to identify the former lagoon and work outward to determine the extent of contamination. Soil vapor is identified as a potential concern and the Site's building, since it has potential to be used on a regular basis by workers, will be evaluated to determine if vapor intrusion is occurring or that there is a potential for a concern to exist.

5.0 TARGET PARAMETERS

5.1 Laboratory Parameters

Soil and groundwater samples will be analyzed for Chemicals of Potential Concern (COPC). The COPC are defined as a Target Compound List (TCL), volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), TCL pesticides/polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) inorganics plus cyanide and mercury. In addition, several groundwater samples will be collected and analyzed for NYSDEC's emerging contaminants; 1,4-Dioxane and sampled and analyzed for Perfluorochemicals ("PFCs"), including Perfluoroalkyl and Polyfluoroalkyl Substances ("PFAS"), and Perfluorooctanoic Acid ("PFOA"). PFAS and PFOAs will be referred to collectively herein as PFAS. Soil vapor (air) samples will be analyzed for VOCs measured by USEPA Method TO-15.

All soil samples will be reported on a dry weight basis. Air samples will be collected in one liter Summa canisters.

A summary of the analytical parameters for each medium is provided in Table 1.

5.2 Field Parameters

Field parameters measured during groundwater sampling will include the following: conductivity, pH, temperature, dissolved oxygen, oxidation-reduction potential and turbidity. These field parameters will be measured during groundwater sampling with the aid of a flow through cell.

Soil sampling and soil vapor sampling will use a PID to evaluate undisturbed and disturbed soil conditions and to evaluate the soil gas upon construction of the soil vapor sampling point.

6.0 DATA QUALITY OBJECTIVES

The data quality objectives (DQOs) were determined based on the use of the data, and the analytical reporting limits that can be achieved with the analytical methods specified. The results of the soil sample analyses obtained during the investigation will be compared to the NYSDEC’s Part 375 Soil Cleanup Objectives for unrestricted use and restricted industrial use which is consistent with the current and anticipated future use. The results of the groundwater samples collected during the investigation will be compared to the NYSDEC TOGS 1.1.1 Ambient Water Quality Standards and Groundwater Effluent Values, and subsequent guidance for the emerging contaminants. The soil vapor sample results will be compared to NYSDOH’s guidance values.

7.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

Specific procedures for sampling, laboratory instrument calibration, laboratory analysis, reporting of data, internal QC, audits, preventive maintenance, and corrective action are described below.

8.0 PROCEDURES FOR THE COLLECTION OF ENVIRONMENTAL SAMPLES

The procedures in this document have been standardized to make them applicable to the anticipated site’s field conditions. It must be recognized that under certain conditions, the procedures discussed herein may not be appropriate given the site conditions at the time of sample collection. In such cases, it will be necessary to adapt the procedures given the specific conditions of the Site and the sampling objective. Changes will be discussed with NYSDEC before sampling.

8.1 Surface Soil Sampling

Surface soil samples will be collected as grab samples along the edge of Site pavement, see Figure 2. The sampling procedures to be used are provided in Appendix A of this plan and limited to the upper two inches of soil. The purpose of limiting the depth of investigation is to obtain data on the immediate environmental and health risks associated with the surface soil.

Information pertinent to the sampling procedures used and observations of the environmental conditions at the time of sampling will be entered into a field logbook with an indelible ink marker. The samples will be visually inspected for staining, color, and texture following the Unified Soil Classification System. The sample will be screened with portable organic vapor analyzers using photoionization detector (“PID”).

8.2 Subsurface Soil Sampling

Subsurface sampling will be completed at the proposed sampling locations shown on Figures 3 of this plan. The sampling procedures to be used are provided in Appendix B. The sampling will be conducted using either direct push or split spoon sampling tools. The purpose of the subsurface soil sampling is to obtain data on the extent of soil contamination within specific intervals in the former lagoon and in the overburden to characterize the soil and groundwater zone conditions. The intervals to be sampled include the following:

- Fill/Waste, this interval was selected because fill is suspected across the Site to an unknown depth below the asphalt pavement. The goal is to characterize the subsurface materials.

- Native soil was selected to characterize the conditions below the fill/waste to a depth where monitoring well screens may be placed, approximately 14 to 20 feet below the ground surface.

Three soil samples will be analyzed for PFAS and 1,4-Dioxane. Since these contaminants are found in many materials creating a potential cross contamination problem, sampling handling will mimic those used for groundwater sampling of PFAS found in Appendix D.

Information pertinent to the sampling procedures used and observations of the environmental conditions at the time of sampling will be entered into a field logbook with an indelible ink marker. The samples will be inspected to evaluate organic vapor readings, color, staining, and texture following the Unified Soil Classification System, location of stains and the location of saturated soil. The information gathered during the collection of subsurface soil samples collected using a sampling device and a borehole drilling method (e.g. hollow stem augers or direct push tools) or a trowel during a test pit excavation will be recorded in the field notebook but also on a boring log which is provided in Appendix B.

8.3 Headspace Soil Sampling

A portion of each sample will be retained for head space screening using a PID. These samples will be retrieved from direct push or split spoon sampling spoons as soon as possible after the initial visual inspection. The samples will be placed into a clean plastic bag or a clean glass container. If the ambient air temperatures are below 70 degrees Fahrenheit (“F”) the samples will be warmed either by placing them into the sunlight or in a warm area for approximately five minutes before they are screened with the PID. The screening results will be recorded in the field logbook.

8.4 Procedures for the Installation of Monitoring Wells

The purpose of the installation of groundwater monitoring wells is to obtain data on the groundwater quality and groundwater elevation data. These goals are achieved through the installation of monitoring wells. The installation process will be completed in two parts: drilling and sampling of test borings, and the construction and sampling of the monitoring wells. The proposed locations of the monitoring wells are shown on Figure 4.

Prior to the start of the drilling process, all equipment will be decontaminated to limit the introduction of contaminants into the environment and to limit the carryover of contaminants from one location to the other.

The drilling of test borings will be started by the split spoon/direct push sampling of the overburden soil in two to four feet intervals. Each sampled interval will be followed by the augering of the soil from the ground surface to increase the hole size. Soil sampling will be completed in consecutive sequence from the ground surface to a point approximately eight feet below the water table. Soil sampling will be done in accordance with the procedures found in Appendix B. The information gathered during the collection of subsurface soil samples collected during the completion of test boring will be recorded in the field notebook but also on a boring log/test pit log that is provided in Appendix B.

Once the bottom of the targeted depth is reached, the drilling contractor will begin the well installation process following procedures in Appendix C. The monitoring wells will be constructed using 2-inch diameter flush joint threaded PVC monitoring well screen and riser pipe. The monitoring wells will be constructed using a conventional monitoring well design following the well construction figure in Appendix C. Appendix C also provides a Well Construction Log which will be completed during or following the construction of the monitoring well.

Monitoring wells will be constructed to produce a representative sample of the shallow groundwater zone and will use a screen no longer than ten feet. The location of the screen will depend on the depth of the groundwater zone, the presence of a semi or impermeable layer (clay), the presence of stains, non-aqueous phased liquids, or volatile organic vapors. Ideally the screen will be positioned to intersect the water table surface.

Each monitoring well will be completed with a flush to the pavement/ground surface road box. The casing/road box which will be installed flush to the ground surface to allow continued use of the pavement for parking and building access. The casing will be fitted with a watertight gasket and the monitoring well will have a watertight locking plug inside the casing. A layer of sand will be used inside the casing and extend below the casing's sides to allow any storm water to flow back into the soil. The outside of the casing will be secured in concrete. The metal cap will facilitate locating the well when covered with snow or dirt with a metal detector.

Following construction, the monitoring wells will be developed to remove silt and clay and to produce a water sample with a turbidity value of less than 50 NTU. Each monitoring well will be surveyed to locate the monitoring well's position and to calculate its elevation.

8.4 Groundwater Sampling Procedures

Groundwater sampling will be completed at each of the proposed monitoring well locations, any existing monitoring wells found on the site, and at grab groundwater sampling locations, see Figure 4. The sampling procedures to be used are detailed in Appendix D of this plan. Two groundwater samples (one upgradient of the site and one

Site will be analyzed for PFAS and 1,4-Dioxane and will require special sampling and handling procedures. Appendix D describes these procedures. The purpose of the groundwater sampling is to obtain a representative sample of the shallow groundwater zone.

Information pertinent to the sampling procedures used and observations of the environmental conditions at the time of sampling will be entered into a field logbook with an indelible ink marker. Prior to the collection of samples field parameters will be measured during the pre-sampling well purging: water level depth below ground surface, dissolved oxygen, pH, turbidity, specific conductance, oxidation-reduction potential, temperature, and the presence of sheens and non-aqueous phase liquids. The collection of the groundwater sample will be conducted after three measurements are taken at 10 minute intervals and the measurements do not vary more than 20 percent. The field parameter data collected during purging will be recorded on the sampling form provided in Appendix D.

8.5 Soil Vapor Sampling

Prior sampling and knowledge of the former manufacturing on the Site indicates VOCs may be present, thus a potential hazard for building users. Soil vapor samples and sub-slab samples will be collected requiring the construction of sampling points on the Site. The sampling locations are shown on Figure 5.

The soil vapor and sub-slab sampling probe construction and sampling procedures to be used are detailed in Appendix E of this plan. The purpose of the soil vapor sampling is to obtain data on the chemical composition of the soil vapor and to evaluate the potential for vapor intrusion impacts within the Site building.

Information pertinent to the sampling procedures used and observations of the environmental conditions at the time of sampling will be entered into a field logbook with an indelible ink marker and on the sampling form provided in Appendix E. The soil samples collected during the drilling of the boreholes to be used guide the construction of the soil vapor sampling points. Any samples collected during the drilling process of the soil vapor probe locations will be visually inspected to color, staining and texture following the Unified Soil Classification System, the presence of stains and the amount of soil moisture present. The samples will also be screened with a PID to measure the presence of organic vapors.

The construction of sub-slab sampling points does not require the drilling through the soil column, so no soil samples will be collected. Important information about the building and the Site conditions will be gathered. Once the concrete floor is penetrated a PID will be used to monitoring the sub-slab vapor conditions. The hole created will be used to construct the sampling point as detailed in Appendix E of this plan. Before the drilling is completed, the field geologist will inspect the building and complete the questionnaire included in the NYSDOH's guidance document entitled "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York" dated October 2006 and revised October 2016. The inspection will identify areas of possible sub-slab infiltration, penetrations to the building envelop, sources of contamination, heating system type and operation at the time of sampling, and to verify the sampling location makes sense for the investigation.

8.6 Field Equipment Cleaning

All non-disposable equipment used for the collection, preparation, and preservation of the environmental samples must be cleaned prior to their use. Unless the equipment and materials used are disposable, or there are a sufficient number to be used during any one sampling period, cleaning will have to be conducted in the field. Field cleaning can be inefficient and lead to cross contamination problems compared to cleaning in a controlled environment. If possible, attempts will be made to minimize field cleaning. To avoid cross contamination between sampling points, dedicated disposable sampling equipment will be used when possible.

The materials needed to clean sample equipment are dependent upon the type of equipment needing cleaning. A sampling trowel will have a different requirement than the probes used in a flow-through cell. The following is a generalized list of materials to be used during cleaning:

- Cleaning solutions. Non-phosphate detergents will be used to clean sampling re-usable equipment.
- Water. In some cases, tap water may be adequate for initial or intermediate rinses. The final rinses, however, will be with deionized/distilled water.
- Buckets and washbasins. For use in the washing and rinsing of equipment.
- A drying rack. All materials and equipment must be dried prior to additional use. Paper towels will be used when necessary for drying equipment.

Drilling equipment, direct push or split spoon sampling tools will be decontaminated between sample locations. The decontamination methods used will include: use of potable water obtained from either the Site building or the Town's hydrant; high pressure spray wash using hot water from a steam generator; and drying of equipment.

Split spoons or geoprobe soil sampling tools used for the collection of soil samples will be decontaminated using the same process used for drilling equipment or hand washed using soap and water and a stiff brush. The tools will be then rinsed with potable water and dried.

Cleaning of the equipment will be done in a dedicated bermed pad area lined with two layers of plastic to facilitate the collection of wastewater. Wastewater generated from the cleaning process will be drummed along with any solid material.

8.7 Waste Handling

The handling of investigation derived waste and any remediation waste generated from an Interim Remedial Measure will be handed following the procedures identified in Appendix F. All wastes will be secured in drums, roll-off boxes or on top of and covered with plastic sheeting so the waste is controlled at all times. Each container will be labeled to identify the waste, the location of generation (borehole or monitoring well number), and the date of generation. Before the end of a field secession the wastes will be sampled and analyzed for characterization. If the waste is determined to be hazardous then each of those containers, boxes or piles will be appropriately labeled. All hazardous will be removed from the site within 90 days of its generation.

8.8 Documentation and Chain of Custody Procedures

8.8.1 Packaging and Shipping Procedures

Once the samples have been collected, the samples will be prepared and preserved in accordance with applicable procedures found in the Work Plan and this plan and packaged for overnight shipment and/or delivery to the laboratory. Table 2 provides the container, preservation and holding time requirements for each sample media and the analysis to be conducted. Chain-of-custody procedures will be followed to ensure the proper handling and possession of the samples until the analytical laboratory has received the samples. This section outlines procedures for the packing and shipping of environmental samples, and the general chain-of-custody procedures.

All individual glass or plastic sample containers will be placed in a durable shipping container. It is recommended that for this purpose, an insulated plastic cooler be used. The following is an outline of the packing and shipping procedures to be followed:

- The drain plug at the bottom of the cooler will be sealed to ensure that water from sample container breakage or ice melting does not leak from the outside container.
- Check screw caps for tightness and mark the sample volume level on the outside of large containers.
- For breakable containers, packing peanuts or bubble wrap may be used to keep containers in place and to prevent breakage.
- When samples must be kept at 4 degrees C, ice sealed in plastic bags or cool packs will be placed in the cooler.
- Documents accompanying the samples will be sealed in a plastic bag attached to the inside of the cooler lid.
- The lid of the cooler will be closed and fastened.
- Duct tape or reinforced shipping tape will be wrapped around the cooler several times to ensure that the lid will not open if the latch becomes unfastened.
- The following information will be attached to the outside of the cooler: name and address of receiving laboratory, return address of the sampling team, arrows indicating "This End Up" on all four sides, and a "This End Up" label on the top of the lid.
- A custody seal will be affixed and signed across the lid of the cooler.

Samples will be shipped by air for next day delivery at the specified laboratory. Personnel will be prepared to open and reseal the cooler for inspection if the courier requires it.

8.8.2 Chain-of-Custody Procedures

The primary objective of these procedures is to create an accurate written record, which can be used to trace the possession and handling of the sample from the moment of its collection through analysis, and to its introduction as evidence.

The number of persons involved in collecting and handling samples should be kept to a minimum. Detailed field records will be kept in the project field logbook and will contain the following information:

- Sample identification and source (including sampler's name, sample location, and sample media).
- Dates and times of sample procurement, preparation, and shipping.
- Preservative used.
- Analyses required.
- Pertinent field data (pH, DO, ORP, specific conductance, temperature, etc.).

To help eliminate possible problems in the chain-of-custody procedures, one person will be appointed Field Custodian for each task. For tasks where sampling teams are used, all samples are to be turned over to the Field Custodian by the team members who collected the samples. The Field Custodian will then document each sampling event and the sample will remain in his/her custody until it is shipped to the laboratory. The Field Custodian is responsible for properly packaging and dispatching samples to the laboratory. The responsibility includes filling out, dating and signing the appropriate portion of the chain-of-custody record.

Labels will be firmly affixed to each sample container. The labels on each sample bottle will be filled out with waterproof ink prior to sample collection. Sample reference numbers identical to that recorded on the labels will be recorded on the chain-of-custody.

When transferring the samples, the individual relinquishing the samples will sign and record the date and time on the chain-of-custody record. Every person who takes custody will fill in the appropriate section of the chain-of-custody record form, and their affiliated company. To minimize custody records, the number of custodians in the chain-of-possession should be minimized.

9.0 SAMPLE ANALYTICAL PROCEDURES

9.1 Field Analytical Procedures

Field measurements will be conducted in accordance with the Work Plan.

9.2 Laboratory Analytical Procedures

Chemical analyses in support of soil, groundwater, and air data will be performed by NYSDOH ELAP certified laboratories. The laboratories will maintain current SOPs for extraction, cleanup, and analysis of soil, water, and air matrices and must have on file current method detection limits ("MDL") studies to demonstrate their ability to meet the project required reporting limits within these matrices. The MDLs must be performed by the laboratories on a yearly basis to ensure their ongoing ability to perform the methods, as specified. The MDLs will be performed in accordance with USEPA guidance described in 40 CFR 136, 1986, Appendix B, "Definition and Procure for the Determination of the Method Detection Limit -Revision 1.11".

9.2.1 Soil, Air, And Groundwater Methods

Using the methods summarized in Table 1, the laboratories will perform analysis of soil, air, and groundwater.

9.3 Sample Documentation in the Laboratory

Upon receipt at the laboratory, the designated sample custodian will inspect the shipping coolerIcontainer and the custody seal. The sample custodian will note the condition of the coolerIcontainer and the custody seal on the Chain-of-Custody record sheet.

The sample custodian will record the temperature of one sample (or temperature blank) from each cooler and the temperature will be noted on the Chain-of-Custody. If the shipping cooler seal is intact, the sample containers will be accepted for analyses. The sample custodian will document the date and time of receipt of the container and sign the form.

If damage or discrepancies are noticed (including sample temperature exceedances), they will be recorded in the remarks column of the record sheet, dated, and signed. Any damage or discrepancies will be reported to the lab supervisor who will inform the lab manager and QA Officer before samples are processed.

10.0 CALIBRATION

Both field instrumentation and laboratory analytical instrumentation are to be used to provide project data. Both systems will require regular calibration in order to provide comparable and accurate information.

On-Site field data concerning VOCs will be obtained using portable organic vapor analyzer monitoring instruments, which will require daily calibration checks and weekly calibration. Other instruments needing calibration include: the water quality meter providing DO, ORP, field conductivity, turbidity meters, pH and temperature probes. Since this instrument will be obtained directly from Eco Rental Solutions ("Eco Rental") and used for on weekly basis, Leader will rely on Eco Rental to provide calibrated equipment, but Leader will also have the manufacturer's calibration instructions in the event that field calibration is required.

10.1 Field Instruments

10.1.1 Portable Organic Vapor Analyzer Calibration

The PID style equipment has a calibrated range of 0 to 2000 parts per million volume ("ppmv") total hydrocarbons and can collect instantaneous and 15 minute average concentrations. It is typically calibrated using isobutylene. A 10.2-eV lamp will be used, which ionizes many of the common air contaminants. The PID is highly sensitive to aromatic compounds such as benzene or toluene.

Calibration will be performed prior to taking the instrument into the field. Certified isobutylene-in-air (100 ppm) and zero-air standard gases are used for calibration, according to the manufacturer's specifications. Calibration checks will be made daily (at a minimum) using the isobutylene calibration gas. If needed, the instrument will be re-calibrated when the calibration check falls below 10-percent of the isobutylene concentration of the calibration gas. Field calibration records will be kept in the project field logbook

10.1.2 Conductivity, pH Meter, Do, Turbidity, Temperature Calibration

The Horiba 22 or similar device Water Quality Monitor is a multi-probe instrument that can measure most of the required field parameters using one hand-held instrument. The instrument will be provided by Eco Rental along with operating manuals and calibration equipment. The calibration of the specific conductance, pH, dissolved oxygen ("Do"), and temperature will be checked prior to beginning work and again at the completion of sampling following the manufacturer's operating procedures, or if results do not make sense based on prior testing. Field calibration records will be kept in the project field logbook

Turbidity will be measured using a standalone device such as the Lamotte 2020WE Turbidity meter. This device uses an optical sensor and utilizes manufacturer provided glassware to use a measurement container. The meter kit also come with calibration liquid for field calibration. Calibration of the meter will be completed at the beginning and at the completion of the workday. Field calibration records will be kept in the project field logbook.

10.2 Laboratory Equipment Calibration

All instruments used to perform chemical measurements must be properly calibrated prior and during use to ensure acceptable and valid results. The accuracy and traceability of all calibration standards used must be properly documented.

The methodologies selected for use in this investigation specify the types and frequency of calibrations. The specific methods to be used are provided in Table 1.

Accessory analytical equipment such as refrigerators, balances and ovens required for the storage and preparation of samples must be calibrated and/or monitored with the following guidelines:

Equipment must be checked daily and the records kept in a logbook or calibration-specific log.

The laboratory must document clearly the acceptance criteria for all such equipment (e.g., refrigerator temperature must be 4°C ± 2°C) and corrective actions must be taken for any out-of-control situation as described in the laboratory's Quality Manual

The equipment must not be used after corrective action until it has been recalibrated or verified through the successful analysis of a check standard

Calibrations of other miscellaneous analytical equipment (e.g., automatic pipettes) must be performed according to manufacturer's recommendations

Implementation of the laboratory calibrations will be the responsibility of the Laboratory Manager and the analysts performing the procedures.

The procedures described in this QAPP are to be used in conjunction with specific instrument manufacturer's instructions, applicable analytical methodology requirements, and specific laboratory field procedures for instrument operation.

10.2.1 Laboratory Instrument Preventative Maintenance

As part of the laboratory QA/QC program, a routine preventative maintenance program is conducted by the laboratory to minimize the occurrence of instrument failure and other system malfunctions. Designated laboratory employees regularly perform routine scheduled maintenance and repair of (or coordinate with the vendor for the repair of) all instruments. All laboratory instruments are maintained in accordance with manufacturer's specifications. The preventive maintenance program should include:

An inventory of replacement and spare parts for instruments that are maintained.

Maintenance logbooks for each instrument with information on routine and non-routine procedures. The logbook records must include the instrument number, description of malfunction or problem, date of maintenance activity, the type of activity performed and final resolution.

Training of laboratory staff in the maintenance requirements of the instruments. Preventive maintenance schedules and activities will be outlined in the laboratory SOPs.

10.2.2 Inductively Coupled Plasma Spectroscopy

The Inductively Coupled Plasma (ICP) Spectrometer should be maintained under service contract with the manufacturer. Routine preventive maintenance should include:

- Checking pump tubing and replacing when necessary
- Checking nebulizer for even "spray" and cleaning, as necessary
- Checking the torch for plasma height and shape and cleaning, as necessary
- Checking sensitivity of photomultiplier and replacing, as necessary

10.2.3 Gas Chromatograph Instruments

The Gas Chromatography ("GC") and GC/Mass Spectometry ("MS") systems will be maintained on a service contract or undergo in-house maintenance to provide routine preventive maintenance. Spare parts for the GC and GC/MS systems should include: filaments, electron multiplier, source parts, o-rings, ferrules, septa, injection port liners, and columns. Routine preventive maintenance for the systems should include:

- Checking the data systems (disk drives, hard drives etc.) and servicing, as necessary
- Changing oil and traps on mechanical and turbo pumps
- Conditioning of moisture traps, every two months or when the gas source is changed
- Carrier gas evaluation and leak checking of electron capture detector when the gas or column is changed
- Servicing the MS source through cleaning, replacement of filaments and other source parts, as necessary
- Replacement of injection port septa and liners, as necessary
- Clipping the front end of GC column or replacement of GC column, as necessary

10.3.4 Atomic Absorption Instruments

The atomic absorption (AA) systems will be maintained on a service contract or undergo in-house maintenance to provide routine preventive maintenance. Routine preventive maintenance procedures should include:

- Checking the plumbing connections
- Checking the auto-sampler and tubing

10.3.4 Thermometers

Thermometers for refrigerators and ovens are calibrated yearly against National Institute of Standards and Technology (NIST) certified thermometers. The Laboratory QA Officer will be responsible for the safekeeping of the NIST thermometers, and for the documentation asserting the accuracy of their measurements.

10.3.5 Analytical Balances

Virtually every analytical procedure requires the use of side-loading and/or top-loading balances. Many of these requirements involve standards preparation and are, therefore, crucial to accurate determination. Balances should be maintained on a service contract. A calibration status label is affixed to each balance after calibration during servicing.

11.0 INTERNAL QUALITY CONTROL CHECKS

11.1 Field Measurements

The type and frequency of field-generated QC samples are summarized in Table 3. Primarily, rinse blanks, trip blanks, and field duplicates are employed to verify the field sampling approach. When handling or sampling for PFOAs, the laboratory conducting those analyses will provide water free of those analytes for use in the field.

11.2 Laboratory Analysis

The type and frequency of laboratory generated QC samples are specified by the analytical method and the laboratory's quality assurance plan. Criteria that the laboratory must meet are presented in the analytical methods.

11.2.1 Laboratory Quality Control

Specific procedures related to internal laboratory QC samples are detailed in the analytical methods. The following QC samples will be analyzed and the results will be used to assess overall analytical accuracy and precision.

11.2.2 Reagent (Method) Blanks

Laboratory glassware and sample containers used to store and transport samples will be cleaned in accordance with method protocols.

A reagent blank will be analyzed by the laboratory at a frequency of one blank per analytical batch. The reagent blank, an aliquot of analyte-free water or sand, will be carried through the entire sample preparation and analytical procedure, including all cleanup procedures. The reagent blank is used to document contamination resulting from the analytical process.

11.2.3 Laboratory Control Samples (LCS)/ Blank Spike Analyses

The LCS or blank spike serves as a monitor of the overall performance of all steps in the analysis, including the sample preparation. LCS or blank spikes will be analyzed for each method using the same sample preparation and analytical procedures employed for the investigative samples.

11.2.4 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

An MS/MSD sample will be analyzed for organic parameters and inorganic parameters at a minimum frequency of one per 20 investigative samples. For each matrix, percent recoveries will be used to evaluate analytical accuracy while the RPD between MS/MSD analyses will be used to assess analytical precision.

11.2.5 Surrogate Analysis

Surrogates are organic compounds which are similar to the analytes of interest and are not normally found in environmental samples. Surrogates are added to samples to monitor the effect of the matrix on the accuracy of the analysis. Every blank, standard, and environmental sample analyzed by GC or GC/MS, including MS/MSD samples, will be spiked with surrogate compounds prior to sample preparation.

The compounds that will be used as surrogates and the levels of recommended spiking are specified in the methods. Surrogate spike recoveries must fall within the laboratory control limits. If surrogate recoveries are excessively low (<10 percent), the laboratory will contact the QA/QC Officer for further instructions.

Dilution of samples to bring the analyte concentration into the linear range of calibration may dilute the surrogates out of the quantification limit. Reanalysis of these samples is not required. Assessment of analytical quality in these cases will be based on the MS/MSD sample analysis results.

11.2.6 Retention Time Window Determination

For organic analyses, determination of the target analyte retention time window will be made based on the procedure specified in the methods of analysis. Positive identification of an analyte will be made when its retention time falls within the window established during calibration.

11.2.7 Internal Standards

To ensure that changes in GC/MS response and sensitivity do not affect sample analysis results, internal standard compounds are added to all samples, blanks, and spike samples prior to VOC and SVOC analyses. All results are calculated as a ratio of the internal standard response. The criteria by which the internal standard results are assessed will be as follows:

- Internal standard area counts must not vary by more than a factor of two (-50 percent to +100 percent) from the associated calibration standard.
- The retention time of the internal standard must not vary more than ±30 seconds from the associated calibration standard.

11.2.8 Cleanup Check Samples

Whenever a cleanup technique is employed to eliminate interferences that may prevent accurate determination of the targets of interest at the project required reporting limits, the cleanup procedure must be verified through the analysis of check standards. A standard containing some or all of the target analytes must be processed through the cleanup procedure and analyzed. The recovery of the target analytes in this check will indicate if the cleanup procedure was effective in elimination of interferences without impacting the target compounds of interest.

11.2.9 Sample Collection QC

Field QA/QC sample quantities are summarized in Table 3 and the use in the analysis of the data is discussed in Table 4. Field duplicates will be submitted at a frequency of one per 20 investigative samples or one per sampling event. The duplicate results will be used to assess overall sampling and analytical precision and will be assessed against acceptance criteria of 50 percent RPD for water samples and 100 percent for soil samples.

Trip blanks for VOCs will be prepared by the laboratory using analyte-free water and submitted with the water sample collection containers. The trip blanks will be kept unopened in the field with sample bottles. One trip blank will be transported to the laboratory with each batch of aqueous VOC samples. The laboratory will analyze trip blanks as samples.

Rinse blanks will be used to assess decontamination procedures of collection equipment used for multiple samples. The rinse blank will be prepared using analyte-free deionized water when non-dedicated equipment is used in the field. The rinse blanks will be analyzed by the laboratory as samples. Rinse blanks will be prepared at a frequency of one per 20 investigative samples per equipment type.

Trip blanks and rinse blanks used when handling and submitting samples for PFOA analysis will use water free of those analytes. This water will be provided directly from the analytical laboratory.

12.0 DATA REDUCTION, VALIDATION, AND REPORTING

All data generated through field activities or by the laboratory operation shall be reduced and validated prior to reporting in accordance with the methods and the following procedures.

12.1 Data Reduction

12.1.1 Field Data Reduction Procedures

Field data reduction procedures will be minimal in scope compared to those implemented in the laboratory setting. Only direct read instrumentation will be employed in the field. The pH, conductivity, temperature, dissolved oxygen, and turbidity readings collected in the field will be generated from direct read instruments following calibration per manufacturer's recommendations. Such data will be written into field logbooks immediately after measurements are taken and/ or recorded on field forms. If errors are made, results will be legibly crossed out, initialed, and dated by the field member, and corrected in a space adjacent to the original entry. Later, when the results forms required for this study are being filled out, the Field QA Officer will proof the forms to determine whether any transcription errors have been made by the field crew.

12.1.2 Laboratory Data Reduction Procedures

For this project, the equations that will be employed in reducing data are found in the appropriate chapters of SW-846, Third Edition. All calculations are checked at the conclusion of each operating day. Errors are noted, corrections are made, but the original notations are crossed out legibly. Analytical results for soil samples shall be calculated and reported on a dry weight basis.

Quality control data (e.g., laboratory duplicates, surrogates, matrix spikes, and matrix spike duplicates) will be compared to the method acceptance criteria. Data considered to be acceptable will be entered into the laboratory computer system. Data summaries will be sent to the Laboratory QA Officer for review. If approved, data are logged into the project database format. Unacceptable data shall be appropriately qualified in the project report. Case narratives will be prepared which will include information concerning data that fell outside acceptance limits, and any other anomalous conditions encountered during sample analysis.

12.2 Data Validation

Data validation will be conducted in accordance with "U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," EPA-540/R-99/008, October 1999, and the "U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," EPA-540/R-94-013, February 1994. The data assessment will include a review of all technical holding times, instrument performance check sample results, initial and continuing calibration results, and all batch and matrix QC including rinse blanks, field duplicates, MS/MSD, matrix duplicates, surrogate recoveries, method blanks, LCS results, continuing and initial calibration checks, and the identification and quantitation of specific analytes of interest. Assessment of analytical and in-house data will include checks on data consistency by looking for comparability of duplicate analyses, adherence to accuracy and precision control criteria detailed in this QAPP, and anomalously high or low parameter values. The results of these data validations will be reported to the project manager and the contract laboratory, noting any discrepancies and their effect upon acceptability of the data.

Data validation reports will summarize the samples reviewed, parameters reviewed, any nonconformance with the established criteria, validation actions (including data qualifiers). Data qualifiers will be consistent with the validation guidelines and will consist of the following:

J) The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

UJ) The analyte was not detected above the sample reporting limit; however, the reporting limit is approximate

U) The sample was analyzed for, but was not detected above the sample reporting limit

R) The sample result is rejected due to serious deficiencies. The presence or absence of the analyte cannot be verified

12.3 Laboratory Data Reporting

The Laboratory will provide electronic copies of all laboratory data reports for project reporting purposes in a format consistent with NYSDEC/USEPA Contract Laboratory Program ("CLP") Category B deliverables. Equis electronic deliverables will also be required for the project database.

12.4 Data Reconciliation with Requirements for Usability

The goal of this project is to produce data to be used in comparison to soil and groundwater quality cleanup criteria. As such, the data generated must meet the data user's needs as defined in the project DQOs in Section 6.0 of this QAPP. In summary, the primary objectives for assessing the usability of the data are:

1. To collect data that is representative of site conditions and comparable with prior data;

2. To produce data that meets the project reporting limit requirements; and

3. To produce data of the highest quality possible in order to accurately and precisely characterize the site.

Data validation personnel will apply the standard data validation qualifiers to data to indicate the level of uncertainty in the associated result. In general, for the purposes of this investigation, data that are left unqualified, data qualified "U" (non-detected), data qualified "J" (detected as an estimated result), and data qualified "UJ" (non-detected at an estimated reporting limit) are considered valid and usable for project objectives. Data that are qualified "R" (rejected) will be considered invalid and unusable.

The goal of this program is to generate valid, usable data. However, in environmental sampling and analysis, some data may be lost due to sampling location logistics, field or laboratory errors, or matrix effects that may cause the rejection of results for some compounds. The overall completeness goal for collection of valid data is 90 percent. If this goal is not met, data gaps may exist that may compromise the intended use of the data.

13.0 PERFORMANCE AND SYSTEM AUDITS

Performance and system audits of both field and laboratory activities may be conducted in accordance with the Work Plan and this QAPP, to verify that sampling and analysis are performed in accordance with the procedures established.

Performance and system audits of both field and laboratory activities will be conducted to verify that sampling and analysis are performed in accordance with the procedures established in the QAPP and analytical methods. The audits of field and laboratory activities will include two independent parts: internal and external audits.

13.1 Field Performance and System Audits

13.1.1 Internal Field Audit Responsibilities

Internal audits of field activities include the review of sampling and field measurements conducted by the Field QA Officer. The audits will verify that all procedures are being followed. Internal field audits will be conducted once during each phase of the sampling and at the conclusion of the project. The audits will include examination of the following:

i) Field sampling records, screening results, instrument operating records

ii) Sample collection

iii) Handling and packaging in compliance with procedures

iv) Maintenance of QA procedures

v) Chain-of-custody reports

Follow up audits will be conducted to correct deficiencies and to verify that procedures are maintained throughout the investigation.

13.1.2 External Field Audit Responsibilities

External audits may be conducted by the NYSDEC or designee at any time during the field operations. These audits may or may not be announced and are at the discretion of the NYSDEC.

13.2 Laboratory Performance and System Audits

13.2.1 Internal Laboratory Audit Responsibilities

For the purpose of internal evaluation, performance evaluation check samples are analyzed periodically by the laboratory. Internally, the evaluation of data from these samples is done on a continuing basis over the duration of a given project.

The project QA Officer may carry out performance and/ or systems audits to ensure that data of known and defensible quality are consistently produced during this program.

Systems audits are qualitative evaluations of all components of laboratory quality control measurement systems. They determine if the measurement systems are being used appropriately. The audits may be carried out before all systems are operational, during the program, or after completion of the analytical report by the laboratory. Such audits typically involve a comparison of the activities given in the QA/QC plan described herein, with activities actually scheduled or performed. A special type of systems audit is the data management audit. This audit addresses only data collection and management activities, and can be used to track data generation and manipulation through the lab.

The performance audit is a quantitative evaluation of the measurement systems used for a monitoring program. It requires testing the measurement systems with samples of known composition or behavior to quantitatively evaluate precision and accuracy. A performance audit may be carried out by or under the auspices of the project QA Officer without the knowledge of the analyst during this program.

It should be noted, however, that any additional QA audits would only be performed if deemed necessary.

13.2.2 External Laboratory Audit Responsibilities

External audits will be conducted as required, by appropriate QA personnel of the NYSDOH.

13.3 Specific Routine Procedures to Assess Data Precision, Accuracy, Representativeness, and Completeness ("PARC")

The laboratory and the project QA/QC officer will evaluate data precision, accuracy and completeness.

The purpose of this Section is to define the goals for the level of QA effort; namely, accuracy; precision and sensitivity of analyses; and completeness, representativeness, and comparability of measurement data from the analytical laboratories. QA objectives for field measurements are also discussed.

DQOs have been established to ensure that the database developed during the monitoring activities meet the objectives and quality necessary for its intended use.

13.3.1 Precision

Precision is a measure of degree to which two or more measurements are in agreement.

Precision $= (D_2 - D_1) / (D_{1+} D_2)/2 \times 100$

D_1 = original result

D_2 = duplicate result

The method(s) precision (reproducibility between duplicate analyses) will be determined based on the duplicate analysis of matrix spike samples for organic parameters and duplicate sample analyses for inorganic parameters. Precision will be reported as Relative Percent Difference (RPD) between duplicate analyses. Sampling precision will be addressed through the collection and measurement of field duplicates at a rate of one per 20 investigative samples or one per sampling event, whichever is greater. Precision will be evaluated using the laboratory control limits.

13.3.2 Accuracy

Accuracy is the degree of agreement between an observed or measured value and an accepted reference or true value.

Accuracy $= [(A-B)/C] \times 100$

A =The analyte determined experimentally from the spike sample.

B = The background level determined by a separate analysis of the unspiked sample.

C = The amount of spike added.

13.3.2.1 Accuracy Objectives

Accuracy will be determined for both field and laboratory activities through the use of field blanks and matrix spike samples.

Field (rinsate) blank samples will be collected and analyzed as a check on the efficiency of the sampling device cleansing protocols and to determine if the field, sample transporting procedures, preservatives, and environments have contaminated the sample. Rinse blanks will be collected at a frequency of one per 20 samples per equipment type.

The method accuracy (percent recovery) for water and soil samples will be determined by spiking selected samples (matrix spikes) with all representative spiking compounds, as specified in the analytical methods. Accuracy will be reported as the percent recovery of the spiking compound(s) and will be evaluated using the laboratory control limits.

13.3.3 Completeness

Completeness is a measure of the amount of valid (usable) data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions.

Completeness = (Number of useable data/Number of useable data planned) X 100

13.3.3.1 Completeness Objective

Completeness is a measure of the amount of valid measurements obtained from all the measurements taken in the project. Laboratory completeness for this project will be 90 percent or greater.

13.3.4 Representativeness

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition or an environmental condition within a defined spatial and/or temporal boundary.

13.3.4.1 Representativeness Objective

Sampling protocols have been presented for the collection of a variety of samples exhibiting specific characteristics or conditions (i.e., the presence of stains or elevated PID readings or when field parameters collected during groundwater sampling stabilize). These conditions may not be representative of the site conditions, but possibly the worst case so the data might reflect what could potentially be on the site and drive risk assessment and eventual cleanup. In these cases, the term representativeness has a very small characteristic population and very small spatial area. Generically, representativeness may suggest a meaning of “typical” or “average” when in fact the sample was biased toward the worst case extreme.

13.3.5 Corrective Actions

Corrective action is the process of identifying and correcting unacceptable procedures or QC performance that can affect data quality and usability. Corrective actions, if necessary, will be implemented in accordance with the procedures presented below and the laboratory SOPs.

Corrective actions may be required for two classes of problems: analytical and equipment problems, and noncompliance problems. Analytical and equipment problems may occur during sampling and sample handling, sample preparation, and laboratory instrumental analysis.

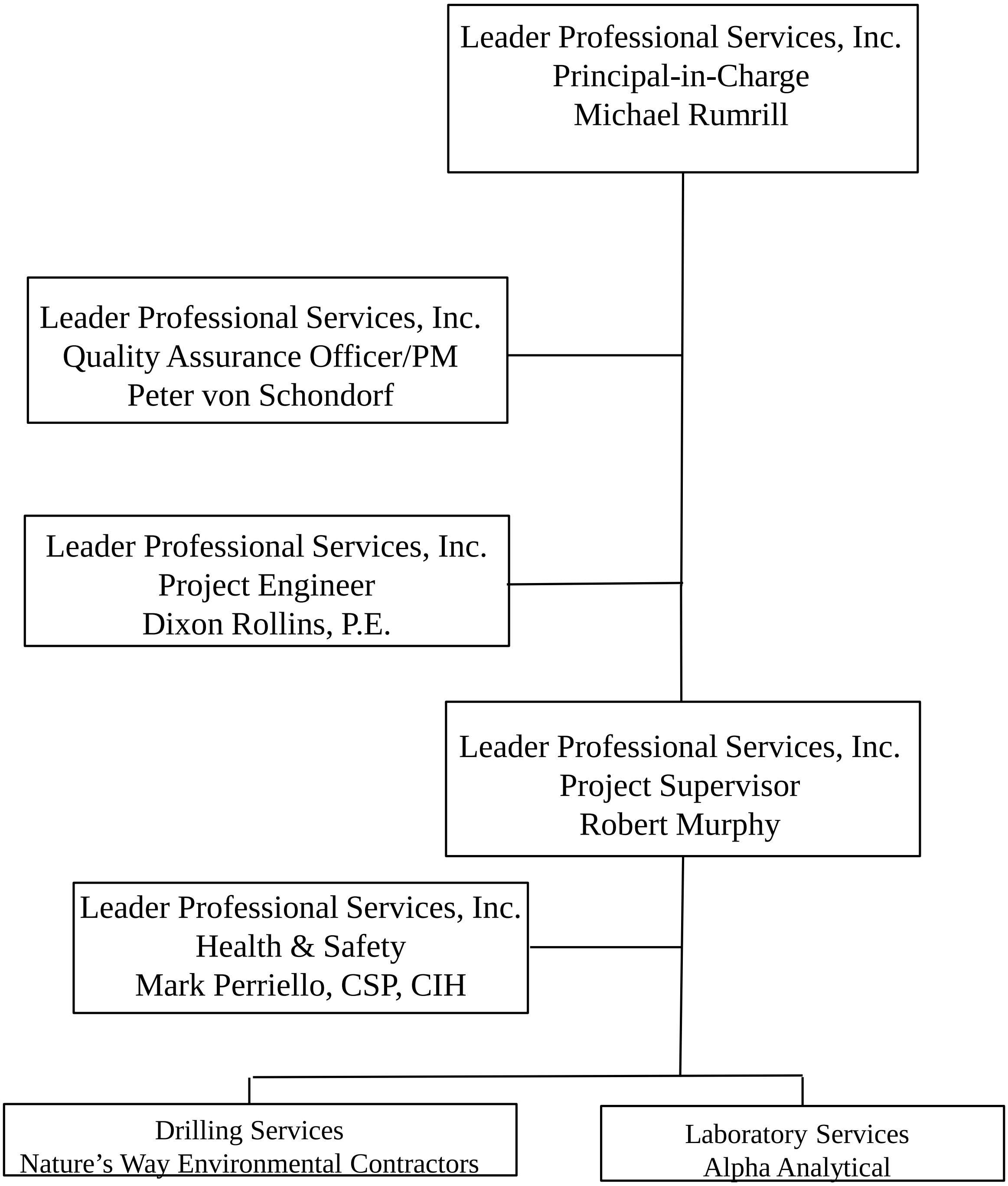
For non-compliance problems, for example, USEPA methods or QC measures are not being followed, a formal corrective action will be implemented at the time the problem is identified. The person who identifies the problem is responsible for notifying the Project Manager. A description of the problem and the corrective action implemented will be confirmed in writing via e-mail, facsimile, or technical memorandum.

Any nonconformance with the established QC procedures in this QAPP will be identified and corrected.

14.0 FIELD NOTES

Field notes will be maintained during all field activities. The overall chronology of field activities as well as sampling details will be recorded in a bound logbook with an indelible ink marker. Each page will be consecutively numbered and signed by the Site Manager at the end of the workday. The following information, as appropriate, will be documented in the field notes:

- Date
- Weather conditions
- Personnel on or visiting Site
- Subcontractors on-Site
- Worked performed
- Changes to planned work as discussed with NYSDEC
- Time at which work, sampling or analysis was performed
- Equipment calibration methods and time
- Problems with personnel or machinery
- Sample identification numbers
- Sampling sequence
- Types of sample containers used
- Parameters requested
- Field analysis methods and data
- Field observations during the sampling event
- Name of sampler



Title: Project Organization
Bisonite Paint Company
Tonawanda, New York

Prepared For: ACM Northfield CR#3, LLC
3144 South Winton Road
Rochester, New York

Leader Professional Services, Inc
271 Marsh Road-Suite 2
Pittsford, New York 14534
(585) 248-2413
Fax (585) 248-2834

Project 842.001

Date November 26, 2018

Scale NTS

Drawn PVS

Checked MPR

File Name Project Org.

Figure 1

Title
Soil Sampling Locations
2266 and 2268 Military Road
Tonawanda, NY

Prepared For
ACM Northern CR#3 LLC
3144 S. Winton Road
Rochester, NY

Leader

Leader Professional Services
271 Marsh Road, Suite 2
Pittsford, NY 14534
(585) 248-2413
FAX (585) 248-2834

Project 235.198A

Date
10/1/2019

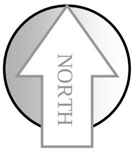
Scale
NTS

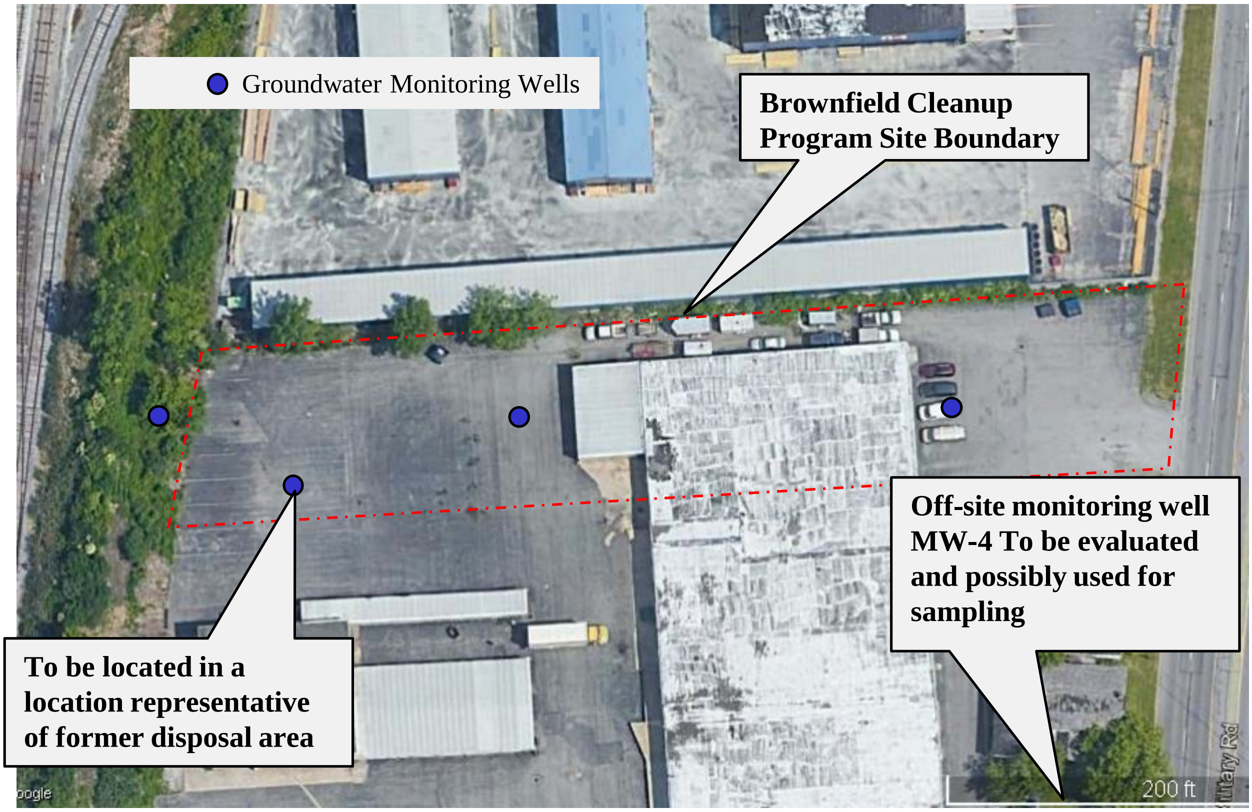
Drawn
PVS

Checked
MPR

File Name
Site Location

Figure
2





● Groundwater Monitoring Wells

Brownfield Cleanup Program Site Boundary

Off-site monitoring well MW-4 To be evaluated and possibly used for sampling

To be located in a location representative of former disposal area

Title
Groundwater Sampling Locations
2250 Military Road
Tonawanda, NY

Prepared For
ACM Northern CR#3 LLC
3144 S. Winton Road
Rochester, NY

Leader
Leader Professional Services
271 Marsh Road, Suite 2
Pittsford, NY 14534
(585) 248-2413
FAX (585) 248-2834

Project 235.0198

Date 11/9/18

Scale NTS

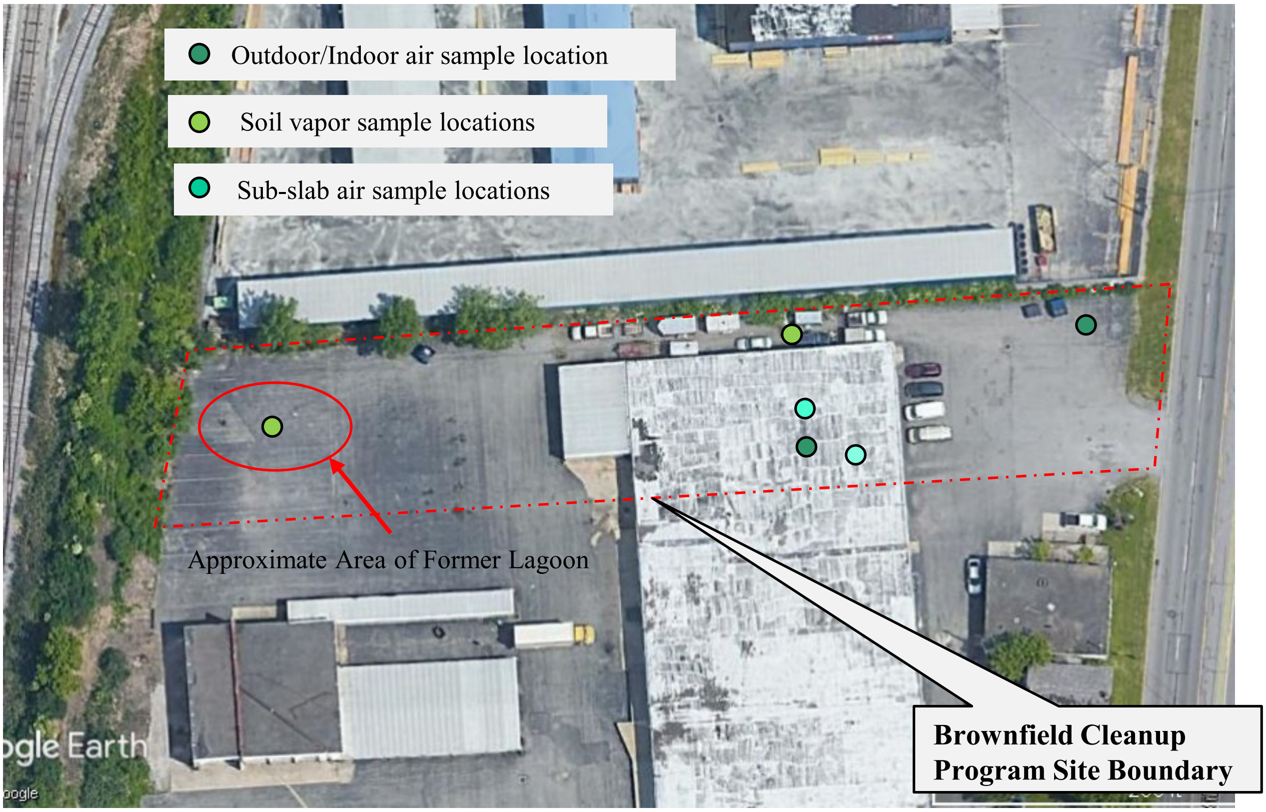
Drawn PVS

Checked MPR

File Name Site Location

Figure 3

NORTH



Title
Soil Vapor, Sub-slab and Indoor Air
Sampling Locations
2266 and 2268 Military Road Tonawanda, NY

Prepared For
ACM Northern CR#3 LLC
3144 S. Winton Road
Rochester, NY

Leader

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271 Marsh Road, Suite 2
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(585) 248-2413
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Project 235.198A

Date 10/1/2019

Scale NTS

Drawn PVS

Checked MPR

File Name Site Location

Figure 4

TABLE 1
Sample Analytical Requirements and Sample Numbers

Sample Types	**Headspace Samples, PID**	**TCL VOCs, TO-15**	**TCL VOCS +20 TICs, SW-846 8260B**	**TCL SVOCS (inc. 1,4-Dioxane)+20 TICs, SW-846 8270**	**TCL Pesticides and Herbicides, SW-846 8081B**	**TAL Metals + Mercury and Cyanide SW-846 6010, 6020, 7471, 9012**	**PCBs, SW-846 8081**	**PFAS SW-846 Method 537.1 (Modified)**	**1,4-Dioxane SW-846 8270-SIM**
Soil Vapor, Sub-slab, Indoor and Ambient Air		6							
Surface Soil									
Ground surface soil	4			4	4	4	4	0	0
Subsurface Soil									
Fill	10		10	10	10	10	10	3	3
Unsaturated zone	10		10	10	10	10	10	0	0
Saturated zone	10		10	10	10	10	10	0	0
Groundwater									
Monitoring well			4	4	4	4	4	2	2
Total Number of Samples, not including QA/QC samples	34	6	34	38	38	38	38	5	5

TABLE 2
Sample Analytical Procedures and Sample Preservation Requirements

Sample Type	Analysis	Type and Size Container	# of Containers per Sample	Preservation	Holding Time
Soil	TCL Volatiles	Glass, 2-ounce jar with Teflon lined cap	2	Cool to 4-deg. C	10 days
	TCL Semivolatile Organics	Glass, 4-ounce jar with Teflon lined cap	1	Cool to 4-deg. C	10 days
	TCL Pesticides	Glass, 4-ounce jar with Teflon lined cap	1	Cool to 4-deg. C	10 days
	TAL Metals + Cyanide	Glass, 4-ounce jar with Teflon lined cap	1	Cool to 4-deg. C	180 days, Mercury 26 days
	Cyanide	Glass, 4-ounce jar with Teflon line cap	1	Cool to 4-deg. C	12 Days
Groundwater	TCL Volatiles	40-ml vial with Teflon septum	3	ph<2 adjusted with HCL Acid, Cool to 4 deg. C	10 days
	TCL Semivolatile Organics	Glass, 1-Liter amber bottle with Teflon lined cap	1	Cool to 4	5 days
	TCL Pesticides	Glass, 1-Liter amber bottle with Teflon lined cap	1	Cool to 4	5 days
	TAL Metals	Plastic, 1-Liter bottle with Teflon lined cap	1	pH<2 adjusted with Nitric Acid, Cool to 4	180 days, Mercury 26 Days
	Cyanide	Plastic, 500-ml with Teflon lined cap	1	pH >12 NaOH	12 days
	PFOAs	High Density Polyethylene 250 ml	1	Cool to 4-deg. C	14-days from extraction
	1,4-Dioxane	Amber glass 500 ml	2	Cool to 4-deg. C	7-days from extraction
Soil Vapor/Sub-slab/Indoor Air	TO-15 VOCs	1 Liter Summa canisters	1	None	30 days from day of collection

TABLE 3
Quality Assurance Sample Schedule

	Trip Blank[1]	**Equipment Rinse Samples[2]**	**Duplicates Samples[2]**	**Matrix Spike[2]**	**Matrix Spike Duplicates[2]**
Soil Vapor	N/A	N/A	N/A	N/A	N/A
Soil Samples	1 per sample shipment	1 per sampling tool	1:20 samples	1:20 samples	1:20 samples
Groundwater Samples	1 per sample shipment	1 per sampling tool	1:20 samples	1:20 samples	1:20 samples

N/A = not applicable

1. VOCs only.
2. All analyzed parameters.

TABLE 4
Schedule of Quality Assurance Samples and Their Use

	Soil	**Groundwater**	**Use**
Trip Blank	√	√	Submitted with each sample shipment and analyzed for volatile organic compounds to determine if cross contamination has occurred between the samples and the laboratory equipment.
Matrix Spike and Matrix Spike Duplicate	√	√	Two samples submitted once per 20 samples for each matrix and analyzed for the same analytical parameters as the typical environmental sample. Is used to determine accuracy of analytical equipment and evaluate sample matrix interference problems.
Duplicates	√	√	One sample is submitted for 20 samples analyzed and analyzed for the same analytical parameters as the typical environmental sample. Is used to determine homogeneity of the sample and accuracy of analytical method and equipment.
Equipment Rinse Blank Samples	√	√	One sample is submitted for every sample tool used. Sample is analyzed for the same analytical parameters as the typical environmental sample. Is used to determine if decontamination procedures are impacting the sample or if procedures are cleaning the equipment.

APPENDIX A

Procedures for Surface Soil Sampling

Surface Soil Sampling Procedures

The collection of surface soil samples will be required to fulfill a variety of objectives including physical description, field screening, and laboratory chemical analysis. The task specific work plan specifies the data objective, location, depth, and analytical parameters for the soil sample program. The purpose of this field operation procedure is to describe the methods to be used during each of these activities.

This procedure will be used for the collection of surface soil samples. Surface soil samples will be collected using a direct push (“DP”) sampling tool or a sample trowel to collect a sample. All surface soil samples will be collected from the upper 2-inches of overburden. In the event vegetation is growing in the sampling area, either a bare spot close to the original location will be selected for sampling or the vegetation will be removed and only the overburden material sampled. The data to be obtained will be used to assess the environmental quality of the ground surface and any impacts that may result from the contaminants that are present.

Field Screening for Volatile Organics

Soil samples collected for field screening will undergo the following handling procedures:

- The sample sleeve will be removed from the DP sampling tool or split spoon sampler will be opened and the soil screened with the PID.
- The observed organic vapor concentration will be recorded for future reference.
- The sample will be visually inspected for soil classification, moisture content, and the presence of debris, stains or waste like materials (sludge, non-aqueous phase liquids).
- The representative portions of the sample will be placed in a glass jars with screw on lids for chemical analysis following the parameter list for surface soil samples.

Physical Description

For each sample interval will be visually examined and described in accordance with the Unified Soil Classification System. This information, together with a record of the length of the recovered portion of the interval, will be entered into the field logbook. Information to be included follows:

- Date;
- Boring Location Number;
- Sample Number;
- Depth Interval;
- Orientation; and
- Job Number.

Soil Samples for Laboratory Analysis

The Project's Work Plan and, or Quality Assurance Plan specifies the sample containers to be used and the parameters to be analyzed. Samples to be analyzed shall be placed in the containers as quickly as possible. Furthermore, all samples for laboratory analysis shall be preserved and transported in accordance with the following procedures. All samples to be sent to the laboratory for chemical analysis must be maintained in a condition that is as close as possible to in situ conditions. The first consideration is the proper selection of containers, preservation, and associated holding times. Other considerations include proper field notes, proper chain-of-custody procedures, and proper labeling of the samples.

Containers

The Quality Assurance Plan specifies the containers to be used.

Preservation

The general purpose of preservation is to maintain the original characteristics (and thus validity) of the sample during the time required for shipping of the sample to the laboratory. For soil, the only preservation technique is cooling the sample to approximately 4°C. This will be done in the field using ice or cold packs in coolers. Samples which are visually (highly) contaminated will be kept in individual sample coolers prior to and during transportation to the laboratory.

Sample Custody Procedures

The goal of implementing chain-of-custody procedures is to ensure that the sample is traceable from the time it is collected until it, or its derived data, are used. Samples would be considered in "custody" under the following conditions:

1. It is in personal possession.
2. It is in personal view after being in personal possession.
3. It was in personal possession when it was property secured.
4. It is in a designated secure area.

When transferring and/or shipping from the field, samples will be accompanied by the chain-of-custody record. The form includes the signatures of the relinquishers and the receiver as well as the date and time of the exchange, and any pertinent remarks. Since all samples will be immediately placed in coolers, shipment will also be made using these coolers. The samplers will complete the appropriate portion of the chain-of-custody form and deliver the cooler to the laboratory or to the shipping company. The receiving party will complete the remainder of the form and a copy will be retained by the sampler and kept with the field data sheets for that round of sampling. Each cooler will also be sealed using chain-of-custody tape.

Labels

The sample to be sent to the laboratory for chemical analysis will be identified with the following information:

- Date and time of collection;
- Location number;
- Sample number; and
- Sampler's name and affiliation.

Equipment Cleaning Methods

Equipment in actual contact with a laboratory sample will be cleaned prior to and between each use. The equipment will then be temporarily placed on clean racks, off the ground until it is used. Equipment such as DP samplers, sample trowels and soil knives will be cleaned with the following materials:

- Trisodium phosphate dissolved in clean water;
- Clean water rinse;
- Pesticide Grade Methanol rinse;
- Distilled/deionized water rinse; and
- Air dry.

APPENDIX B

Procedures for Subsurface Soil Sampling

Soil Sampling Procedures

The collection of samples will be required to fulfill a variety of objectives including physical description, field screening, and laboratory chemical analysis. The task specific work plan specifies the data objective, location, depth, and analytical parameters for the soil sample program. The purpose of this field operation procedure is to describe the methods to be used during each of these activities.

This procedure will be used for the collection of subsurface samples. Soil samples will be collected using either a 4-foot-long by 2-inch-diameter direct push ("DP") sampling tool, a 2 to 3-inch diameter split spoon sampler, or grab samples from the sidewall of an excavation. A Geoprobe sampling rig will be used to advance DP tooling and a truck mounted drilling rig, using hollow stem augers, will be used to advance the split spoon sampler. The DP sampling tool will collect the samples within a clear acrylic sleeve. Grab samples will be taken directly from the undisturbed soil using a clean trowel or from disturbed soil from the backhoe bucket. Samples taken from the backhoe bucket will only collect samples which are less likely to have been impacted by the bucket. Taking the sample from undisturbed soil clumps. The selection of material for sampling will follow the procedures identified below.

Field Screening for Volatile Organics

Soil samples collected for field screening will undergo the following handling procedures:

- The sample sleeve will be removed from the DP sampling tool or split spoon sampler will be opened and the soil screened with the PID.
- The observed organic vapor concentration will be recorded for future reference.
- The sample will be visually inspected for soil classification, moisture content, and the presence of debris, stains or waste like materials (sludge, non-aqueous phase liquids).
- The representative portions of the sample will be placed in a glass jars with screw on lids.

Physical Description

For each sample interval will be visually examined and described in accordance with the Unified Soil Classification System. This information, together with a record of the length of the recovered portion of the interval, will be entered into the field logbook. Information to be included follows:

- Date;
- Boring Location Number;
- Sample Number;
- Depth Interval;
- Orientation; and
- Job Number.

Soil Samples for Laboratory Analysis

The Project's Work Plan and, or Quality Assurance Plan specifies the sample containers to be used and the parameters to be analyzed. Samples to be analyzed shall be placed in the containers as quickly as possible. Furthermore, all samples for laboratory analysis shall be preserved and transported in accordance with the following procedures. All samples to be sent to the laboratory for chemical analysis must be maintained in a condition that is as close as possible to in situ conditions. The first consideration is the proper selection of containers, preservation, and associated holding times. Other considerations include proper field notes, proper chain-of-custody procedures, and proper labeling of the samples.

Containers

The Quality Assurance Plan specifies the containers to be used.

Preservation

The general purpose of preservation is to maintain the original characteristics (and thus validity) of the sample during the time required for shipping of the sample to the laboratory. For soil, the only preservation technique is cooling the sample to approximately 4°C. This will be done in the field using ice or cold packs in coolers. Samples which are visually (highly) contaminated will be kept in individual sample coolers prior to and during transportation to the laboratory.

Sample Custody Procedures

The goal of implementing chain-of-custody procedures is to ensure that the sample is traceable from the time it is collected until it, or its derived data, are used. Samples would be considered in "custody" under the following conditions:

1. It is in personal possession.
2. It is in personal view after being in personal possession.
3. It was in personal possession when it was property secured.
4. It is in a designated secure area.

When transferring and/or shipping from the field, samples will be accompanied by the chain-of-custody record. The form includes the signatures of the relinquishers and the receiver as well as the date and time of the exchange, and any pertinent remarks. Since all samples will be immediately placed in coolers, shipment will also be made using these coolers. The samplers will complete the appropriate portion of the chain-of-custody form and deliver the cooler to the laboratory or to the shipping company. The receiving party will complete the remainder of the form and a copy will be retained by the sampler and kept with the field data sheets for that round of sampling. Each cooler will also be sealed using chain-of-custody tape.

Labels

The sample to be sent to the laboratory for chemical analysis will be identified with the following information:

- Date and time of collection;
- Boring number;
- Sample number; and
- Sampler's name and affiliation.

Equipment Cleaning Methods

Equipment in actual contact with a laboratory sample will be cleaned prior to and between each use. The equipment will then be temporarily placed on clean racks, off the ground until it is used. Equipment such as DP samplers, split spoon samplers and soil knives will be cleaned with the following materials:

- Trisodium phosphate dissolved in clean water;
- Clean water rinse;
- Pesticide Grade Methanol rinse;
- Distilled/deionized water rinse; and
- Air dry.

Non-dedicated drilling equipment, backhoe buckets, and sampling equipment in contact with soil or waste materials will be cleaned prior to use and between each boring location. Decontamination of this equipment will be accomplished using a brush and trisodium phosphate dissolved in clean water to remove large solid particles, followed by steam cleaning with clean water. The equipment will be placed on top of open bins, drums, or "luggers" which will collect all wash water. When full, the contents will be pumped into closed drums and left on the Site for a disposal contractor. The drilling rig will be steam-cleaned prior to site entry and prior to leaving the site.

APPENDIX C

Procedures for Monitoring Well Construction

Monitoring Well Construction Procedure

The purpose of this document is to explain the procedures that will be followed during the construction and installation of monitoring wells. The purpose of the monitoring well construction is to provide representative samples of the groundwater. Monitoring well construction should be designed based on conditions of the groundwater zone. Since those conditions are relatively familiar because of the investigations and remediations completed on the Ford Motor Company site to the east, some changes are anticipatedand minor changes to the design may be required.

Monitoring Well Construction

The drilling of test borings will be started by the split spoon sampling of the surface soil followed by the augering of the soil from the ground. Split spoon sampling will be completed in consecutive sequence from the ground surface to a point approximately five feet below the water table. From this point forward, split spoon samples will be collected in 5-foot intervals. Soil sampling will be done in accordance with the procedures found in Appendix A. Augering will be completed as needed following each two foot or five foot sample interval. Drilling will continue until the bottom of the groundwater zone is found or to a point approximately 20-feet below the ground surface.

One the field geologist has confirmed the bottom of the planned monitoring well, the Drilling Contractor will fill the interior portions of the hollow stem auger with water to place a positive pressure on the seal of the auger plug. If sand heaving is a problem the Drilling Contractor may add pure Bentonite clay to the water or drive casing with a disposable casing plug.

As the hollow stem auger flights are being filled the Drilling Contractor will construct the monitoring well using 2-inch diameter, clean PVC screen and riser. The monitoring well screen will be composted of slotted PVC with a minimum of 0.001-inch width slots. The slotted pipe will be approximately the length of the exposed groundwater zone thickness plus 2 feet, but will have a length of no more than 10-feet. The Drilling Contractor will then attach a sufficient length of 2-inch diameter PVC riser to extend the top of the monitoring well approximately 2-feet above the ground surface. Monitoring well sections will be joined using a threaded coupling.

Once the monitoring well is completed the Drilling Contractor will then remove the auger plug and insert the completed monitoring well. If the monitoring well does not reach the bottom of the hole, the Drilling Contractor will either push lightly onto the top of the monitoring well to force it into place or remove the monitoring well and re-drill that section of the test boring hole.

Once the monitoring well is in place the Drilling Contractor and field geologist will measure the monitoring well to ensure the depth of the bottom. Prior to removing the auger flights, the Drilling Contractor will slowly add sand to the annulus of the monitoring well to form a sand pack surrounding the monitoring well screen. With the addition of sand the Drilling Contractor will slowly begin removing the auger flights. During this process the Drilling Contractor and field geologist will monitor the thickness of the sand pack and monitoring well depth. Sand will be added to the annulus of the monitoring well until the sand reaches a point two feet above the monitoring well screen, see Figure 8.

At this point the Drilling Contractor will remove approximately 5 to 10 gallons of water from the monitoring well to settle the sand pack. After the water has been removed the sand pack will be re-measured and if consistent with previous measurement, the Drilling Contractor will be directed to add Bentonite clay pellets or granular clay to the annulus to form a seal above the sand pack. The Bentonite will be added in the same manner as the sand, adding a small amount of material and lifting or removing an auger flight. If the seal is above the water table, the Drilling Contractor will be directed to add potable water to the annulus to help hydrate Bentonite clay. The seal will have a thickness of at least two feet.

The Drilling Contractor will be directed to tamp the surface of the Bentonite with a weight tape or rod to compact the clay before adding the grout mixture. The grout mixture will consist of one sack (90-pounds of Portland cement), 3-pounds Bentonite clay powder, and six gallons of potable water. The grout will be mixed until a smooth consistency is formed. The grout will be placed into the annulus using a Tremie pipe placed approximately 2-feet above the clay. The slurry will be pumped into the annulus until the annulus is filled to a point approximately 2.5 feet below the ground surface.

The grout will be allowed to solidify before installing a protective casing or developing the monitoring well. The type of protective casing will be dependent on the location of the monitoring well. High traffic areas will require flush mounted curb boxes while remote areas will be fitted with casing that stick up from the ground surface approximately 2.5 feet. Each casing type will have locking mechanism; either a keyed lock or bolted cover. Each monitoring well will be given a locking plug.

Well Development

Monitoring well development will be started at least 1 day after the monitoring well is completed. Development will be completed by surging and pumping or bailing groundwater from the monitoring well to remove sediment from the monitoring well screen and well bore. Development will continue until the turbidity of the groundwater is less than 50 NTU. During the development process, the field geologist will monitoring the pumped groundwater for water quality (presence of sheens) and monitor the ambient air and groundwater for the presence of volatile organic compounds.

Records

The field geologist will be responsible for taking notes on all samples collected during the sampling process and all measurements and quantities used during the construction and development of the monitoring well. At the completion of the field activities, boring logs and constructions logs will be prepared for the final report, development records will be kept and water level measurements recorded.

APPENDIX D

Procedures for Groundwater Sampling

Procedures for Groundwater Quality Sampling

The purpose of this document is to explain the procedures that will be followed during all groundwater sampling activities at the Site.

The water quality sampling will take place over a period of one to several days. The first day will consist of the pre-sampling activities listed below. All of the water level measurements for the wells to be sampled during each round will be made in a single day. Wells will be evacuated and sampled during the same day.

PRE-SAMPLING ACTIVITIES

Well Maintenance Check

Prior to every sampling event, a routine inspection of the condition of the protective casing and surface seal will be performed. The protective casing will be inspected for the integrity of the locking cap and the surface seal. In addition, each well will be checked for any other signs of damage or inadvertent entry. Observations of any irregularities will be noted in the field log book, as well as the well number, date, and time.

Air Monitoring

In order to provide workers with the proper respiratory protection for sampling, air monitoring in the breathing zone and immediately over the wellhead will be performed immediately after the initial uncapping. Health and safety procedures that are appropriate to the ambient air conditions will be implemented. Readings for both the breathing zone and wellhead will be recorded in the field log book. See the Health and Safety Plan for respiratory protection action levels, and a description of the proper air monitoring equipment.

Water Level Measurements

The depth to groundwater will be measured with an electronic depth-indicating sounder. The probe will be lowered into the well until the meter indicates water is reached. The probe will be raised above the water level and slowly lowered again until water is indicated. The cable will be held against the side of the inner protective casing for water level measurements and a depth reading taken. The value will be recorded to the nearest 0.01 foot in the field log book. The measurement will be repeated three times and the measurement recorded. The probe will be raised to the surface and together with the amount of cable that was wetted in the well, will be decontaminated with a wipe followed by a distilled/deionized water rinse.

The calibrated cable on the depth indicator will be checked against a surveyor’s steel tape once per quarter year. A new cable will be installed if the cable has changed by more than 0.01 percent (0.01 feet for a 100-foot cable).

WELL EVACUATION

Overburden Monitoring Wells

- The well will be purged with a low flow peristaltic pump. The pump's acrylic or PVC intake tubing will be lowered into the monitoring well to a point that is approximately in the center of the monitoring well screen or in the center of the water column. The discharge end of the tubing will be placed into a flow-through cell from which groundwater quality parameters will be measured. The discharge from the flow-through cell will be routed into a five-gallon bucket for discharge measurement. For sampling water flow will be approximately 0.25 liters per minute or until a constant stream of water is obtained. The water level in the monitoring well will also be monitored and not allowed to drop below 0.125 feet from the original pre-sampling static water level.
- When the groundwater quality is stable indicating that a representative sample of groundwater can be collected, the discharge end of the tubing will be disconnected from the flow-through cell and routed into a five-gallon bucket to collected spills from the filling of sample containers.
- The appropriate sample vials will be filled slowly and with a constant stream of water (flow) to avoid sample aeration and the field parameter tests conducted as described in "Field Measurements."

FIELD MEASUREMENTS

A portion of the groundwater collected during the sampling procedures will be subjected to the field tests of temperature, dissolved oxygen ("DO"), turbidity, specific electrical conductance, oxidation-reduction potential ("ORP") and pH. Field measurements will be conducted on the well purge water immediately prior to sample collection. Groundwater for these tests will be collected and measured in a plastic flow-through cell. All field test parameters will be measured with a portable water quality instrument such as a Horiba U-22 Water Quality Monitoring System. Temperature will be measured to the nearest tenth of a degree and the value recorded in the field log book. Turbidity will be measured in standardized nephelometeric turbidity units ("N.T.U."). After each measurement the N.T.U. value of the sample will be recorded. The goal of the well purging will be to reduce the turbidity of the groundwater extracted from the monitoring well to less than or equal to 50 N.T.U. The specific electrical conductance will be measured to the nearest 1unit and recorded in the field log book. The pH will be measured to the nearest 0.1 pH unit and the reading recorded in the field log book. The DO will be measured to the nearest 0.1 unit and the reading recorded in the field log book. The ORP will be measured to the nearest 1 millivolt and the reading recorded in the field log book. Calibration will be conducted according to manufacturer's specifications.

EQUIPMENT DECONTAMINATION

All of the sampling equipment (excluding the water quality probes) will be decontaminated between sampling events using the following procedures or disposed of, if dedicated equipment is used (i.e. sample tubing).

- An initial wash with trisodium phosphate dissolved in clean water;
- Clean water rinse;
- Pesticide Grade Methanol rinse;
- Air dry.

Decontamination wastewater will be collected in containers and disposed of properly.

SAMPLE LABELS

Sample labels will be placed on all samples and will contain the following information:

- Date and time of collection;
- Sample location;
- Sample number;
- Analysis to be performed; and
- Sampler's initials.

FIELD LOG BOOKS

The field log books used during sampling procedures will include the following information:

- Sampler's name (initials);
- Sampling location;
- Static water level (depth to water);
- Depth to bottom of the well;
- Calculated well volume;
- Actual evacuation volume;
- Date and time;
- Analyses to be performed;
- Preservation method;
- Field meter calibration information;
- General remarks (weather conditions, etc.); and
- Sample number.

All entries will be made in black indelible ink with a ball-point pen and will be written legibly. Entry errors will be crossed out with a single line, dated, and initialed by the person making the correction. Field log books will be reviewed by the Quality Assurance Officer on a weekly basis

SAMPLE CHAIN-OF-CUSTODY

A chain-of-custody form will be completed after sample collection event. The chain-of-custody forms will accompany the samples to the laboratory. The field personnel collecting the samples will be responsible for the custody of the samples until transportation to the laboratory. Sample transfer will require the individuals relinquishing and receiving the samples to sign, date, and note the time on the chain-of-custody forms.

APPENDIX E

Procedures for Soil Vapor and Sub-slab Sampling

Soil Vapor Sampling Procedure

The installation of probes for the collection of soil vapor samples will assist in the determination of whether or not there is a threat to on-site users and offsite receptors to vapor intrusion. The data will also be used to evaluate the subsurface soil and the groundwater quality since these samples are prone to evaluating only small areas and soil vapor data can represent the accumulation of impacts from the soil and groundwater over larger areas.

Sampling Probes

The soil vapor samples will be collected from temporary sampling locations placed into the ground using direct push ("DP") sampling equipment or split spoon sample holes. The soil probes will be extended to a point approximately 5 feet below the ground surface. The water table in the site area is unknown and the depth of the probes may require adjustment to ensure groundwater is not entrained into the sample.

Each sample location will be built using the following procedure:

- A Site utility location survey will be requested from local utilities to identify where utilities enter and cross the property.

- A 2-inch diameter DP hole or split spoon hole will be advanced to the targeted depth using Geoprobe DP rods or drill rods. The DP tools will be pulled and a 0.5-foot slotted PVC screen attached to a 0.25-inch outside diameter PVC or polyethylene food grade tubing will be placed into the hole.

- The hole will be backfilled with clean quartz sand to a point approximately 6 inches above the top of the vapor well intake. On top of the sand and to the ground surface, the open hole will be backfilled with a grout slurry mixture of 2 to 3 percent Bentonite and Portland cement. The 0.25-inch diameter tubing or PVC pipe will extend above the grout approximately 3 feet so it can be accessed for sampling.

- The tubing will then be purged to remove gases trapped in the sand and in the monitoring point during placement. A plug will then be placed into the tubing unless sampling will begin immediately. Purging will be done for a period of 5 minutes or until one to three open space (pore) volumes have been removed at a rate not to exceed 0.2 liters per minute. Ideally, the soil vapor sample point will have a volume of approximately 0.2 liters. After purging the tubing will be plugged.

4.1.2 Sample Collection

Prior to the start of sampling time, weather conditions, air temperature, barometric pressure, wind direction and approximate wind velocity will be noted. In addition, all sample locations will be tested with a tracer gas, consisting of Helium gas or propane, to determine if ambient air is infiltrating the sample. The tracer test will be conducted using the following steps:

- Sample tubing will be connected to the brass fitting on the in-place sample tubing or PVC pipe. The tubing will be of sufficient length to extend beyond a bucket placed over the sample location.

- A ring of hydrated Bentonite clay will be placed around the sample location. The Bentonite ring will act as a seal between the ground and the bucket, which will be used to enclose the sample location and to confine the tracer gas.

- A bucket will be placed over the sample location and a hole placed into the top of the bucket with a diameter equal to the sample tubing. The sample tubing will be placed through the hole and inserted into a sampling pump. The sample pump will be connected to a Helium detector. A second hole will be placed on the side of the bucket near the ground surface. A second tube connected to a Helium/propane gas cylinder will be threaded through the bucket and placed next to the sample location. The tubing will be taped or sealed to the bucket using Silicone or modeling clay. The Helium will be released into the bucket, the sample pump started and the Helium detector monitored.

- The test will be performed for 10 minutes. If Helium/propane is not detected in the sampled gas, the sub-slab sample will be collected. If Helium/propane is detected, the surface seal and tubing connections will be examined and either repaired or replaced and the tracer test completed again until a successful test is performed.

Prior to sample collection, the time, weather conditions, air temperature, barometric pressure, and wind direction and approximate velocity will be noted. Ideally, sample collection will start at 10:00 AM and continue uninterrupted for one hour. During the sample collection period, the sampling technician will inspect the sampling train and gauges several times to ensure the regulator and sampling train are operating properly. Sampling of the soil vapor will follow these procedures:

- The sampling technician will label the Summa canister with a unique sample number and record the sample number in the field notebook. The sampling technician will record the identification number of each canister and assign a canister to each sampling location. The technician will also not have or use permanent markers or use other products containing VOCs during sampling.
- The technician will then connect the Summa canister to the sample tubing. The technician will note the time and open the Summa canister regulator. The laboratory will specify the collection time for the sample flow rate and the desired detection limit needed for the Site. At this time, a 6 liter Summa Canister will be used and the sample will be collected for a period of 1 hour at a flow rate of 0.1 Liters per minute.
- When the sampling is completed the technician will close the regulator noting the time and vacuum, and disconnect the sample canister from the sample tubing. The technician

will label the canister with the sample time on the Summa canister and then complete the chain of custody and the field notebook with the sample information.

- The sampling technician will plug the sample tubing and place the Summa canister into the shipping container.
- The samples will be shipped overnight so the laboratory will receive the samples the next day.

APPENDIX F

Procedures for Waste Handling

The procedures identified in this Appendix were prepared with the intent of providing instruction for the safe handling, temporary storage and disposal of investigation derived waste and waste possibly generated from the completion of an interim remedial measure (“IRM”). In general, for any of the wastes generated during this project, will be placed in containers compatible with the waste and appropriate containers the type of waste being handled. Health and safety of the site workers is not covered in this procedure.

Investigation Derived Waste

Investigation derived waste can include: drill cuttings, decontamination water, purge water from monitoring wells, solid waste consisting of personnel protective equipment, card board, plastic, and paper. How the waste is handled will be decided based on the expected volume and the consistency of the waste. Consequently the following acceptable containers have been identified:

Drums - Liquid

Steel or plastic 55-gallon drums with closed lids will be utilized to control decontamination water and purge water from monitoring wells. In general, decontamination water will be kept segregated from other liquid waste because of the potential for this waste stream to be handled as a non-hazardous waste. Decontamination water will be pumped from the decontamination area into the drums after sediment has been removed. This will be done to minimize the amount of sediment accumulating in a drum and the possible need to sample the sediment.

Groundwater pumped from monitoring wells during development and sampling will be containerized in steel or plastic closed lid drums. Since development waters may be heavily laden with sediment an open top drum may be used as an interim step before transferring the waste into closed drums. Sediment separated from development water will be temporarily held in an open top drum. In the event free product is found during the development or monitoring well purging, the free product will be placed in a separate drum and appropriately identified.

When each drum is full, a label will be placed on the drum indicating the type of waste, where it is from (monitoring well number, decontamination pit, etc.), and the date it was generated. The drums will be placed in a location where site equipment and trucks will not disturb them and a location where they can be easily managed. Caution tape and, or snow fencing will be used to warn passerby’s of the materials being stored.

Drums – Solids

Steel or plastic open top 55-gallon drums will be used to containerize solids generated by the investigation activities. During the course of the field investigation waste solids will be generated and consist of unsoiled personnel protective equipment, paper, plastic, and card board ("dry waste"), and soil cuttings or sediment. Dry waste will not be co-mingled with other waste and handed as household trash. Personnel protective equipment that has been contaminated with dirt or free product will be separated from the other non-contaminated dry waste and placed in a separate drum.

Soil cuttings or sediment from the decontamination area or development water will be placed into open top steel drums for temporary storage at work locations. At the completion of work at any particular location the drum will be brought to the temporary storage area.

When each drum is full, a label will be placed on the drum indicating the type of waste, where it is from (monitoring well number or decontamination pit), and the date it was generated. The drums will be placed in a location where site equipment and trucks will not disturb them and a location where they can be easily managed. Caution tape and, or snow fencing will be used to warn passerby's of the materials being stored.

Soil Cuttings and Sediment

Because the cost of the disposal of soil cuttings and sediment is significantly more when the waste is handled in drums, waste of similar quality will be placed on two layers of plastic sheeting. The temporary storage area will be located in an area where site equipment and trucks will not disturb the waste. The storage area will be constructed with a berm made from soil, sand bags or wood boards. The berm will be covered with a plastic sheet. A second plastic layer will drape over the first and have enough material so it can be folded over the waste. This layer will be secured in place with tires or water filled pails.

If some of the waste is stained, giving off volatiles as measured by the organic vapor analyzer, or odorous a second pile may be started. If only a small quantity of waste has these characteristics then it may remain in a drum.

The covered soil pile will be inspected for tears or the accumulation of rain or snow. Water will be drained from the plastic and onto the ground if there is no indication of a tear in the plastic. Water found mixed with the waste will be either pumped into a drum or absorbed and the plastic replaced of covered.

Soil piles will be posted or labeled indicating the type of waste, where it is from (monitoring well number or decontamination pit), and the date it was generated. The piles will be surrounded with caution tape and, or snow fencing to warn passerby's of the materials being stored.

IRM Waste

IRM waste will be handled like the investigation derived waste if the quantities expected to be generated remain relatively small: a few hundred gallons of water or less than 5-tons of soil. If the IRM will exceed those volumes and weights then tanks or a roll off box will be used to containerize the waste. However, regardless of the size of the container, the same procedures will be used. Waters will be as sediment free as possible and waste in the roll off box will be covered. If the waste is anticipated to be wet, the roll off box will be lined. The containers will be located to facilitate removal and, or to minimize handling. The containers will be labeled indicating the type of waste, where it is from (monitoring well number, decontamination pit, etc.), and the date it was generated. The tanks will have valves locked to minimize the consequences of vandalism. Roll offs will be surrounded with caution tape and, or snow fencing to warn passerby's of the materials being stored.

Waste Characterization

It is anticipated that the waste characterization requirements will closely follow USEPA's RCRA regulations, but these may be changed based on the requirements of the facilities where the waste may be landfilled and, or treated. Samples of the generated waste will be collected at the completion of field work. The goal of the waste characterization will be to remove the waste from the site within 90-days.

APPENDIX B

Site Health and Safety Plan

HEALTH AND SAFETY PLAN

Former Bisonite Paint Company
2268 Military Road and 2266 Military Road
Tonawanda, New York
New York State Department of Environmental Conservation
Brownfield Cleanup Program Site #C915010

Prepared for:

ACM Northfield CR#3, LLC
3144 South Winton Road
Rochester, New York

Prepared by:

Leader Professional Services, Inc.
271 Marsh Road, Suite 2
Pittsford, New York 14534

235.198

October 2019

Leader

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1.0 Project Personnel Responsibilities

Project organization is presented below in Section 1.5.

1.1 Principle-In-Charge

The Principal-In-Charge for this project will be Michael Rumrill. Mr. Rumrill will act in a supervisory capacity for Leader Professional Services, Inc. (Leader) employees and their subcontractors and the planned site activities with respect to the project site. Mr. Rumrill will have the authority to direct site operations including the performance of this Health and Safety Plan. The project manager will have the required 29 CFR 1910.120 40-Hour Training and have an updated 8-Hour Refresher Training Certificate.

1.2 Project Manager

The Project Manager/QA/QC Manager will be Dixon Rollins, P.E. of Leader. If a substitute is required, the Project Supervisor will be an employee of Leader. The project supervisor will oversee all field and related activities specific to the project when the project manager is not on the site. The project manager will have the required 29 CFR 1910.120 40-Hour Training and have an updated 8-Hour Refresher Training Certificate.

1.3 Health and Safety Officer

Mr. Mark Perriello, CIH, CSP, will be the site's Health and Safety Officer ("HSO"). Mr. Perriello will have the authority to stop work if any operation threatens the health and safety of workers or the public. The HSO may designate a member of the work party for site health and safety responsibilities when the HSO cannot be on site. The HSO will have the required 29 CFR 1910.120 40-Hour Training and have an updated 8-Hour Refresher Training Certificate.

1.4 Project Team

Personnel and subcontractors on the project team will be responsible for the completion of the Work plan's required tasks. All personnel on the project team will comply with the site safety plan and ensure the site safety and health officer or supervisor is notified of any unsafe conditions. It is anticipated that the project team will consist of one to three individuals. This may vary due to any changes that occur during the actual site work. All personnel on the project team will have the required 29CFR 1910.120 40-Hour Training and participate in daily tailgate health and safety meetings.

1.5 Project Organization

Project Manager/Engineer – Dixon Rollins, P.E, Leader
Site Supervisor – Robert Murphy, Leader
Health and Safety Officer – Mark Perriello, CIH, CSP, Leader

2.0 Site Standard Operating Safety Procedures

Standard operating and safety procedures include safety precautions and operating practices that all personnel will follow. These include:

2.1 Personal Precautions

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated contaminated.

- Hands and face must be thoroughly washed upon leaving the work area.

- Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.

- No facial hair, which interferes with a satisfactory fit of the mask-to-face seal, is allowed on personnel required to wear respirators. Personnel will use the negative pressure fit test prior to each use of the equipment.

- Contact with contaminated or suspected contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, leachate, discolored surfaces, kneel on ground, lean, sit or place equipment on drums, containers, or the ground.

- Medicine and alcohol can enhance or mask the effects from exposure to toxic chemicals. Prescribed drugs should not be taken by field personnel where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Alcoholic beverages should be avoided, in the off-duty hours, during the project.

2.2 Operations

- All personnel going on-site must be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures, and communications.

- Any required respiratory protection and chemical protective clothing must be worn by all personnel going into areas designated for wearing protective equipment.

- Personnel on-site must use the buddy system when wearing respiratory protection. As a minimum, one person, suitably equipped, is required as safety backup during initial entry.

- Visual contact must be maintained between pairs on-site and safety personnel. Entry team members should remain together to assist each other during emergencies.

- During continual operations, on-site workers act as safety backup to each other. Off-site personnel provide emergency assistance.

  Communications using radios, hand signals, signs, or other means must be maintained between team members at all times.

- Wind indicators visible to all site personnel should be strategically located throughout the site.

- Personnel and equipment in the contaminated area should be minimized to reduce the potential for cross contamination and the generation of decontamination waste.

- Work areas for various operational activities will be established by the project manager, or his designee, and the HSO.

- Procedures for leaving a contaminated area must be planned and implemented prior to going on-site. Work areas and decontamination procedures have been established based on expected site conditions and are described in the project Work Plan.

3.0 Health and Safety Hazards

The potential hazards that may be experienced during the performance of the Work Plan include: chemical exposures from contact with contaminated soil and groundwater; hazards inherent to working with drilling and sampling equipment and working within an active storage facility where vehicles come and go; slip, trip and fall hazards; and cold and heat stress from performing heavy work while working in cold temperatures and wearing protective clothing. The extent of contamination is well known but monitoring for the presence of organic vapors will be conducted. To prevent unnecessary exposures to vapors and to limit the potential for cross-contamination, all work areas will be limited from general access. The formation of distinctive work zones will assist in reducing the potential hazards that may exist at working at this facility. To further reduce the potential for accidents to involve moving vehicles, Leader will coordinate each field activity with the site manager(s) so tenants and delivery drivers know where investigative activities are occurring on the Site. To reduce accidents from occurring that involve slip, trip and fall hazards and hypothermia, work will be monitored by the Site HSO and workers will be encouraged to use the "buddy-system" while lifting heavy tools or items to reduce early fatigue while wearing protective clothing.

Table 1 list potential health and safety hazards that may be encountered based on general site tasks. This list has been compiled based on the scheduled activities and potential site conditions.

4.0 Personal Protective Equipment

4.1 Protective Equipment

All personnel will be provided with appropriate personal safety equipment and protective clothing. Each individual will be properly trained in the use of this safety equipment before the start of field activities. Safety equipment and protective clothing shall be used as directed by the Project Manager and/or Site HSO. All such equipment and clothing will be cleaned and maintained in proper condition by the personnel. The Site HSO will monitor the maintenance of personnel protective equipment to ensure proper procedures are followed.

Personal protective equipment will be worn at all times designated by this Health and Safety Plan. Levels of protective clothing and equipment are not expected to exceed Level C. Results from the previous groundwater samplings and on-site readings will be used to set action levels and levels of personal protection.

The personal protective equipment levels designated below are in conformance with EPA criteria for Level A, B, C, and D protection. All respiratory protective equipment used will be approved by National Institute for Occupational Safety and Health ("NIOSH") and Mine Safety and Health Administration ("MSHA"). Although the conditions within the proposed work areas are well known monitoring will be completed at all times, but it is doubtful that levels of respiratory protection will exceed Level D.

4.2 Level C Protection

A. Personal Protective Equipment

- Half-face, air-purifying, canister-equipped respirator (MSHA/NIOSH approved) for acid/gas/organic vapor with particulate filter

- Chemical-resistant clothing (overalls and long sleeved jacket; coveralls or hooded, one piece or two-piece chemical-splash suit; disposable chemical resistant one-piece suits)

- Work Clothes (Long Shelve Shirt and pants)

- Gloves (outer), chemical resistant

- Gloves (inner), chemical resistant

- Boots (inner), leather work shoe with steel toe and shank

- Boots (outer), chemical resistant (disposable*)

- Hard Hat (face shield*)

- Safety Glasses or goggles

- Taping between suit and gloves, and suit and boots

- High visibility vest

*Optional

B. Criteria for Selection

Meeting all of these criteria permits use of Level C Protection.

- Measured air concentration of identified substances will be reduced by the respirator to, at, or below the substance's Threshold Limit Value (TLV)/Permissible Exposure Limits (PEL) and the concentration is within the service limit of the canister.

- Atmospheric contaminant concentrations do not exceed IDLH levels.

- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect the small area of skin left unprotected by chemical resistant clothing.

4.3 Level D Protection

A. Personal Protective Equipment

- Work Clothes (Long shelve shirt and pants)

- Leather, steel-toed boots

- High visibility vest

- As required:

    - Hard hat
    - Safety glasses/goggles
    - Hearing protection
    - Gloves

B. Criteria for Selection

Meeting all of these criteria permits the use of Level D Protection.

- Measured air concentrations of identified substances are below the substances Permissible Exposure Limit (PEL) or TLV.

- Oxygen content is > 19.5%.

- No unknown substances are present.

5.0 Decontamination

It is expected that the usual level of protection to be Level D. Level C will be used when potential exposures to contaminants justify increased protection. A decontamination zone will be set up at the entrance of each work zone. Based on the level of expected exposure to contaminants, the following decontamination protocol will be used.

5.1 Personnel Decontamination

It is expected that a minimum of Level D decontamination will be continually in effect at the site. On these occasions when higher levels of protection are required, appropriate decontamination procedures will be used. The extent of the decontamination procedures will be at the discretion of the site HSO.

In general, decontamination involves removing potentially contaminated soil from gloves and clothing, followed by scrubbing with a non-phosphate soap/water solution and clean water rinses. As a general rule, protective clothing will be removed in the reverse order as it was put on: gloves and boots off first, followed by protective suits and then breathing apparatus. As the different types of waste are generated, the team members will segregate the waste into different drums. Potentially contaminated soil and sediment will be placed into one drum and decontamination waste fluid into a second drum. All disposable items will be placed into a dry goods drum.

Certain parts of contaminated respirators, harness assemblies and leather or cloth components, are difficult to decontaminate. If grossly contaminated, they may have to be discarded. Rubber components can be soaked in soap and water and scrubbed with a brush. In addition to being decontaminated, all respirators, non-disposable protective clothing, and other personal articles must be sanitized before they can be used again unless they are assigned to individuals. The manufacturer’s instruction should be followed in sanitizing the respirator masks. The Site HSO will be responsible for supervising the proper protective equipment.

All decontamination wastewaters will be collected and disposed of according to applicable regulations. This disposal will be done at the direction of the Project Manager.

5.2 Equipment Decontamination

Decontamination will be applicable to all activities on site and be completed in the contamination reduction zone ("CRZ") section of the exclusion zone. All equipment (i.e., tools, monitoring equipment, etc.) will receive initial decontamination. All equipment that has been in contact with contaminants shall be stored in an area within the limits of the existing exclusion zone or shall be thoroughly decontaminated prior to leaving the area. Decontamination will consist of cleaning of the entire piece of equipment to the satisfaction of the Site Supervisor or the HSO. Decontamination will be a multi-process task, first all loose dirt or other foreign materials will be removed from equipment surface. Scrubbing with a synthetic wire brush may be required to remove materials that adhere to the surfaces. After the loose dirt is removed, the equipment will be washed using a detergent and water solution and a wire brush followed by successive rinses with clean water. Washing with hot water from a power washer may be substituted for a synthetic wire brush.

All dirty equipment will be stored on plastic sheeting in such a manner that decontamination waters can be collected and disposed of in accordance with applicable regulations. Clean equipment not in use will be covered with plastic and stored at a designated storage area.

Air monitoring equipment will be protected with an outer coating (i.e. plastic), if there is a potential for the equipment to come into contact with potentially contaminated materials prior to the initial entry into the exclusion zone. Decontamination will then consist of removal of the protective coating in a manner that will not contaminate the air monitoring equipment.

6.0 Site Air Monitoring

Field activities associated with the work tasks at the Site may pose hazardous conditions, such as the release of hazardous substances into the worker's breathing zone. These substances may be in the form of vapors, dusts, or mists that can enter the body through ingestion, inhalation, or direct skin or eye contact. If the HSO, relying on instrument observations and odor, determines that a condition exists in which workers may be exposed to airborne hazardous materials, the HSO will upgrade the team's level of respiratory protection and complete chemical specific monitoring.

The following paragraphs describe the monitoring parameters to be evaluated during the start of the project. As the project continues, other site-specific monitoring will be required based on site conditions and experience at the site. Because this project will be completed in the winter/early spring and the proposed work area is covered with a combination of asphalt, concrete or dirt, there is a concern about contaminated dust being an issue. Potential combustible concentrations of volatile organic compounds have not been identified recently, but there remains a concern, thus the necessity for oxygen and combustible gas monitors is supported for the field investigation. All instruments to be used during site activities will meet the established requirements set forth by OSHA, MSHA, NIOSH, and state agencies where applicable.

Field instrument measurements will be made during work progress with a direct reading organic vapor meter. Monitoring will take place in the work zone and workers breathing zone, up and down-wind from the work zone and at the site perimeter. Monitoring within the work zone will be taken at least every 15 to 30 minutes. Monitoring up and downwind of the work zone will be completed at least every 30 to 60 minutes and monitoring at the site perimeter will be completed at least every 60 minutes. If elevated readings are obtained (elevated compared to up-wind readings or compared to site specific action levels), then the frequency of taking measurements will be increased at the monitoring stations. NYSDEC and NYSDOH will be notified within 24-hours of any releases requiring work stoppage.

Dust monitoring will be conducted each day as conditions warrant from strategic locations up and down will of the site's work areas as a part of the Community Air Monitoring Program ("CAMP"). The CAMP monitoring will be done concurrently with the organic vapor monitoring done for the intrusive investigation. Dust monitoring will not be done when it is raining or snowing, or when minimal intrusive work is being conducted. For example, dust monitoring will not be required when sampling monitoring wells. These locations may vary based on where on the site work is being conducted and the wind direction. At least one upwind and one downwind locations will be monitored. The Project Manager and HSO may require additional monitoring stations based on the level of activity, wind conditions, and the proximity to air vents, open doors, and occupied spaces.

If dust exceeds thresholds at the upwind monitoring location during the investigative activities, the HSO will instruct the contractor to take an appropriate level of corrective action. If dust from the work areas exceed project thresholds at the downwind monitoring locations compared to the upwind monitoring location, the HSO will determine what is causing the problem and seek a remedy, and if needed, they will stop work until it can be corrected.

All soil and groundwater sampling data for the site is dated, but it is anticipated that organic vapors could range from 0 to 100 parts per million ("ppm") in the sample headspace. As a result, there is still a potential for VOCs to be identified in the breathing zone. Similarly, there is a potential for nuisance odors to be an issue. Organic vapor concentrations will be the primary measure for upgrading or downgrading worker respiratory protective equipment and implementing additional precautions or procedures (See Table 2, Action Levels).

All site monitoring will be conducted by or under the direction of the site HSO or if a concern was raised by a worker or NYSDEC. All readings obtained will be recorded in a dedicated site notebook maintained by the Project Manager/HSO or their designee. The site HSO will maintain all monitoring instruments throughout the remedial action to ensure their reliability and proper operation. Observations will be made during work progress with a direct reading organic vapor meter. Monitoring will take place in the work zone and workers breathing zone, up and down-wind from the work zone and at the Site perimeter. Monitoring within the work zone will be taken at least every 15 to 30-minutes. Monitoring up and down-wind of the work zone will be completed at least every 30 to 60 minutes and monitoring at the Site perimeter will be completed at least every 60 minutes. If work is being conducted within 20-feet of building air ducts or open doors air monitoring will be conducted at least every 15 to 30-minutes. If elevated readings are obtained (elevated compared to up-wind readings or compared to Site specific action levels), then the frequency of taking measurements will be increased at the monitoring stations and as needed corrective action taken. NYSDEC and NYSDOH will be notified within 24-hours of exceedances of the air monitoring thresholds, which require work stoppage.

If dust exceeds thresholds at the upwind monitoring location during the investigative activities, the HSO will instruct the site manager to take an appropriate level of corrective action. If dust from the sampling or drilling operations exceed project thresholds at the downwind monitoring location compared to the upwind monitoring location, the HSO will determine what is causing the problem and seek a remedy, and if needed, they will stop work until it can be corrected. As a result, air monitors will be located up and down wind of the investigation work. As mentioned in the discussion for air monitoring of VOCs, if work is being conducted within 20-feet of a building air ducts and open doors, additional dust monitoring stations will be set up to monitor these features on the building. If elevated readings are observed, the HSO or their designee will also monitor the interior of the building(s). NYSDEC and NYSDOH will be notified within 24-hours of exceedances of the air monitoring thresholds, which require work stoppage.

All site monitoring will be conducted by or under the direction of the Site HSO. All readings obtained will be recorded in a dedicated site notebook maintained by the Project Supervisor or designate. NYSDEC and NYSDOH will be provided with CAMP data on a weekly basis. The Site HSO will maintain all monitoring instruments throughout the site investigation to ensure their reliability and proper operation.

7.0 Action Levels

Action levels have been established for the upgrade and downgrade in the levels of personal protective equipment. Table 2 lists the action levels, airborne concentrations and their respective personal protection for unknown sources of organic vapor concentrations. Section 8.0 discusses the minimal personal protection required for specific site activities based on current information. Changes to these specified levels are dependent on the result of air monitoring as outlined below.

8.0 Site Activities and Associated Personnel Protective Requirements

The levels of protection have been assigned anticipated Site activities (below) and represent a best estimate of exposure potential and protective equipment needed for that exposure. The site HSO will revise those levels of protection, up or down, based on air monitoring results, and on-site assessments of actual exposures.

- *Level D* - General site work with limited physical contact with contaminated soil by personnel. If workers must pick up contaminated tools or a soil samples, protective chemical resistant gloves will be worn. Respiratory protection is not required because contaminant action levels cited on Table 2 are not exceeded.

- *Modified Level C* - General site work where personnel will be in direct contact with contaminated soil or groundwater, but respiratory protection is not required because contaminant action levels cited on Table 2 are not exceeded.

- *Level C* - General site work where personnel will be in direct contact with contaminated soil or groundwater, and organic vapor measurements or dust measurements are greater than those action levels cited on Table 2.

9.0 Contingency Plan

The Project Manager/Supervisor or HSO is responsible for implementing the Contingency Plan whenever there is either a threat to human health or an environmental hazard. Possible Contingency Plan situations include actual or imminent fires, explosions or spills.

The individual discovering the emergency situation is to notify the Project Supervisor or HSO who will then notify the facility manager for ACM and, or the appropriate organizations as described in Table 3.

9.1 Assessment

The Project Manager/Supervisor is responsible for ascertaining any possible health or environmental hazards and determining the need for evacuation and notification of the proper authorities.

9.2 Control Procedures

The team member or site employee discovering a fire, explosion, spill or other emergency situation is responsible for notifying the Project Supervisor or Site HSO and as much as possible, provide the information listed in Table 3.0. The Project Supervisor or HSO will assess the situation and notify the Tonawanda Self Storage representative to determine if it can be adequately handled by yard personnel or if additional assistance is needed.

Before any team member attempts to extinguish a fire, clean-up and contain a spill or take any action, he or she must be aware of the properties of the material involved and its associated hazards. All team members are familiarized with this information during the initial tail grate safety meeting and are instructed on the proper protective clothing to be worn in such a situation.

Table 3 includes a list of the organizations that are available to provide emergency assistance.

9.3 Fire and/or Explosion

The most serious emergency situation that could be faced at the site would be a chemical release or major fire. In the event of a fire or explosion, the Project Supervisor or HSO should be notified as described in the preceding section. The Project Supervisor or HSO will notify the Fire Department immediately and work with the representative from the facility manager to notify tenants.

The Fire Department should be notified immediately once a fire is detected. Small fires can be extinguished using a fire extinguisher located at the site. Larger fires will require the assistance of the fire department. The fire department will be informed of the nature of the fire and wastes at the site, and if water can be used to extinguishing fire.

9.4 Spill and/or Material Releases

The procedure for notification of the Project Manager/Supervisor and, or HSO are described in Section 9.2. Immediately following the discovery of a spill the NYSDEC will be notified. In addition, the Comprehensive Environmental Response, Compensation, and Liability act of 1980 (CERCLA, or Superfund) requires that the National Response Center be notified of any release in excess of the reportable quantity of a listed material.

Spill clean-up poses no danger under normal conditions. The first step is to determine the source of the spill and correct it. This may involve patching a leaking drum, closing a valve or turning off a pump. In the event of a small spill, absorbent granules or sorbent pads will be utilized to soak up the spilled material. The granules would then be swept up and containerized in Department of Transportation approved drums.

In the event a large spill occurs, ACM's preferred remedial contractor will be called to bring in pumps and vacuum trucks and transfer spilled material from the collection area into storage tanks or drums. All absorbent materials will be placed in DOT approved drums.

Any contaminated structures and equipment must be properly cleaned before being returned to service. This procedure will include use of pressure washers and sorbent materials. All affected floors and equipment, pumps and hoses, will be cleaned with an appropriate detergent and rinsed with clear clean water.

10.0 Work Areas

The Project Manager/Supervisor, HSO, the representative from ACM, and if needed the Contractor, will clearly layout and identify work areas in the field and will limit equipment, operations, and personnel as defined in the following areas:

a) "Exclusion Zone" - This area will include all areas where environmental monitoring has shown, or it is suspected that a contamination may exist and be a potential exposure problem to workers. The level of personnel protective equipment required in these areas will be determined by the Site HSO. The area will be clearly delineated from the decontamination area. As work within the hazardous zone proceeds, the delineating boundary will be relocated as necessary to prevent the accidental contamination of nearby people and equipment. The Exclusion Zone will be delineated by plastic caution tape, barriers, or fencing (e.g. chain link, snow, or orange plastic fencing).

b) Contamination Reduction Zone (CRZ) - This zone will occur at the interface of "Contaminated" and "Clean" areas and will provide for the decontamination of equipment and materials and the transfer of equipment from the Clean Area to the Exclusion Zone. This area will contain all required emergency equipment, etc. This area will be clearly delineated by plastic tape, barriers or fencing (e.g. chain link, snow, or orange plastic fencing).

c) Support Zone ("Clean" Area) - This area is the remainder of the work site and project site. The "Clean" area will be clearly delineated, and procedures implemented to prevent active or passive contamination from the work site.

The function of the "Clean" area includes:

1) An entry area for personnel, material, and equipment to the "Contaminated Zone" area of site operations through the neutral zone.

2) An exit for decontaminated personnel, materials, and equipment from the "CRZ" area of site operations; and

3) A clean storage area for safety and work equipment.

11.0 Safety Equipment and Protective Clothing Specifications

<u>All</u> project team members and contractors will have the following safety equipment:

- Air purifying respirator with appropriate cartridges

- All protective clothing including, but not limited to:

    - Tyvek and washable PVC rain suits

    - Gloves
    - Boots

- Safety glasses

- Hearing protection

- Hard hats

- High visibility vest.

12.0 Air Emissions Control

The Project Team and subcontractor shall have on site all equipment and personnel necessary to monitor and control air emissions.

It is not expected that air emissions will pose a significant risk to health and safety or to the environment due to the nature of the contaminants on this project.

The Project Manager/Supervisor and/or the HSO will make the determination for requiring monitoring and control of air emissions with the assistance of the following monitoring equipment and the action levels cited on Table 2. It is anticipated that an organic vapor analyzer and chemical specific detection tubes will be used to measure the concentration of most organic contaminants in the air. These two measurement devices will handle the bulk of the real-time contaminant monitoring.

13.0 Additional Health and Safety Comments

1) The Site HSO will ensure that all safety equipment and protective clothing is kept clean and well maintained.

2) All prescription eyeglasses in use on this project will be safety glasses and will be compatible with respirators. No contact lenses shall be allowed on-site.

3) All disposable or reusable gloves worn on the site will be approved by the HSO.

4) During periods of prolonged respirator usage in contaminated areas, respirator filters will be changed upon breakthrough and at a minimum filters will be changed daily.

5) Footwear used on-site will be covered by rubber over-boots when entering or working in the "Exclusion Zone" area or "CRZ." Boots will be washed with water and detergents to remove dirt and contaminated sediment before leaving the "CRZ."

6) All personnel protective equipment used on-site will be decontaminated or disposed of at the end of the workday.

7) All air purifying respirators will be individually assigned and not interchanged between workers without cleaning and sanitizing.

8) Any team member or Contractor unable to pass a fit test as a result of facial hair or facial configuration shall not enter or work in an area that requires respiratory protection.

9) The Contractor will ensure that all project team members shall have vision or corrected vision to at least 20/40 in one eye.

10) Team members found to be disregarding any provision of this plan will, at the request of the HSO, be barred from the project.

11) Used disposable outerwear will be removed upon leaving CRZ and will be placed inside disposable containers labeled for that purpose. These containers will be stored at the site at the designated staging area. Leader will be responsible for proper disposal of these materials at the completion of the project.

12) Tyvek or PVC rain suits that become torn or badly soiled will be replace immediately.
13) Eating, drinking, chewing gum or tobacco, smoking, etc., will be prohibited in the exclusion zones and CRZ zones.

14) All personnel will thoroughly cleanse their hands, face, forearms, and other exposed areas prior to eating, smoking, or drinking.

15) All personnel will wash their hands, face, and forearms before using toilet facilities.

16) No alcohol, firearms, or drugs (without prescription) will be allowed on-site at any time.

14.0 Miscellaneous Health and Safety Items

14.1 Hypothermia

Pervious Clothing: When the ambient air temperature dips below 40° F. the Site HSO will begin to monitor employees for signs of hypothermia. Monitoring will take the form of measuring oral temperatures. The air temperature will be measured two times a day when the air temperature is expected to be below 40° F or as determined by the HSO.

Impervious Clothing: When the ambient air temperature has dip below 40° F. the HSO will begin to monitor employees for signs of hypothermia. Monitoring will take the form of measuring oral temperatures and checking an individual’s verbal and physical responses. As the air temperature dips below 32° F., oral temperatures will be measured at the direction of the HSO and, or every hour during work periods.

In the event that the oral temperature at the beginning of the rest period drops below 96^o F., the employee will be decontaminated and be advised to proceed to a heated room or vehicle and remove wet clothing and to drink warm fluids. At the end of the rest period, the oral temperature will be taken again to ensure that the employee's temperature is above 96^o F. If the oral temperature has remained below 96^o F., the employee will be advised to take a shower to increase his/her temperature. However, if the oral temperature still remains below 96^o F. after the shower, the employee will be immediately sent to consult with a physician.

A fluid/electrolyte replacement will be used as necessary to minimize fluid loss. This liquid supplement will be stored in a cooler or thermos at the edge of the decontamination zone in plastic squeeze bottles. The plastic bottles will be marked with individual's names. Disposable cups with lids and straws may be used in place of the squeeze bottles.

Prior to drinking within the decontamination zone, the project personnel shall follow the following decontamination procedures:

1) Personnel shall wash and rinse their outer gloves and remove them.

2) Personnel shall remove their hard hats and respirators and place on a table.

3) Personnel shall remove their inner gloves and place them on a table.

4) Personnel shall wash and rinse their face and hands.

5) Personnel shall carefully remove their personal bottle or cup from the cooler to ensure that their outer clothes do not touch any bottles, cups, etc.

6) The used bottle or cups will not be returned to the cooler but will be placed in a receptacle or container to be cleaned or disposed of.

7) Personnel shall replace their respirators, hard hats, gloves, and tape gloves prior to re-entering the hazardous zone.

14.2 Retention On-Site

During the course of the project, it is expected that waste materials will be retained on-site until removed by ACM. All waste containers will be labeled according to DOT and other regulations where appropriate. Waste materials, both drummed and bulk, will be stored in designated areas. All waste drums will be sealed before they are moved from the exclusion zone.

14.3 Equipment and Material Decontamination

All equipment and material used in this project shall be thoroughly decontaminated using procedures described in the project Work Plan before it is removed from the project site. Debris and contaminated clothing and tools which cannot be decontaminated, shall be disposed of.

14.4 Communications

Telephone communications will be available at all times on the site. A telephone will be maintained with the Project Manager or Site Supervisor.

Communication procedures are outlined in the Contingency Plan in Section 9.0 of the Health and Safety Plan.

Table 3 contains an emergency call list and will be posted in one of the team member's vehicles and in the Tonawanda Self Storage office.

14.5 On-Site Hygiene Facilities

The office lavatories will be available for decontaminated team members and subcontractors. Water will be available in the CRZ for decontamination.

A first aid kit will be kept in the support zone at the Site at all times.

15.0 Tailgate Safety Meetings

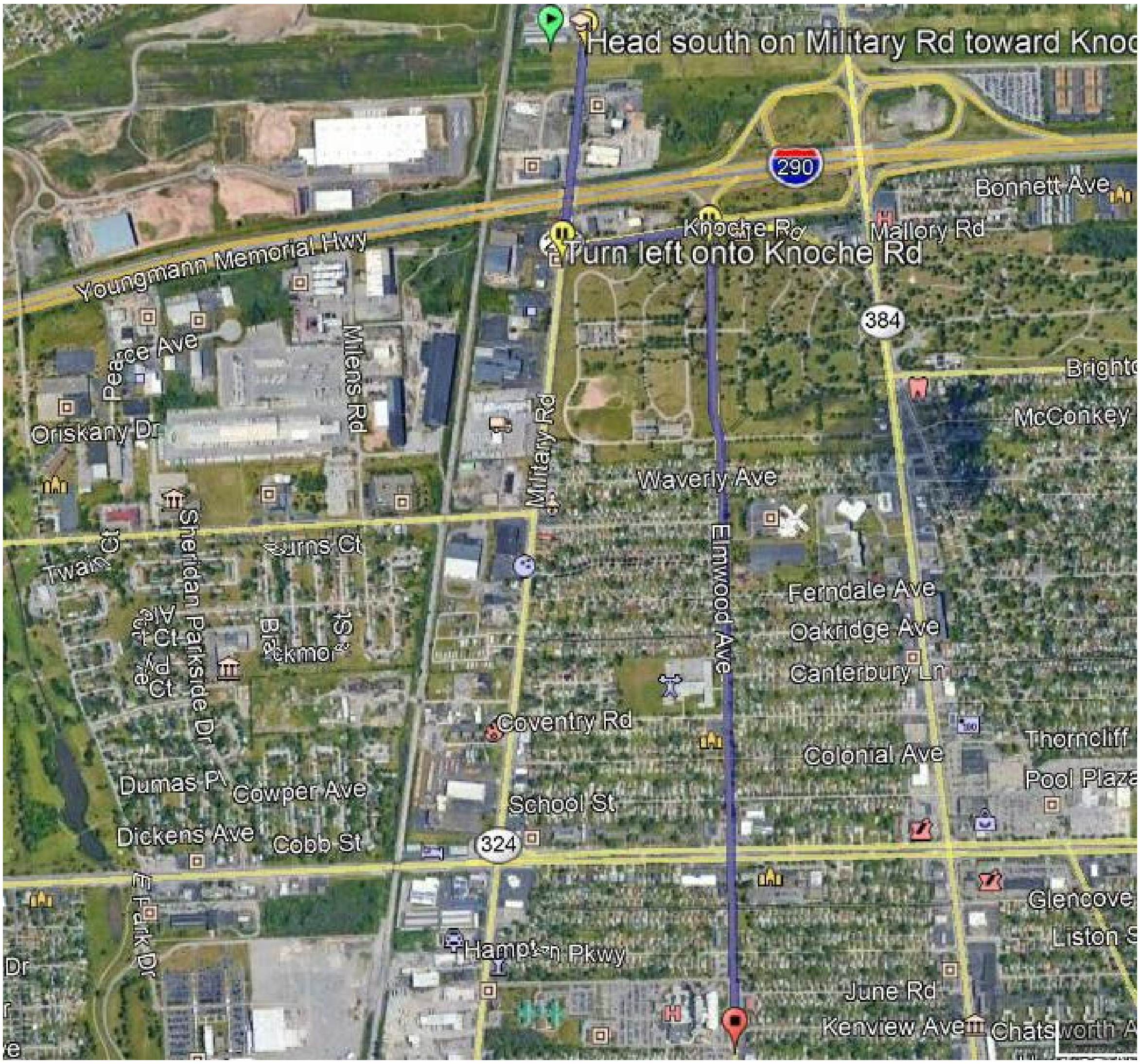
The HSO or the designated representative will conduct daily tailgate safety meetings each workday and will be mandatory for all project personnel. The meetings will provide information on the anticipated site conditions and the work to be completed that day. Appendix A contains a form for documenting Safety Meetings. Completed forms will be retained in Leader's project file.

Additional safety meetings will be held on an as required basis.

16.0 Medical Surveillance

All team members and subcontractors that may potentially have contact with hazardous substances at concentrations above the permissible exposure level (PEL) will be part of a Medical Monitoring Program as outlined in 29CFR 1910.134 and 29CFR 1910.120.

NORTH



Route to Hospital
Leaving the Site, make a right turn on Military Road.
Travel south approximately 0.3 miles and make a left (first traffic light south of Rt. 190) onto Knoche Road.
From Knoche Road travel east 0.2 miles and make left onto Elmwood Avenue (first traffic light).
From Elmwood Avenue travel south 1.15-miles to the hospital which on the right
(west) side of the road. The second entrance into the hospital leads to the Emergency Department
(716) 447-6121.

Title
Route to Hospital
2950 Elmwood Avenue
Buffalo, New York

Prepared For
ACM Northfield CR#3, LLC
3144 South Winton Road
Rochester, New York

Leader

Leader Professional Services
271 Marsh Road, Suite 2
Pittsford, NY 14534
(585) 248-2413
FAX (585) 248-2834

Project 235.198
Date 11/26/18
Scale Not to Scale

Drawn PVS
Checked MPR
File Name Hospital Map

Figure 1

TABLE 1

KNOWN AND POTENTIAL HEALTH AND SAFETY HAZARDS
BISONITE PAINT COMPANY
TONAWANDA, NEW YORK

Known and Potential Site Hazards: *Chemical* (See Appendix B for information sheets and/or MSDSs)

1) Contaminants

- Xylene
- Toluene
- Antimony
- Barium
- Chromium
- Lead
- Mercury

2) Review of Symptoms

Symptoms of exposure to hazardous wastes and in particular to the contaminants above will be reviewed with all site personnel. Symptoms of both acute and chronic exposures will be covered. In addition, the on-site coordinators will be advised to watch for outward evidence of changes in workers' health. These outward symptoms may include fatigue, tremor, insomnia, skin irritations or discoloration, eye, nose and throat irritation, cough, or abdominal soreness.

Note the number and nature of potential contaminants mandate that contact of waste materials with the exposed skin must not be allowed to occur under any circumstances.

Known and Potential Site Hazards: *Non-Chemical*

- General Physical Hazards. Since the project will take place at an active truck terminal, the physical hazards include:

  Vehicular traffic
  Underground and aboveground utilities
  Slip, trip, and fall

TABLE 2

ACTION LEVELS
BISONITE PAINT COMPANY
TONAWANDA, NEW YORK

Unknown Organic Vapor Concentrations (ppm)[1]	Level of Protection
< 1	Level D
≥ 1 < 10	Level C
>10	Level B
Anticipated Chemical Contaminants[2]	**Time Weight Average (ppm)**
Xylene	100
Toluene	100
Metals (as Mercury dust)	<0.025 mg/cubic meter

Note:

1 Unknown organic vapor action levels are based on the lowest known exposure limits for chlorine (PEL = 1 ppm, IDLH = 30 ppm). The air purifying cartridge limitation for chlorine is 10 ppm.

TABLE 3

EMERGENCY CALL LIST
BISONITE PAINT COMPANY
TONAWANDA, NEW YORK

Fires - Spills

Tonawanda Fire Department	911

Public Services

Tonawanda Police Emergency	911

Emergency Medical Services

Kenmore Mercy Hospital (Emergency Department)	(716) 447-6121

SPILL NOTIFICATION

Agencies

National Response Center	(800) 424-8802
Local DEC Office Region 9	(716) 851-7220
Spill Hotline	(800) 457-7362

Provide the following information to the agencies:

- Name of person making the call
- Company and location
- Nature of fire (fire calls only)
- Name and estimated amount of chemical released to the environment (spills only)
- Time of release
- Remedial action taken to correct the problem

Site Contacts

Joshua M. Vaccaro (NYSDEC Project Manager)	(716) 851-7220
Shaun Surani (Public Health Specialist, NYSDOH)	(518) 402-7860
Dixon Rollins, P.E. (Leader Professional Services-Rochester)	(585) 248-2413
Michael Rumrill (Leader Professional Services – Rochester)	(585) 248-2413

APPENDIX A

SAFETY MEETING SIGN-OFF SHEETS

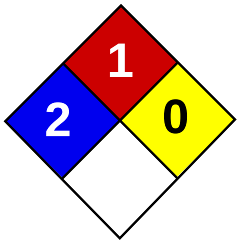
SAFETY MEETING ATTENDENCE SIGN-OFF SHEET

Person/Company	Date

APPENDIX B

MSDS

ScienceLab.com
Chemicals & Laboratory Equipment



Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet

Antimony MSDS

Section 1: Chemical Product and Company Identification

Product Name: Antimony

Catalog Codes: SLA1453, SLA4462

CAS#: 7440-36-0

RTECS: CC4025000

TSCA: TSCA 8(b) inventory: Antimony

CI#: Not available.

Synonym: Stibium

Chemical Name: Not available.

Chemical Formula: Sb

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Antimony	7440-36-0	100

Toxicological Data on Ingredients: Antimony: ORAL (LD50): Acute: 7000 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to blood, kidneys, lungs, the nervous system, liver, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In

case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.5 Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 121.75 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 1635°C (2975°F)

Melting Point: 630°C (1166°F)

Critical Temperature: Not available.

Specific Gravity: 6.691 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 7000 mg/kg [Rat].

Chronic Effects on Humans: Causes damage to the following organs: blood, kidneys, lungs, the nervous system, liver, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion. Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Human: passes through the placenta, excreted in maternal milk.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Antimony powder UNNA: UN2871 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Antimony Massachusetts RTK: Antimony TSCA 8(b) inventory: Antimony

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R36/38- Irritating to eyes and skin.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 11:19 AM

Last Updated: 05/21/2013 12:00 PM

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SAFETY DATA SHEET
North American Version

BARIUM CARBONATE

1. PRODUCT AND COMPANY IDENTIFICATION

1.1. Identification of the substance or mixture

Product name : BARIUM CARBONATE
Product grade(s) : A , B , C , D
Barium Carbonate Granular
Barium Carbonate Powder
Chemical Name : Barium carbonate
Synonyms : Barium salt
Molecular formula : BaCO3
Molecular Weight : 197.3 g/mol

1.2. Use of the Substance/Mixture

Recommended use :

- Use in the manufacturing of other barium substances
- Use as reactive processing aid (sulfate removal)
- Glass industry
- Manufacture of ceramic materials
- Manufacture of electro-ceramic materials
- Manufacture of glazes, frits and enamels
- Use in welding electrode coating
- Use in the preparation of slurry
- Manufacture of pyrotechnical products
- Welding in industrial and professional settings
- For further information, please contact: Supplier

1.3. Company/Undertaking Identification

Address : SOLVAY CHEMICALS, INC.
3333 RICHMOND AVENUE
HOUSTON TX 77098-3099
United States

1.4. Emergency and contact telephone numbers

Emergency telephone number : **1 (800) 424-9300 CHEMTREC ® (USA & Canada)**
01-800-00-214-00 (MEX. REPUBLIC)

Contact telephone number (product information): : **US: +1-800-765-8292 (Product information)**
US: +1-713-525-6500 (Product information)

2. HAZARDS IDENTIFICATION

2.1. Emergency Overview:

NFPA : H= 2 F= 0 I= 1 S= None
HMIS : H= 2 F= 0 R= 1 PPE = Supplied by User; dependent on local conditions

General Information

Appearance : powder, pellets
Colour : white
Odour : odourless

2.2. Potential Health Effects:

Inhalation

- May cause irritation of the mucous membranes.

Eye contact

- Contact with eyes may cause irritation.

Skin contact

- Prolonged skin contact may cause skin irritation.

Ingestion

- Acute intoxication by inhalation or ingestion of water soluble barium salts causes vomiting, diarrhoea, convulsive tremors and muscular paralysis.
- Risk of convulsions, pulmonary arrest.
- Risk of cardiac rhythm alteration, sudden cardiac failure.
- Risk of shock.

Other toxicity effects

- See section 11: Toxicological Information

2.3. Environmental Effects:

- See section 12: Ecological Information

3. COMPOSITION/INFORMATION ON INGREDIENTS

Barium carbonate

CAS-No.	:	513-77-9
Concentration	:	**>= 97.0 %**

4. FIRST AID MEASURES

4.1. Inhalation

- Move to fresh air.
- If symptoms persist, call a physician.

4.2. Eye contact

- Rinse thoroughly with plenty of water, also under the eyelids.
- If eye irritation persists, consult a specialist.

4.3. Skin contact

- Remove and wash contaminated clothing before re-use.
- Wash off with plenty of water.
- If symptoms persist, call a physician.

4.4. Ingestion

- Call a physician immediately.
- Take victim immediately to hospital.
- If swallowed, rinse mouth with water (only if the person is conscious).
- Artificial respiration and/or oxygen may be necessary.

4.5. Notes to physician

Exposure to decomposition products :

- Give to drink 30 grams of sodium sulphate in 250 ml of fresh water.
- Immediate medical attention is required.
- Medical examination necessary even only on suspicion of intoxication.

5. FIREFIGHTING MEASURES

5.1. Suitable extinguishing media

- Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

5.2. Extinguishing media which shall not be used for safety reasons

- None.

5.3. Special exposure hazards in a fire

- Not combustible.

5.4. Hazardous decomposition products

- Barium oxide
- Other hazardous decomposition products may be formed.

5.5. Special protective equipment for firefighters

- In the event of fire, wear self-contained breathing apparatus.
- Use personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. Advice for non-emergency personnel

- Evacuate personnel to safe areas.

6.1.2. Advice for emergency responders

- Use personal protective equipment.
- Prevent further leakage or spillage.

6.2. Environmental precautions

- Should not be released into the environment.
- Local authorities should be advised if significant spillages cannot be contained.

6.3. Methods and materials for containment and cleaning up

- Pick up and transfer to properly labelled containers.
- Keep in suitable, closed containers for disposal.

6.4. Reference to other sections

- Refer to protective measures listed in sections 7 and 8.

7. HANDLING AND STORAGE

7.1. Handling

- Ensure adequate ventilation.
- Avoid contact with skin and eyes.

7.2. Storage

- Store in original container.
- Keep in a well-ventilated place.
- Keep in a dry place.
- Keep in properly labelled containers.
- Keep container closed.

- Keep away from Incompatible products.

7.3. Packaging material

- Paper + PE.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Exposure Limit Values

Barium carbonate

- US. ACGIH Threshold Limit Values 2009
  time weighted average = 0.5 mg/m3
  Remarks: as Ba
- US. OSHA Table Z-1-A (29 CFR 1910.1000) 1989
  time weighted average = 0.5 mg/m3
  Remarks: as Ba
- US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) 02 2006
  Permissible exposure limit = 0.5 mg/m3
  Remarks: as Ba
- US. Tennessee. OELs. Occupational Exposure Limits, Table Z1A 06 2008
  time weighted average = 0.5 mg/m3
  Remarks: as Ba

Strontium carbonate

- US. ACGIH Threshold Limit Values
  Remarks: none established

Barium sulfate

- US. ACGIH Threshold Limit Values 12 2010
  time weighted average = 10 mg/m3
- US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) 02 2006
  Permissible exposure limit = 5 mg/m3
- US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) 02 2006
  Permissible exposure limit = 15 mg/m3
- US. OSHA Table Z-1-A (29 CFR 1910.1000) 1989
  time weighted average = 5 mg/m3
- US. OSHA Table Z-1-A (29 CFR 1910.1000) 1989
  time weighted average = 10 mg/m3
- US. Tennessee. OELs. Occupational Exposure Limits, Table Z1A 06 2008
  time weighted average = 5 mg/m3
  Remarks: respirable dust fraction
- US. Tennessee. OELs. Occupational Exposure Limits, Table Z1A 06 2008
  time weighted average = 10 mg/m3
  Remarks: Total dust

ACGIH® and TLV® are registered trademarks of the American Conference of Governmental Industrial Hygienists.
SAEL = Solvay Acceptable Exposure Limit, Time Weighted Average for 8 hour workdays. No Specific TLV STEL (Short Term Exposure Level) has been set. Excursions in exposure level may exceed 3 times the TLV TWA for no more than a total of 30 minutes during a workday and under no circumstances should they exceed 5 times the TLV TWA.

8.2. Engineering controls

- Apply technical measures to comply with the occupational exposure limits.

8.3. Personal protective equipment

8.3.1. Respiratory protection

- In case of insufficient ventilation, wear suitable respiratory equipment.
- Self-contained breathing apparatus (EN 133)

- Respirator with a dust filter
- Use only respiratory protection that conforms to international/ national standards.
- Use NIOSH approved respiratory protection.

8.3.2. Hand protection

- Impervious gloves
- Suitable material: PVC, Neoprene, Natural Rubber

8.3.3. Eye protection

- Dust proof goggles, if dusty.

8.3.4. Skin and body protection

- Long sleeved clothing

8.3.5. Hygiene measures

- Eye wash bottles or eye wash stations in compliance with applicable standards.
- When using do not eat, drink or smoke.
- Wash hands before breaks and at the end of workday.
- Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. General Information

Appearance	:	powder, pellets
Colour	:	white
Odour	:	odourless

9.2. Important health safety and environmental information

pH	:	5 - 7
Boiling point/boiling range	:	*Remarks*: not applicable, Thermal decomposition
Flash point	:	*Remarks*: not applicable
Flammability	:	*Remarks*: The product is not flammable.
Explosive properties	:	*Explosion danger*. *Remarks*: Not explosive
Oxidizing properties	:	*Remarks*: Non oxidizer
Vapour pressure	:	*Remarks*: not applicable
Relative density / Density	:	4.31
Bulk density	:	from 400 - 2,000 kg/m3
Solubility(ies)	:	14 mg/l (Water) *Temperature*: 20 °C (68 °F)
Partition coefficient: n-octanol/water	:	*Remarks*: not applicable
Vapour density	:	*Remarks*: not applicable
Evaporation rate	:	*Remarks*: not applicable

9.3. Other data

Melting point/range	: >= 900 °C (1,652 °F) *Remarks*: Thermal decomposition
Auto-flammability	: *Remarks*: not applicable
Granulometry	: 2.32 - 14.6 µm (powder) *Remarks*: d 50
Decomposition temperature	: 1,380 °C (2,516 °F)

10. STABILITY AND REACTIVITY

10.1. Stability

- Stable under recommended storage conditions.

10.2. Conditions to avoid

- none
- Keep at temperature not exceeding: 1,380 °C (2,516 °F)

10.3. Materials to avoid

- Acids

10.4. Hazardous decomposition products

- Barium oxide, Other hazardous decomposition products may be formed.

11. TOXICOLOGICAL INFORMATION

Toxicological data

Acute oral toxicity

- LD50, rat, < 300 mg/kg (Barium chloride anhydrous)
- LD50, rat, > 300 mg/kg, Remarks. practically insoluble

Acute inhalation toxicity

- LC50, , Remarks study scientifically unjustified

Acute dermal irritation/corrosion

- LD50, rat, > 2,000 mg/kg (Barium chloride anhydrous)

Skin irritation

- rabbit, No skin irritation

Eye irritation

- rabbit, No eye irritation

Sensitisation

- Did not cause sensitization. (Barium chloride anhydrous)

Chronic toxicity

- Inhalable dust, Repeated exposure, rat, Target Organs: cardio-vascular system, hematology system, Respiratory system, NOEL: 5.2 mg/m3, observed effect
- Inhalable dust, NOEL: 1 mg/m3, NOAEL
- Oral, Repeated exposure, rat/mouse, Target Organs: cardio-vascular system, hematology system, renal system, adrenal glands, NOEL: 87.8 mg/kg, NOAEL

Carcinogenicity

- Oral, Prolonged exposure, rat/mouse, Animal testing did not show any carcinogenic effects., (Barium chloride anhydrous)

Genetic toxicity in vitro

- in vitro, Animal testing did not show any mutagenic effects. (Barium chloride anhydrous)

Reproductive toxicity

- Effect on fertility, Repeated exposure, Target Organs: Oral, 258 - 290 mg/kg, NOAEL, 2 (Barium chloride anhydrous)

Remarks

- Harmful if swallowed.
- The toxicity is mainly linked to the barium ion (nervous, cardiovascular, respiratory and gastro-intestinal troubles).
- Risk of effect on the liver, the cardiovascular system, the hematological system and the adrenals
- Irritating to eyes and skin.

12. ECOLOGICAL INFORMATION

12.1. Ecotoxicity effects

Acute toxicity

- Remarks: Aquatic toxicity is unlikely due to low solubility.
- Fishes, Brachydanio rerio, LC50, 96 h, > 152 mg/l (Barium chloride anhydrous)
- Crustaceans, Daphnia magna, LC50, 48 h, 14.5 mg/l (Barium chloride anhydrous)

Chronic toxicity

- Crustaceans, Daphnia magna, EC50, 21 Days, 2.9 mg/l
- Pseudokirchneriella subcapitata (green algae), growth rate, 72 h, >= 61 mg/l
  Remarks: NOEC
- Pseudokirchneriella subcapitata (green algae), EC50, growth rate, 72 h, > 100 mg/l

12.2. Mobility

- Air
  Remarks: mobility as solid aerosols
- Water/soil
  Remarks: low solubility and mobility

12.3. Persistence and degradability

Abiotic degradation

- Water/soil
  Result: slow ionization and cation precipitation in presence of sulfates or carbonates

Biodegradation

- Remarks: The methods for determining biodegradability are not applicable to inorganic substances.

12.4. Bioaccumulative potential

- Bioconcentration
  Result: potential accumulation of the cation

12.5. Other adverse effects

- no data available

12.6. Remarks

- Ecological injuries are not known or expected under normal use.
- Persistent product mainly in its inert form.

13. DISPOSAL CONSIDERATIONS

13.1. Waste from residues / unused products

- In accordance with local and national regulations.
- Use a solution of sodium or magnesium sulphate or possibly a dilute solution of sulphuric acid to form a sulphate precipitate.

- Dispose of wastes in an approved waste disposal facility.

13.2. Packaging treatment

- Containers that cannot be cleaned must be treated as waste.
- Must be incinerated in a suitable incineration plant holding a permit delivered by the competent authorities.

13.3. RCRA Hazardous Waste

- Listed RCRA Hazardous Waste (40 CFR 302) - No
- Unlisted RCRA Hazardous Waste (40 CFR 302) - Yes
- D005 (barium containing waste)

14. TRANSPORT INFORMATION

- not regulated

15. REGULATORY INFORMATION

15.1. Inventory Information

Toxic Substance Control Act list (TSCA)	: -	In compliance with inventory.
Australian Inventory of Chemical Substances (AICS)	: -	In compliance with inventory.
Canadian Domestic Substances List (DSL)	: -	In compliance with inventory.
Korean Existing Chemicals Inventory (KECI (KR))	: -	In compliance with inventory.
EU list of existing chemical substances (EINECS)	: -	In compliance with inventory.
Japanese Existing and New Chemical Substances (MITI List) (ENCS)	: -	In compliance with inventory.
Inventory of Existing Chemical Substances (China) (IECS)	: -	In compliance with inventory.
Philippine Inventory of Chemicals and Chemical Substances (PICCS)	: -	In compliance with inventory.
New Zealand Inventory of Chemicals (NZIOC)	: -	In compliance with inventory.

15.2. Other regulations

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A)

- not regulated.

SARA Hazard Designation (SARA 311/312)

- Acute Health Hazard: Yes.

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

- not regulated.

US. EPA CERCLA Hazardous Substances (40 CFR 302)

- not regulated.

US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)
- yes.

US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)
- yes.

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)
- not regulated.

16. OTHER INFORMATION

Ratings :

NFPA (National Fire Protection Association)
Health = 2 Flammability = 0 Instability = 1 Special =None

HMIS (Hazardous Material Information System)
Health = 2 Fire = 0 Reactivity = 1 PPE : Supplied by User; dependent on local conditions

Further information
- Update
  This data sheet contains changes from the previous version in section(s): 8 , 11 , 12 , 15
- Distribute new edition to clients

Material Safety Data Sheets contain country specific regulatory information; therefore, the MSDS's provided are for use only by customers of the company mentioned in section 1 in North America. If you are located in a country other than Canada, Mexico or the United States, please contact the Solvay Group company in your country for MSDS information applicable to your location.

The previous information is based upon our current knowledge and experience of our product and is not exhaustive. It applies to the product as defined by the specifications. In case of combinations or mixtures, one must confirm that no new hazards are likely to exist. In any case, the user is not exempt from observing all legal, administrative and regulatory procedures relating to the product, personal hygiene, and integrity of the work environment. (Unless noted to the contrary, the technical information applies only to pure product).

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ScienceLab.com
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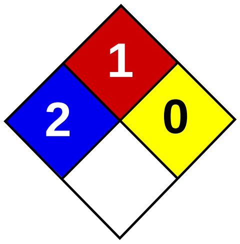

Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet

Chromium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Chromium

Catalog Codes: SLC4711, SLC3709

CAS#: 7440-47-3

RTECS: GB4200000

TSCA: TSCA 8(b) inventory: Chromium

CI#: Not applicable.

Synonym: Chromium metal; Chrome; Chromium Metal Chips 2" and finer

Chemical Name: Chromium

Chemical Formula: Cr

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Chromium	7440-47-3	100

Toxicological Data on Ingredients: Chromium LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, lungs, liver, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 580°C (1076°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Moderate fire hazard when it is in the form of a dust (powder) and burns rapidly when heated in flame. Chromium is attacked vigorously by fused potassium chlorate producing vivid incandescence. Pyrophoric chromium unites with nitric oxide with incandescence. Incandescent reaction with nitrogen oxide or sulfur dioxide.

Special Remarks on Explosion Hazards:
Powdered Chromium metal +fused ammonium nitrate may react violently or explosively. Powdered Chromium will explode spontaneously in air.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.5 (mg/m3) from ACGIH (TLV) [United States] TWA: 1 (mg/m3) from OSHA (PEL) [United States] TWA: 0.5 (mg/m3) from NIOSH [United States] TWA: 0.5 (mg/m3) [United Kingdom (UK)] TWA: 0.5 (mg/m3) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 52 g/mole

Color: Silver-white to Grey.

pH (1% soln/water): Not applicable.

Boiling Point: 2642°C (4787.6°F)

Melting Point: 1900°C (3452°F) +/- !0 deg. C

Critical Temperature: Not available.

Specific Gravity: 7.14 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water. Soluble in acids (except Nitric), and strong alkalies.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, acids, alkalis.

Corrosivity: Not available.

Special Remarks on Reactivity:
Incompatible with molten Lithium at 180 deg. C, hydrogen peroxide, hydrochloric acid, sulfuric acid, most caustic alkalies and alkali carbonates, potassium chlorate, sulfur dioxide, nitrogen oxide, bromine pentafluoride. It may react violently or ignite with bromine pentafluoride. Chromium is rapidly attacked by fused sodium hydroxide + potassium nitrate. Potentially hazardous incompatibility with strong oxidizers.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause cancer based on animal data. There is no evidence that exposure to trivalent chromium causes cancer in man.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: May cause skin irritation. Eyes: May cause mechanical eye irritation. Inhalation: May cause irritation of the respiratory tract and mucous membranes of the respiratory tract. Ingestion: May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea. Chronic Potential Health Effects: Inhalation: The effects of chronic exposure include irritation , sneezing, reddness of the throat, bronchospasm, asthma, cough, polyps, chronic inflammation, emphysema, chronic bronchitis, pharyngitis, bronchopneumonia, pneumoconoisis. Effects on the nose from chronic chromium exposure include irritation, ulceration, and perforation of the nasal septum. Inflammation and ulceration of the larynx may also occur. Ingestion or Inhalation: Chronic exposure may cause liver and kidney damage.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Chromium Illinois toxic substances disclosure to employee act: Chromium Illinois chemical safety act: Chromium New York release reporting list: Chromium Rhode Island RTK hazardous substances: Chromium Pennsylvania RTK: Chromium Minnesota: Chromium Michigan critical material: Chromium Massachusetts RTK: Chromium Massachusetts spill list: Chromium New Jersey: Chromium New Jersey spill list: Chromium Louisiana spill reporting: Chromium California Director's List of Hazardous Substances: Chromium TSCA 8(b) inventory: Chromium SARA 313 toxic chemical notification and release reporting: Chromium CERCLA: Hazardous substances.: Chromium: 5000 lbs. (2268 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
R40- Limited evidence of carcinogenic effect S36/37/39- Wear suitable protective clothing, gloves and eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:16 PM

Last Updated: 05/21/2013 12:00 PM

Lead

SAFETY DATA SHEET

1 PRODUCT AND SUPPLIER IDENTIFICATION

Product Name: Lead - pellets, shot, sheet, foil, rod, wire, target

Formula: Pb

Supplier: ESPI Metals
1050 Benson Way
Ashland, OR 97520

Telephone: 800-638-2581

Fax: 541-488-8313

Email: sales@espimetals.com

Emergency: Infotrac 800-535-5053 (US) or 352-323-3500 (24 hour)

Recommended Uses: Scientific Research

2 HAZARDS IDENTIFICATION

GHS Classification (29 CFR 1910.1200): Acute toxicity, category 4, Carcinogenicity, category 2, Reproductive toxicity, category 2.

GHS Label Elements:

Signal Word: Warning

Hazard Statements: H302 Harmful if swallowed, H332 Harmful if inhaled, H351 Suspected of causing cancer, H361 Suspected of damaging fertility or the unborn child.

Precautionary Statements: P260 Do not breath dust/fume/gas/mist/vapors/spray, P264 Wash hands thoroughly after handling, P281 Use personal protective equipment as required, P301+P304+P312 IF SWALLOWED OR INHALED: Call a POISON CENTER or doctor/physician if you feel unwell.

3 COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient: Lead

CAS#: 7439-92-1

%: 100

EC#: 231-100-4

4 FIRST AID MEASURES

General Measures: Under normal handling and use, exposure to solid forms of this material present few health hazards. Subsequent operations such as grinding, melting or welding may produce hazardous dust or fumes which can be inhaled or come in contact with the skin or eyes. Emergency responders should take care to avoid secondary exposure to lead particulate. Wear appropriate protective equipment.

INHALATION: Remove to fresh air, keep warm and quiet, give oxygen if breathing is difficult. Seek immediate medical attention.

INGESTION: Rinse mouth with water. Do not induce vomiting. Seek immediate medical attention. Never induce vomiting or give anything by mouth to an unconscious person.

SKIN: Remove contaminated clothing, wash affected area with soap and water. Seek medical attention. Wash contaminated clothing before reusing.

EYES: Flush eyes with lukewarm water, including under upper and lower eyelids, for at least 15 minutes. Seek medical attention.

Most Important Symptoms/Effects, Acute and Delayed: May cause irritation. See section 11 for more information.

Indication of Immediate Medical Attention and Special Treatment: No other information available.

5 FIREFIGHTING MEASURES

Extinguishing Media: Use suitable extinguishing agent for surrounding materials and type of fire.

Unsuitable Extinguishing Media: No information available.

Specific Hazards Arising from the Material: This product does not present fire or explosion hazards as shipped. Fine dust from processing is a weak to moderate fire hazard if allowed to accumulate and subjected to an ignition source. Under fire conditions toxic fumes of lead oxide may be released.

Special Protective Equipment and Precautions for Firefighters: Full face, self-contained breathing apparatus and full protective clothing when necessary.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures: Wear appropriate respiratory and protective equipment specified in section 8. Avoid creating dusts. Avoid breathing dust or fume. Isolate spill area and provide ventilation.

Methods and Materials for Containment and Cleaning Up: For larger pieces - pick up mechanically. For chips or dust - vacuum using a HEPA filter. Place in properly labeled closed containers. Avoid creating dusts. Do not use compressed air.

Environmental Precautions: Do not allow to enter drains or to be released to the environment.

7 HANDLING AND STORAGE

Precautions for Safe Handling: Handle in a well-ventilated area. Avoid creating dust. Avoid exposure to high temperature. Avoid breathing dust or fumes. Avoid contact with skin and eyes. Wash thoroughly before eating or smoking. See section 8 for information on personal protection equipment.

Conditions for Safe Storage, Including Any Incompatibilities: Store in a sealed container. Store in a cool, dry area. Protect from moisture. Do not store together with strong oxidizers or acids. See section 10 for more information on incompatible materials.

8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits:	Lead
OSHA/PEL:	50 μg/m^3
ACGIH/TLV:	0.05 mg/m^3

Appropriate Engineering Controls: Whenever possible the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne dust and fume to meet established occupational exposure limits. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air. Clothing worn in areas of exposure to lead dust or fume should be restricted to the workplace and laundered regularly.

Individual Protection Measures, Such as Personal Protective Equipment:

Respiratory Protection: When potential exposures are above the occupational limits, approved respirators must be used.

Eye Protection: Safety glasses

Skin Protection: Wear impermeable gloves, protective work clothing as necessary.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:

Form:	Solid in various forms
Color:	Silvery metallic
Odor:	Odorless

Odor Threshold: Not determined

pH: N/A

Melting Point: 327.5 ^{o}C

Boiling Point: 1740 ^{o}C

Flash Point: N/A

Evaporation Rate: N/A

Flammability: No data

Upper Flammable Limit: No data

Lower Flammable Limit: No data

Vapor Pressure: 1 mm Hg @ 973 ^{o}C

Vapor Density: N/A

Relative Density (Specific Gravity): 11.34 g/cc

Solubility in H_2O: Insoluble

Partition Coefficient (n-octanol/water): Not determined

Autoignition Temperature: No data

Decomposition Temperature: No data

Viscosity: N/A

10 STABILITY AND REACTIVITY

Reactivity: No data

Chemical Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: High temperatures will generate toxic lead oxide fumes.

Conditions to Avoid: Avoid creating or accumulating fines or dusts. Avoid high temperatures.

Incompatible Materials: Strong acids, strong oxidizers, halogens and interhalogen compounds.

Hazardous Decomposition Products: Lead oxide fume.

Other: Freshly cut or cast lead surfaces tarnish rapidly due to the formation of an insoluble protective layer of basic lead carbonate.

11 TOXICOLOGICAL INFORMATION

Likely Routes of Exposure: Inhalation, skin, eyes. Product as shipped does not present an inhalation hazard; however subsequent operations may create dusts or fumes which could be inhaled.

Symptoms of Exposure: Skin or eye contact with dust or fume may cause local irritation. Inhalation of dust or fumes may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in legs, arms, and joints. An acute short-term dose of lead could cause acute encephalopathy with seizures, coma, and death. However, short-term exposure of this magnitude is rare. Kidney damage, as well as anemia, can occur from acute exposure. Symptoms due to ingestion of lead dust or fume would be similar to those from inhalation. Other health effects such as metallic taste in the mouth and constipation or bloody diarrhea might also be expected to occur.

Acute and Chronic Effects: Lead accumulates in bone and body organs once it enters the body. Elimination from the body is slow. Initial and periodic medical examinations are advised for persons repeatedly exposed to levels above the exposure limits of lead dust or fumes. Once lead enters the body, it can affect a variety of organ systems, including the nervous system, kidneys, reproductive system, blood formation, and gastrointestinal system.

Acute Toxicity: No data

Carcinogenicity: **NTP**: R - Reasonably anticipated to be a carcinogen **IARC**: 2B - Possibly carcinogenic to humans

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

12 ECOLOGICAL INFORMATION

Ecotoxicity: No data

Persistence and Degradability: No data

Bioaccumulative Potential: No data

Mobility in Soil: No data

Other Adverse Effects: Do not allow material to be released to the environment. No further relevant information available.

13 DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Product: Dispose of in accordance with Federal, State and Local regulations.

Packaging: Dispose of in accordance with Federal, State and Local regulations.

14 TRANSPORT INFORMATION

DOT/ADR/IATA/IMDG Regulations: Not regulated

UN Number: N/A

UN Proper Shipping Name: N/A

Transport Hazard Class: N/A

Packing Group: N/A

Marine Pollutant: No

Special Precautions: N/A

15 REGULATORY INFORMATION

TSCA Listed: All components are listed.

Regulation (EC) No 1272/2008 (CLP): Acute toxicity, category 4, Carcinogenicity, category 2, Reproductive toxicity, category 2.

Canada WHMIS Classification (CPR, SOR/88-66): Class D, Division 2, Subdivision A - Very toxic material causing other toxic effects.

HMIS Ratings: **Health**: 1 **Flammability**: 0 **Physical**: 0

NFPA Ratings: **Health**: 1 **Flammability**: 0 **Reactivity**: 0

Chemical Safety Assessment: A chemical safety assessment has not been carried out.

16 OTHER INFORMATION

The above information is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. ESPI Metals shall not be held liable for any damages resulting from handling or from contact with the above product.

Prepared by: ESPI Metals

Revised/Reviewed: September 2014

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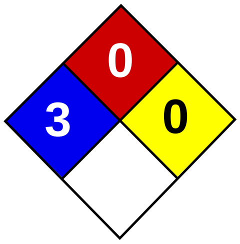
Chemicals & Laboratory Equipment



Health	3
Fire	0
Reactivity	0
Personal Protection	

Material Safety Data Sheet

Mercury MSDS

Section 1: Chemical Product and Company Identification

Product Name: Mercury

Catalog Codes: SLM3505, SLM1363

CAS#: 7439-97-6

RTECS: OV4550000

TSCA: TSCA 8(b) inventory: Mercury

CI#: Not applicable.

Synonym: Quick Silver; Colloidal Mercury; Metallic Mercury; Liquid Silver; Hydragyrum

Chemical Name: Mercury

Chemical Formula: Hg

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Mercury	7439-97-6	100

Toxicological Data on Ingredients: Mercury LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A5 (Not suspected for human.) by ACGIH. 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, liver, brain, peripheral nervous system, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation.

Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
When thrown into mercury vapor, boron phosphodiiodide ignites at once. Flame forms with chlorine jet over mercury surface at 200 deg to 300 deg C. Mercury undergoes hazardous reactions in the presence of heat and sparks or ignition.

Special Remarks on Explosion Hazards:
A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. CHLORINE DIOXIDE & LIQUID HG, WHEN MIXED, EXPLODE VIOLENTLY. Mercury and Ammonia can produce an

explosive compound. A mixture of the dry carbonyl and oxygen will explode on vigorous shaking with mercury. Methyl azide in the presence of mercury was shown to be potentially explosive.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, metals.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 25°C (77°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.025 from ACGIH (TLV) [United States] SKIN TWA: 0.05 CEIL: 0.1 (mg/m3) from OSHA (PEL) [United States] Inhalation TWA: 0.025 (mg/m3) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Heavy liquid)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 200.59 g/mole

Color: Silver-white

pH (1% soln/water): Not available.

Boiling Point: 356.73°C (674.1°F)

Melting Point: -38.87°C (-38°F)

Critical Temperature: 1462°C (2663.6°F)

Specific Gravity: 13.55 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 6.93 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Ground mixtures of sodium carbide and mercury, aluminum, lead, or iron can react vigorously. A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. Incompatible with boron diiodophosphide; ethylene oxide; metal oxides, metals(aluminum, potassium, lithium, sodium, rubidium); methyl azide; methylsilane, oxygen; oxidants(bromine, peroxyformic acid, chlorine dioxide, nitric acid, tetracarbonynickel, nitromethane, silver perchlorate, chlorates, sulfuric acid, nitrates,); tetracarbonylnickel, oxygen, acetylinic compounds, ammonia, ethylene oxide, methylsiliane, calcium,

Special Remarks on Corrosivity:
The high mobility and tendency to dispersion exhibited by mercury, and the ease with which it forms alloys (amalga) with many laboratory and electrical contact metals, can cause severe corrosion problems in laboratories. Special precautions: Mercury can attack copper and copper alloy materials.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A5 (Not suspected for human.) by ACGIH. 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, brain, peripheral nervous system, central nervous system (CNS).

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May affect genetic material. May cause cancer based on animal data. Passes through the placental barrier in animal. May cause adverse reproductive effects(paternal effects- spermatogenesis; effects on fertility - fetotoxicity, post-implantation mortality), and birth defects.

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Mercury UNNA: 2809 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Mercury California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Mercury Connecticut hazardous material survey.: Mercury Illinois toxic substances disclosure to employee act: Mercury Illinois chemical safety act: Mercury New York acutely hazardous substances: Mercury Rhode Island RTK hazardous substances: Mercury Pennsylvania RTK: Mercury Minnesota: Mercury Massachusetts RTK: Mercury New Jersey: Mercury New Jersey spill list: Mercury Louisiana spill reporting: Mercury California Director's List of Hazardous Substances.: Mercury TSCA 8(b) inventory: Mercury SARA 313 toxic chemical notification and release reporting: Mercury CERCLA: Hazardous substances.: Mercury: 1 lbs. (0.4536 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):
R23- Toxic by inhalation. R33- Danger of cumulative effects. R38- Irritating to skin. R41- Risk of serious damage to eyes. R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S2- Keep out of the

reach of children. S7- Keep container tightly closed. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39- Wear eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S46- If swallowed, seek medical advice immediately and show this container or label. S60- This material and its container must be disposed of as hazardous waste. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 0

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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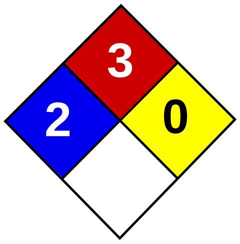
Last Updated: 05/21/2013 12:00 PM



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet

Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C6-H5-CH3 or C7-H8

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO_2).

Fire Hazards in Presence of Various Substances:
Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:
Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N_2O_4; $AgClO_4$; BrF_3; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m3) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Cauess mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abraisons. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite. Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophostatemia), severe, muscle weakness and Rhabdomyolysis. Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey.: Toluene Illinois

toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:30 PM

Last Updated: 05/21/2013 12:00 PM

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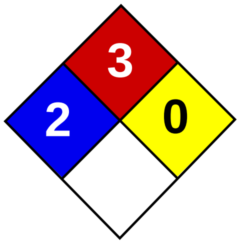

Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Xylenes MSDS

Section 1: Chemical Product and Company Identification

Product Name: Xylenes

Catalog Codes: SLX1075, SLX1129, SLX1042, SLX1096

CAS#: 1330-20-7

RTECS: ZE2100000

TSCA: TSCA 8(b) inventory: Xylenes

CI#: Not available.

Synonym: Xylenes; Dimethylbenzene; xylol; methyltoluene

Chemical Name: Xylenes (o-, m-, p- isomers)

Chemical Formula: C6H4(CH3)2

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Xylenes	1330-20-7	100

Toxicological Data on Ingredients: Xylenes: ORAL (LD50): Acute: 4300 mg/kg [Rat]. 2119 mg/kg [Mouse]. DERMAL (LD50): Acute: >1700 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 464°C (867.2°F)

Flash Points: CLOSED CUP: 24°C (75.2°F). (Tagliabue.) OPEN CUP: 37.8°C (100°F).

Flammable Limits: LOWER: 1% UPPER: 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Slightly explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Vapors may travel to source of ignition and flash back.

Special Remarks on Explosion Hazards:
Vapors may form explosive mixtures with air. Containers may explode when heated. May polymerize explosively when heated. An attempt to chlorinate xylene with 1,3-Dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin) caused a violent explosion

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined

areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 (ppm) [Canada] TWA: 435 (mg/m3) [Canada] TWA: 434 STEL: 651 (mg/m3) from ACGIH (TLV) [United States] TWA: 100 STEL: 150 (ppm) from ACGIH (TLV) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless. Clear

pH (1% soln/water): Not available.

Boiling Point: 138.5°C (281.3°F)

Melting Point: -47.4°C (-53.3°F)

Critical Temperature: Not available.

Specific Gravity: 0.864 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 1 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water. Miscible with absolute alcohol, ether, and many other organic liquids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles

Incompatibility with various substances: Reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Store away from acetic acid, nitric acid, chlorine, bromine, and fluorine.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2119 mg/kg [Mouse]. Acute dermal toxicity (LD50): >1700 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5000 4 hours [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS).

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals:
Lowest Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Man] - Route: Oral; Dose: 10000 ppm/6H

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Passes through the placental barrier in animal. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects (male and femael fertility (spontaneous abortion and fetotoxicity)) and birth defects based animal data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation. Can be absorbed through skin. Eyes: Causes eye irritation. Inhalation: Vapor causes respiratory tract and mucous membrane irritation. May affect central nervous system and behavior (General anesthetic/CNS depressant with effects including headache, weakness, memory loss, irritability, dizziness, giddiness, loss of coordination and judgement, respiratory depression/arrest or difficulty breathing, loss of appetite, nausea, vomiting, shivering, and possible coma and death). May also affects blood, sense organs, liver, and peripheral nerves. Ingestion: May cause gastrointestinal irritation including abdominal pain, vomiting, and nausea. May also affect liver and urinary system/ kidneys. May cause effects similar to those of acute inhalation. Chronic Potential Health Effects: Chronic inhalation may affect the urinary system (kidneys) blood (anemia), bone marrow (hyperplasia of bone marrow) brain/behavior/Central Nervous system. Chronic inhalation may alsocause mucosal bleeding. Chronic ingestion may affect the liver and metabolism (loss of appetite) and may affect urinary system (kidney damage)

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Xylenes UNNA: 1307 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Xylenes Illinois chemical safety act: Xylenes New York acutely hazardous substances: Xylenes Rhode Island RTK hazardous substances: Xylenes Pennsylvania RTK: Xylenes Minnesota: Xylenes Michigan critical material: Xylenes Massachusetts RTK: Xylenes Massachusetts spill list: Xylenes New Jersey: Xylenes New Jersey spill list: Xylenes Louisiana spill reporting: Xylenes California Director's List of Hazardous Substances: Xylenes TSCA 8(b) inventory: Xylenes SARA 302/304/311/312 hazardous chemicals: Xylenes SARA 313 toxic chemical notification and release reporting: Xylenes CERCLA: Hazardous substances.: Xylenes: 100 lbs. (45.36 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R10- Flammable. R21- Harmful in contact with skin. R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S36/37- Wear suitable protective clothing and gloves. S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 05/21/2013 12:00 PM

APPENDIX C

Community Air Monitoring Plan

Generic Community Air Monitoring Plan
Bisonite Paint Company Site
2268 and 2266 Military Road
Tonawanda, New York

1.0 Overview

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

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

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

2.0 Community Air Monitoring Plan

The limited site information suggests VOCs, semivolatile organic compounds (“SVOCs”), PCBs, and metals are present in the soil and possibly only VOCs being present in the groundwater. Based on the known and potential contaminants at the site, real-time air monitoring for VOCs and particulate levels at the perimeter of the exclusion zone and work area will be necessary.

2.1 Continuous Monitoring

Continuous air monitoring will be required for all intrusive in-ground activities conducted during the site investigation, interim remedial measures or remediation. During these activities which continuous monitoring will be required and will include: drilling of boreholes, sampling and development of monitoring wells (VOCs only), test pitting, and soil/waste excavation and handling.

2.2 Periodic Monitoring

Periodic monitoring for VOCs will be required during non-intrusive site activities such as the collection of surface soil or the collection of groundwater samples from monitoring wells. Periodic monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. At this time the closest surface soil sampling location to an occupied building is approximately 60-feet therefore does not warrant continuous monitoring. As sampling data is obtained the CAMP will be re-evaluated.

2.2.1 VOC Monitoring, Response Levels, and Actions

VOCs will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as wind speed and as the concentration of VOCs at the point of measurement dictate. Upwind concentrations will be measured at the start of each workday and periodically (every 15 to 30-minutes) thereafter to establish background conditions, particularly if wind direction changes. The monitoring work will be performed using at least an organic vapor analyzer with a photoionization or flame ionization detector. The equipment will be field checked for calibration at least daily using a gas standard. As the field calibration drifts beyond an acceptable limit a complete calibration will be conducted or the equipment will be replaced. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

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

2. If total organic vapor levels at the downwind perimeter of the work area or the 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.

    a. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. NYSDEC and NYSDOH will be notified within 24-hours of exceedances of the perimeter air monitoring requiring work stoppage.

    b. All 15-minute readings must be recorded and be available for NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

2.2.2 Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations during actions where larger areas of the ground surface are disturbed or when waste is being handled. For example when test pitting is being conducted or there is a soil/waste handling taking place. Disturbing the soil during the drilling of soil borings will necessitate particulate monitoring when full augers (soil is caked onto the auger flights) are being extracted and the soil is removed. These short duration events monitoring will be done with hand held equipment up and down wind of the drilling equipment. During the collection of surface soil samples particulate sampling will not be required.

The particulate monitoring equipment will be able to measure real time date to particulate sizes of less than 10 micrometers (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will also provide an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

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

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

3. If dust exceeds 150 mcg/m^3 at the upwind monitoring location during the investigative activities, Leader will instruct the site manager to take appropriate corrective action. If dust from the sampling or drilling operations exceed project thresholds at the downwind monitoring location compared to the upwind monitoring location, the field manager will determine what is causing the problem and seek a remedy, and if needed, they will stop work until it can be corrected. As a result, air monitors will be located up and down wind of the investigation work.

4. All readings must be recorded and be available for NYSDEC, NYSDOH and County Health personnel to review. If there are exceedances to the CAMP, NYSDEC and NYSDOH will be notified within 24-hours. CAMP results will be provided to NYSDOH on a weekly basis.