REMEDIAL INVESTIGATION/
INTERIM REMEDIAL MEASURES WORK PLAN

FOR
THE WEBSTER BLOCK
75 MAIN STREET
CITY OF BUFFALO, ERIE COUNTY, NEW YORK
SITE NO. C915270

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ACRONYM LIST

IR	REMEDIAL INVESTIGATION
IRM	INTERIM REMEDIAL MEASURES
NYSDEC	NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DER	DEPARTMENT OF ENVIRONMENTAL REMEDIATION
HCD	HARBORCENTER DEVELOPMENT, LLC
SITE	75 MAIN STREET WITH SECTIONS OF PERRY AND WASHINGTON STREETS
SCO	SOIL CLEANUP OBJECTIVES
BGS	BELOW GROUND SURFACE
VOC	VOLATILE ORGANIC COMPOUNDS
SVOC	SEMI-VOLATILE ORGANIC COMPOUNDS
PAH	POLYCYCLIC AROMATIC HYDROCARBONS
ACM	ASBESTOS-CONTAINING MATERIAL
PID	PHOTO-IONIZATION DETECTOR
CPP	CITIZEN PARTICIPATION PLAN
CAMP	COMMUNITY AIR MONITORING PLAN
BSA	BUFFALO SEWER AUTHORITY
RI/AAR	REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT
MS/MSD	MATRIX SPIKE / MATRIX SPIKE DUPLICATE
NYSDOH	NEW YORK STATE DEPARTMENT OF HEALTH
ELAP	ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
ASP	ANALYTICAL SERVICES PROTOCOL
U.S. EPA	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
DUSR	DATA USABILITY AND SUMMARY REPORT
HASP	HEALTH AND SAFETY PLAN
EDD	ELECTRONIC DATA DELIVERABLE

EXECUTIVE SUMMARY

This document presents the Remedial Investigation and Interim Remedial Measures work plan for the Brownfield Cleanup Program Site No. C915270 located at 75 Main Street, Buffalo, NY. The project details are summarized below:

Contaminant Source and Constituents

The contamination is sourced from fill that has been impacted by unregulated deposition of material from historic industrial uses over the past 192 years. The site is currently used for surface parking. Constituents requiring remediation are semi-volatile organic compounds and metals.

Extent of Contamination

Soil contamination generally extends from 2 feet below grade to 10 feet below grade. Fill material is known to extend to a depth of 16 feet below grade. The contamination extends across the Site.

Interim Remedy

To facilitate the development of the site for a large scale office building, **the project has set a goal of meeting Commercial Use Soil Cleanup Objectives** for the Site. To achieve this, the project developers will complete the following interim remedial measures:

1. Installation of temporary lag and pile shoring to achieve and excavation depth of up to 12 feet.

2. Removal of approximately 33,000 cu.yds. of contaminated soil/urban fill for off-site disposal or treatment at a regulated facility.

3. Dewatering of the excavation area and on-site treatment of contaminated groundwater for discharge into the sanitary sewer system (under permit from the Buffalo Sewer Authority).

4. Confirmatory soil sampling of the excavation walls (where exposed) and bottom to show compliance with Commercial Use Soil Cleanup Objectives.

1 INTRODUCTION

This Remedial Investigation ("RI") / Interim Remedial Measures ("IRM") Work Plan provides a summary of the nature and extent of contamination and a description of the procedures that will be implemented for the remediation of contaminated soil and groundwater under the assigned New York State Department of Environmental Conservation ("NYSDEC") Site No C915270. This IRM has been prepared in accordance with Division of Environmental Remediation ("DER")-10 "Technical Guidance for Site Investigation and Remediation." The remedial activities described in the IRM are in accordance with accepted remedies outlined in DER-15 "Presumptive/Proven Remedial Technologies" that will protect both the environment and the health of the local community. To effectively describe the environmental conditions and remedial activities this IRM will cover the following:

- Description of the current and historic site conditions;
- Summary of contaminants of concern and the extent of the contamination;
- Description and sequence of the remedial activities;
- Quality controls and protocols for analytical sampling;
- Description of the health and safety procedures to protect site workers and the local community; and
- Description of community participation activities.

On November 20, 2012, HARBORcenter Development, LLC ("HCD") acting as a BCP Volunteer, submitted a BCP Application to remediate and develop one parcel and a portion of Washington Street in the City of Buffalo, New York. This parcel, 75 Main Street, is also known as the Webster Block. Combined the parcel and this portion of Washington Street total 2.01 acres and will hereinafter be referred to as the "Site." Remedial action covered under this IRM will include the entire 2.01 acre Site.

The Site is the location of the planned construction by HCD of a multi-use facility that will include multiple floors of above ground parking, two ice rinks, restaurant, retail and a hotel.

The Site has an extensive industrial and commercial history related to its location near the former Erie Canal and Buffalo Harbor. Past uses such as a brass foundry, oil warehouse, chemical company, machining company and years of unregulated deposition of fill have impacted the subsurface soil. The intent of this IRM is to remediate the subsurface soils to meet Commercial Use Soil Cleanup Objectives ("SCO") standards as defined in NYCRR Part 375-6.

As part of the RI / IRM process, an RI will be employed to further evaluate the extent of the contaminated fill material. Section 3 Remedial Investigation describes the scope of the investigation during remediation.

Closure sampling will be conducted as part of the initial sampling in the RI process and may also after the IRM has been implemented. The results of the closure sampling will determine if remedial SCOs have been achieved.

1.1 Site Description

The Site is comprised of one tax parcel, 75 Main Street, and a section of one public street as indicated by City of Buffalo on-line mapping website.

Figure 1.1 shows the Project Area and Site Boundaries.

The Site includes a section of Washington Street. This section is a City of Buffalo Street and has no publicly available property information. This section of Washington Street runs concurrently with the eastern property line of 75 Main Street to the intersection of Washington and Perry (418 ft) and extends east 33 ft to the centerline of Washington Street.

The Site served as a parking lot for the surrounding commercial office buildings and for visitors to the First Niagara Center. The Site boundary is bordered by the following streets:

North- Scott Street

East- Washington Street

South- Perry Street

West- Main Street

The Site is flat with a slight grade to the southwest toward the Buffalo River and has an average elevation of approximately 583 ft (NAD 88 Vertical Datum).

1.2 Site History

It is understood that the contamination sources are related to the historical urban and industrial use of the property and the uncontrolled deposition of urban fill that occurred over time prior to the Site's use as a parking lot.

Significant Site development history dates back to the 1820s. Major development began due to its location adjacent to a major harbor and water transportation hub. The Site has been used for warehousing and manufacturing for much of its 192 years of developed history.

Evidence of past uses (and their ancillary supporting uses such as heat and mechanical/forging operations) was verified during the excavation of archeological test pits on the site in October of 2012. These uses include:

- Coal burning: layers of black ash and cinders were observed in several building foundations associated with a former tin shop along Perry Street. These layers are consistent with coal burning for both heat and for heating/forging of tin and metal.

- Potential tar: black, dense pitch/tar-like material was found in the southern quadrant of the site. The layer extended for approximately 10 linear feet along on excavation wall and exhibited a strong "naphtha" odor.

- Dark black soil with strong petroleum odor in the central area of the Site near the former "oil storage" area in the 1890s; this soil was approximately 3 feet thick and was covered by wood planking.

- Black oil sludge: At approximately 10-12 feet below surface a clay pipe containing oil sludge was encountered. This material was reported to NYSDEC Region 9 and has been assigned NYSDEC Spill # 1207292.

Historic maps support the presence of past operations that may have deposited the materials observed in the pits. These past operations include:

- Paint/oil Storage
- Machine Shop
- Tin Shop/Ironwork
- Blacksmith
- Engineering Supply
- Copper and Tin Smith
- Nickel Plating Shop
- Chemical Company
- Oil Refining
- Foundry
- Asbestos Warehouse

2 SUMMARY OF ENVIRONMENTAL CONDITIONS

2.1 Nature and Extent of Contamination

Site fill has been impacted by unregulated deposition of material from historic industrial uses over the past 192 years. The nature of these contaminants is SVOC and Metal compounds; which are consistent with the industrial uses of the Site. The extent of contamination is difficult to identify due to the heterogeneous nature of the fill material. Past investigations have determined that the fill material across the Site at depth between 8 to 16 ft below ground surface ("BGS"). The majority of the data collected in the previous site investigations was provided in the BCP Application. Additional data collected to support the IRM approach since the submission of the BCP Application is provided as appendices to this document.

2.1.1 Groundwater

Groundwater is present on-Site in two hydrogeologic zones. The first hydrogelogic zone is a unconfined aquifer within the fill material extending downward to a clay layer that ranges from 10 to 20 ft BGS. This zone is affected by numerous foundations throughout the Site.

Beneath the fill and clay layer is a semi-confined aquifer extending into native material consisting of fine sandy silt overlaying silty clay and bedrock. This zone vertically extends from approximately 20 ft BGS to 40 ft BGS.

Groundwater direction is estimated to flow southwest toward the Buffalo River.

Groundwater monitoring did reveal metal concentrations above NYSDEC standards and guidance values. The following metals were detected:

Contaminate	*Standard (mg/L)*	*Detected (mg/L)*
Arsenic:	0.025	Detected to two (2) wells (0.045 and 0.031)
Barium:	1.03	Detected in two (2) wells (1.03 and 1.14)
Iron:	0.3	Detected in six (6) wells (From 115 to 0.77)
Magnesium:	35	Detected in five (5) wells (From 194 to 46.7)
Manganese:	0.3	Detected in five (5) wells (From 4.98 to 0.389)
Sodium:	20	Detected in six (6) wells (From 2,750 to 638)

Metal concentrations are above NYSDEC groundwater standards; however, groundwater is banned from potable use in the City of Buffalo. This ban reduces the likelihood of exposure to contaminated groundwater. Furthermore, the presence of metals in groundwater in an urban area may not directly relate to the specific Site, but may represent regional groundwater conditions.

Figure 2-1 illustrates detected concentrations on the Site. Appendix A provides a summary of the analytical results from the November 2010 sampling event.

2.1.2 Soils

The extent of soil contamination is generally limited to the horizontal and vertical extent of the fill layer. Fill deposits are heterogeneous and consist of a mixture of sand, silt, clay, ash/cinders, organic matter and demolition debris. Layers of ash/cinders have been observed to be 3 to 4 feet thick with scattered deposits of coal, slag, coal tar and petroleum impacted soil.

Due to the heterogeneous nature of the fill material no defined point sources of contamination can be identified. General sources of contamination are numerous and are related to previous commercial and industrial activities and unregulated depositions of urban fill across the Site. Contamination was observed to be limited to the fill material and laboratory analysis indicates the fill material has not impacted the native material underneath.

Figure 2-2 shows analytical results from soil sampling in the fill layer. Figure 2-3 shows analytical results from native material.

Sampling indicates that the fill material contains concentrations of SVOCs and Metals exceeding Residential Use SCOs with some Industrial and Commercial SCO exceedences.

Exceedances of SVOCs typically occur in discrete deposits of ash or soil intermixed with ash/cinders. Samples indicate that detected SVOCs present in these deposits are classified as polycyclic aromatic hydrocarbons ("PAH"). PAH compounds are usually associated with burning of organic material (i.e. wood, coal or petroleum products). The presence of these compounds are consistent with the historical industrial uses of the Site.

A summary of soil analytical results events by contaminant class from the 2010 and 2000 sampling is provided as follows:

Volatile Organic Compounds

All results below Unrestricted Use criteria or not detected.

Semi -Volatile Organic Compounds

Benzo(a)anthracene:	Four (4) detections above Restricted Residential Use SCO; Two (2) detects above Commercial Use SCO; Three (3) detections above Industrial Use SCO
Benzo(a)pyrene:	One (1) detection above Unrestricted Residential Use SCO and Six (6) detections above Industrial Use SCO
Benzo(b)fluoranthene:	Seven (7) detections above Restricted Residential Use SCO; One (1) detection above Commercial Use SCO and Three (3) detections above Industrial Use SCO
Benzo(k)fluoranthene:	Two (2) detections above Unrestricted Residential Use SCO; Three (3) detections above Restricted Residential Use SCO and Two (2) detections above Industrial Use SCO
Chrysene:	Four (4) detections above Unrestricted Restricted Residential Use SCO; Four (4) detection above Restricted Residential Use SCO and One (1) above Industrial Use SCO
Fluoranthene:	One (1) above Industrial Use SCO
Fluorene:	One (1) above Industrial Use SCO
Indeno (1,2,3-cd)pyrene:	Five (5) detections above Restricted Residential Use SCO; One (1) detection above Commercial Use SCO and Three (3) detections above Industrial Use SCO
Naphthalene:	One (1) above Industrial Use SCO
Phenanthrene:	One (1) above Industrial Use SCO
Pyrene:	One (1) above Industrial Use SCO

Metals

Arsenic:	One (1) detection above Unrestricted Residential Use SCO; One (1) detection above Commercial Use SCO; Four (4) detections above Industrial Use SCO
Barium:	One (1) detection above Residential Use SCO; One (1) detection above Commercial Use SCO.
Cadmium:	One (1) detection above Restricted Residential Use SCO.
Chromium (trivalent):	One (1) detection above Unrestricted Residential Use SCO; Two (2) detection above Residential Use SCO and one (1) detection above Commercial Use SCO.
Copper:	Six (6) detections above Unrestricted Use SCO. One (1) detection above Residential Use SCO; Four (4) detections above Commercial Use SCO; One (1) detection above Industrial Use SCO
Lead:	Eleven (11) detections above Unrestricted Use SCO. Five (5) detections above Restricted Residential Use SCO and Five (5) detections above Commercial Use SCO.
Mercury:	Seven (7) detections above Unrestricted Use SCO; Three (3) detections above Restricted Residential Use SCO; Four (4) detection above Commercial Use SCO.
Manganese:	Two (2) detections above Residential Use SCO.
Zinc:	Twelve (12) detections above Unrestricted Use SCO. Two (2) detections above Residential Use SCO.

Geotechnical and test pit investigations have defined the vertical extent of the fill material to range between 8 to 16 feet BGS. Since, fill material consists of a heterogeneous matrix of contaminated and non-contaminated material the horizontal extent cannot be clearly defined; therefore, the horizontal extent will be the limits of the BCP boundary which consists of the entire Site.

Appendix A provides summary tables of soil analytical results. Figure 2-4 shows the approximate depths of fill material. Depths of fill material were derived from soil boring logs (provided in Brownfield Cleanup Application) and cross section drawings from archaeological trenching activities. Appendix B provides selected material from the Phase IB Cultural Resources Investigation Report.

Asbestos-Containing Material

Historic Sanborn maps and a title search revealed that four properties on-Site were operated as a Celotex Warehouse, insulation warehouse, and asbestos warehouse from 1944 to 1980. The

four properties are located on the northern portion of the Site and have been demolished sometime after they appear on the 1980 Sanborn map.

In October 2012, C&S conducted an assessment of the subsurface conditions to identify if any discrete layers asbestos-containing material ("ACM") was deposited from the past operations or demolition of the facilities. Four test pits were excavated in areas of suspected asbestos use. No discrete layers of ACM were observed during the excavation.

A total of 20 samples were collected from 8 suspect materials and analyzed for asbestos content. No asbestos was detected in 16 of the 20 samples. Four samples contained Chrysotile; however, concentrations were less than 1% in each sample. None of the material sampled qualify as Asbestos-Containing Material.

The results of the subsurface assessment and asbestos sampling are provided in Appendix C.

2.1.3 Area and Volume of Contaminated Soil

Contaminated soil is expected to exist on-site from surface to an average depth of approximately 10 feet BGS. The Site is 2.01 acres.

Potential volume of contaminated soils that exceed Commercial Use SCOs is approximately 875,600 cubic feet; or approximately 33,000 cubic yards.

3 REMEDIAL INVESTIGATION

Previous soil investigations have indicated that fill material beneath the Site is impacted by SVOC and Metal compounds above NYSDEC soil standards. Remedial activities outlined in the IRM will cleanup impacted fill material to meet Commercial Use SCOs. This RI describes the scope of work necessary to collect sufficient data to determine the extent of contaminated fill material which will support the IRM in achieving Commercial Use SCOs. This RI will provide an outline for the following sections:

- Field Investigation
- Sampling Plan
- Laboratory Analysis

The RI will be conducted in concert with Site construction/remediation as described in Section 4: IRM Work Plan. The implementation of the RI will be a close coordination with construction managers and supervisors. Site construction/remediation activities will allow for a comprehensive view of subsurface conditions. The RI will be implemented either in advance or simultaneous with earth moving activities for the installation of the building's foundation. In preparation for installing the building's foundation, the Site will be excavated from ground surface to 10 ft BGS. In addition, removal and relocation of the underground utilities will occur on Washington Street. After the limits of excavation for the building's foundation have been reached, further analysis of the subsurface conditions will be conducted as outlined in this RI.

3.1 Field Investigation

The RI intends to supplement the previous soil and groundwater sampling by completing additional test pits and groundwater monitoring. Development of a 50 x 50 foot grid will divide the Site into 50 blocks. One test pit will be excavated in each block; a total of 32 test pits (TP-06 through TP-34) will be excavated on 75 Main Street and a total of 4 test pits will be excavated on Washington Street (TP-35 through TP-38). . Test pits will be excavated in areas where initial earth moving activities for foundation construction of 10 ft BGS does not expose native material. Finally, one round of groundwater monitoring and sampling will be conducted from existing wells (MW-01 through MW-9).

3.1.1 Test Pits

Test pits will evaluate subsurface conditions to further define areas of COCs and the vertical extent of the fill material layer. Construction of the building foundation will remove all fill material from ground surface to approximately 10 ft BGS across 75 Main Street and Washington Street. This fill material will be removed from the Site and sent to a designated landfill for disposal. Test pit investigation will focus on assessing fill material that will remain after the overlaying 10 feet of fill is removed. The remaining fill/soil, 10 feet BGS and deeper, will be evaluated to determine which blocks will need to be excavated further to meet Commercial Use SCOs.

Test pits will be excavated using a track-mounted excavator from ground surface until 10 ft BGS. Once excavation has reached 10 ft BGS, fill/soil material will be removed in 2 to 3 foot intervals until native material is encountered (generally 8-16 ft BGS). Soil/fill samples will be collected from the excavator bucket using stainless steel sampling tools. Representative grab samples from the excavator bucket will be placed in plastic zip-lock bags. Test pits will be excavated in approximately 2 to 3 foot increments to aid in accurately determining the depth of discrete layers of fill and native material. The soil type and depth of fill and native material will be visually identified and recorded and provided in a Test Pit Log.

Excavated soil and fill will be examined for visual and olfactory evidence of contamination. A photo-ionization detector ("PID") will be used on-Site to conduct head space screening on each soil/fill sample for the presence of volatile compounds. Based on the examination and the PID head space screening, soil/fill samples will be placed in the appropriate glass sample jar or tube for laboratory testing.

Three samples will be collected for laboratory testing from each test pit. Two samples from the fill material will be collected for VOC, SVOC and TAL Metals in accordance with EPA SW-846 methodology. One sample from the native material will be collected for VOC, SVOC and Metals.

Sample locations will be field recorded using a GEOXH ® Trimble GPS unit. Sample depths will be recorded with a tape measure from grade. These locations will be recorded and mapped. Samples collected from the pit that demonstrate concentrations of contaminants below the Commercial Use criteria will be used as confirmatory samples to show compliance with the remedial objectives of the IRM.

Each test pit will be backfilled with excavated material, restored to best match the pre-existing grade.

Figure 3-1 shows the test pit locations.

3.1.2 Off Site Assessment

BCP regulations require that Volunteers that enter the program assess the extent of contamination that is remaining outside of the BCP boundaries. The BCP boundaries are defined by the centerline limits of the shoring that will be placed to allow excavation to depths of at least 10 feet below grade.

Prior to installing the sheet pile for shoring, the shoring locations will be pre-excavated to loosen urban fill and old foundations. This will allow for the sheet piling to be driven through the fill into native soils.

During the pre-excavation for the shoring, samples of the material will be collected from a depth between 5 to 6 feet from grade. A sample will be collected every 30 linear feet along the shoring path and will be analyzed for VOC, SVOC and TAL Metals. These samples will be used to assess the material that will remain outside of the BCP boundary as required by the BCP regulations. However, if staining, petroleum product or petroleum impacted soils related to a discrete release are encountered additional offsite assessment will be conducted to evaluate if similar conditions are encountered outside the BCP boundary.

3.1.3 Groundwater Monitoring

Groundwater monitoring wells were installed by three contractors. An unknown contractor installed monitoring wells MW-A through MW-I (no logs have been provided for these wells), in 2010 LiRo Engineers installed monitoring wells MW-01 through MW-06 and in 2012 SJB installed monitoring wells MW-7A and MW-9.

One round of groundwater sampling will be conducted on monitoring wells installed by LiRo Engineers and SJB (MW-01 through MW-06; MW-7A and MW-9). Sampling will be conducted using low flow purging and sampling.

Before purging the well, water levels will be measured using an electric water level sounder capable of measuring to the 0.01 foot accuracy. Peristaltic or bladder pumps using manufacture specified tubing will be used for purging and sampling groundwater. Calibration, purging and sampling procedures will be performed as specified by the USEPA[1] for low flow sampling. Decontamination will be conducted after each well is sampled to reduce the likelihood of cross contamination. Calibration times, purging volumes, water levels and field measurements will be recorded in a field log and will be provided in the Final Engineering Report.

Figure 3-1 shows the targeted monitoring well locations.

[1] U.S. EPA Region 1 Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, January 19, 2010.

3.2 Sampling Plan and Laboratory Analysis

Please refer to Table 3.2-1 for a summary of the soil/fill sampling plan. The rationale for sampling locations is provided in Table 3.2-2. Figure 3-1 shows the test pit locations.

4 IRM WORK PLAN

The remedial action will be comprised of three main tasks:

- The construction of the shoring system;
- Soil excavation and removal and
- Groundwater collection and treatment.

This remedial action has been determined to be appropriate for the cleanup of contaminated soil to achieve specific soil cleanup standards outlined in NYCRR Part 375-6.

4.1 IRM Cleanup Objectives

The remedial work planned for the Site is intended to remediate soil contamination to meet Commercial Use SCO as specified in NYCRR Part 375-6.

4.2 Phasing of Remedial Activities

To ensure efficient use of the resources required for the remediation of the Site, it is essential that the sequence of Site activities be well defined. The IRM work at the Site will be conducted in the following sequence:

- Waste Characterization
- Site Preparation
- Installation of shoring system
- Placement of groundwater collection and treatment system
- Excavation of contaminated fill and removal of underground utilities
- Sampling and analysis of soil to confirm Commercial Use SCO has been completed

Work is proposed to begin in March of 2013. It is estimated that remedial activities will last approximately 2 months. All sampling activities will be conducted in accordance with NYSDEC quality assurance protocols outlined in **Section 5: Quality Assurance and Quality Control Protocols.** The Citizen Participation Plan ("CPP") that informs the public on the proposed remediation is included in Appendix D. The public health of the local community will be monitored during construction activities as outlined in the Community Air Monitoring Plan ("CAMP") provided in Appendix E. C&S will provide oversight, air monitoring, soil screening, GPS data and photographic and other documentation during the IRM activities. The

following sections define the work required to complete each of the tasks comprising the remedial activities of the IRM.

4.2.1 Waste Characterization

Two sampling events in October 2012 and November 2010 collected composite soil samples for waste characterization. Composite samples were sent to a laboratory and were analyzed for the following contaminates:

- TCLP VOCs
- TCLP SVOCs
- TCLP Metals
- PCBs
- Pesticides
- Ignitability
- Flash Point

LiRO Engineers, Inc collected two composite samples in November 2010 from MW-2,3,5 and MW-1,4,6 (See Figure 2-2). On October 2012, C&S conducted waste characterization sampling on four geotechnical borings. Samples from the October 2012 were collected at the following locations:

- B-02 (4-12 ft)
- B-03 (4-12 ft)
- B-13 (0-10 ft)
- B-18 (0-12 ft)

The results of the both sampling events determined the soil was not a hazardous waste.

4.2.2 Site Preparation

Public Exclusion Areas

A public exclusion area will be clearly marked out around the Site by the temporary construction fencing.

Fencing will run north along the Main Street property line and continue eastward along the Scott Street property line. Fencing will be extended east across Washington Street, and run southward along Washington Street. From the corner of Washington and Perry Streets, fencing will extend south across Perry Street, then run westward along Perry Street. Finally, fencing will extend northward to Main Street providing Site security and to complete the "exclusion

zone". Site access will be at Perry Street. Additionally, to allow for dedicated pedestrian access through this area during construction, jersey barriers will be placed along Main Street and Scott Street.

Figure 4-1 shows the general construction layout of the site.

4.2.3 Shoring System

Site Shoring

The perimeter of the Site will be shored with steel sheet pile wall system. consisting of overlapping, interconnected steel plates. The general estimate of excavation for installation of the slab-on-grade foundation is 10 ft BGS. The shoring system is sized for an estimated maximum excavation depth of 12 ft BGS. Shoring will be installed at twice the depth of excavation (12 ft maximum); therefore, shoring will be installed to a depth of 24 feet BGS. .

Shoring along the perimeter will utilize tie-backs into the surrounding soil to maintain structural integrity during excavation. Where deeper excavation does not extend all the way to the Site perimeter, excavation walls will use a combination of temporary shoring and soil benching to maintain wall integrity.

Following excavation, the site foundation systems will be installed and engineered backfill will be placed and compacted. Once the site is brought up to approximately 3 feet from grade, the shoring will be removed.

Figure 4-2 shows a typical section design of the shoring system.

4.2.4 Groundwater Collection and Treatment System

An industrial discharge permit will be secured from the Buffalo Sewer Authority ("BSA") to discharge groundwater into the sanitary sewer system. The BSA permit allows treated water to be discharged into the BSA sanitary sewer system. Groundwater collected as part of Site de-watering activities will be pumped into on-site settling tanks. From the tanks, it will subsequently pass through a sequestration filter and/or activated carbon treatment vessel for treatment of suspended metals, VOCs and SVOCs prior to discharge to the BSA sewer system.

Figure 4-3 shows a schematic of the treatment system.

If required, pre- and post-treatment samples of collected water will be periodically sampled per permit requirements to verify treatment system performance. Samples will be analyzed on a 48 hour turnaround time. The flow of water through the treatment system will be monitored with a flow meter to record total volume treated and discharged to the BSA.

Treatment system operational records including daily volumes, influent and effluent analytical results (if required by the permit), times of operation and permit discharge monitoring reports (if required by the permit) will be kept on-site and will also be included in the final engineering report.

4.2.5 Excavation

Soils within the shoring wall area will be excavated at various depths across the Site. Excavation will remove contaminated fill to the level required to meet Commercial Use SCO. The following lists the type of equipment to be used during excavation (Note that this list is subject to change as needed by the contractor as excavation conditions change):

- Two Caterpillar Backhoes (3 yard bucket)
- Mini-excavators (1 yard bucket)
- Caterpillar Front Loader (5-6 yard bucket)
- Pile driver machine
- 20-ton Dump Trucks

Soil/Fill Management

Fill is known to extend to a depth of 14 or more feet in some areas of the site. However, site investigations indicate contaminated soil/fill is variable and is known to extend to a depth of approximately 10 ft BGS. Previous investigations collected evidence that contamination consists of SVOCs, particularly PAH compounds, and metals at levels above Commercial Use SCOs.

Contaminated soil/fill will be encountered during the foundation construction. The proposed building will be constructed as a slab-on-grade. Fill material to a depth of approximately 10-12 ft BGS will be excavated. Soil/fill management during excavation and grading will cover the following items:

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

Excavation and Handling of On-site Soil/Fill Material

Excavation for foundation construction will begin on the southern end (along Perry Street) of the Site and proceed northward toward Scott Street. Trucks will enter and exit from Scott Street and soil/fill will be direct loaded into trucks. It is estimated that 50 trucks per day will be removing soil/fill material from the Site to a licensed disposal or treatment facility.

Once the base limits of excavation of 10ft BGS are met additional sampling will determine if remedial goals have been achieved. This data will primarily be collected during the Test Pit investigation of the IRM.

If required by site conditions, additional exploratory test pits in discrete areas may be excavated to further assess soil/fill conditions above native soil. An environmental professional will inspect each completed area for staining, odors or suspect material.

Based on the analytical results, excavation will continue until remedial goals have been achieved.

Backfill Material

The excavation will be backfilled to approximately 3 ft BGS to allow for placement of an engineered base and slab building foundation. Material used to backfill excavations or grade the Site will meet the following criteria:

- Excavated soil/fill reused on-Site will be in accordance with Table 5.4(e)4 in DER-10.
- Off-site soil will originate from known sources having no evidence of disposal or releases of hazardous or petroleum substances.
- All off-site sources of soil to be used as backfill will be tested in accordance with sampling frequency and analysis in Table 5.4(e)10 and compared with concentrations outlined in Appendix A of DER-10, or will come from a NYSDEC certified source.

Sampling parameters of excavated soils will be generally based on guidance provided in DER-10 Table 5.4(e)10; or in coordination with the NYSDEC field representative. Results of the excavated soil testing will be reported to the NYSDEC.

Soil Tracking Prevention

Trucks and equipment leaving the Site will be broom-cleaned to remove clumped soil and prevent soil tracking off-site. Standard construction protocols will be utilized, including stone aprons and periodic sweeping of the construction exit areas. Adjacent roads in the designated truck route will be inspected daily to ensure the prevention of soils migration. Roads that have any soils accumulation will be mechanically scraped rather than mechanically broom swept to reduce fugitive dust emissions. Excavation on-site will occur in a manner which minimizes the tracking of on-road haul trucks from moving through contaminated soils. The use of water to clean truck tires will be avoided to prevent the generation of potentially impacted water.

Health and Safety Procedures

To assure the safety of the workers and the local community, monitoring practices of the work environment will be in place during all phases of IRM activities. A Health and Safety Plan ("HASP") was prepared that details procedures for maintaining safe working

conditions and minimizing the potential for exposure to hazardous material. The HASP is provided in Appendix F.

4.2.6 Closure Sampling Plan

Soil sampling will be performed to assess whether cleanup standards have been achieved. As outlined in **Section 3.1: IRM Cleanup Objectives**; remediation will be deemed complete when soil analytical results from the excavation limits demonstrate that SVOC and Metal concentrations (as well as other regulated constituents) are below the Commercial Use SCO.

Approximately 10% of the closure samples (bottom and side walls) will be analyzed for all parameters on TCL organics and TAL metals list**.**

Prior to excavation, the Site will be divided into excavation approximately 50 by 50 foot sectors that coincide with the sectors assessed in the IRM portion of the site work. These sectors will be used to systematically excavate the hole and provide sufficient entrance and egress.

Final excavation in each sector will have been pre-determined based on the RI sampling. Once the target depth in the sector has been met, the bottom will be inspected from the presence of fill material. If fill material is present on the sector bottom, an additional confirmatory sample will be collected at a frequency of 1 closure sample for every 900 square feet (i.e. 30 foot centers) .

If analytical results indicate that the remedial goals have been met, the results will be transmitted to the NYSDEC and excavation will cease in that sector.

As the excavation will extend to the steel shoring at the boundaries, collection of sidewall samples are not anticipated. However, as noted previously, samples of the fill along the shoring boundary will be collected during the IRM at a frequency of 1 every 30 linear feet . Based on the estimated limits and depths of excavation (1,201 linear feet of wall to a maximum depth of 10 feet), approximately 35 side-wall samples will be collected.

Soils

Soil sampling will assess whether Commercial Use SCO have been achieved. Soil sampling will be performed after horizontal limits and vertical depths have been completed in a particular area of excavation. Soil sample frequency will be based on guidance provided in DER-10. Confirmatory bottom soil samples will be collected on a 50 by 50 foot square grid (2500 sq ft). Based on the estimated excavation area of 87,556 sq. ft., approximately 32 confirmatory bottom samples will be collected. If fill material is left over a significant portion of the Site the sampling frequency of confirmatory bottom samples will be increased to be collected on a 30 by 30 foot square grid (900 sq ft).

Note that horizontal excavation limits may end at the shoring walls. In this instance no sampling will be collected. Final number of samples will be verified once field excavation limits are achieved. Sampling frequency will be established in concurrence with the NYSDEC field representative. Category B deliverable package will be requested to validate analytical results by a third-party expert.

All sampling locations will be given a discrete identifying number, its depth will be recorded (based on construction surveying crew data) and its horizontal location will be recorded using a survey quality hand held GPS, with an approximate accuracy of 2 feet. Post excavation soil samples will be collected in concurrence with the NYSDEC field representative.

Samples will be collected as grab samples from both the excavation floor and side walls. Samples will be collected as outlined in DER-10 for grab samples and discussed in **Section 5.1.1 Sampling Methods** in this IRM.

An estimated total of 67 confirmatory samples will be collected from both the walls and bottom. As stated in DER-10, if conditions warrant (discrete layers of staining, etc.), additional samples may also be collected. Table 3.2-1 presents a summary of the number of samples scheduled for collection.

4.2.7 Groundwater

No post construction groundwater monitoring is anticipated. Historic sampling shows only metal exceedances. Metal concentrations are above NYSDEC standards; however, groundwater is banned from potable use in the City of Buffalo. This ban reduces the likelihood of exposure to contaminated groundwater.

4.2.8 Sub-grade facilities

The proposed building will be constructed as a slab-on-grade. At this time no sub-grade facilities will be installed. However because of the heterogeneous fill on site, excavation of fill material to 10-12 feet BGS and installation of engineered fill will be required for building construction.

4.3 Reporting

Based on the results of the remedial investigation a Remedial Investigation / Alternative Analysis Report ("RI/AAR") will be submitted to the NYSDEC. The RI/AAR will assess the effectiveness of the IRM in comparison with other remedial options in achieving site cleanup levels.

5 QUALITY ASSURANCE AND QUALITY CONTROL PROTOCOLS

To ensure that suitable and verifiable data results are obtained from the information collected at the Site, quality assurance procedures are detailed in this section.

5.1 Sampling Methods, Analytical Procedures and Documentation

5.1.1 Sampling Methods

Sampling procedures will be conducted in accordance with the NYSDEC *Sampling Guidelines and Protocols Manual*. Collecting of representative samples will include the following procedures:

- Ensuring that the sample taken is representative of the material being sampled;

- Using proper sampling, handling and preservation techniques;
- Properly identifying the collected samples and documenting their collection in field records;
- Maintaining chain-of-custody; and
- Properly preserving samples after collection.

Soil Sampling

Soil sampling will be performed using two methods: (1) field screening using a PID and (2) grab samples.

Whether soil samples are collected from the excavator bucket or from split spoons they will be collected as grab samples and placed into individual zip-lock bags. Soil samples will be allowed to sit in sealed zip-lock bag for a short period of time (minimum of five minutes). Head space measurements will then be taken from each zip-lock bag. To prevent cross contamination zip-lock bags will not be reused and will be properly disposed. Calibration of all electronic field screening equipment will be completed daily and will be done to manufacturer's specifications.

Contaminates of concern during excavation are SVOC and Metals. As detailed in the *Sampling Guidelines and Protocols Manual*, grab samples will be placed in 8oz, wide-mouth, glass jars. Sample jars will immediately be placed on ice in a cooler.

Closure sample frequency will be based on the guidance with DER-10. One sidewall sample will be collected for each 30 linear feet by 20 vertical feet of excavated sidewall and one sample will be collected from the bottom of each 2500 square feet (50 by 50 feet) of excavated bottom. Based on these guidelines, approximately 32 bottom samples and 35 sidewall samples will be collected.

Confirmatory samples will be collected in a timely manner, based on the following DER guidance:

- Within 24 hours of excavation, samples should be collected from the zero to six-inch depth interval;
- After 24 hours, samples should be collected at six to twelve inches depth interval at the excavation floor; and
- No water should be present in the excavation bottom where bottom samples are collected.

Sampling plan and rationale for the RI is provided in Tables 3.2-1 and 3.2-2 included as Appendix B.

Water Sampling

Water sampling will be conducted on the de-watering treatment system to demonstrate compliance with the BSA temporary Industrial Discharge permit. Effluent samples will be collected as required to show that discharge limits are being met, as well as to track the effectiveness of the carbon filtration media and estimate the timing for carbon replacement. Additionally, influent samples will be collected in order to track the general VOC, SVOC and Metal concentrations that are entering the treatment system, and to evaluate the concentration of VOC, SVOC and Metals in groundwater remaining in the ground. It is estimated that 20 influent samples will be collected during site activities.

Samples will be collected in 40 ml and 1-liter glass jars and immediately placed on ice. The water will be analyzed for VOC, SVOC and Metals on a 24-hour turnaround time.

QA/QC Sampling

Duplicate samples will be collected from a minimum of 10% of the locations, selected randomly. Based on an estimate of 67 confirmatory soil samples and 20 water influent samples, 7 duplicate soil and 2 water samples will be collected .

Matrix Spike /Matrix Spike Duplicates ("MS/MSD") will also b e collected on a 10% allocation. Therefore an additional 7 soil and 2 water samples will be collected for MS/MSD analysis.

Table 5-1: Summary of Estimated Sampling

Sample Type	***Matrix***	***Est. #***	***Purpose***
Excavation Bottom	Soil	32	Confirmatory
Excavation Wall	Soil	35	Confirmatory
Groundwater Influent	Water	20	Confirmatory
Duplicate Soil	Soil	7	QA/QC
Duplicate Influent	Water	2	QA/QC
MS/MSD –So.	Soil	7	QA/QC
MS/MSD –Aq.	Water	2	QA/QC
	Total	**105**	

Sampling plan is provided in Tables 3.2-1 included as Appendix G.

5.1.2 Analytical Procedures

Laboratory Analysis

Laboratory analysis will be conducted by a third-party laboratory that is accredited by the NYSDOH Environmental Laboratory Accreditation Program ("ELAP"). Laboratory analytical methods will include the most current NYSDEC Analytical Services Protocol ("ASP").

Soil samples sent to a certified laboratory will be analyzed in accordance with EPA SW-846 methodology for the following contaminates:

- Target Compound List for Volatile Organic Compounds (EPA Method 5035)
- Target Compound List for Semi-volatile Compounds (EPA Method 8270);
- Target Analytes List for Metals (EPA Method 6010)

Category B deliverable will be requested to be used in a third-party data validation.

Data Usability

Data Usability Summary Report ("DUSR") will be performed by a third-party data consultant using the most recent methods and criteria from the U.S. EPA. The DUSR will assess all sample analytical data, blanks, duplicates and laboratory control samples and evaluate the completeness of the data package.

5.1.3 Documentation

Custody Procedures

As outlined in NYSDEC *Sampling Guidelines and Protocols*, a sample is in custody under the following conditions:

- It is in your actual possession;
- It is in your view after being in your physical possession;
- It was in your possession and then you locked or sealed it up to prevent tampering; or
- It is in a secure area

The environmental professional will maintain all chain-of-custody documents that will be completed for all samples that will leave the Site to be tested in the laboratory.

Soil Manifests

All soil being removed from the Site will be tracked by bills-of-lading forms.

Truckloads of contaminated soil will be tracked using bills-of-lading provided by the respective disposal facility.

Records of truck loads will be kept on-site during construction and recording sheets and copies of the bills of lading documenting the final total trucked tonnage will be provided in the Final Engineering Report.

Water Sampling Results

Treatment influent and effluent analytical results will be included in the Final Engineering Report. The final influent sampling results from each dewatering sump will provide documentation of the remaining groundwater conditions.

Air Monitoring Records

Air monitoring will be conducted for both community air protection and for in-hole construction activities. Air monitoring will be conducted continuously during active excavation periods. The monitoring will include particulate and VOC screening. All records will be kept on-site during construction and will be made available for regulatory inspection. A daily air monitoring log, including discrete and time-weighted average meter readings, will be maintained through the end of remedial field activities. The specifics of the air monitoring procedures and criteria are detailed in the CAMP (community perimeter monitoring) and HASP (in-hole activities).

6 HEALTH AND SAFETY

To assure the safety of the workers and the local community, monitoring practices of the work environment will be in place during all phases of RI/IRM activities. A Health and Safety Plan ("HASP") was prepared that details procedures for maintaining safe working conditions and minimizing the potential for exposure to hazardous material. The HASP is provided in Appendix F.

Air monitoring during active construction will be conducted using PID and a aerosol particle meter. Details on air monitoring are provided in the Community Air Monitoring Plan ("CAMP"). The CAMP is provided in Appendix E.

7 REPORTING

An environmental professional from C&S will be on-site on a full-time basis to document RI/ IRM activities. Documentation will include the following parts:

- Daily reports of remedial activities;
- CAMP results; and
- Photographs and fieldwork maps.

7.1 Construction Monitoring

Reporting procedures will include a daily report. Information that may be included on the daily report includes:

- Processes and location of construction under way;

- Equipment and personnel working in the area;
- Number and type of truckloads of soil/fill removed from the Site;
- A description of off-site materials received;
- Approximate verification sampling locations and sample designations; and
- Problem identification and corrective measures.

The NYSDEC will be notified of problems requiring modifications to this RI/IRM prior to proceeding. Photographic documentation of the IRM activities will be prepared by C&S throughout the duration of the remediation as necessary.

A summary of the RI/IRM activities will be submitted to the NYSDEC as monthly progress reports and will be included in the Final Engineering Report. All data submitted to the NYSDEC will be in approved electronic data deliverable ("EDD") format.

8 SCHEDULE

It is assumed that NYSDEC will promptly review this RI/IRM work plan followed by a 30 day comment period. An approved RI/IRM work plan by March would allow remedial activities to commence by early March, 2013. Site preparation is planned to begin in April of 2013. IR/IRM activities are anticipated to last 2 months. Below is an anticipated schedule of milestones for the remediation of the Site.

Anticipated Date	**Milestone**
November 2012	Brownfield Credit Program Application Submission
December 28, 2012	Remedial Investigation / Interim Remedial Measure Work Plan Submittal
January 24, 2013	BCP Acceptance
February 15, 2013	Remedial Investigation / Interim Remedial Measure Work Plan Approved
March 6, 2013	BCA Signed
May 1, 2013	Site Preparation and Site Remediation/Site Excavation Work Begins
October 1, 2013	Remedial Investigation / Alternatives Analysis Report Submittal
December 1, 2013	Final Engineering Report Submittal
March 15, 2014	Certificate of Completion
September 2014	Building Occupancy

FIGURES

Location Map

Legend

- Parcel Boundary
- BCP Boundary

Notes

1) Digital orthophotographs obtained from NYS GIS Clearinghouse. City of Buffalo, 2008. 12 in Resolution.

2) Coordinate System: NAD 1983 StatePlane NY West FIPS 3103
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CITY OF BUFFALO, NY

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SITE PLAN

FIGURE 1-1

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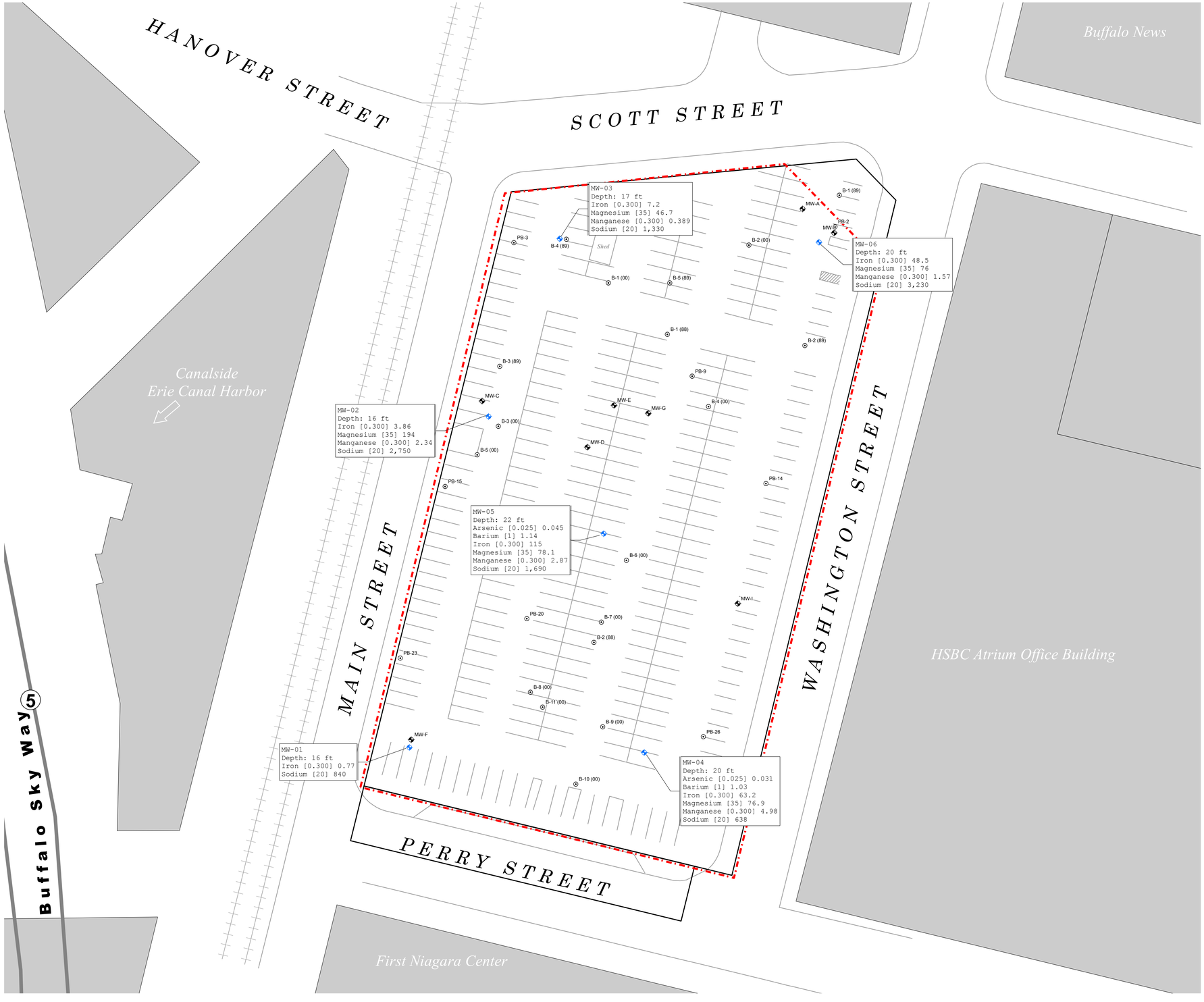

LOCATION MAP

LEGEND

- BCP Boundary
- Parcel Boundary
- Erie County Tax Map Parcel Boundaries
- Soil Boring
- Previously Installed Monitoring Well
- Monitoring Well (installed by LiRo 2010)

LABEL LEGEND

"Arsenic"	Contaminate
[0.025]	NYSDEC Standard (mg/L)
0.031	Concentration (mg/L)

NOTES

1) Erie County parcel data from NYS GIS Clearinghouse, 2005 .

2) Analytical data from 2000 Malcom Pirine Report and 2010 LiRo Report.

3) Coordinate System: NAD 1983 StatePlane New York West FIPS 3103 Ft
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GROUNDWATER CONTAMINATION

FIGURE 2-1

Table 1: Analytical Sampling Results (2000 - 2010)

Sample ID	Sample Depth[1]	Detected Compounds[2]	SCO Exceeded[3]					
			Total	UR	RS	RR	CM	IN
B-1 (00)	4'-6'	SVOC	5		2	2		1
		Metals	1				1	
B-2 (00)	6'-8'	Metals	1				1	
B-3 (00)	10'-12'			Below UR				
B-4 (00)	6'-8'	Metals	2	1			1	
B-5 (00)	2'-4'	SVOC	4		2	2		
		Metals	1	1				
B-6 (00)	4'-6'			Below UR				
B-7 (00)	6'-8'	SVOC	1				1	
		Metals	5	2	1	2		
B-9 (00)	6'-8'	SVOC	6		2	3		1
		Metals	4	1	1		2	
B-10 (00)	4'-6'	Metals	4	2	1	1		
B-11 (00)	4'-6'	SVOC	3			3		
		Metals	2	2				
MW-01	4'-8'	SVOC	1				1	
		Metals	4	2	1	1		
MW-02	10'-12'	VOC	1	1				
		Metals	1				1	
MW-03	6'-8'	VOC	1	1				
		Metals	3	3				
MW-04	4'-8'			Below UR				
MW-04	8'-10'	VOC	1	1				
MW-05	8'-10'	VOC	1	1				
MW-06	4'-8'	Metals	3	2				1

Table 2: Analytical Sampling Results (2012)

Sample ID	Sample Depth[1]	Detected Compounds[2]	SCO Exceeded[3]					
			Total	UR	RS	RR	CM	IN
B-2	15'-17'			Below UR				
B-3	15'-17'			Below UR				
B-13	12'-14'	VOC	1	1				
B-13	25'-27'			Below UR				
B-13	35'-37'	VOC	1	1				
MW-9	12'-14'	VOC	1	1				
Block 1 N	3'	VOC	3	3				
		SVOC	6			2		4
		Metals	4	2			2	
Block 2 N	3'	VOC	3	3				
		SVOC	14					14
Block 2 E	8'	VOC	1	1				
Block 2 C	11'			Below UR				
Block 3 C	4'-6'	VOC	3	3				
		SVOC	5			3	1	1
		Metals	7	4		1	1	1
Block 3 S	4'-6'	VOC	2	2				
		SVOC	6			2	3	1
		Metals	5	4			1	
Block 3 C	12.5'			Below UR				
Block 3	Pipe	VOC	1	1				
		SVOC	2	1		1		
Block 4 SW	4'	Metals	4	2		1	1	
Block 4 SW	9.5'	VOC	1	1				
Block 5 C	2'-3'	Metals	7	2	1	1	2	1
Block 5 SW	2'	SVOC	7			1		6
		Metals	5		1		2	2
TP-01	12'	VOC	1	1				
TP-4	10'	Metals	5	2		1		1
TP-5	6'	VOC	1	1				
		Metals	3	2		1		

LOCATION MAP

LEGEND

- BCP Boundary
- Erie County Tax Map Parcel Boundaries
- Parcel Boundary
- Test Pit (2012)

Exceedance of NYSDEC Soil Cleanup Objectives

- Below Unrestricted Residential
- Sample Exceeded Unrestricted Residential Criteria for at Least One Compound
- Sample Exceeded Residential Criteria for at Least One Compound
- Sample Exceeded Restricted Residential Criteria for at Least One Compound
- Sample Exceeded Commercial Criteria for at Least One Compound
- Sample Exceeded Industrial Criteria for at Least One Compound

TABLE NOTES

1) Sample depths in feet below ground surface.

2) "VOC" Volatile Organic Compounds
"SVOC" Semi-volatile Organic Compounds

3) Soil Cleanup Objectives ("SCO"):
"UR" Unrestricted Residential Criteria
"RS" Residential Criteria
"RR" Restricted Residential Criteria
"CM" Commercial Criteria
"IN" Industrial Criteria

NOTES

1) Erie County parcel data from NYS GIS Clearinghouse, 2005.

2) Analytical data from 2000 Malcom Pirine Report and 2010 LiRo Report.

3) Additional analytical samples collected by C&S during October 2012 Phase IIB Archaeological Investigation.

4) Coordinate System: NAD 1983 StatePlane New York West FIPS 3103 Ft
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0 15 30 60 Feet

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SOIL CONTAMINATION

FIGURE 2-2

Location Map

Legend

- Parcel Boundary
- BCP Boundary
- Monitoring Well
- Soil Boring
- Grab Sample from Test Pit

Label Legend

"RR"	Restricted Residential Criteria
"VOC"	Volatile Organic Compounds
VOC > UR (1)	= One VOC Compound Exceed Unrestricted Residential Use Criteria

Native Material Note

Native material is soil (sand, silt or clay) that has not been significantly modified by industrial and commercial uses observed on-site.

Notes

1) Erie County parcel data from NYS GIS Clearinghouse, 2005.

2) Analytical data from 2000 Malcom Pirine Report and 2010 LiRo Report.

3) Additional analytical samples collected by C&S during October 2012 Phase IIB Archaeological Investigation.

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NATIVE SOIL SAMPLE RESULTS

FIGURE 2-3

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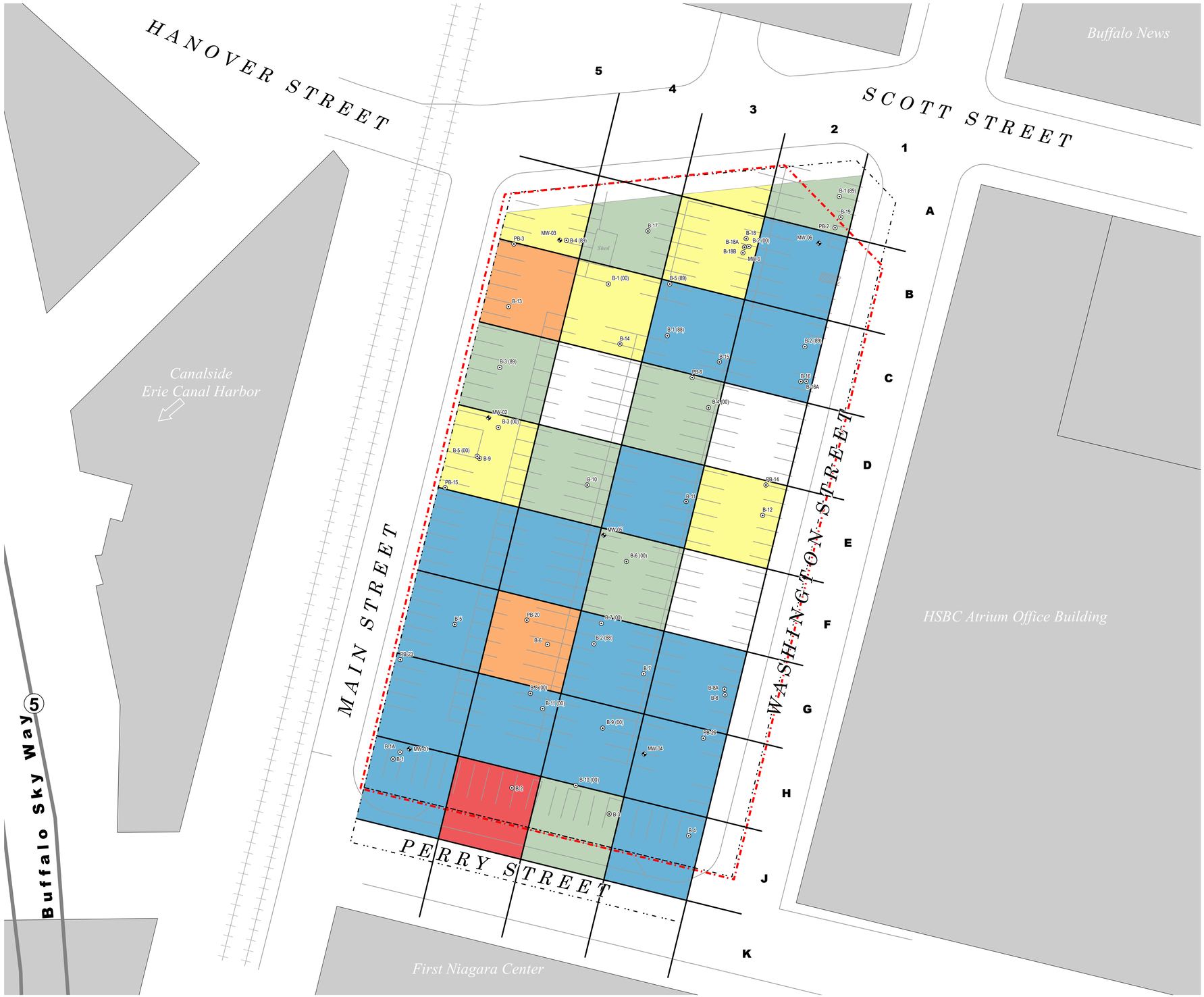

LOCATION MAP

LEGEND

- BCP Boundary
- Erie County Tax Map Parcel Boundaries
- Parcel Boundary

Approximate Fill Depths (feet below ground surface)

- 8 - 10
- 10 - 12
- 12 -14
- 14 -16
- 16 - 18

FILL NOTES

1) Fill consists of a layer of brick, concrete and gravel rubble overlaying re-worked sand, silt and clay. In addition, fill material was intermixed with deposits of ash /cinders, organic material and coal.

2) Fill depths are based on soil boring data collected from 1988 to 2010 investigations. Fill depths can vary highly across the site. Fill depths presented on this map should be considered an approximation.

NOTES

1) Erie County parcel data from NYS GIS Clearinghouse, 2005.

2) Fill depth data from 1988 through 2012 environmental and geotechnical reports.

3) Additional fill depth data was reviewed from the September 2010 Phase I Archaeological Investigation.

4) Coordinate System: NAD 1983 StatePlane New York West FIPS 3103 Ft
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FILL DEPTHS

FIGURE 2-4

LOCATION MAP

LEGEND

- BCP Boundary
- Parcel Boundary
- Archaeological Test Pit
- Proposed Test Pit
- Erie County Tax Map Parcel Boundaries
- Monitoring Well Targeted for Sampling

REMEDIAL INVESTIGATION

TEST PITS

1) A total of thirty-two (32) test pits will be excavated for this RI.

2) Test pits in Washington Street will be coordinated with the utility closure and removal of utility line.

3) Test pits will be excavated from ground surface to approximately 10 ft below grade. Once excavation has reached 10 ft below grade, material will be removed in 2-3 ft intervals until "native material" is encountered.

4) Three samples from each test pit will be collected for volatile organic compounds ("VOC"), semi-volatile compounds ("SVOC"), and Total Analytical List ("TAL") Metals. A total of 96 samples will be collected from test pit excavations.

GROUNDWATER MONITORING

1) One round of groundwater sampling will be conducted on monitoring wells installed by LirRo Engineers in 2010 and wells installed by SJB in 2012.

2) Sampling will be conducted using low flow purging and sampling procedures.

3) Groundwater samples will be collected for VOC, SVOC and TAL Metals.

NOTES

1) Erie County parcel data from NYS GIS Clearinghouse, 2005 .

2) Coordinate System: NAD 1983 StatePlane New York West FIPS 3103 Ft
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REMEDIAL INVESTIGATION

FIGURE 3-1

HANOVER ST

SCOTT STREET

Buffalo News

Canalside
Erie Canal Harbor

Shed

Groundwater Collection & Treatment System

MAIN STREET

WASHINGTON STREET

Construction Laydown

HSBC Atrium Office Building

A

PERRY STREET

First Niagara Center

Truck Access

Location Map

Legend

- Parcel Boundary
- BCP Boundary
- Temporary Construction Fence
- Sheet Pile Shoring System
- Groundwater Collection Tanks

Label Legend

(A) Typical Shoring Design Section - See Figure 4-2

Notes

1) Erie County parcel data from NYS GIS Clearinghouse, 2005.

2) Coordinate System: NAD 1983 StatePlane NY West FIPS 3103
Projection: Transverse Mercator
Datum: North American 1983
Units: Foot US

0 60 120 Feet

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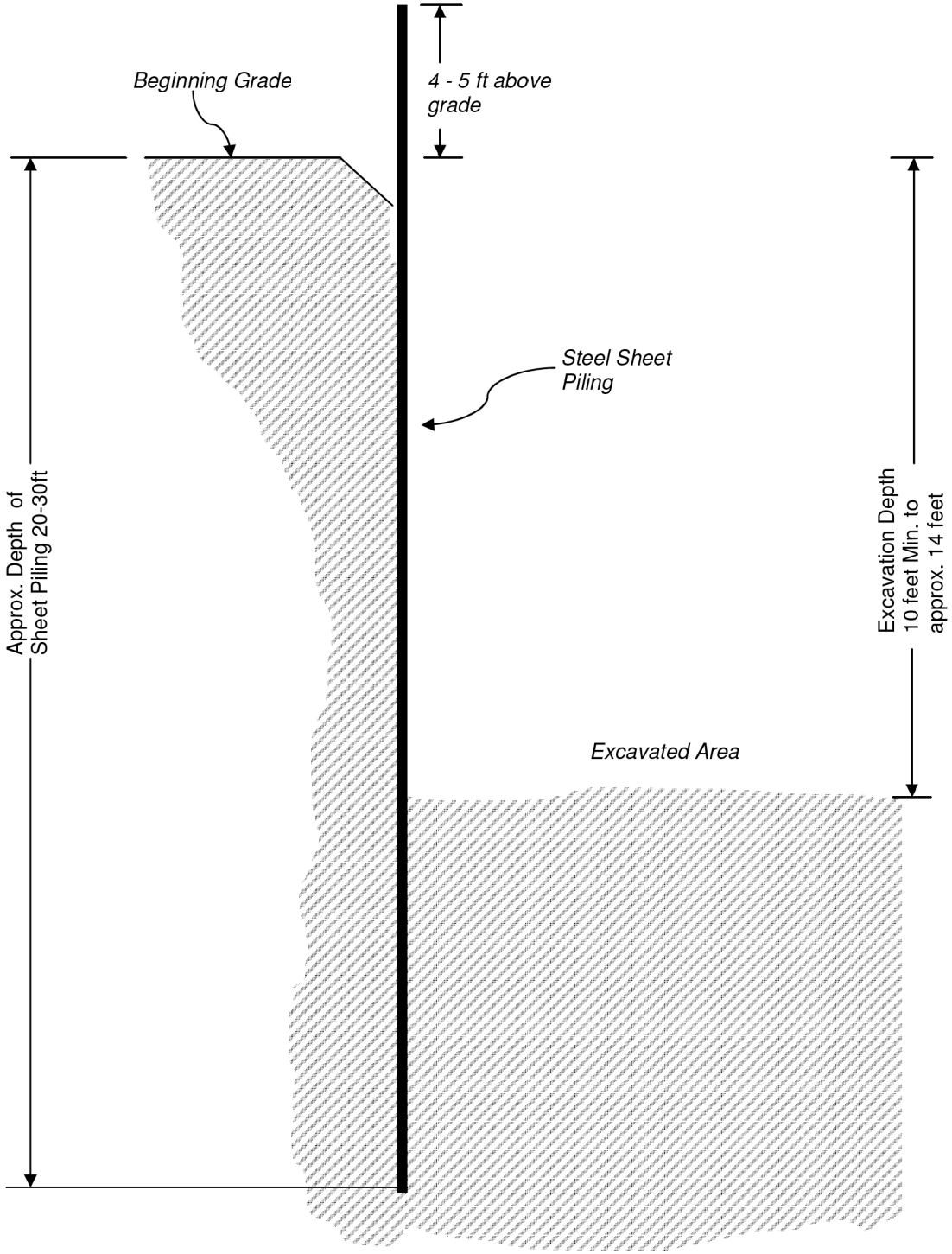
SCALE:	1" = 60'
DRAWN BY:	CAM
DESIGNED BY:	CAM
CHECKED BY:	MJC

GENERAL CONSTRUCTION LAYOUT

FIGURE 4-1

Path: F:\Project\M86- HARBORcenter Development LLC\M86001001 - HARBORcenter\Environmental\CADD-GIS\GIS\Projects\CONT_LAYOUT.mxd



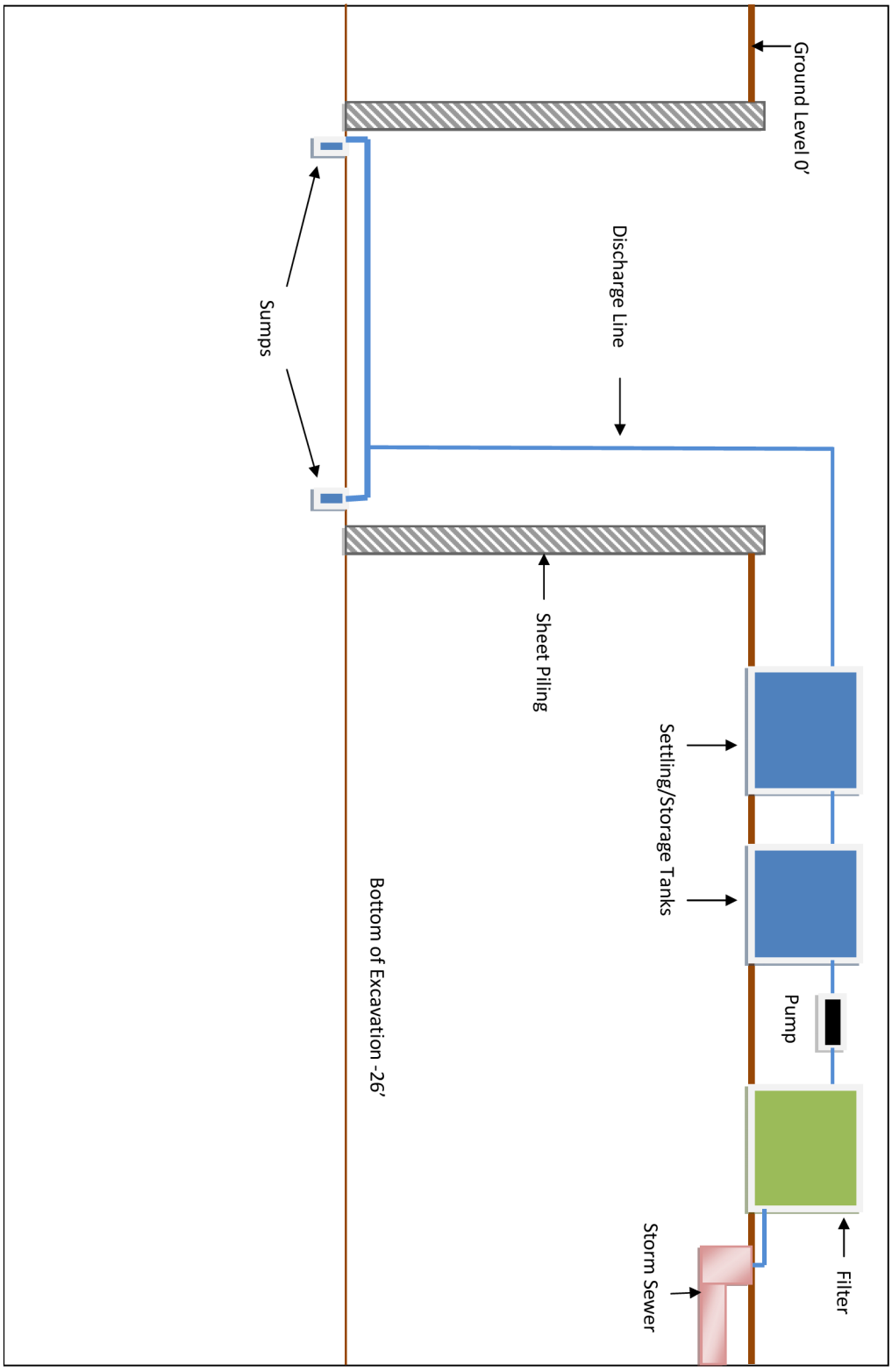
TITLE:

TYPICAL SHORING DESIGN SECTION

C&S Engineers, Inc.
90 Broadway
Buffalo, New York 14203
Phone: 716-847-1630
Fax: 716-847-1454
www.cscos.com

DATE:	March 11, 2013
SCALE:	Not to Scale
FILE NO.	M86.001.001

FIGURE 4-2



TITLE:

TEMPORARY DEWATERING TREATMENT SYSTEM

C&S Engineers, Inc.
90 Broadway
Buffalo, New York 14203
Phone: 716-847-1630
Fax: 716-847-1454
www.cscos.com

DATE:	December 7, 2012
SCALE:	Not to Scale
FILE NO.	M86.001.001

FIGURE 4-3

APPENDICES

APPENDIX A
TABLES OF CONTAMINATES

TABLE 2.1.1-1
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - VOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Standards & Guidance Values	MW-01	MW-02	MW-03	MW-04	MW-05	MW-06
Sample Date		10-Oct-10	10-Oct-10	10-Oct-10	10-Oct-10	10-Oct-10	10-Oct-10
Matrix		Water	Water	Water	Water	Water	Water
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Contaminate							
Volatile Organic Compounds							
Acetone	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Benzene	1	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Bromodichloromethane	50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bromomethane	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bromoform	50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Butanone	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Carbon disulfide	N/S	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Carbon Tetrachloride	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorobenzene	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chloroethane	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chloromethane	N/S	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
2-Chloroethyl vinyl Ether	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Chloroform	7	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dibromochloromethane	50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,2-Dichlorobenzene	N/S	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,3-Dichlorobenzene	N/S	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,4-Dichlorobenzene	N/S	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1-Dichloroethane	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,2-Dichloroethane	0.6	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1-Dichloroethene	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
cis-1,2-Dichloroethene	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
trans-1,2-Dichloroethene	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,2-Dichloropropane	1	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
cis-1,3-Dichloroproene	N/S	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
trans-1,3-Dichloroproene	N/S	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
2-Hexanone	50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methylene Chloride	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-pentanone	N/S	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Styrene	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Tetrachloroethene	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,2-Trichloroethane	1	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Trichloroethene	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Trichlorofluoromethane	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Toluene	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl acetate	N/S	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Vinyl chloride	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Xylene (total)	5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

Notes

1) Shaded areas indicate concentration exceeds NYSDEC T.O.G.S 1.1.1 Ambient Water Quality Standards

2) < = not detected - below Method Detection Limit.

3) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero.

4) N/S = No Standard

TABLE 2.1.1-2
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SVOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Standards & Guidance Values	MW-01	MW-02	MW-03	MW-04	MW-05	MW-06
Sample Date		10-Oct-10	10-Oct-10	10-Oct-10	10-Oct-10	10-Oct-10	10-Oct-10
Matrix		Water	Water	Water	Water	Water	Water
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Contaminate							
Semi-volatile Organic Compounds							
1,2,4-Trichlorobenzene	5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
1,2-Dichlorobenzene	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
1,3-Dichlorobenzene	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
1,4-Dichlorobenzene	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
2,4,5-Trichlorophenol	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
2,4,6-Trichlorophenol	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
2,4-Dichlorophenol	5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
2,4-Dimethylphenol	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
2,4-Dinitrophenol	10	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
2,4-Dinitrotoluene	5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
2,6-Dichlorophenol	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
2,6-Dinitrotoluene	5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
2-Chloronaphthalene	10	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
2-Chlorophenol	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
2-Methylnaphthalene	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
2-Methylphenol	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
2-Nitroaniline	5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
2-Nitrophenol	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
3&4-Methlphenol	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
3,3'-Dichlorobenzidine	5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
3-Nitroaniline	5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
4,6-Dinitro-2-methlphenol	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
4-Chloro-3-methyphenol	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
4-Chloroaniline	5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
4-Chlorophenyl-phenyl ether	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
4-Nitroaniline	5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
4-Nitrophenol	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Acenaphthene	20	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Acenaphthylene	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Anthracene	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Benzl alcohol	N/S	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
Benzo(a)anthracene	0.002	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Benzo(a)pyrene	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Benzo(b)fluoranthene	0.002	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Benzo(g,h,i)perylene	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Benzo(k)fluoranthene	0.002	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Benzoic Acid	NS	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
bis (2-chloroethoxy) methane	5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
bis(2-chloroethyl) ether	1	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
bis(2-choroisopropyl) ether	NS	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
bis(2-ethylhexyl)phthalate	5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Butylbenzyl phathalate	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Chrysene	0.002	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Dibenz(a,h)anthracene	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Dibenzofuran	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Diethyl phthalate	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Dimethyl phthalate	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Di-n-butyl phthalate	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Di-n-octyl phthalate	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Fluoranthene	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0

TABLE 2.1.1-2
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - SVOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Standards & Guidance Values	MW-01	MW-02	MW-03	MW-04	MW-05	MW-06
Sample Date		10-Oct-10	10-Oct-10	10-Oct-10	10-Oct-10	10-Oct-10	10-Oct-10
Matrix		Water	Water	Water	Water	Water	Water
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Contaminate							
Semi-volatile Organic Compounds							
Fluorene	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Hexachlorobenzene	0.04	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Hexachlorobutadiene	0.5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Hexachloroethane	5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Hexchlorocyclopentadiene	5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Indeno (1,2,3-cd) pyrene	0.002	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Isophorone	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Naphthalene	10	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Nitrobenzene	0.4	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
N-Nitro-di-n-propylamine	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
N-Nitrosodimethylamine	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
N-Nitrosodiphenylamine	N/S	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Pentachlorophenol	1	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
Phenanthrene	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Phenol	1	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Pyrene	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0

Notes

1) Shaded areas indicate concentration exceeds NYSDEC T.O.G.S 1.1.1 Ambient Water Quality Standards

2) < = not detected - below Method Detection Limit.

3) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero.

4) N/S = No Standard

TABLE 2.1.1-3
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - METALS
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Standards & Guidance Values	MW-01	MW-02	MW-03	MW-04	MW-05	MW-06
Sample Date		10-Oct-10	10-Oct-10	10-Oct-10	10-Oct-10	10-Oct-10	10-Oct-10
Matrix		Water	Water	Water	Water	Water	Water
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Contaminate							
Metals							
Aluminum	N/S	0.287	0.417	<0.200	0.651	0.768	1.2
Antimony	0.003	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Arsenic	0.025	0.007	0.011	0.012	0.031	0.045	0.013
Barium	1	0.168	0.521	0.164	1.03	1.14	0.33
Beryllium	0.003	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	N/S	121	378	127	432	538	666
Chromium, trivalent	0.05	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cobalt	N/S	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Copper	0.2	0.014	0.011	<0.010	0.01	0.012	0.012
Iron	0.3	0.77	3.86	7.2	63.2	115	48.5
Lead	0.025	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Magnesium	35	22.3	194	46.7	76.9	78.1	76
Manganese	0.3	0.175	2.34	0.389	4.98	2.87	1.57
Mercury	0.0007	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	0.1	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Potassium	N/S	23.7	81.7	22	62.2	89.1	95.5
Selenium	0.01	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Silver	0.05	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	20	840	2750	1330	638	1690	3230
Thallium	0.0005	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Vanadium	N/S	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	2	0.021	<0.020	<0.020	<0.020	<0.020	<0.020

Notes

1) Shaded areas indicate concentration exceeds NYSDEC T.O.G.S 1.1.1 Ambient Water Quality Standards

2) < = not detected - below Method Detection Limit.

3) J = The analyte was positively identified but, the number indicates an estimated value.
Detected concentration is less than the contract required quanititation limit but is greater than zero.

4) N/S = No Standard

TABLE 2.1.2-1
SUMMARY OF SOIL ANALYTICAL RESULTS - VOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					B-1 (00)	B-2 (00)	B-3 (00)	B-4 (00)
Sample Depth						4.0 -6.0	6.0-8.0	10.0-12.0	6.0-8.0
Sample Date						29-Jun-00	29-Jun-00	29-Jun-00	29-Jun-00
Matrix						Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	**Unrestricted Residential**	**Residential**	**Restricted Residential**	**Commercial**	**Industrial**				
Volatile Organic Compounds									
1,1,1-Trichloroethane	0.68	100	100	500	1000	<.006	<.006	<.005	<.007
1,1-Dichloroethane	0.27	19	26	240	480	<.006	<.006	<.005	<.007
1,1-Dichloroethene	0.33	100	100	500	1000	<.006	<.006	<.005	<.007
1,2-Dichlorobenzene	1.1	100	100	500	1000				
1,2-Dichloroethane	0.02	2.3	3.1	30	60	<.006	<.006	<.005	<.007
1,3-Dichlorobenzene	2.4	17	49	280	560				
1,4-Dichlorobenzene	1.8	9.8	13	130	250				
Acetone	0.05	100	100	500	1000	<.028	<.030	<.027	<.033
Benzene	0.06	2.9	4.8	44	89	<.0008	<.0008	<0.0007	<0.0009
Carbon Tetrachloride	0.76	1.4	2.4	22	44	<.006	<.006	<.005	<.007
Chlorobenzene	1.1	100	100	500	1000	<.006	<.006	<.005	<.007
Chloroform	0.37	10	49	350	700	<.006	<.006	<.005	<.007
cis-1,2-Dichloroethene	0.25	59	100	500	1000	<.006	<.006	<.005	<.007
Ethylbenzene	1	30	41	390	780	<.006	<.006	<.005	<.007
Methylene Chloride	0.05	51	100	500	1000	<.006	<.006	<.005	<.007
Tetrachloroethene	1.3	5.5	19	150	300	<.006	<.006	<.011	<.007
Toluene	0.7	100	100	500	1000	<.006	<.006	<.005	<.007
trans-1,2-Dichloroethene	0.19	100	100	500	1000	<.006	<.006	<.005	<.007
Trichloroethene	0.47	10	21	200	400				
Vinyl chloride	0.02	0.21	0.9	13	27	<.002	<.002	<.002	<.003
Xylene (total)	0.26	100	100	500	1000	<.006	<.006	<.005	<.007

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-1
SUMMARY OF SOIL ANALYTICAL RESULTS - VOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					B-5 (00)	B-6 (00)	B-7 (00)	B-7 (00)
Sample Depth						2.0-4.0	4.0-6.0	6.0-8.0	8.0-10.0
Sample Date						29-Jun-00	29-Jun-00	29-Jun-00	29-Jun-00
Matrix						Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	**Unrestricted Residential**	**Residential**	**Restricted Residential**	**Commercial**	**Industrial**				
Volatile Organic Compounds									
1,1,1-Trichloroethane	0.68	100	100	500	1000	<.005	<.028	<.04	<1.7
1,1-Dichloroethane	0.27	19	26	240	480	<.005	<.028	<.04	<1.7
1,1-Dichloroethene	0.33	100	100	500	1000	<.005	<.140	<.04	<1.7
1,2-Dichlorobenzene	1.1	100	100	500	1000				
1,2-Dichloroethane	0.02	2.3	3.1	30	60	<.005	<.028	<.04	<1.7
1,3-Dichlorobenzene	2.4	17	49	280	560				
1,4-Dichlorobenzene	1.8	9.8	13	130	250				
Acetone	0.05	100	100	500	1000	<.026	<.028	<0.2	<8.6
Benzene	0.06	2.9	4.8	44	89	<0.0007	<.004	<.006	<0.240
Carbon Tetrachloride	0.76	1.4	2.4	22	44	<.005	<.028	<.04	<1.7
Chlorobenzene	1.1	100	100	500	1000	<.005	<.028	<.04	<1.7
Chloroform	0.37	10	49	350	700	<.005	<.028	<.04	<1.7
cis-1,2-Dichloroethene	0.25	59	100	500	1000	<.005	<.028	<.04	<1.7
Ethylbenzene	1	30	41	390	780	<.005	<.028	<.04	<1.7
Methylene Chloride	0.05	51	100	500	1000	<.005	<.028	<.04	<1.7
Tetrachloroethene	1.3	5.5	19	150	300	<.011	<.028	<.04	<1.7
Toluene	0.7	100	100	500	1000	<.005	<.028	<.04	<1.7
trans-1,2-Dichloroethene	0.19	100	100	500	1000	<.005	<.028	<.04	<1.7
Trichloroethene	0.47	10	21	200	400				
Vinyl chloride	0.02	0.21	0.9	13	27	<.002	<.028	<.04	<0.690
Xylene (total)	0.26	100	100	500	1000	<.005	<.028	<.04	<1.7

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-1
SUMMARY OF SOIL ANALYTICAL RESULTS - VOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					B-9 (00)	B-11 (00)	MW-01	MW-02
Sample Depth						6.0-8.0	4.0-6.0	6.0-8.0	10.0-12.0
Sample Date						29-Jun-00	29-Jun-00	18-Oct-10	18-Oct-10
Matrix						Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Residential	Residential	Restricted Residential	Commercial	Industrial				
Volatile Organic Compounds									
1,1,1-Trichloroethane	0.68	100	100	500	1000	<.006	<.006	<.0094	<.011
1,1-Dichloroethane	0.27	19	26	240	480	<.006	<.006	<.0094	<.011
1,1-Dichloroethene	0.33	100	100	500	1000	<.006	<.006	<.0094	<.011
1,2-Dichlorobenzene	1.1	100	100	500	1000			<.0094	<.011
1,2-Dichloroethane	0.02	2.3	3.1	30	60	<.006	<.006	<.0094	<.011
1,3-Dichlorobenzene	2.4	17	49	280	560			<.0094	<.011
1,4-Dichlorobenzene	1.8	9.8	13	130	250			<.0235	<.011
Acetone	0.05	100	100	500	1000	<.032	<.028	<.047	**0.152**
Benzene	0.06	2.9	4.8	44	89	<.0009	<.0008	<.0094	<.011
Carbon Tetrachloride	0.76	1.4	2.4	22	44	<.006	<.006	<.0094	<.011
Chlorobenzene	1.1	100	100	500	1000	<.006	<.006	<.0094	<.011
Chloroform	0.37	10	49	350	700	<.006	<.006	<.0094	<.011
cis-1,2-Dichloroethene	0.25	59	100	500	1000	<.006	<.006	<.0094	<.011
Ethylbenzene	1	30	41	390	780	<.006	<.006	<.0094	<.011
Methylene Chloride	0.05	51	100	500	1000	<.006	<.006	<.0235	<.0274
Tetrachloroethene	1.3	5.5	19	150	300	<.006	<.006	<.0235	<.0274
Toluene	0.7	100	100	500	1000	<.006	<.006	<.0094	<.011
trans-1,2-Dichloroethene	0.19	100	100	500	1000	<.006	<.006	<.0094	<.011
Trichloroethene	0.47	10	21	200	400			<.0094	<.011
Vinyl chloride	0.02	0.21	0.9	13	27	<.003	<.002	<.0094	<.011
Xylene (total)	0.26	100	100	500	1000	<.006	<.006	<.0094	<.011

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-1
SUMMARY OF SOIL ANALYTICAL RESULTS - VOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					MW-02	MW-03	MW-04	MW-04
Sample Depth						7.0-8.0	6.0-8.0	7.0-8.0	8.0-10.0
Sample Date						18-Oct-10	18-Oct-10	18-Oct-10	18-Oct-10
Matrix						Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Residential	Residential	Restricted Residential	Commercial	Industrial				
Volatile Organic Compounds									
1,1,1-Trichloroethane	0.68	100	100	500	1000	<.021	<.0084	<.0107	<.0121
1,1-Dichloroethane	0.27	19	26	240	480	<.021	<.0084	<.0107	<.0121
1,1-Dichloroethene	0.33	100	100	500	1000	<.021	<.0084	<.0107	<.0121
1,2-Dichlorobenzene	1.1	100	100	500	1000	<.021	<.0084	<.0107	<.0121
1,2-Dichloroethane	0.02	2.3	3.1	30	60	<.021	<.0084	<.0107	<.0121
1,3-Dichlorobenzene	2.4	17	49	280	560	<.021	<.0084	<.0107	<.0121
1,4-Dichlorobenzene	1.8	9.8	13	130	250	<.021	<.0084	<.0107	<.0121
Acetone	0.05	100	100	500	1000	**0.36**	**0.118**	<0.53	**0.183**
Benzene	0.06	2.9	4.8	44	89	<.021	<.0084	<.0107	<.0121
Carbon Tetrachloride	0.76	1.4	2.4	22	44	<.021	<.0084	<.0107	<.0121
Chlorobenzene	1.1	100	100	500	1000	<.021	<.0084	<.0107	<.0121
Chloroform	0.37	10	49	350	700	<.021	<.0084	<.0107	<.0121
cis-1,2-Dichloroethene	0.25	59	100	500	1000	<.021	<.0084	<.0107	<.0121
Ethylbenzene	1	30	41	390	780	<.021	<.0084	<.0107	<.0121
Methylene Chloride	0.05	51	100	500	1000	<.0512	<.021	<.0276	<.0302
Tetrachloroethene	1.3	5.5	19	150	300	<.0512	<.021	<.0276	<.0302
Toluene	0.7	100	100	500	1000	<.021	<.0084	<.0107	<.0121
trans-1,2-Dichloroethene	0.19	100	100	500	1000	<.021	<.0084	<.0107	<.0121
Trichloroethene	0.47	10	21	200	400	<.021	<.0084	<.0107	<.0121
Vinyl chloride	0.02	0.21	0.9	13	27	<.021	<.0084	<.0107	<.0121
Xylene (total)	0.26	100	100	500	1000	<.021	<.0084	<.0107	<.0121

Notes
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4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-1
SUMMARY OF SOIL ANALYTICAL RESULTS - VOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					MW-05	MW-06	MW-06	B-02
Sample Depth						8.0-10.0	4.0-8.0	7.0-8.0	15.0-17.0
Sample Date						18-Oct-10	18-Oct-10	18-Oct-10	10-Oct-12
Matrix						Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Residential	Residential	Restricted Residential	Commercial	Industrial				
Volatile Organic Compounds									
1,1,1-Trichloroethane	0.68	100	100	500	1000	<.0116	<.002	<.0116	<.00445
1,1-Dichloroethane	0.27	19	26	240	480	<.0116	<.002	<.0116	<.00445
1,1-Dichloroethene	0.33	100	100	500	1000	<.0116	<.002	<.0116	<.00445
1,2-Dichlorobenzene	1.1	100	100	500	1000	<.0116	<.002	<.0116	<.00445
1,2-Dichloroethane	0.02	2.3	3.1	30	60	<.0116	<.002	<.0116	<.00445
1,3-Dichlorobenzene	2.4	17	49	280	560	<.0116	<.002	<.0116	<.00445
1,4-Dichlorobenzene	1.8	9.8	13	130	250	<.0116	<.002	<.0116	<.00445
Acetone	0.05	100	100	500	1000	**0.214**	<.010	**0.214**	0.0299
Benzene	0.06	2.9	4.8	44	89	<.0116	<.002	<.0116	<.00445
Carbon Tetrachloride	0.76	1.4	2.4	22	44	<.0116	<.002	<.0116	<.00445
Chlorobenzene	1.1	100	100	500	1000	<.0116	<.002	<.0116	<.00445
Chloroform	0.37	10	49	350	700	<.0116	<.002	<.0116	<.00445
cis-1,2-Dichloroethene	0.25	59	100	500	1000	<.0116	<.002	<.0116	<.00445
Ethylbenzene	1	30	41	390	780	<.0116	<.002	<.0579	<.00445
Methylene Chloride	0.05	51	100	500	1000	<0.0289	<.005	<.0289	0.00694
Tetrachloroethene	1.3	5.5	19	150	300	<0.0289	<.005	<.0289	<.00445
Toluene	0.7	100	100	500	1000	<.0116	<.002	<.0116	<.00445
trans-1,2-Dichloroethene	0.19	100	100	500	1000	<.0116	<.002	<.0116	<.00445
Trichloroethene	0.47	10	21	200	400	<.0116	<.002	<.0116	<.00445
Vinyl chloride	0.02	0.21	0.9	13	27	<.0116	<.002	<.0116	<.00445
Xylene (total)	0.26	100	100	500	1000	<.0116	<.002	<.0116	<.00445

Notes
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2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
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4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-1
SUMMARY OF SOIL ANALYTICAL RESULTS - VOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					B-03	B-13	B-13	B-13
Sample Depth						15.0-17.0	12.0-14.0	25.0-27.0	35.0-37.0
Sample Date						9-Oct-12	10-Oct-12	10-Oct-12	10-Oct-12
Matrix						Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Residential	Residential	Restricted Residential	Commercial	Industrial				
Volatile Organic Compounds									
1,1,1-Trichloroethane	0.68	100	100	500	1000	<.00359	<.225	<.00397	<.00371
1,1-Dichloroethane	0.27	19	26	240	480	<.00359	<.225	<.00397	<.00371
1,1-Dichloroethene	0.33	100	100	500	1000	<.00359	<.225	<.00397	<.00371
1,2-Dichlorobenzene	1.1	100	100	500	1000	<.00359	<.225	<.00397	<.00371
1,2-Dichloroethane	0.02	2.3	3.1	30	60	<.00359	<.225	<.00397	<.00371
1,3-Dichlorobenzene	2.4	17	49	280	560	<.00359	<.225	<.00397	<.00371
1,4-Dichlorobenzene	1.8	9.8	13	130	250	<.00359	<.225	<.00397	<.00371
Acetone	0.05	100	100	500	1000	0.0127 J B	**0.629 J**	0.0136 J	**0.337**
Benzene	0.06	2.9	4.8	44	89	<.00359	<.225	<.00397	<.00371
Carbon Tetrachloride	0.76	1.4	2.4	22	44	<.00359	<.225	<.00397	<.00371
Chlorobenzene	1.1	100	100	500	1000	<.00359	<.225	<.00397	<.00371
Chloroform	0.37	10	49	350	700	<.00359	<.225	<.00397	<.00371
cis-1,2-Dichloroethene	0.25	59	100	500	1000	<.00359	<.225	<.00397	<.00371
Ethylbenzene	1	30	41	390	780	<.00359	<.225	<.00397	<.00371
Methylene Chloride	0.05	51	100	500	1000	0.00471 J	0.407 J B	<.00397	0.00546
Tetrachloroethene	1.3	5.5	19	150	300	<.00359	<.225	<.00397	<.00371
Toluene	0.7	100	100	500	1000	<.00359	<.225	<.00397	0.00522
trans-1,2-Dichloroethene	0.19	100	100	500	1000	<.00359	<.225	<.00397	<.00371
Trichloroethene	0.47	10	21	200	400	<.00359	<.225	<.00397	<.00371
Vinyl chloride	0.02	0.21	0.9	13	27	<.00359	<.225	<.00397	<.00371
Xylene (total)	0.26	100	100	500	1000	<.00359	<.225	<.00397	<.00371

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
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N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-1
SUMMARY OF SOIL ANALYTICAL RESULTS - VOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					B-18	Block 1	Block 2	Block 2
Sample Depth						12.0-14.0	3.0 N	3.0 N	8.0 E
Sample Date						10-Oct-12	11-Oct-12	15-Oct-12	16-Oct-12
Matrix						Soil	Soil	Soild	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Residential	Residential	Restricted Residential	Commercial	Industrial				
Volatile Organic Compounds									
1,1,1-Trichloroethane	0.68	100	100	500	1000	<.00421	<.00605	<.0421	<.00415
1,1-Dichloroethane	0.27	19	26	240	480	<.00421	<.00605	<.0421	<.00415
1,1-Dichloroethene	0.33	100	100	500	1000	<.00421	<.00605	<.0421	<.00415
1,2-Dichlorobenzene	1.1	100	100	500	1000	<.00421	<.00605	<.0421	<.00415
1,2-Dichloroethane	0.02	2.3	3.1	30	60	<.00421	<.00605	<.0421	<.00415
1,3-Dichlorobenzene	2.4	17	49	280	560	<.00421	<.00605	<.0421	<.00415
1,4-Dichlorobenzene	1.8	9.8	13	130	250	<.00421	<.00605	<.0421	<.00415
Acetone	0.05	100	100	500	1000	**0.0796**	**0.0832 B**	**1.71 J B**	**0.149 B**
Benzene	0.06	2.9	4.8	44	89	<.00421	<.00605	<.0421	<.00415
Carbon Tetrachloride	0.76	1.4	2.4	22	44	<.00421	<.00605	<.0421	<.00415
Chlorobenzene	1.1	100	100	500	1000	<.00421	<.00605	<.0421	<.00415
Chloroform	0.37	10	49	350	700	<.00421	<.00605	<.0421	<.00415
cis-1,2-Dichloroethene	0.25	59	100	500	1000	<.00421	<.00605	<.0421	<.00415
Ethylbenzene	1	30	41	390	780	<.00421	<.00605	0.584	<.00415
Methylene Chloride	0.05	51	100	500	1000	0.00662 J	0.0116 J B	<.0421	<.00415
Tetrachloroethene	1.3	5.5	19	150	300	<.00421	<.00605	<.0421	<.00415
Toluene	0.7	100	100	500	1000	<.00421	<.00605	**0.648**	<.00415
trans-1,2-Dichloroethene	0.19	100	100	500	1000	<.00421	<.00605	<.0421	<.00415
Trichloroethene	0.47	10	21	200	400	<.00421	<.00605	<.0421	<.00415
Vinyl chloride	0.02	0.21	0.9	13	27	<.00421	<.00605	<.0421	<.00415
Xylene (total)	0.26	100	100	500	1000	<.00421	<.00605	**2.347**	<.00415

Notes
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3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-1
SUMMARY OF SOIL ANALYTICAL RESULTS - VOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					Block 2	Block 3	Block 3	Block 3
Sample Depth						11.0 C	4.0-6.0 C	4.0-6.0 S	12.5 C
Sample Date						16-Oct-12	19-Oct-12	19-Oct-12	24-Oct-12
Matrix						Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Residential	Residential	Restricted Residential	Commercial	Industrial				
Volatile Organic Compounds									
1,1,1-Trichloroethane	0.68	100	100	500	1000	<.00303	<1.15	<0.329	<.00681
1,1-Dichloroethane	0.27	19	26	240	480	<.00303	<1.15	<0.329	<.00681
1,1-Dichloroethene	0.33	100	100	500	1000	<.00303	<1.15	<0.329	<.00681
1,2-Dichlorobenzene	1.1	100	100	500	1000	<.00303	<1.15	<0.329	<.00681
1,2-Dichloroethane	0.02	2.3	3.1	30	60	<.00303	<1.15	<0.329	<.00681
1,3-Dichlorobenzene	2.4	17	49	280	560	<.00303	<1.15	<0.329	<.00681
1,4-Dichlorobenzene	1.8	9.8	13	130	250	<.00303	<1.15	<0.329	<.00681
Acetone	0.05	100	100	500	1000	0.0145 B	**11.6**	<0.329	0.0463 B
Benzene	0.06	2.9	4.8	44	89	<.00303	<1.15	**0.413**	<.00681
Carbon Tetrachloride	0.76	1.4	2.4	22	44	<.00303	<1.15	<0.329	<.00681
Chlorobenzene	1.1	100	100	500	1000	<.00303	<1.15	<0.329	<.00681
Chloroform	0.37	10	49	350	700	<.00303	<1.15	<0.329	<.00681
cis-1,2-Dichloroethene	0.25	59	100	500	1000	<.00303	<1.15	<0.329	<.00681
Ethylbenzene	1	30	41	390	780	<.00303	0.751 J	0.222	<.00681
Methylene Chloride	0.05	51	100	500	1000	<.00303	**2.73 J**	<0.329	<.00681
Tetrachloroethene	1.3	5.5	19	150	300	<.00303	<1.15	<0.329	<.00681
Toluene	0.7	100	100	500	1000	<.00303	**0.691 J**	0.262 J	<.00681
trans-1,2-Dichloroethene	0.19	100	100	500	1000	<.00303	<1.15	<0.329	<.00681
Trichloroethene	0.47	10	21	200	400	<.00303	<1.15	<0.329	<.00681
Vinyl chloride	0.02	0.21	0.9	13	27	<.00303	<1.15	<0.329	<.00681
Xylene (total)	0.26	100	100	500	1000	<.00303	**10.124**	**2.709**	<.00681

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-1
SUMMARY OF SOIL ANALYTICAL RESULTS - VOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					Block 3	Block 4	Block 4	Block 5
Sample Depth						Pipe*	4.0 SW	9.5 SW	2.0-3.0 C
Sample Date						25-Oct-12	31-Oct-12	31-Oct-12	1-Nov-12
Matrix						Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Residential	Residential	Restricted Residential	Commercial	Industrial				
Volatile Organic Compounds									
1,1,1-Trichloroethane	0.68	100	100	500	1000	<.0048	<.00337	<.00544	<.00358
1,1-Dichloroethane	0.27	19	26	240	480	<.0048	<.00337	<.00544	<.00358
1,1-Dichloroethene	0.33	100	100	500	1000	<.0048	<.00337	<.00544	<.00358
1,2-Dichlorobenzene	1.1	100	100	500	1000	<.0048	<.00337	<.00544	<.00358
1,2-Dichloroethane	0.02	2.3	3.1	30	60	<.0048	<.00337	<.00544	<.00358
1,3-Dichlorobenzene	2.4	17	49	280	560	<.0048	<.00337	<.00544	<.00358
1,4-Dichlorobenzene	1.8	9.8	13	130	250	<.0048	<.00337	<.00544	<.00358
Acetone	0.05	100	100	500	1000	**0.299 B**	<.00337	**0.367**	<.00358
Benzene	0.06	2.9	4.8	44	89	<.0048	<.00337	<.00544	<.00358
Carbon Tetrachloride	0.76	1.4	2.4	22	44	<.0048	<.00337	<.00544	<.00358
Chlorobenzene	1.1	100	100	500	1000	<.0048	<.00337	<.00544	<.00358
Chloroform	0.37	10	49	350	700	<.0048	<.00337	<.00544	<.00358
cis-1,2-Dichloroethene	0.25	59	100	500	1000	<.0048	<.00337	<.00544	<.00358
Ethylbenzene	1	30	41	390	780	0.00902	<.00337	<.00544	<.00358
Methylene Chloride	0.05	51	100	500	1000	<.0048	<.00337	<.00544	<.00358
Tetrachloroethene	1.3	5.5	19	150	300	<.0048	<.00337	<.00544	<.00358
Toluene	0.7	100	100	500	1000	<.0048	<.00337	<.00544	<.00358
trans-1,2-Dichloroethene	0.19	100	100	500	1000	<.0048	<.00337	<.00544	<.00358
Trichloroethene	0.47	10	21	200	400	<.0048	<.00337	<.00544	<.00358
Vinyl chloride	0.02	0.21	0.9	13	27	<.0048	<.00337	<.00544	<.00358
Xylene (total)	0.26	100	100	500	1000	0.00966	<.00337	<.00544	<.00358

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-1
SUMMARY OF SOIL ANALYTICAL RESULTS - VOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					TP-01	TP-05	TP-05
Sample Depth						12.0	6.0	7.0
Sample Date						31-Oct-12	1-Nov-12	1-Nov-12
Matrix						Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg
Contaminate	**Unrestricted Residential**	**Residential**	**Restricted Residential**	**Commercial**	**Industrial**			
Volatile Organic Compounds								
1,1,1-Trichloroethane	0.68	100	100	500	1000	<.00416	<.00420	<.00372
1,1-Dichloroethane	0.27	19	26	240	480	<.00416	<.00420	<.00372
1,1-Dichloroethene	0.33	100	100	500	1000	<.00416	<.00420	<.00372
1,2-Dichlorobenzene	1.1	100	100	500	1000	<.00416	<.00420	<.00372
1,2-Dichloroethane	0.02	2.3	3.1	30	60	<.00416	<.00420	<.00372
1,3-Dichlorobenzene	2.4	17	49	280	560	<.00416	<.00420	<.00372
1,4-Dichlorobenzene	1.8	9.8	13	130	250	<.00416	<.00420	<.00372
Acetone	0.05	100	100	500	1000	**0.106**	**0.135**	**0.0616**
Benzene	0.06	2.9	4.8	44	89	<.00416	<.00420	<.00372
Carbon Tetrachloride	0.76	1.4	2.4	22	44	<.00416	<.00420	<.00372
Chlorobenzene	1.1	100	100	500	1000	<.00416	<.00420	<.00372
Chloroform	0.37	10	49	350	700	<.00416	<.00420	<.00372
cis-1,2-Dichloroethene	0.25	59	100	500	1000	<.00416	<.00420	<.00372
Ethylbenzene	1	30	41	390	780	<.00416	<.00420	<.00372
Methylene Chloride	0.05	51	100	500	1000	<.00416	<.00420	<.00372
Tetrachloroethene	1.3	5.5	19	150	300	<.00416	<.00420	<.00372
Toluene	0.7	100	100	500	1000	<.00416	<.00420	<.00372
trans-1,2-Dichloroethene	0.19	100	100	500	1000	<.00416	<.00420	<.00372
Trichloroethene	0.47	10	21	200	400	<.00416	<.00420	<.00372
Vinyl chloride	0.02	0.21	0.9	13	27	<.00416	<.00420	<.00372
Xylene (total)	0.26	100	100	500	1000	<.00416	<.00420	0.00467 J

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-2
SUMMARY OF SOIL ANALYTICAL RESULTS - SVOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					B-1 (00)	B-2 (00)	B-3 (00)	B-4 (00)	B-5 (00)
Sample Depth						4.0'-6.0'	6.0'-8.0'	10.0'-12.0'	6.0'-8.0'	2.0'-4.0'
Sample Date						29-Jun-00	29-Jun-00	29-Jun-00	29-Jun-00	29-Jun-00
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Use	Residential	Restricted Residential	Commercial	Industrial					
Semi-volatile Organic Compounds										
1,2,4-Trichlorobenzene		NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
1,2-Dichlorobenzene	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
1,3-Dichlorobenzene	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
1,4-Dichlorobenzene	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
2,4,5-Trichlorophenol	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
2,4,6-Trichlorophenol	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
2,4-Dichlorophenol	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
2,4-Dimethylphenol	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
2,4-Dinitrophenol	NS	NS	NS	NS	NS	<1.20	<1300	<1200	<1400	<0.290
2,4-Dinitrotoluene	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	0.120J
2,6-Dichlorophenol	NS	NS	NS	NS	NS					
2,6-Dinitrotoluene	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
2-Chloronaphthalene	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
2-Chlorophenol	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
2-Methyl-4,6-dinitrophenol	NS	NS	NS	NS	NS	<1.20	<1.30	<1.20	<1.40	<1.10
2-Methylnaphthalene	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	0.065J
2-Methylphenol	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
2-Nitroaniline	NS	NS	NS	NS	NS	<1.20	<1.30	<1.20	<1.40	<0.290
2-Nitrophenol	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
3&4-Methlphenol	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
3,3'-Dichlorobenzidine	NS	NS	NS	NS	NS	<590	<0.310	<580	<0.68	<0.570
3-Nitroaniline	NS	NS	NS	NS	NS	<1.20	<1.30	<1.20	<1400	<1.10
4,6-Dinitro-2-methlphenol	NS	NS	NS	NS	NS					
4-Bromophenyl-phenyl ether	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
4-Chloro-3-methyphenol	NS	NS	NS	NS	NS	<0.590	<0.630	<0.580	<0.68	<0.570
4-Chloroaniline	NS	NS	NS	NS	NS	<0.590	<0.310	<0.580	<0.68	<0.57
4-Chlorophenyl-phenyl ether	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
4-Nitroaniline	NS	NS	NS	NS	NS	<1.20	<1.30	<1.20	<1.40	<1.10
4-Nitrophenol	NS	NS	NS	NS	NS	<1.20	<1.30	<1.20	<1.40	<0.290
Acenaphthene	20	100[a]	100[a]	500[b]	1,000[c]	0.066J	<0.310	<0.290	<0.34	<0.290
Acenaphthylene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	0.190J	<0.310	<0.290	<0.34	0.075J
Anthracene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	0.87	<0.310	<0.290	<0.34	<0.38
Benzidine	NS	NS	NS	NS	NS					
Benzl alcohol	NS	NS	NS	NS	NS					
Benzo(a)anthracene	1[c]	1[f]	1[f]	5.6	11		0.093J	<0.290	0.120J	**1.1**
Benzo(a)pyrene	1[c]	1[f]	1[f]	1[f]	1.1	**3.00**	0.089J	<0.290	0.096J	**1**
Benzo(b)fluoranthene	1[c]	1[f]	1[f]	5.6	11	**3.6**	0.130J	<0.290	0.140J	**1.4**
Benzo(g,h,i)perylene	100	100[a]	100[a]	500[b]	1,000[c]	0.79	<0.310	<0.290	<0.34	0.3
Benzo(k)fluoranthene	0.8 [c]	1	3.9	56	110	**1.8**	<0.310	<0.290	<0.34	0.69
Benzoic Acid	NS	NS	NS	NS	NS					
bis (2-chloroethoxy) methane	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
bis(2-chloroethyl) ether	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
bis(2-choroisopropyl) ether	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
bis(2-ethylhexyl)phthalate	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	0.220J
Butylbenzyl phathalate	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
Carbazole	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
Chrysene	1[c]	1[f]	3.9	56	110	**2.5**	<0.630	<0.290	0.130J	**1.2**
Dibenz(a,h)anthracene	0.33 [b]	0.33[e]	0.33[e]	0.56	1.1	<0.290	<0.310	<0.290	<0.34	<0.290
Dibenzofuran	NS	NS	NS	NS	NS	.071J	<0.310	<0.290	<0.34	<1.10
Diethyl phthalate	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
Dimethyl phthalate	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<1.10
Di-n-butyl phthalate	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
Di-n-octyl phthalate	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
Fluoranthene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	4.1	<0.310	<0.290	0.310J	2.1
Fluorene	30	100[a]	100[a]	500[b]	1,000[c]	0.110J	<0.310	<0.290	<0.34	0.120J
Hexachlorobenzene	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
Hexachlorobutadiene	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
Hexachloroethane	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
Hexchlorocyclopentadiene	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
Indeno (1,2,3-cd) pyrene	0.5 [c]	0.5[f]	0.5[f]	5.6	11	**0.99**	<0.310	<0.290	<0.34	0.38
Isophorone	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
Naphthalene	12	100[a]	100[a]	500[b]	1,000[c]	0.170J	<0.310	<0.290	0.240J	0.092J
Nitrobenzene	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
N-Nitro-di-n-propylamine	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
N-Nitrosodimethylamine	NS	NS	NS	NS	NS					
N-Nitrosodiphenylamine	NS	NS	NS	NS	NS	<0.290	<0.310	<0.290	<0.34	<0.290
Pentachlorophenol	0.8[b]	2.4	6.7	6.7	55	<1.20	<1.30	<1.20	<1.40	<1.10
Phenanthrene	100	100[a]	100[a]	500[b]	1,000[c]	2.5	0.090J	<0.290	0.310J	2.1
Phenol	0.33[b]	100[a]	100[a]	500[b]	1,000[c]	<0.290	<0.310	<0.290	<0.34	<0.290
Pyrene	100	100[a]	100[a]	500[b]	1,000[c]	5.4	<0.310	<0.290	0.280J	2.8

Notes
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3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-2
SUMMARY OF SOIL ANALYTICAL RESULTS - SVOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					B-6 (00)	B-7 (00)	B-9 (00)	B-10 (00)	B-11 (00)
Sample Depth						4.0'-6.0'	6.0'-8.0'	6.0'-8.0'	4.0'-6.0'	4.0'-6.0'
Sample Date						29-Jun-00	29-Jun-00	29-Jun-00	29-Jun-00	29-Jun-00
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Use	Residential	Restricted Residential	Commercial	Industrial					
Semi-volatile Organic Compounds										
1,2,4-Trichlorobenzene		NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
1,2-Dichlorobenzene	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
1,3-Dichlorobenzene	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
1,4-Dichlorobenzene	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
2,4,5-Trichlorophenol	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
2,4,6-Trichlorophenol	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
2,4-Dichlorophenol	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
2,4-Dimethylphenol	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
2,4-Dinitrophenol	NS	NS	NS	NS	NS	<0.33	<1.90	<1.30	<2.40	<1200
2,4-Dinitrotoluene	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
2,6-Dichlorophenol	NS	NS	NS	NS	NS					
2,6-Dinitrotoluene	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
2-Chloronaphthalene	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
2-Chlorophenol	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
2-Methyl-4,6-dinitrophenol	NS	NS	NS	NS	NS	<1.30	<1.90	<1.30	<2.40	<1.20
2-Methylnaphthalene	NS	NS	NS	NS	NS	0.130J	0.310J	0.230J	<0.59	<0.30
2-Methylphenol	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
2-Nitroaniline	NS	NS	NS	NS	NS	<1.30	<1.90	<1.30	<2.40	<1.20
2-Nitrophenol	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
3&4-Methlphenol	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
3,3'-Dichlorobenzidine	NS	NS	NS	NS	NS	<0.66	<0.47	<650	<2.40	<0.59
3-Nitroaniline	NS	NS	NS	NS	NS	<1.30	<1.90	<1.30	<2.40	<1.20
4,6-Dinitro-2-methlphenol	NS	NS	NS	NS	NS					
4-Bromophenyl-phenyl ether	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
4-Chloro-3-methyphenol	NS	NS	NS	NS	NS	<0.66	<0.47	<650	<1200	<0.59
4-Chloroaniline	NS	NS	NS	NS	NS	<0.66	<940	<650	<1200	<0.59
4-Chlorophenyl-phenyl ether	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
4-Nitroaniline	NS	NS	NS	NS	NS	<1.30	<1.90	<1.30	<2400	<1.20
4-Nitrophenol	NS	NS	NS	NS	NS	<1.30	<1.90	<1.30	<2400	<1.20
Acenaphthene	20	100[a]	100[a]	500[b]	1,000[c]	0.110J	0.190J	0.62	<0.59	0.210J
Acenaphthylene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<0.33	<0.47	0.076J	<0.59	<0.30
Anthracene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	0.34	0.56	1.5	<0.59	0.58
Benzidine	NS	NS	NS	NS	NS					
Benzl alcohol	NS	NS	NS	NS	NS					
Benzo(a)anthracene	1[c]	1[f]	1[f]	5.6	11	0.62	0.82	**2.9**	0.460J	**1.1**
Benzo(a)pyrene	1[c]	1[f]	1[f]	1[f]	1.1	0.55	0.66	**2.4**	0.330J	0.94
Benzo(b)fluoranthene	1[c]	1[f]	1[f]	5.6	11	0.98	**1**	**3.4**	0.59	**1.1**
Benzo(g,h,i)perylene	100	100[a]	100[a]	500[b]	1,000[c]	<0.33	<0.47	0.75	<0.59	0.39
Benzo(k)fluoranthene	0.8 [c]	1	3.9	56	110	<0.33	0.400J	**1.1**	<0.59	0.51
Benzoic Acid	NS	NS	NS	NS	NS					
bis (2-chloroethoxy) methane	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
bis(2-chloroethyl) ether	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
bis(2-choroisopropyl) ether	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
bis(2-ethylhexyl)phthalate	NS	NS	NS	NS	NS	1.1	0.71	<0.33	0.540J	<0.30
Butylbenzyl phathalate	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
Carbazole	NS	NS	NS	NS	NS	<0.33	<0.47	0.69	<0.59	<0.30
Chrysene	1[c]	1[f]	3.9	56	110	0.74	0.82	**3.3**	0.530J	<0.30
Dibenz(a,h)anthracene	0.33 [b]	0.33[e]	0.33[e]	0.56	1.1	<0.33	<0.47	0.23J	<0.59	<0.30
Dibenzofuran	NS	NS	NS	NS	NS	0.130J	<0.23J	0.46	<0.59	0.130J
Diethyl phthalate	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
Dimethyl phthalate	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
Di-n-butyl phthalate	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
Di-n-octyl phthalate	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
Fluoranthene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	1.1	1.6	5.7	0.79	2
Fluorene	30	100[a]	100[a]	500[b]	1,000[c]	0.170J	0.300J	0.71	<0.59	0.240J
Hexachlorobenzene	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
Hexachlorobutadiene	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
Hexachloroethane	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
Hexchlorocyclopentadiene	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
Indeno (1,2,3-cd) pyrene	0.5 [c]	0.5[f]	0.5[f]	5.6	11	0.230J	0.260J	**1**	<0.59	**0.5**
Isophorone	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
Naphthalene	12	100[a]	100[a]	500[b]	1,000[c]	0.150J	0.460J	0.4	<0.59	0.075J
Nitrobenzene	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
N-Nitro-di-n-propylamine	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
N-Nitrosodimethylamine	NS	NS	NS	NS	NS					
N-Nitrosodiphenylamine	NS	NS	NS	NS	NS	<0.33	<0.47	<0.33	<0.59	<0.30
Pentachlorophenol	0.8[b]	2.4	6.7	6.7	55	<1.30	<1.90	<1.30	<2.40	<1.20
Phenanthrene	100	100[a]	100[a]	500[b]	1,000[c]	1.2	2.1	6.7	0.84	1.9
Phenol	0.33[b]	100[a]	100[a]	500[b]	1,000[c]	<0.33	<0.47	<0.33	<0.59	<0.30
Pyrene	100	100[a]	100[a]	500[b]	1,000[c]	1.7	2	6.7	0.89	2.5

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-2
SUMMARY OF SOIL ANALYTICAL RESULTS - SVOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					MW-01	MW-02	MW-02	MW-03	MW-04
Sample Depth						4.0'-8.0'	10.0'-12.0'	1.0'-10.0'	6.0'-8.0'	4.0'-8.0'
Sample Date						18-Oct-10	18-Oct-10	18-Oct-10	18-Oct-10	18-Oct-10
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Use	Residential	Restricted Residential	Commercial	Industrial					
Semi-volatile Organic Compounds										
1,2,4-Trichlorobenzene		NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
1,2-Dichlorobenzene	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
1,3-Dichlorobenzene	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
1,4-Dichlorobenzene	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
2,4,5-Trichlorophenol	NS	NS	NS	NS	NS	<0.341	<0.846	<0.902	<0.806	<0.921
2,4,6-Trichlorophenol	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
2,4-Dichlorophenol	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
2,4-Dimethylphenol	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
2,4-Dinitrophenol	NS	NS	NS	NS	NS	<0.341	<0.846	<0.902	<0.806	<0.921
2,4-Dinitrotoluene	NS	NS	NS	NS	NS	<0.852	<0.338	<0.361	<0.322	<0.368
2,6-Dichlorophenol	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
2,6-Dinitrotoluene	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
2-Chloronaphthalene	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
2-Chlorophenol	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
2-Methyl-4,6-dinitrophenol	NS	NS	NS	NS	NS					
2-Methylnaphthalene	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
2-Methylphenol	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
2-Nitroaniline	NS	NS	NS	NS	NS	<0.852	<0.846	<0.902	<0.806	<0.921
2-Nitrophenol	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
3&4-Methlphenol	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
3,3'-Dichlorobenzidine	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
3-Nitroaniline	NS	NS	NS	NS	NS	<0.852	<0.846	<0.902	<0.806	<0.921
4,6-Dinitro-2-methlphenol	NS	NS	NS	NS	NS	<0.852	<0.846	<0.902	<0.806	<0.921
4-Bromophenyl-phenyl ether	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
4-Chloro-3-methyphenol	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
4-Chloroaniline	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
4-Chlorophenyl-phenyl ether	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
4-Nitroaniline	NS	NS	NS	NS	NS	<0.852	<0.846	<0.902	<0.806	<0.921
4-Nitrophenol	NS	NS	NS	NS	NS	<0.852	<0.846	<0.361	<0.806	<0.921
Acenaphthene	20	100[a]	100[a]	500[b]	1,000[c]	<0.341	<0.338	<0.361	<0.322	<0.368
Acenaphthylene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<0.341	<0.338	<0.361	<0.322	<0.368
Anthracene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<0.341	<0.338	<0.361	<0.322	<0.368
Benzidine	NS	NS	NS	NS	NS	<0.852	<0.846	<0.902	<0.806	<0.921
Benzl alcohol	NS	NS	NS	NS	NS	<0.852	<0.846	<0.902	<0.806	<0.921
Benzo(a)anthracene	1[c]	1[f]	1[f]	5.6	11	0.719	0.529	<0.361	0.491	<0.368
Benzo(a)pyrene	1[c]	1[f]	1[f]	1[f]	1.1	0.653	0.624	<0.361	0.4	<0.368
Benzo(b)fluoranthene	1[c]	1[f]	1[f]	5.6	11	0.555	0.545	<0.361	<0.322	<0.368
Benzo(g,h,i)perylene	100	100[a]	100[a]	500[b]	1,000[c]	0.419	0.544	<0.361	<0.322	<0.368
Benzo(k)fluoranthene	0.8 [c]	1	3.9	56	110	0.533	0.339	<0.361	0.337	<0.368
Benzoic Acid	NS	NS	NS	NS	NS	<0.852	<0.846	<0.902	<0.806	<0.921
bis (2-chloroethoxy) methane	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
bis(2-chloroethyl) ether	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
bis(2-choroisopropyl) ether	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
bis(2-ethylhexyl)phthalate	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
Butylbenzyl phathalate	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
Carbazole	NS	NS	NS	NS	NS					
Chrysene	1[c]	1[f]	3.9	56	110	0.743	0.608	<0.361	0.46	<0.368
Dibenz(a,h)anthracene	0.33 [b]	0.33[e]	0.33[e]	0.56	1.1	<0.341	<0.338	<0.361	<0.322	<0.368
Dibenzofuran	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
Diethyl phthalate	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
Dimethyl phthalate	NS	NS	NS	NS	NS	<0.852	<0.846	<0.902	<0.806	<0.921
Di-n-butyl phthalate	NS	NS	NS	NS	NS					
Di-n-octyl phthalate	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
Fluoranthene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	1.35	0.903	<0.361	1.16	<0.368
Fluorene	30	100[a]	100[a]	500[b]	1,000[c]	<0.341	<0.338	<0.361	<0.322	<0.368
Hexachlorobenzene	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
Hexachlorobutadiene	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
Hexachloroethane	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
Hexchlorocyclopentadiene	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
Indeno (1,2,3-cd) pyrene	0.5 [c]	0.5[f]	0.5[f]	5.6	11	**0.578**	0.459	<0.361	<0.322	<0.368
Isophorone	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
Naphthalene	12	100[a]	100[a]	500[b]	1,000[c]	<0.341	<0.338	<0.361	<0.322	<0.368
Nitrobenzene	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
N-Nitro-di-n-propylamine	NS	NS	NS	NS	NS	<0.341	<0.338	<0.902	<0.322	<0.921
N-Nitrosodimethylamine	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
N-Nitrosodiphenylamine	NS	NS	NS	NS	NS	<0.341	<0.338	<0.361	<0.322	<0.368
Pentachlorophenol	0.8[b]	2.4	6.7	6.7	55	<0.852	<0.846	<0.902	<0.806	<0.921
Phenanthrene	100	100[a]	100[a]	500[b]	1,000[c]	1.34	0.788	<0.361	1.04	<0.368
Phenol	0.33[b]	100[a]	100[a]	500[b]	1,000[c]	<0.341	<0.338	<0.361	<0.322	<0.368
Pyrene	100	100[a]	100[a]	500[b]	1,000[c]	1.44	0.924	<0.361	0.947	<0.368

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-2
SUMMARY OF SOIL ANALYTICAL RESULTS - SVOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					MW-04	MW-05	MW-06	B-02	B-03
Sample Depth						8.0'-10.0'	8.0'-10.0'	4.0'-8.0'	15.0-17.0	15.0-17.0
Sample Date						18-Oct-10	18-Oct-10	18-Oct-10	10-Oct-12	9-Oct-12
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Use	Residential	Restricted Residential	Commercial	Industrial					
Semi-volatile Organic Compounds										
1,2,4-Trichlorobenzene		NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
1,2-Dichlorobenzene	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
1,3-Dichlorobenzene	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
1,4-Dichlorobenzene	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
2,4,5-Trichlorophenol	NS	NS	NS	NS	NS	<0.983	<0.948	<0.948	<0.846	<0.888
2,4,6-Trichlorophenol	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
2,4-Dichlorophenol	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
2,4-Dimethylphenol	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
2,4-Dinitrophenol	NS	NS	NS	NS	NS	<0.983	<0.948	<0.948	<0.846	<0.888
2,4-Dinitrotoluene	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
2,6-Dichlorophenol	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
2,6-Dinitrotoluene	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
2-Chloronaphthalene	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
2-Chlorophenol	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
2-Methyl-4,6-dinitrophenol	NS	NS	NS	NS	NS				<0.339	<0.355
2-Methylnaphthalene	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
2-Methylphenol	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
2-Nitroaniline	NS	NS	NS	NS	NS	<0.983	<0.948	<0.948	<0.846	<0.888
2-Nitrophenol	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
3&4-Methlphenol	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
3,3'-Dichlorobenzidine	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
3-Nitroaniline	NS	NS	NS	NS	NS	<0.983	<0.948	<0.948	<0.846	<0.888
4,6-Dinitro-2-methlphenol	NS	NS	NS	NS	NS	<0.983	<0.948	<0.948	<0.846	<0.888
4-Bromophenyl-phenyl ether	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
4-Chloro-3-methyphenol	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
4-Chloroaniline	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
4-Chlorophenyl-phenyl ether	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
4-Nitroaniline	NS	NS	NS	NS	NS	<0.983	<0.948	<0.948	<0.846	<0.888
4-Nitrophenol	NS	NS	NS	NS	NS	<0.393	<0.948	<0.948	<0.846	<0.888
Acenaphthene	20	100[a]	100[a]	500[b]	1,000[c]	<0.393	<0.379	<0.379	<0.846	<0.888
Acenaphthylene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<0.393	<0.379	<0.379	<0.339	<0.355
Anthracene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<0.393	<0.379	<0.379	<0.339	<0.355
Benzidine	NS	NS	NS	NS	NS	<0.983	<0.948	<0.948	<0.339	<0.355
Benzl alcohol	NS	NS	NS	NS	NS	<0.983	<0.948	<0.948	<0.339	<0.355
Benzo(a)anthracene	1[c]	1[f]	1[f]	5.6	11	<0.393	<0.379	<0.379	<0.339	<0.355
Benzo(a)pyrene	1[c]	1[f]	1[f]	1[f]	1.1	<0.393	<0.379	<0.379	<0.339	<0.355
Benzo(b)fluoranthene	1[c]	1[f]	1[f]	5.6	11	<0.393	<0.379	<0.379	<0.339	<0.355
Benzo(g,h,i)perylene	100	100[a]	100[a]	500[b]	1,000[c]	<0.393	<0.379	<0.379	<0.339	<0.355
Benzo(k)fluoranthene	0.8 [c]	1	3.9	56	110	<0.393	<0.379	<0.379	<0.339	<0.355
Benzoic Acid	NS	NS	NS	NS	NS	<0.983	<0.948	<0.948		
bis (2-chloroethoxy) methane	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
bis(2-chloroethyl) ether	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
bis(2-choroisopropyl) ether	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
bis(2-ethylhexyl)phthalate	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	0.254 J
Butylbenzyl phathalate	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
Carbazole	NS	NS	NS	NS	NS				<0.339	<0.355
Chrysene	1[c]	1[f]	3.9	56	110	<0.393	<0.379	<0.379	<0.339	<0.355
Dibenz(a,h)anthracene	0.33 [b]	0.33[e]	0.33[e]	0.56	1.1	<0.393	<0.379	<0.379	<0.339	<0.355
Dibenzofuran	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
Diethyl phthalate	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
Dimethyl phthalate	NS	NS	NS	NS	NS	<0.983	<0.948	<0.948	<0.846	<0.888
Di-n-butyl phthalate	NS	NS	NS	NS	NS				<0.339	<0.355
Di-n-octyl phthalate	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
Fluoranthene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<0.393	<0.379	<0.379	<0.339	<0.355
Fluorene	30	100[a]	100[a]	500[b]	1,000[c]	<0.393	<0.379	<0.379	<0.339	<0.355
Hexachlorobenzene	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
Hexachlorobutadiene	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
Hexachloroethane	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
Hexchlorocyclopentadiene	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
Indeno (1,2,3-cd) pyrene	0.5 [c]	0.5[f]	0.5[f]	5.6	11	<0.393	<0.379	<0.379	<0.339	<0.355
Isophorone	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
Naphthalene	12	100[a]	100[a]	500[b]	1,000[c]	<0.393	<0.379	<0.379	<0.339	<0.355
Nitrobenzene	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
N-Nitro-di-n-propylamine	NS	NS	NS	NS	NS	<0.983	<0.948	<0.948	<0.339	<0.355
N-Nitrosodimethylamine	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
N-Nitrosodiphenylamine	NS	NS	NS	NS	NS	<0.393	<0.379	<0.379	<0.339	<0.355
Pentachlorophenol	0.8[b]	2.4	6.7	6.7	55	<0.983	<0.948	<0.948	<0.846	<0.888
Phenanthrene	100	100[a]	100[a]	500[b]	1,000[c]	<0.393	<0.379	<0.379	<0.339	<0.355
Phenol	0.33[b]	100[a]	100[a]	500[b]	1,000[c]	<0.393	<0.379	<0.379	<0.339	<0.355
Pyrene	100	100[a]	100[a]	500[b]	1,000[c]	<0.393	<0.379	0.465	<0.339	<0.355

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-2
SUMMARY OF SOIL ANALYTICAL RESULTS - SVOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					B-13	B-13	B-13	MW-9	Block 1
Sample Depth						12.0-14.0	25.0-27.0	35.0-37.0	12.0-14.0	3.0 N
Sample Date						10-Oct-12	10-Oct-12	10-Oct-12	10-Oct-12	11-Oct-12
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Use	Residential	Restricted Residential	Commercial	Industrial					
Semi-volatile Organic Compounds										
1,2,4-Trichlorobenzene		NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
1,2-Dichlorobenzene	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
1,3-Dichlorobenzene	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
1,4-Dichlorobenzene	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
2,4,5-Trichlorophenol	NS	NS	NS	NS	NS	<4.11	<0.869	<0.888	<0.942	<4.63
2,4,6-Trichlorophenol	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
2,4-Dichlorophenol	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
2,4-Dimethylphenol	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
2,4-Dinitrophenol	NS	NS	NS	NS	NS	<4.11	<0.869	<0.888	<0.942	<4.63
2,4-Dinitrotoluene	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
2,6-Dichlorophenol	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
2,6-Dinitrotoluene	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
2-Chloronaphthalene	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
2-Chlorophenol	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
2-Methyl-4,6-dinitrophenol	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
2-Methylnaphthalene	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	3.25J
2-Methylphenol	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
2-Nitroaniline	NS	NS	NS	NS	NS	<4.11	<0.869	<0.888	<0.942	<4.63
2-Nitrophenol	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
3&4-Methlphenol	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
3,3'-Dichlorobenzidine	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
3-Nitroaniline	NS	NS	NS	NS	NS	<4.11	<0.869	<0.888	<0.942	<4.63
4,6-Dinitro-2-methlphenol	NS	NS	NS	NS	NS	<4.11	<0.869	<0.888	<0.942	<4.63
4-Bromophenyl-phenyl ether	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
4-Chloro-3-methyphenol	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
4-Chloroaniline	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
4-Chlorophenyl-phenyl ether	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
4-Nitroaniline	NS	NS	NS	NS	NS	<4.11	<0.869	<0.888	<0.942	<4.63
4-Nitrophenol	NS	NS	NS	NS	NS	<4.11	<0.869	<0.888	<0.942	<4.63
Acenaphthene	20	100[a]	100[a]	500[b]	1,000[c]	<4.11	<0.869	<0.888	<0.942	9.14
Acenaphthylene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<1.64	<.347	<0.356	<0.377	<4.63
Anthracene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<1.64	<.347	<0.356	<0.377	16.7
Benzidine	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
Benzl alcohol	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
Benzo(a)anthracene	1[c]	1[f]	1[f]	5.6	11	<1.64	<.347	<0.356	<0.377	**22.8**
Benzo(a)pyrene	1[c]	1[f]	1[f]	1[f]	1.1	<1.64	<.347	<0.356	<0.377	**18.4**
Benzo(b)fluoranthene	1[c]	1[f]	1[f]	5.6	11	<1.64	<.347	<0.356	<0.377	**15.4**
Benzo(g,h,i)perylene	100	100[a]	100[a]	500[b]	1,000[c]	<1.64	<.347	<0.356	<0.377	9.34
Benzo(k)fluoranthene	0.8 [c]	1	3.9	56	110	<1.64	<.347	<0.356	<0.377	**14.2**
Benzoic Acid	NS	NS	NS	NS	NS					
bis (2-chloroethoxy) methane	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
bis(2-chloroethyl) ether	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
bis(2-choroisopropyl) ether	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
bis(2-ethylhexyl)phthalate	NS	NS	NS	NS	NS	<1.64	0.2 J	0.291 J	<0.377	<4.63
Butylbenzyl phathalate	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
Carbazole	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	5.59
Chrysene	1[c]	1[f]	3.9	56	110	<1.64	<.347	<0.356	<0.377	**22.7**
Dibenz(a,h)anthracene	0.33 [b]	0.33[e]	0.33[e]	0.56	1.1	<1.64	<.347	<0.356	<0.377	<4.63
Dibenzofuran	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	6.27
Diethyl phthalate	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
Dimethyl phthalate	NS	NS	NS	NS	NS	<4.11	<0.869	<0.888	<0.942	<4.63
Di-n-butyl phthalate	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
Di-n-octyl phthalate	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
Fluoranthene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<1.64	<.347	<0.356	<0.377	51.7
Fluorene	30	100[a]	100[a]	500[b]	1,000[c]	<1.64	<.347	<0.356	<0.377	8.94
Hexachlorobenzene	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
Hexachlorobutadiene	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
Hexachloroethane	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
Hexchlorocyclopentadiene	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
Indeno (1,2,3-cd) pyrene	0.5 [c]	0.5[f]	0.5[f]	5.6	11	<1.64	<.347	<0.356	<0.377	**11.9**
Isophorone	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
Naphthalene	12	100[a]	100[a]	500[b]	1,000[c]	<1.64	<.347	<0.356	<0.377	4.49
Nitrobenzene	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
N-Nitro-di-n-propylamine	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
N-Nitrosodimethylamine	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
N-Nitrosodiphenylamine	NS	NS	NS	NS	NS	<1.64	<.347	<0.356	<0.377	<4.63
Pentachlorophenol	0.8[b]	2.4	6.7	6.7	55	<4.11	<0.869	<0.888	<0.942	<4.63
Phenanthrene	100	100[a]	100[a]	500[b]	1,000[c]	<1.64	<.347	<0.356	<0.377	58.4
Phenol	0.33[b]	100[a]	100[a]	500[b]	1,000[c]	<1.64	<.347	<0.356	<0.377	<4.63
Pyrene	100	100[a]	100[a]	500[b]	1,000[c]	<1.64	<.347	<0.356	<0.377	43.5

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-2
SUMMARY OF SOIL ANALYTICAL RESULTS - SVOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					Block 2	Block 2	Block 2	Block 3	Block 3
Sample Depth						3.0 N	8.0 E	11.0 C	4.0-6.0 C	4.0-6.0 S
Sample Date						15-Oct-12	16-Oct-12	16-Oct-12	19-Oct-12	19-Oct-12
Matrix						Soild	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Use	Residential	Restricted Residential	Commercial	Industrial					
Semi-volatile Organic Compounds										
1,2,4-Trichlorobenzene		NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
1,2-Dichlorobenzene	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
1,3-Dichlorobenzene	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
1,4-Dichlorobenzene	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
2,4,5-Trichlorophenol	NS	NS	NS	NS	NS	<6,300	<0.926	<0.955	<9.99	<8.60
2,4,6-Trichlorophenol	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
2,4-Dichlorophenol	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
2,4-Dimethylphenol	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
2,4-Dinitrophenol	NS	NS	NS	NS	NS	<2,520	<0.926	<0.955	<4.0	<3.44
2,4-Dinitrotoluene	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
2,6-Dichlorophenol	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
2,6-Dinitrotoluene	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
2-Chloronaphthalene	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
2-Chlorophenol	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
2-Methyl-4,6-dinitrophenol	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
2-Methylnaphthalene	NS	NS	NS	NS	NS	1,380 J	<0.37	<0.382	3.14 J	1.89 J
2-Methylphenol	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
2-Nitroaniline	NS	NS	NS	NS	NS	<6,300	<0.926	<0.955	<9.99	<8.60
2-Nitrophenol	NS	NS	NS	NS	NS	<6,300	<0.37	<0.382	<4.0	<3.44
3&4-Methlphenol	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
3,3'-Dichlorobenzidine	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
3-Nitroaniline	NS	NS	NS	NS	NS	<6,300	<0.926	<0.955	<9.99	<8.60
4,6-Dinitro-2-methlphenol	NS	NS	NS	NS	NS	<6,300	<0.926	<0.955	<9.99	<8.60
4-Bromophenyl-phenyl ether	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
4-Chloro-3-methyphenol	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
4-Chloroaniline	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
4-Chlorophenyl-phenyl ether	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
4-Nitroaniline	NS	NS	NS	NS	NS	<6,300	<0.926	<0.955	<9.99	<8.60
4-Nitrophenol	NS	NS	NS	NS	NS	<6,300	<0.926	<0.955	<9.99	<8.60
Acenaphthene	20	100[a]	100[a]	500[b]	1,000[c]	**2,440**	<0.926	<0.955	2.55 J	1.93 J
Acenaphthylene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<2,520	<0.37	<0.382	<4.0	<3.44
Anthracene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	**6,010**	<0.37	<0.382	3.56 J	3.55
Benzidine	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
Benzl alcohol	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
Benzo(a)anthracene	1[c]	1[f]	1[f]	5.6	11	**6,290**	<0.37	<0.382	**7.92**	**9.7**
Benzo(a)pyrene	1[c]	1[f]	1[f]	1[f]	1.1	**4,740**	<0.37	<0.382	**3.31 J**	**8.96**
Benzo(b)fluoranthene	1[c]	1[f]	1[f]	5.6	11	**4,000**	<0.37	<0.382	**3.56 J**	**8.75**
Benzo(g,h,i)perylene	100	100[a]	100[a]	500[b]	1,000[c]	**2,270 J**	<0.37	<0.382	<4.0	5.24
Benzo(k)fluoranthene	0.8 [c]	1	3.9	56	110	**3,230**	<0.37	<0.382	<4.0	**5.89**
Benzoic Acid	NS	NS	NS	NS	NS					
bis (2-chloroethoxy) methane	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
bis(2-chloroethyl) ether	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
bis(2-choroisopropyl) ether	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
bis(2-ethylhexyl)phthalate	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
Butylbenzyl phathalate	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
Carbazole	NS	NS	NS	NS	NS	2,300 J	<0.37	<0.382	<4.0	<3.44
Chrysene	1[c]	1[f]	3.9	56	110	**5,840**	<0.37	<0.382	**9.67**	**11.3**
Dibenz(a,h)anthracene	0.33 [b]	0.33[e]	0.33[e]	0.56	1.1	<2,520	<0.37	<0.382	<4.0	<3.44
Dibenzofuran	NS	NS	NS	NS	NS	2,550	<0.37	<0.382	<4.0	<3.44
Diethyl phthalate	NS	NS	NS	NS	NS	<6,300	<0.37	<0.382	<4.0	<3.44
Dimethyl phthalate	NS	NS	NS	NS	NS	<6,300	<0.926	<0.955	<9.99	<8.60
Di-n-butyl phthalate	NS	NS	NS	NS	NS	<6,300	<0.37	<0.382	<4.0	<3.44
Di-n-octyl phthalate	NS	NS	NS	NS	NS	<6,300	<0.37	<0.382	<4.0	<3.44
Fluoranthene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	**14,900**	<0.37	<0.382	6.15	21.5
Fluorene	30	100[a]	100[a]	500[b]	1,000[c]	**4,110**	<0.37	<0.382	<4.0	2.12 J
Hexachlorobenzene	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
Hexachlorobutadiene	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
Hexachloroethane	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
Hexchlorocyclopentadiene	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
Indeno (1,2,3-cd) pyrene	0.5 [c]	0.5[f]	0.5[f]	5.6	11	**2,700**	<0.37	<0.382	**2.57 J**	**7.07**
Isophorone	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
Naphthalene	12	100[a]	100[a]	500[b]	1,000[c]	**3,890**	<0.37	<0.382	<4.0	<3.44
Nitrobenzene	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
N-Nitro-di-n-propylamine	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
N-Nitrosodimethylamine	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
N-Nitrosodiphenylamine	NS	NS	NS	NS	NS	<2,520	<0.37	<0.382	<4.0	<3.44
Pentachlorophenol	0.8[b]	2.4	6.7	6.7	55	<2,520	<0.926	<0.955	<9.99	<8.60
Phenanthrene	100	100[a]	100[a]	500[b]	1,000[c]	**20,800**	<0.37	<0.382	11.9	16
Phenol	0.33[b]	100[a]	100[a]	500[b]	1,000[c]	<2,520	<0.37	<0.382	<4.0	<3.44
Pyrene	100	100[a]	100[a]	500[b]	1,000[c]	**12,300**	<0.37	<0.382	12.7	19.3

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-2
SUMMARY OF SOIL ANALYTICAL RESULTS - SVOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					Block 3	Block 3	Block 4	Block 4	Block 5
Sample Depth						12.5 C	Pipe*	4.0 SW	9.5 SW	2.0 SW
Sample Date						24-Oct-12	25-Oct-12	31-Oct-12	31-Oct-12	1-Nov-12
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Use	Residential	Restricted Residential	Commercial	Industrial					
Semi-volatile Organic Compounds										
1,2,4-Trichlorobenzene		NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
1,2-Dichlorobenzene	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
1,3-Dichlorobenzene	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
1,4-Dichlorobenzene	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
2,4,5-Trichlorophenol	NS	NS	NS	NS	NS	<1.46	<0.925	<0.845	<1.09	<22.5
2,4,6-Trichlorophenol	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
2,4-Dichlorophenol	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
2,4-Dimethylphenol	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
2,4-Dinitrophenol	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
2,4-Dinitrotoluene	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
2,6-Dichlorophenol	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
2,6-Dinitrotoluene	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
2-Chloronaphthalene	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
2-Chlorophenol	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
2-Methyl-4,6-dinitrophenol	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
2-Methylnaphthalene	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	4.91 J
2-Methylphenol	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
2-Nitroaniline	NS	NS	NS	NS	NS	<1.46	<0.925	<0.845	<1.09	<22.5
2-Nitrophenol	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
3&4-Methlphenol	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
3,3'-Dichlorobenzidine	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
3-Nitroaniline	NS	NS	NS	NS	NS	<1.46	<0.925	<0.845	<1.09	<22.5
4,6-Dinitro-2-methlphenol	NS	NS	NS	NS	NS	<1.46	<0.925	<0.845	<1.09	<22.5
4-Bromophenyl-phenyl ether	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
4-Chloro-3-methyphenol	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
4-Chloroaniline	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
4-Chlorophenyl-phenyl ether	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
4-Nitroaniline	NS	NS	NS	NS	NS	<1.46	<0.925	<0.845	<1.09	<22.5
4-Nitrophenol	NS	NS	NS	NS	NS	<1.46	<0.925	<0.845	<1.09	<22.5
Acenaphthene	20	100[a]	100[a]	500[b]	1,000[c]	<1.46	0.595	<0.845	<1.09	15.3
Acenaphthylene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<0.585	<0.925	<0.338	<0.436	<8.98
Anthracene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<0.585	0.386 J	<0.338	<0.436	29.9
Benzidine	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
Benzl alcohol	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
Benzo(a)anthracene	1[c]	1[f]	1[f]	5.6	11	<0.585	**1.28**	<0.338	<0.436	**41.1**
Benzo(a)pyrene	1[c]	1[f]	1[f]	1[f]	1.1	<0.585	0.55	<0.338	<0.436	**32.1**
Benzo(b)fluoranthene	1[c]	1[f]	1[f]	5.6	11	<0.585	0.499	<0.338	<0.436	**26.0**
Benzo(g,h,i)perylene	100	100[a]	100[a]	500[b]	1,000[c]	<0.585	0.318	<0.338	<0.436	**13.6**
Benzo(k)fluoranthene	0.8 [c]	1	3.9	56	110	<0.585	0.331	<0.338	<0.436	**25.3**
Benzoic Acid	NS	NS	NS	NS	NS					
bis (2-chloroethoxy) methane	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
bis(2-chloroethyl) ether	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
bis(2-choroisopropyl) ether	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
bis(2-ethylhexyl)phthalate	NS	NS	NS	NS	NS	<0.585	<0.370	1.72	1.09	<8.98
Butylbenzyl phathalate	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
Carbazole	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	8.82 J
Chrysene	1[c]	1[f]	3.9	56	110	<0.585	**1.5**	<0.338	<0.436	**42.0**
Dibenz(a,h)anthracene	0.33 [b]	0.33[e]	0.33[e]	0.56	1.1	<0.585	<0.370	<0.338	<0.436	<8.98
Dibenzofuran	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	8.42 J
Diethyl phthalate	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
Dimethyl phthalate	NS	NS	NS	NS	NS	<1.46	<0.925	<0.845	<1.09	<22.5
Di-n-butyl phthalate	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
Di-n-octyl phthalate	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
Fluoranthene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<0.585	1.57	<0.338	<0.436	87.1
Fluorene	30	100[a]	100[a]	500[b]	1,000[c]	<0.585	<0.370	<0.338	<0.436	12.0
Hexachlorobenzene	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
Hexachlorobutadiene	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
Hexachloroethane	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
Hexchlorocyclopentadiene	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
Indeno (1,2,3-cd) pyrene	0.5 [c]	0.5[f]	0.5[f]	5.6	11	<0.585	<0.370	<0.338	<0.436	**16.3**
Isophorone	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
Naphthalene	12	100[a]	100[a]	500[b]	1,000[c]	<0.585	<0.370	<0.338	<0.436	<8.98
Nitrobenzene	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
N-Nitro-di-n-propylamine	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
N-Nitrosodimethylamine	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
N-Nitrosodiphenylamine	NS	NS	NS	NS	NS	<0.585	<0.370	<0.338	<0.436	<8.98
Pentachlorophenol	0.8[b]	2.4	6.7	6.7	55	<1.46	<0.925	<0.845	<1.09	<22.5
Phenanthrene	100	100[a]	100[a]	500[b]	1,000[c]	<0.585	<0.370	<0.338	<0.436	93.2
Phenol	0.33[b]	100[a]	100[a]	500[b]	1,000[c]	<0.585	<0.370	<0.338	<0.436	<8.98
Pyrene	100	100[a]	100[a]	500[b]	1,000[c]	<0.585	1.95	<0.338	<0.436	69.7

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-2
SUMMARY OF SOIL ANALYTICAL RESULTS - SVOC
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					Block 5	TP-01	TP-04	TP-05	TP-05
Sample Depth						2.0-3.0 C	12.0	10.0	6.0	7.0
Sample Date						1-Nov-12	31-Oct-12	31-Oct-12	1-Nov-12	1-Nov-12
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Use	Residential	Restricted Residential	Commercial	Industrial					
Semi-volatile Organic Compounds										
1,2,4-Trichlorobenzene		NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
1,2-Dichlorobenzene	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
1,3-Dichlorobenzene	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
1,4-Dichlorobenzene	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
2,4,5-Trichlorophenol	NS	NS	NS	NS	NS	<0.793	<0.921	<1.31	<0.832	<0.804
2,4,6-Trichlorophenol	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
2,4-Dichlorophenol	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
2,4-Dimethylphenol	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
2,4-Dinitrophenol	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
2,4-Dinitrotoluene	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
2,6-Dichlorophenol	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
2,6-Dinitrotoluene	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
2-Chloronaphthalene	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
2-Chlorophenol	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
2-Methyl-4,6-dinitrophenol	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
2-Methylnaphthalene	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
2-Methylphenol	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
2-Nitroaniline	NS	NS	NS	NS	NS	<0.793	<0.921	<1.31	<0.832	<0.804
2-Nitrophenol	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
3&4-Methlphenol	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
3,3'-Dichlorobenzidine	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
3-Nitroaniline	NS	NS	NS	NS	NS	<0.793	<0.921	<1.31	<0.832	<0.804
4,6-Dinitro-2-methlphenol	NS	NS	NS	NS	NS	<0.793	<0.921	<1.31	<0.832	<0.804
4-Bromophenyl-phenyl ether	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
4-Chloro-3-methyphenol	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
4-Chloroaniline	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
4-Chlorophenyl-phenyl ether	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
4-Nitroaniline	NS	NS	NS	NS	NS	<0.793	<0.921	<1.31	<0.832	<0.804
4-Nitrophenol	NS	NS	NS	NS	NS	<0.793	<0.921	<1.31	<0.832	<0.804
Acenaphthene	20	100[a]	100[a]	500[b]	1,000[c]	<0.793	<0.921	<1.31	0.322 J	0.624
Acenaphthylene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<0.317	<0.368	<0.526	<0.333	<0.322
Anthracene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	<0.317	<0.368	<0.526	<0.333	0.204 J
Benzidine	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Benzl alcohol	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Benzo(a)anthracene	1[c]	1[f]	1[f]	5.6	11	0.44	<0.368	0.505 J	<0.333	<0.322
Benzo(a)pyrene	1[c]	1[f]	1[f]	1[f]	1.1	0.399	<0.368	0.529	<0.333	<0.322
Benzo(b)fluoranthene	1[c]	1[f]	1[f]	5.6	11	0.514	<0.368	0.472 J	<0.333	<0.322
Benzo(g,h,i)perylene	100	100[a]	100[a]	500[b]	1,000[c]	0.304 J	<0.368	0.337 J	<0.333	<0.322
Benzo(k)fluoranthene	0.8 [c]	1	3.9	56	110	0.217 J	<0.368	0.410 J	<0.333	<0.322
Benzoic Acid	NS	NS	NS	NS	NS					
bis (2-chloroethoxy) methane	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
bis(2-chloroethyl) ether	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
bis(2-choroisopropyl) ether	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
bis(2-ethylhexyl)phthalate	NS	NS	NS	NS	NS	<0.317	2.46	<0.526	<0.333	<0.322
Butylbenzyl phathalate	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Carbazole	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Chrysene	1[c]	1[f]	3.9	56	110	0.523	<0.368	0.641	<0.333	<0.322
Dibenz(a,h)anthracene	0.33 [b]	0.33[e]	0.33[e]	0.56	1.1	<0.317	<0.368	<0.526	<0.333	<0.322
Dibenzofuran	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Diethyl phthalate	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Dimethyl phthalate	NS	NS	NS	NS	NS	<0.793	<0.921	<1.31	<0.832	<0.804
Di-n-butyl phthalate	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Di-n-octyl phthalate	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Fluoranthene	100 [a]	100[a]	100[a]	500[b]	1,000[c]	0.843	<0.368	1.25	0.239 J	<0.322
Fluorene	30	100[a]	100[a]	500[b]	1,000[c]	<0.317	<0.368	<0.526	0.341	0.444
Hexachlorobenzene	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Hexachlorobutadiene	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Hexachloroethane	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Hexchlorocyclopentadiene	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Indeno (1,2,3-cd) pyrene	0.5 [c]	0.5[f]	0.5[f]	5.6	11	0.333	<0.368	0.37 J	<0.333	<0.322
Isophorone	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Naphthalene	12	100[a]	100[a]	500[b]	1,000[c]	<0.317	<0.368	<0.526	<0.333	<0.322
Nitrobenzene	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
N-Nitro-di-n-propylamine	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
N-Nitrosodimethylamine	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
N-Nitrosodiphenylamine	NS	NS	NS	NS	NS	<0.317	<0.368	<0.526	<0.333	<0.322
Pentachlorophenol	0.8[b]	2.4	6.7	6.7	55	<0.793	<0.921	<1.31	<0.832	<0.804
Phenanthrene	100	100[a]	100[a]	500[b]	1,000[c]	<0.317	<0.368	0.781	<0.333	1.38
Phenol	0.33[b]	100[a]	100[a]	500[b]	1,000[c]	0.641	<0.368	<0.526	<0.333	<0.322
Pyrene	100	100[a]	100[a]	500[b]	1,000[c]	<0.317	<0.368	1.11	0.293 J	<0.322

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-3
SUMMARY OF SOIL ANALYTICAL RESULTS - METALS
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					B-1 (00)	B-2 (00)	B-3 (00)	B-4 (00)	B-5 (00)
Sample Depth						4.0'-6.0'	6.0'-8.0'	10.0'-12.0'	6.0'-8.0'	2.0'-4.0'
Sample Date						29-Jun-00	29-Jun-00	29-Jun-00	29-Jun-00	29-Jun-00
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	**Unrestricted Use**	**Residential**	**Restricted Residential**	**Commercial**	**Industrial**					
Metals										
Aluminum	NS	NS	NS	NS	NS	6480	6220	2190	4440	5240
Antimony	NS	NS	NS	NS	NS	<5.62	<110	<5.38	<6.20	<110
Arsenic	13	16	16	16	16	<13.5	<13.5	<12.9	<14.9	<12.6
Barium	350	350	400	400	10000	99.5	34.6	9.11	91.6	74.6
Beryllium	7.2	14	72	590	2700	0.407	0.3	<0.215	0.267	0.354
Cadmium	2.5	2.5	4.3	9.3	60	<0.5620	<0.5610	<0.5380	<0.6200	<10.5
Calcium	NS	NS	NS	NS	NS	55500	14500	27900	40500	105000
Chromium, trivalent	30	36	180	1500	6800	**1500**	6.46	3.33	6.78	13.5
Cobalt	NS	NS	NS	NS	NS	7.25	3.28	2.9	3.93	5.96
Copper	50	270	270	270	10,000	42.3	12	7.04	38.9	33.4
Cyanide	27	27	27	27	10000	<0.563	<0.572	<0.555	<0.617	<0.477
Iron	NS	NS	NS	NS	NS	15800	9420	5740	9520	54000
Lead	63	400	400	1000	3900	**75.5**	**762**	<4.73	**375**	**166**
Magnesium	NS	NS	NS	NS	NS	15500	4700	4300	6810	8710
Manganese	1600	2000	2000	10000	10000	286	150	163	219	264
Mercury	0.18	0.81	0.81	2.8	5.7	0.077	0.11	0.012	**2.2**	0.25
Nickel	NS	NS	NS	NS	NS	14.7	8.3	7.44	9.9	12.5
Potassium	NS	NS	NS	NS	NS	1390	753	391	794	1300
Selenium	3.9	36	180	1500	6800	<7.87	<7.85	<7.53	<8.68	<150
Silver	2	36	180	1500	6800	<1.12	<1.12	<1.08	<1.24	<20.9
Sodium	NS	NS	NS	NS	NS	887	600	227	690	551
Thallium	NS	NS	NS	NS	NS	<7.31	<7.29	<6.99	<8.06	<6.82
Vanadium	NS	NS	NS	NS	NS	15.7	14.1	4.74	10.9	18.3
Zinc	109	2200	10000	10000	10000	82.1	62.3	23.5	65.3	78.1

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-3
SUMMARY OF SOIL ANALYTICAL RESULTS - METALS
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					B-6 (00)	B-7 (00)	B-9 (00)	B-10 (00)	B-11 (00)
Sample Depth						4.0'-6.0'	6.0'-8.0'	6.0'-8.0'	4.0'-6.0'	4.0'-6.0'
Sample Date						29-Jun-00	29-Jun-00	29-Jun-00	29-Jun-00	29-Jun-00
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Use	Residential	Restricted Residential	Commercial	Industrial					
Metals										
Aluminum	NS	NS	NS	NS	NS	5970	5020	3780	938	5460
Antimony	NS	NS	NS	NS	NS	<6.17	<9.23	<120	<10.1	<4.97
Arsenic	13	16	16	16	16	<14.8	<22.2	<290	<24.2	<11.9
Barium	350	350	400	400	10000	67.7	**361**	130	56	99.6
Beryllium	7.2	14	72	590	2700	0.481	0.421	0.335	<0.403	0.354
Cadmium	2.5	2.5	4.3	9.3	60	<0.6170	<0.9230	<11.9	**8.46**	<0.4970
Calcium	NS	NS	NS	NS	NS	8230	30500	43100	30500	31800
Chromium, trivalent	30	36	180	1500	6800	7.55	12	10.7	3.62	9.19
Cobalt	NS	NS	NS	NS	NS	4.15	4.85	8.14	<2.02	4.13
Copper	50	270	270	270	10,000	27.4	**261**	**3380**	**333**	36.1
Cyanide	27	27	27	27	10000	<0.62	<0.838	1.4	<1.17	<0.591
Iron	NS	NS	NS	NS	NS	18300	10000	43500	1700	10200
Lead	63	400	400	1000	3900	39.6	**810**	**3020**	**135**	**122**
Magnesium	NS	NS	NS	NS	NS	1930	4090	5340	984	5450
Manganese	1600	2000	2000	10000	10000	219	138	317	58.9	171
Mercury	0.18	0.81	0.81	2.8	5.7	0.024	**2.1**	**0.18**	**0.19**	**0.25**
Nickel	NS	NS	NS	NS	NS	8.08	15.1	29.4	15.2	13.2
Potassium	NS	NS	NS	NS	NS	775	823	765	717	946
Selenium	3.9	36	180	1500	6800	<8.64	<12.9	<170	<14.1	<6.96
Silver	2	36	180	1500	6800	<1.23	<1.85	<23.8	<2.02	<0.994
Sodium	NS	NS	NS	NS	NS	566	1130	771	5560	332
Thallium	NS	NS	NS	NS	NS	<8.02	<12.0	<7.72		<6.46
Vanadium	NS	NS	NS	NS	NS	17.3	13.1	11.6		10.4
Zinc	109	2200	10000	10000	10000	53.2	**190**	**2460**		96.1

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5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
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* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-3
SUMMARY OF SOIL ANALYTICAL RESULTS - METALS
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					MW-01	MW-02	MW-02	MW-03	MW-04
Sample Depth						4.0'-8.0'	1.0'-10.0'	10.0'-12.0'	6.0'-8.0'	4.0'-8.0'
Sample Date						18-Oct-10	18-Oct-10	18-Oct-10	18-Oct-10	18-Oct-10
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Use	Residential	Restricted Residential	Commercial	Industrial					
Metals										
Aluminum	NS	NS	NS	NS	NS	4070	6090	13700	6020	10500
Antimony	NS	NS	NS	NS	NS	<5.54	<6.73	<7.13	<5.69	<7.42
Arsenic	13	16	16	16	16	5.78	5.75	10	10.3	2.45
Barium	350	350	400	400	10000	298	189	104	58.8	48.2
Beryllium	7.2	14	72	590	2700	<0.462	<0.562	0.656	<0.473	<0.619
Cadmium	2.5	2.5	4.3	9.3	60	0.859	<0.562	<0.594	0.48	<0.619
Calcium	NS	NS	NS	NS	NS	72400	55800	9270	132000	14900
Chromium, trivalent	30	36	180	1500	6800	**154**	11.6	16.9	6.59	12.3
Cobalt	NS	NS	NS	NS	NS	4.61	4.29	24.6	3.25	7.78
Copper	50	270	270	270	10,000	**58.9**	22.9	17.5	**104**	39.7
Cyanide	27	27	27	27	10000					
Iron	NS	NS	NS	NS	NS	22300	15200	31400	6440	15500
Lead	63	400	400	1000	3900	**438**	**372**	21.9	**100**	**72.4**
Magnesium	NS	NS	NS	NS	NS	7020	5680	4660	59400	7950
Manganese	1600	2000	2000	10000	10000	305	195	**2590**	215	315
Mercury	0.18	0.81	0.81	2.8	5.7	0.233	0.149	0.0693	0.133	0.229
Nickel	NS	NS	NS	NS	NS	21.6	10.5	29.2	8.26	12.3
Potassium	NS	NS	NS	NS	NS	712	950	1250	723	1820
Selenium	3.9	36	180	1500	6800	<0.462	<1.12	<1.19	<0.611	<0.619
Silver	2	36	180	1500	6800	<0.924	<1.12	<1.19	<0.948	<1.24
Sodium	NS	NS	NS	NS	NS	532	1450	375	568	678
Thallium	NS	NS	NS	NS	NS	<0.554	<1.12	<1.19	<0.948	<0.742
Vanadium	NS	NS	NS	NS	NS	14.2	20.7	23.6	15.1	24.2
Zinc	109	2200	10000	10000	10000	**214**	**209**	88.8	**168**	75.6

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TABLE 2.1.2-3
SUMMARY OF SOIL ANALYTICAL RESULTS - METALS
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					MW-04	MW-05	MW-06	B-02	B-03
Sample Depth						8.0'-10.0'	8.0'-10.0'	4.0'-8.0'	15.0-17.0	15.0-17.0
Sample Date						18-Oct-10	18-Oct-10	18-Oct-10	10-Oct-12	9-Oct-12
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	**Unrestricted Use**	**Residential**	**Restricted Residential**	**Commercial**	**Industrial**					
Metals										
Aluminum	NS	NS	NS	NS	NS	21300	9950	5580	6390	3130
Antimony	NS	NS	NS	NS	NS	<7.15	<8.08	<7.61	<6.60	<6.71
Arsenic	13	16	16	16	16	4.72	5.65	11.3	4.93	3.07
Barium	350	350	400	400	10000	128	71.4	130	35.4	<11.2
Beryllium	7.2	14	72	590	2700	0.934	<0.673	<0.633	0.296 J	<0.559
Cadmium	2.5	2.5	4.3	9.3	60	<0.596	<0.673	<0.633	<0.55	<0.559
Calcium	NS	NS	NS	NS	NS	2420	8170	22900	24300	19700
Chromium, trivalent	30	36	180	1500	6800	24.9	11.8	9.86	11.1	5.09
Cobalt	NS	NS	NS	NS	NS	12.4	7.61	14.9	6.07	3.64 J
Copper	50	270	270	270	10,000	22.8	17.5	3130	16.9	11.8
Cyanide	27	27	27	27	10000					
Iron	NS	NS	NS	NS	NS	25900	16000	60100	16700	11600
Lead	63	400	400	1000	3900	17.2	15	**2070**	7.19	4.63
Magnesium	NS	NS	NS	NS	NS	4940	5150	6370	10600	7420
Manganese	1600	2000	2000	10000	10000	352	288	188	294	643
Mercury	0.18	0.81	0.81	2.8	5.7	0.0964	0.103	**0.945**	<0.0095	<0.0094
Nickel	NS	NS	NS	NS	NS	32	17.6	25.2	13.7	8.03
Potassium	NS	NS	NS	NS	NS	1970	961	827	1270	665
Selenium	3.9	36	180	1500	6800	<0.596	<1.35	<0.633	<1.10	1.06
Silver	2	36	180	1500	6800	<1.19	<1.35	1.36	<1.10	<1.12
Sodium	NS	NS	NS	NS	NS	743	311	2040	596	830
Thallium	NS	NS	NS	NS	NS	<0.715	<1.35	<0.761	<2.75	<2.79
Vanadium	NS	NS	NS	NS	NS	36.2	18.8	17.6	20.6	10.3
Zinc	109	2200	10000	10000	10000	92	64	**504**	47.2	35

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* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-3
SUMMARY OF SOIL ANALYTICAL RESULTS - METALS
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					B-13	B-13	B-13	MW-9	Block 1
Sample Depth						12.0-14.0	25.0-27.0	35.0-37.0	12.0-14.0	3 ft N
Sample Date						10-Oct-12	10-Oct-12	10-Oct-12	10-Oct-12	11-Oct-12
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	**Unrestricted Use**	**Residential**	**Restricted Residential**	**Commercial**	**Industrial**					
Metals										
Aluminum	NS	NS	NS	NS	NS	11900	2010	2440	16500	
Antimony	NS	NS	NS	NS	NS	<6.66	<7.12	<6.70	<7.58	
Arsenic	13	16	16	16	16	7.43	<1.19	1.65	5.95	4.14
Barium	350	350	400	400	10000	90.3	<11.9	14.1	126	52.5
Beryllium	7.2	14	72	590	2700	0.631	<0.594	<0.558	0.737	<0.775
Cadmium	2.5	2.5	4.3	9.3	60	0.548 J	<0.594	<0.558	0.367 J	0.782
Calcium	NS	NS	NS	NS	NS	29500	43000	47400	1690	
Chromium, trivalent	30	36	180	1500	6800	17.3	3.74	4.89	25.3	2.36
Cobalt	NS	NS	NS	NS	NS	9.4	<5.94	<5.58	12.5	
Copper	50	270	270	270	10,000	24	5.98	4.61	25.4	**380**
Cyanide	27	27	27	27	10000					<0.70
Iron	NS	NS	NS	NS	NS	20200	7440	6900	26300	
Lead	63	400	400	1000	3900	59.9	6.14	4.63	13.2	**292**
Magnesium	NS	NS	NS	NS	NS	9640	18300	20600	5030	
Manganese	1600	2000	2000	10000	10000	317	180	173	299	150
Mercury	0.18	0.81	0.81	2.8	5.7	0.041	<0.0090	<0.0099	0.0311	**5.46**
Nickel	NS	NS	NS	NS	NS	22.1	2.99 J	3.09 J	39.6	47.2
Potassium	NS	NS	NS	NS	NS	1330	515	590	2110	
Selenium	3.9	36	180	1500	6800	1.94	0.685	<1.12	3.56	1.13 J
Silver	2	36	180	1500	6800	<1.11	0.616 J	0.669 J	<1.26	0.93 J
Sodium	NS	NS	NS	NS	NS	690	246 J	386	249 J	
Thallium	NS	NS	NS	NS	NS	<2.77	<2.96	<2.79	<3.16	
Vanadium	NS	NS	NS	NS	NS	22.7	11.3	12.3	26.6	
Zinc	109	2200	10000	10000	10000	83.2	64.7	45	89.8	**1010**

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4) Sample Depth = feet below ground surface
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6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-3
SUMMARY OF SOIL ANALYTICAL RESULTS - METALS
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					Block 2	Block 2	Block 3	Block 3	Block 3
Sample Depth						8.0 E	11.0 C	4.0-6.0 C	4.0-6.0 S	12.5 C
Sample Date						16-Oct-12	16-Oct-12	19-Oct-12	19-Oct-12	24-Oct-12
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	Unrestricted Use	Residential	Restricted Residential	Commercial	Industrial					
Metals										
Aluminum	NS	NS	NS	NS	NS	10900	18600	4130	6190	17000
Antimony	NS	NS	NS	NS	NS	<7.33	<7.97	14.1	27.6	<6.70
Arsenic	13	16	16	16	16	5.35	5.33	**31.0**	**13.3**	6.77
Barium	350	350	400	400	10000	60.8	107	**401**	78.9	104
Beryllium	7.2	14	72	590	2700	0.434 J	0.77	0.389 J	0.274 J	0.86
Cadmium	2.5	2.5	4.3	9.3	60	<0.611	0.398 J	1.9	1.09	<0.559
Calcium	NS	NS	NS	NS	NS	14200	2710	6290	9980	2150
Chromium, trivalent	30	36	180	1500	6800	14.3	23.8	**30.2**	14.3	22.8
Cobalt	NS	NS	NS	NS	NS	6.71	7.21	10.7	5.14	14.4
Copper	50	270	270	270	10,000	18.2	14.4	**222**	**1130**	22.4
Cyanide	27	27	27	27	10000					
Iron	NS	NS	NS	NS	NS	14300	20300	77500	57400	26400
Lead	63	400	400	1000	3900	14.7	16.6	**670**	**266**	17.9
Magnesium	NS	NS	NS	NS	NS	3910	4430	1520	1990	4760
Manganese	1600	2000	2000	10000	10000	131	138	320	482	641
Mercury	0.18	0.81	0.81	2.8	5.7	0.0455	0.0511	**0.295**	**0.229**	0.0424
Nickel	NS	NS	NS	NS	NS	21.1	26.5	29.4	10	32.8
Potassium	NS	NS	NS	NS	NS	1350	1820	474	705	1700
Selenium	3.9	36	180	1500	6800	0.983 J	1.07 J	9.72	1.56	1.07 J
Silver	2	36	180	1500	6800	<1.22	<1.33	<1.29	0.981	<1.12
Sodium	NS	NS	NS	NS	NS	1340	441	1720	1270	358
Thallium	NS	NS	NS	NS	NS	<3.05	<3.33	<3.23	<2.44	<2.79
Vanadium	NS	NS	NS	NS	NS	20.7	29.8	19.2	24.5	29.1
Zinc	109	2200	10000	10000	10000	76.7	82.9	**1040**	**794**	85.4

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6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-3
SUMMARY OF SOIL ANALYTICAL RESULTS - METALS
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					Block 4	Block 4	Block 5	Block 5	TP-01
Sample Depth						4.0 SW	9.5 SW	2.0 SW	2.0-3.0 C	12.0
Sample Date						31-Oct-12	31-Oct-12	1-Nov-12	1-Nov-12	31-Oct-12
Matrix						Soil	Soil	Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Contaminate	**Unrestricted Use**	**Residential**	**Restricted Residential**	**Commercial**	**Industrial**					
Metals										
Aluminum	NS	NS	NS	NS	NS	5050	12900	2730	1310	16200
Antimony	NS	NS	NS	NS	NS	83.9	<8.64	25.8	53.4	<6.93
Arsenic	13	16	16	16	16	6.45	7.32	**30.8**	**37.5**	7.67
Barium	350	350	400	400	10000	116	117	180	27.4	110
Beryllium	7.2	14	72	590	2700	0.275 J	0.587 J	0.419 J	<0.512	0.772
Cadmium	2.5	2.5	4.3	9.3	60	0.572	0.681 J	1.22	**13.0**	0.621
Calcium	NS	NS	NS	NS	NS	34200	6680	13700	2480	2510
Chromium, trivalent	30	36	180	1500	6800	7.49	22.6	9.85	**103**	22.6
Cobalt	NS	NS	NS	NS	NS	3.19 J	9.47	13.5	21.3	11.2
Copper	50	270	270	270	10,000	**70.8**	22.3	**12100**	**493**	18.8
Cyanide	27	27	27	27	10000					
Iron	NS	NS	NS	NS	NS	10500	23500	42800	580000	28500
Lead	63	400	400	1000	3900	**1360**	26.1	**1500**	**328**	21
Magnesium	NS	NS	NS	NS	NS	9540	4630	1860	<256	4650
Manganese	1600	2000	2000	10000	10000	236	242	675	**3100**	447
Mercury	0.18	0.81	0.81	2.8	5.7	**1.38**	0.0433	**5.31**	0.0429	0.0341
Nickel	NS	NS	NS	NS	NS	8.64	27.3	19.9	83.3	27.7
Potassium	NS	NS	NS	NS	NS	1010	2180	463	<256	1650
Selenium	3.9	36	180	1500	6800	<1.08	0.919 J	5.11	13.8	0.990 J
Silver	2	36	180	1500	6800	0.647 J	<1.44	19.7	<1.02	<1.15
Sodium	NS	NS	NS	NS	NS	792	663	781	1100	432
Thallium	NS	NS	NS	NS	NS	<2.71	<3.60	<3.02	<2.56	<2.89
Vanadium	NS	NS	NS	NS	NS	14.7	21.5	15.7	5.16	27.3
Zinc	109	2200	10000	10000	10000	**488**	86.4	**2670**	**184**	98.1

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

TABLE 2.1.2-3
SUMMARY OF SOIL ANALYTICAL RESULTS - METALS
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Sample Location	NYSDEC Soil Cleanup Objectives					TP-04	TP-05	TP-05
Sample Depth						10.0	6.0	7.0
Sample Date						31-Oct-12	1-Nov-12	1-Nov-12
Matrix						Soil	Soil	Soil
Units						mg/kg	mg/kg	mg/kg
Contaminate	**Unrestricted Use**	**Residential**	**Restricted Residential**	**Commercial**	**Industrial**			
Metals								
Aluminum	NS	NS	NS	NS	NS	4490	5330	2920
Antimony	NS	NS	NS	NS	NS	8.69 J	2.96 J	<6.12
Arsenic	13	16	16	16	16	**23.4**	10.7	2.99
Barium	350	350	400	400	10000	186	76.1	14.3
Beryllium	7.2	14	72	590	2700	<0.899	<0.484	<0.510
Cadmium	2.5	2.5	4.3	9.3	60	1.66	0.734	<0.510
Calcium	NS	NS	NS	NS	NS	14000	30800	32000
Chromium, trivalent	30	36	180	1500	6800	11.7	10	3.34
Cobalt	NS	NS	NS	NS	NS	6.87 J	6.6	<5.10
Copper	50	270	270	270	10,000	**287**	46.8	8.22
Cyanide	27	27	27	27	10000			
Iron	NS	NS	NS	NS	NS	46800	35700	8020
Lead	63	400	400	1000	3900	**1370**	**796**	5.33
Magnesium	NS	NS	NS	NS	NS	3780	8960	3830
Manganese	1600	2000	2000	10000	10000	241	187	442
Mercury	0.18	0.81	0.81	2.8	5.7	**2.15**	**0.224**	0.0095
Nickel	NS	NS	NS	NS	NS	18.2	13.4	5.32
Potassium	NS	NS	NS	NS	NS	630	674	439
Selenium	3.9	36	180	1500	6800	2.36	2.07	<1.02
Silver	2	36	180	1500	6800	1.14 J	0.728 J	<1.02
Sodium	NS	NS	NS	NS	NS	1990	2020	344
Thallium	NS	NS	NS	NS	NS	<4.49	<2.42	<2.54
Vanadium	NS	NS	NS	NS	NS	17.3	18.7	5.99
Zinc	109	2200	10000	10000	10000	**989**	**424**	27.4

Notes
1) Bold text indicate that the concentration exceeds NYSDEC Soil Cleanup Objectives.
2) Colors correspond to the criteria the concentration exceeded. Brown = unrestricted residential, Blue = residential, Purple = restricted residential, Green = commercial and Red = industrial.
3) < = not detected - below Method Detection Limit.
4) Sample Depth = feet below ground surface
N = north, S = south, E = east, W = west and C = center.
5) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero. B = The method blank contained trace levels of analyte.
6) N/S = No Standard
* Sample collected from ceramic pipe approximately 10 ft below grade

APPENDIX B
SELECTIONS FROM PHASE IB CULTURAL RESOURCES INVESTIGATION REPORT

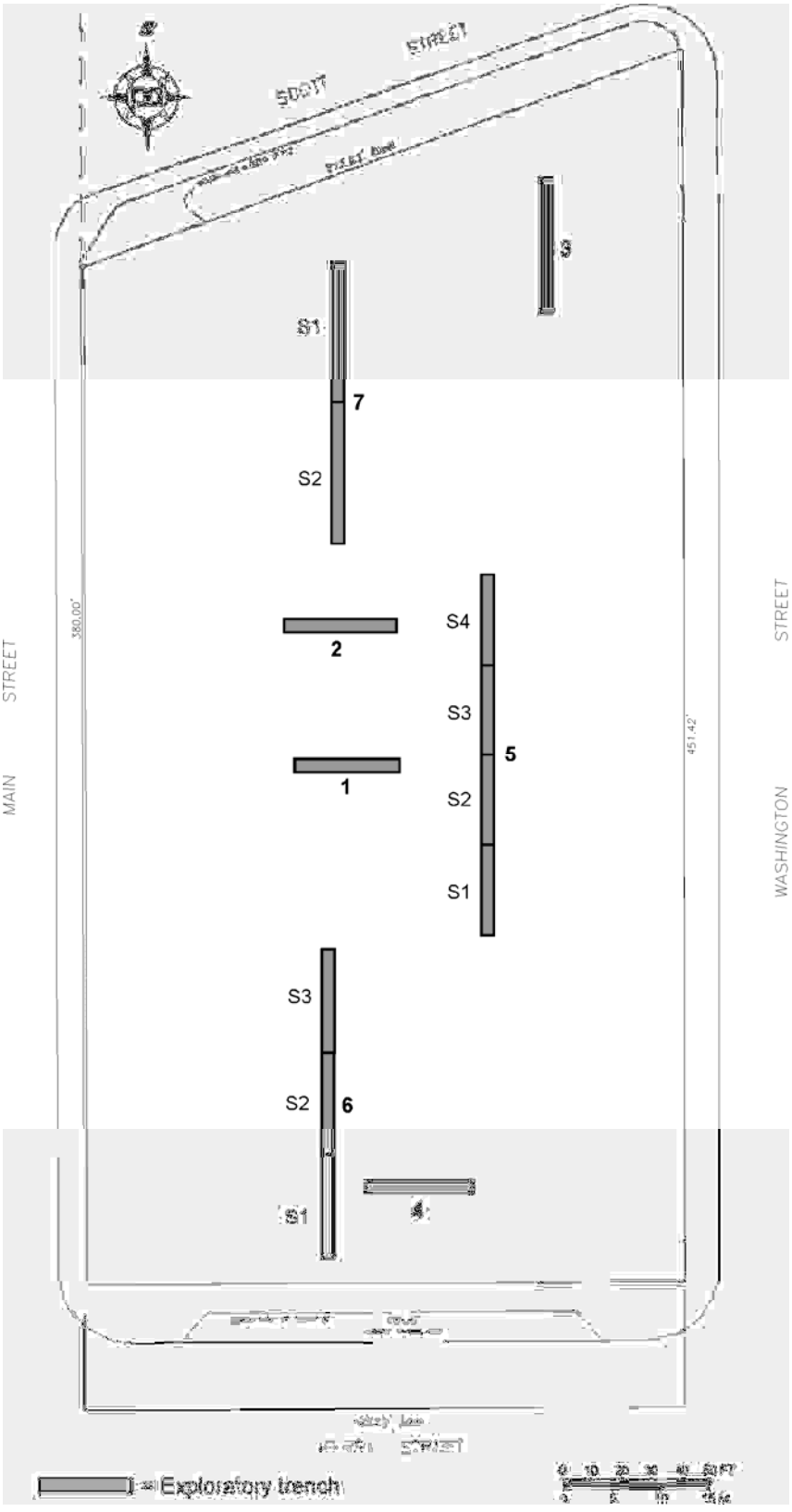


Figure 3.1. Map of trench placements on current configuration of the block.

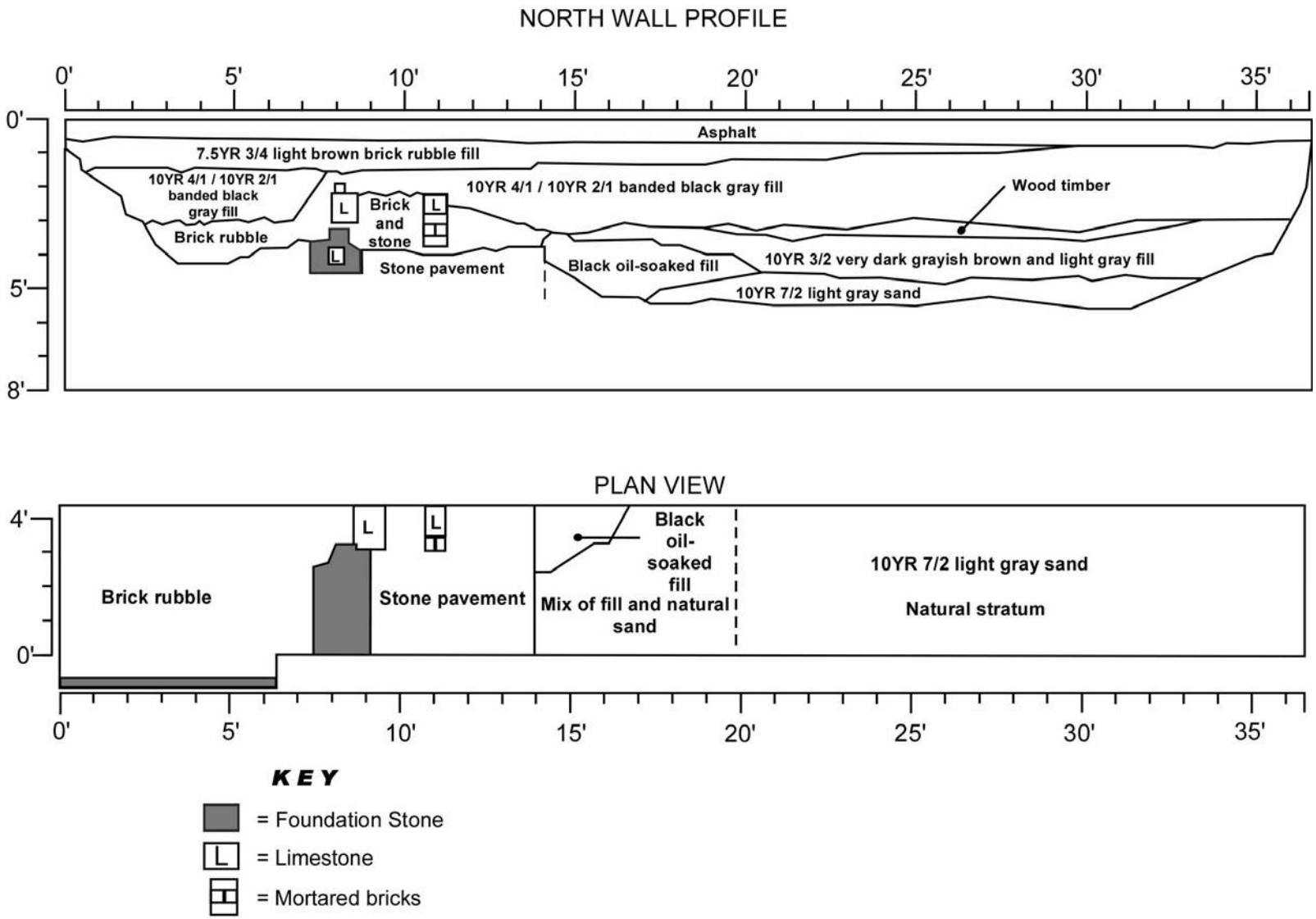


Figure 4.1. Trench 1 north wall profile and plan view.

Photograph 4.1. Trench 1: north wall profile (note limestone foundations and brick rubble), facing northwest *(PCI 2002).*

Photograph 4.2. Trench 1: plan view of limestone foundation with a north/south orientation, limestone and brick feature (possible incinerator), and stone "pavement," facing down and south *(PCI 2002).*

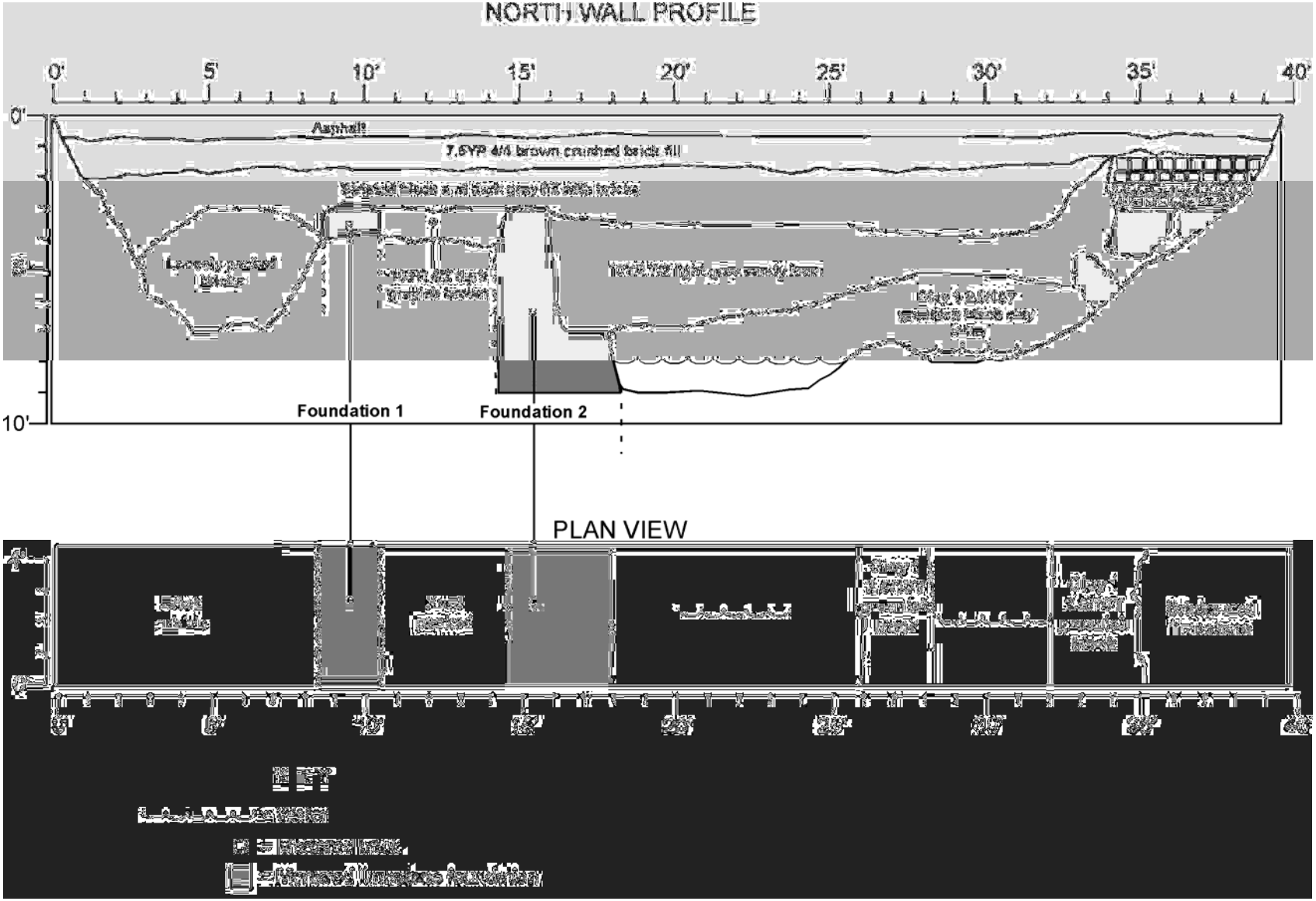


Figure 4.2. Trench 2 north wall profile and plan view.

Photograph 4.4. Trench 2: north wall profile, facing north. Note water seepage at bottom of trench *(PCI 2002).*

Photograph 4.5. Trench 2: westernmost limestone foundation wall, facing north *(PCI 2002).*

Photograph 4.6. Trench 2: limestone foundation wall near the center of the trench, facing north *(PCI 2002).*

Photograph 4.7. Trench 2: limestone foundation wall and overlying mortared brick near the eastern end of the trench, facing north *(PCI 2002).*

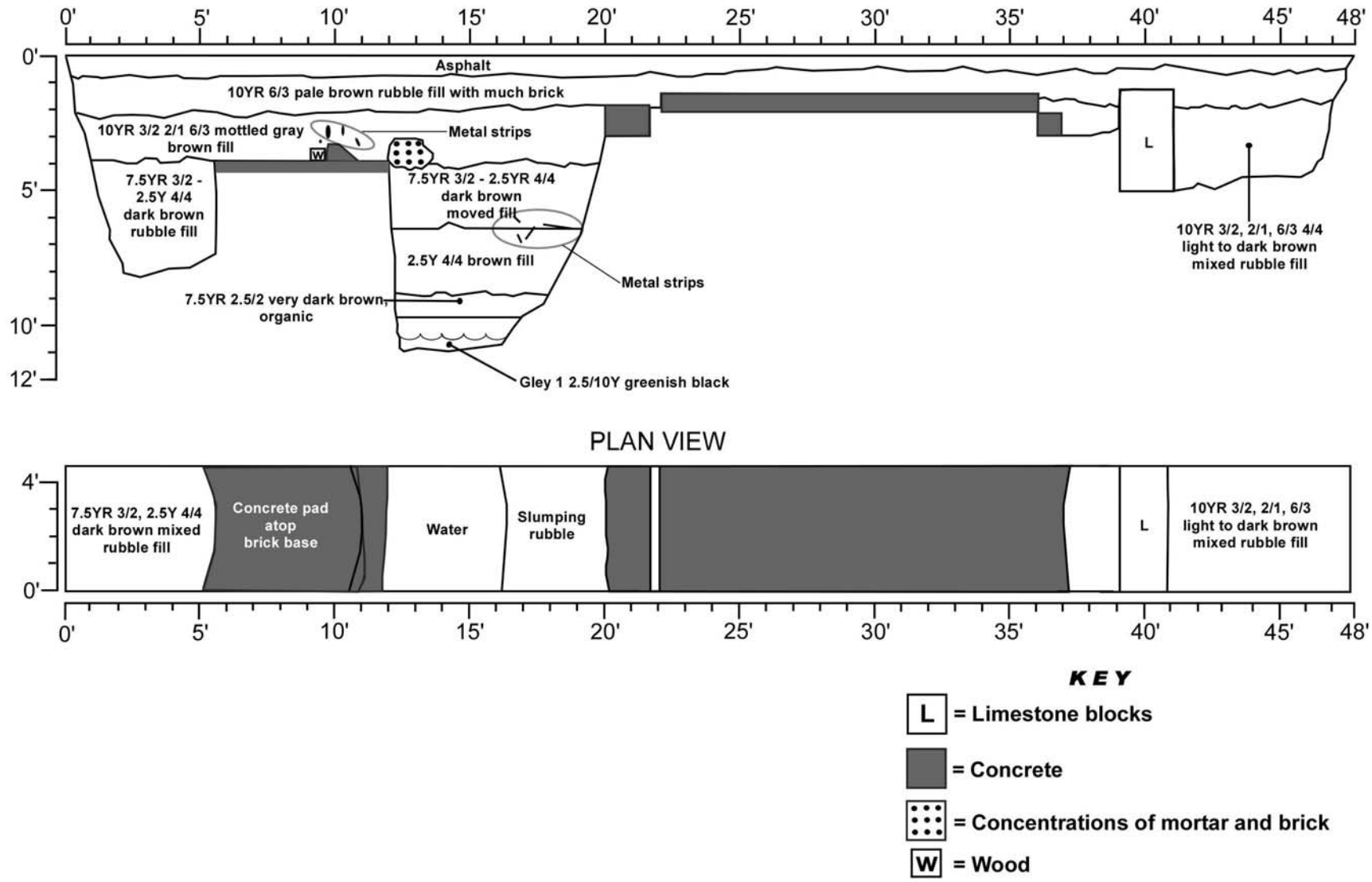


Figure 4.3. Trench 3 east wall profile and plan view.

Photograph 4.8. Trench 3: east wall profile, facing east. Note water seepage at bottom of trench *(PCI 2002).*

Photograph 4.9. Trench 3: northern end of trench with arced concrete and brick feature, facing south *(PCI 2002).*

Photograph 4.10. Trench 3: concrete feature across central to eastern part of trench, facing south *(PCI 2002).*

Photograph 4.11. Trench 3: limestone foundation oriented east/west at south end of trench, facing south *(PCI 2002).*

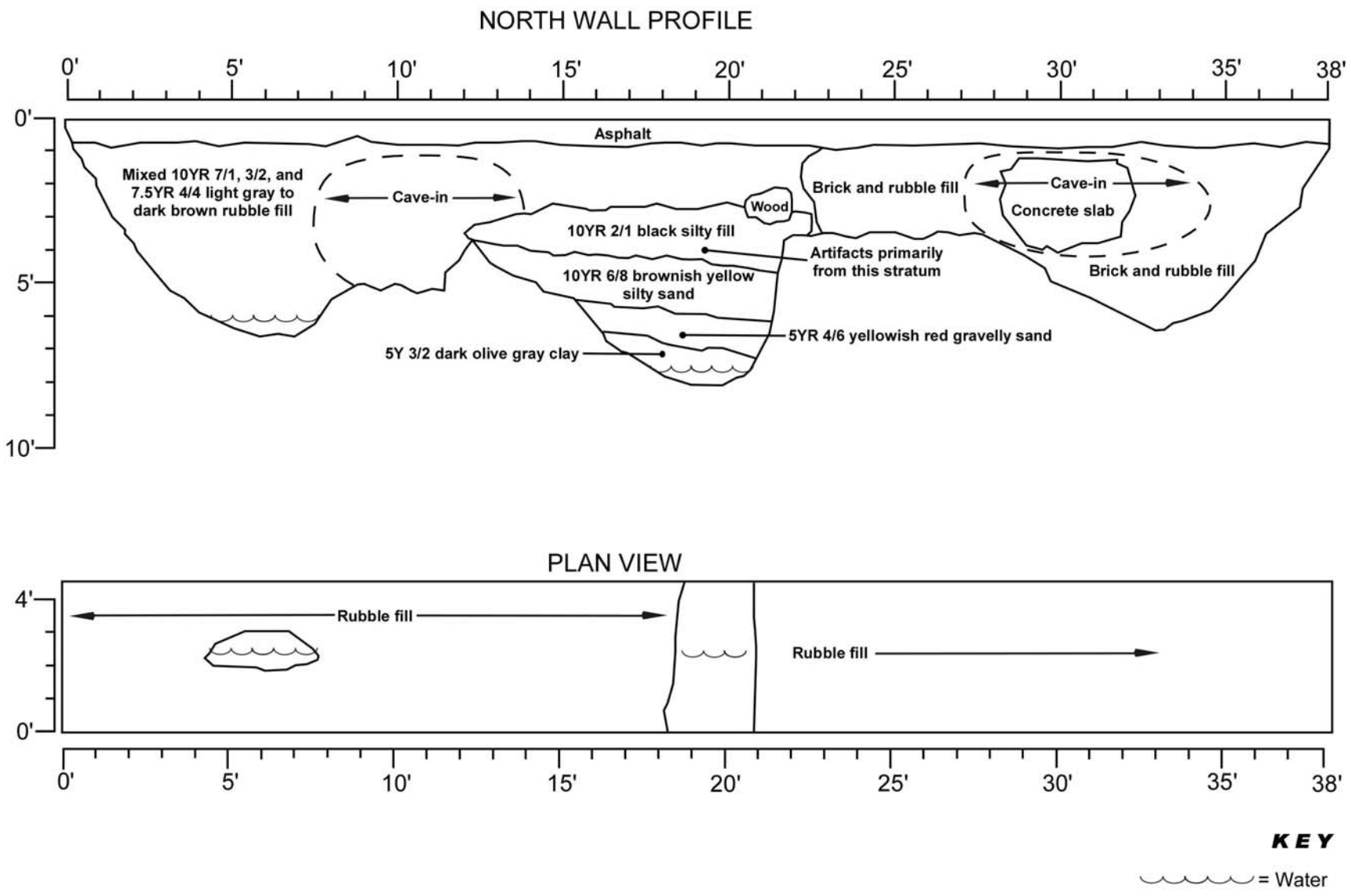


Figure 4.4. Profile of Trench 4.

Photograph 4.12. Trench 4: north wall profile, western half of trench, facing northeast *(PCI 2002).*

Photograph 4.13. Trench 4: north wall profile in eastern half of trench, facing northwest *(PCI 2002).*

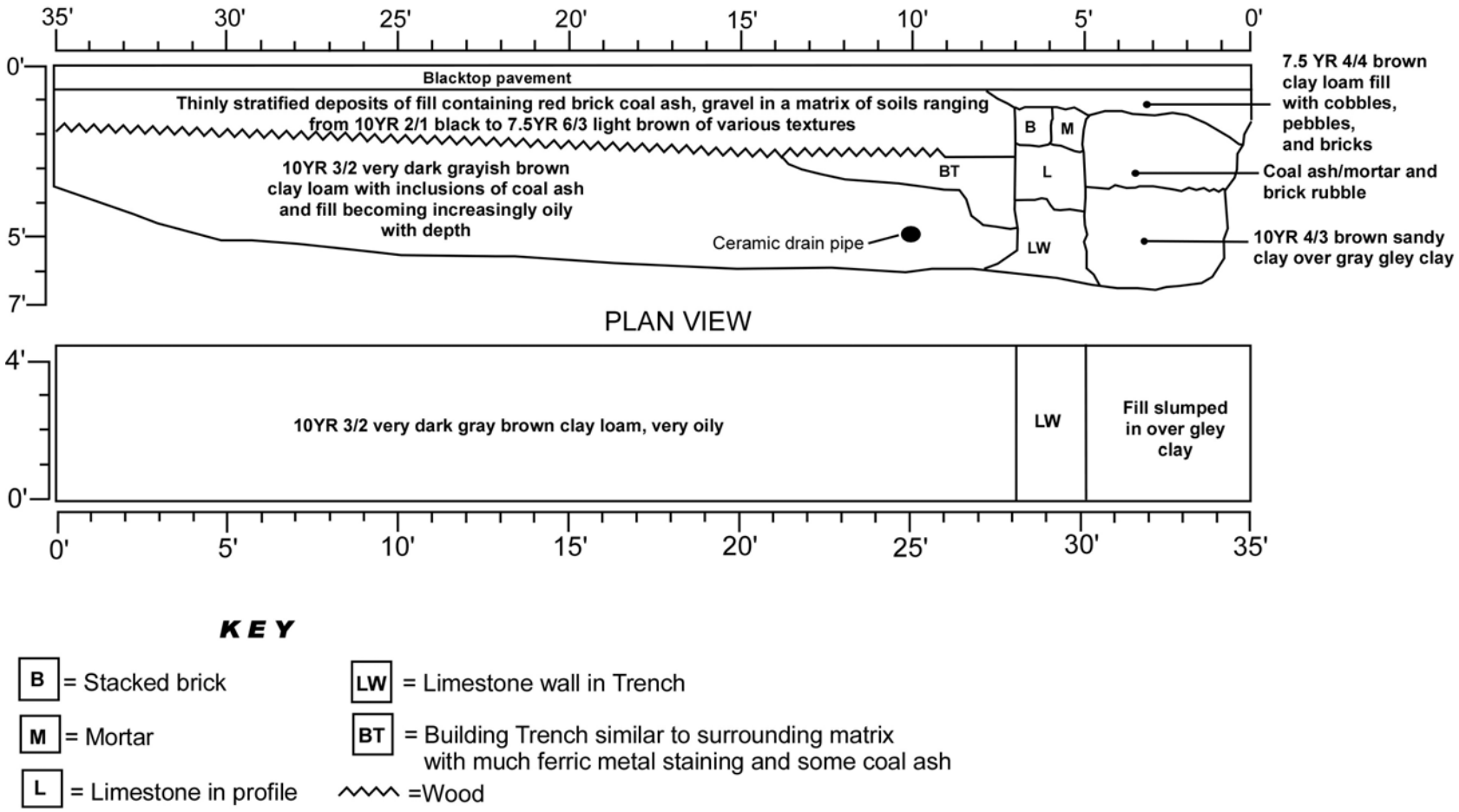


Figure 4.5. Profile of Trench 5, Section 1.

Photograph 4.14. Trench 5, Section 1: east wall profile with limestone foundation, facing northeast *(PCI 2002).*

Photograph 4.15. Trench 5, Section 1: plank floor in northern portion of trench, facing north-northeast *(PCI 2002).*

Photograph 4.16. Trench 5, Section 1: east/west oriented limestone foundation at south end of trench, facing north *(PCI 2002).*

Photograph 4.17. Trench 5, Section 1: east/west oriented limestone foundation at south end of trench showing mortared brick structural remains in profile, facing east *(PCI 2002).*

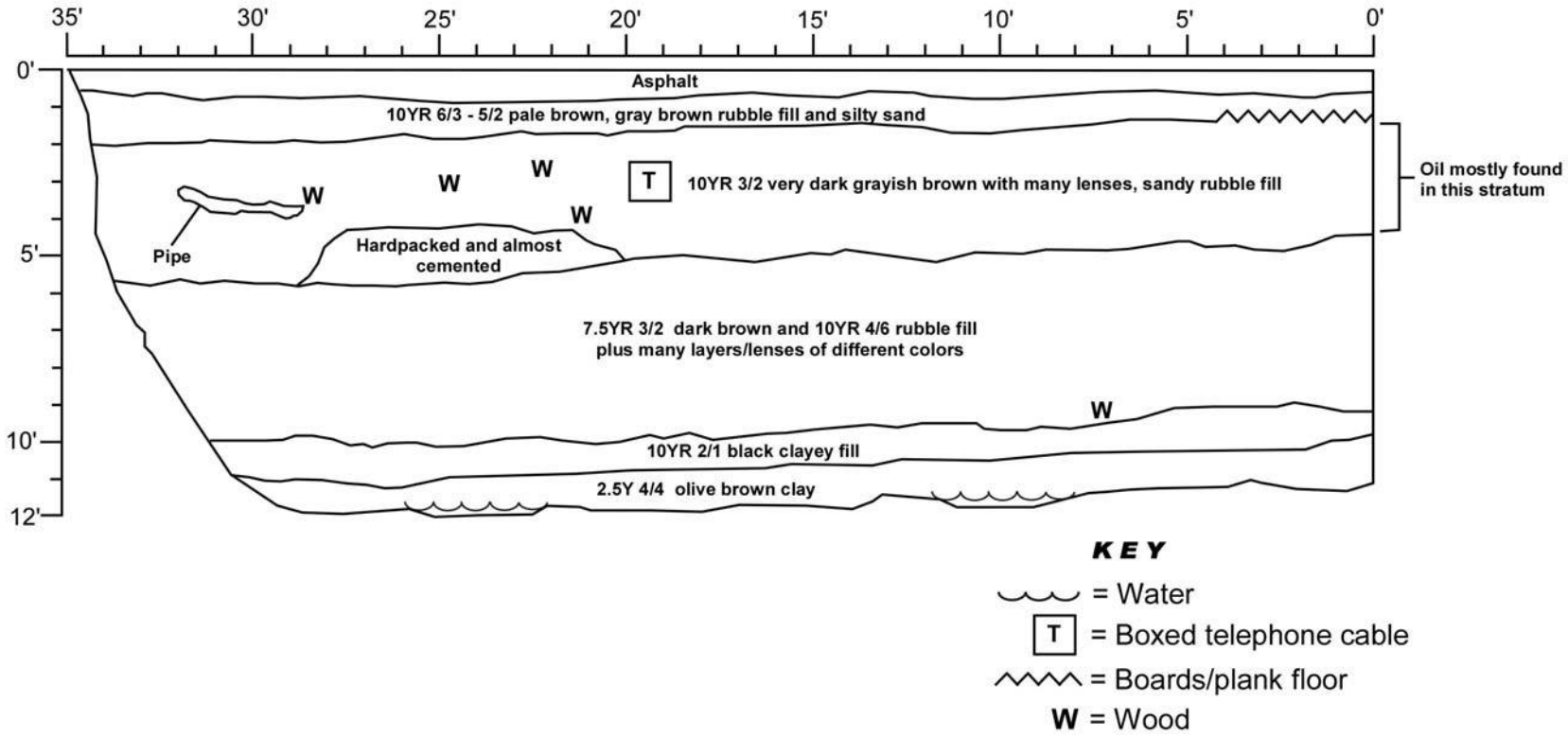


Figure 4.6. Profile of Trench 5, Section 2.

Photograph 4.18. Trench 5, Section 2: east wall profile with defunct telephone cables protruding from trench wall, facing north-northeast *(PCI 2002).*

Photograph 4.19. Trench 5, Section 2: oil seepage at south end of trench, facing down and west *(PCI 2002).*

Trench 5, Section 3. This section of Trench 5 was 30 ft (9.2 m) long and excavated to a maximum depth of 10.5 ft (3.2 m). A brick wall feature and a wood plank floor were found in this section of Trench 5.

Five distinct layers of fill were encountered beneath the asphalt including pinkish white clayey sand, very dark grayish brown to black sand and rubble, dark grayish brown clay fill, very pale brown sand and clay, and dark gray culturally sterile clay (Figures 4.7 and 4.8; Photograph 4.20; see the Trench 5, Section 3 Artifact Description, below). Oil was identified between 3 and 6 ft (0.9 and 1.8 m). The dark gray culturally sterile clay was the deepest stratum exposed in which water seepage occurred (see Photograph 4.20). *In situ* remnants of a 2-ft (61 cm)-wide mortared brick wall were uncovered 6 ft (1.8 m) north of the south end of the trench. It was oriented east/west and was resting on a limestone block (Photograph 4.21).

A 5-ft (1.5 m) area of *in situ* plank flooring was exposed on the south side of the mortared brick wall at a depth of 4 ft (1.2 m) (see Photograph 4.21). The planks were fastened together with machine-cut nails. The soil below the planks was hard-packed olive brown silty fill above dark grayish brown clayey fill. Two wood beams were found 7 ft (2.1 m) below the asphalt pavement but did not appear to be, or associated with, *in situ* features.

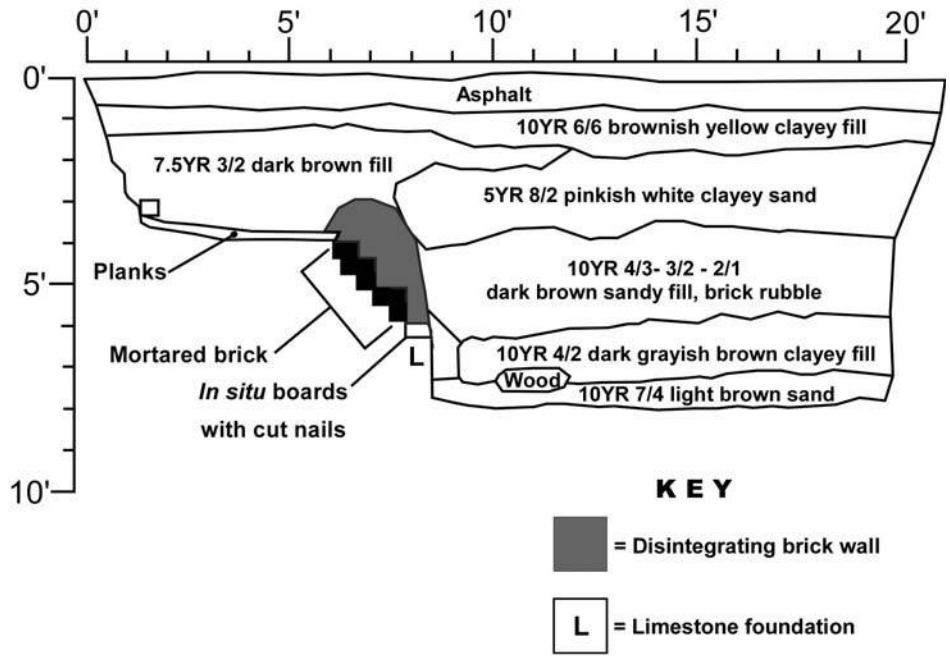


Figure 4.7. Trench 5, Section 3, portion of west wall profile, prior to removal of brick foundation and planks.

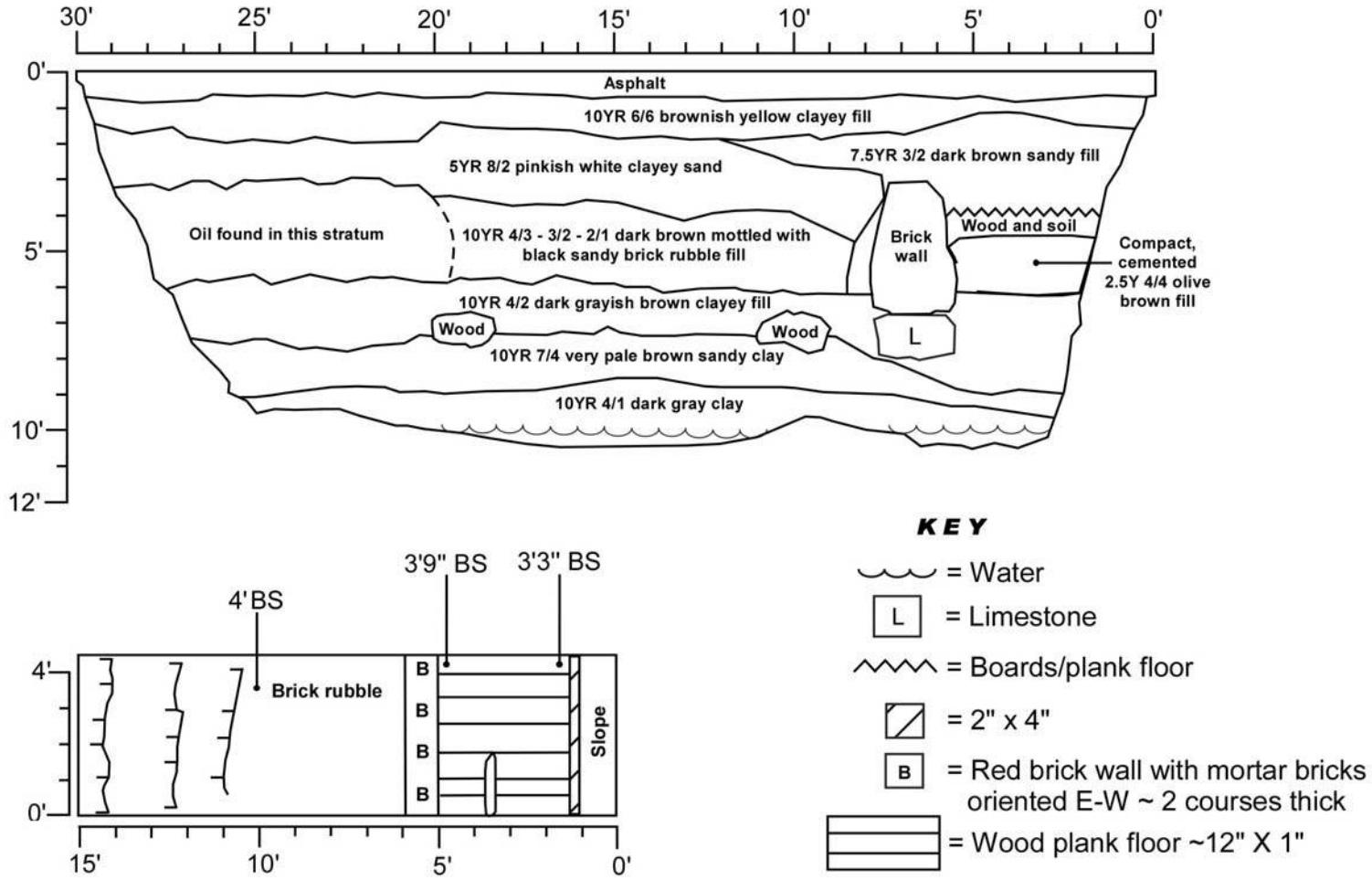


Figure 4.8. Trench 5, Section 3, east wall profile and partial plan showing northern brick wall foundation and wood floor feature.

Photograph 4.20. Trench 5, Section 3: east wall profile, facing northeast *(PCI 2002).*

Photograph 4.21. Trench 5, Section 3: brick wall and wood plank feature, facing south and down *(PCI 2002).*

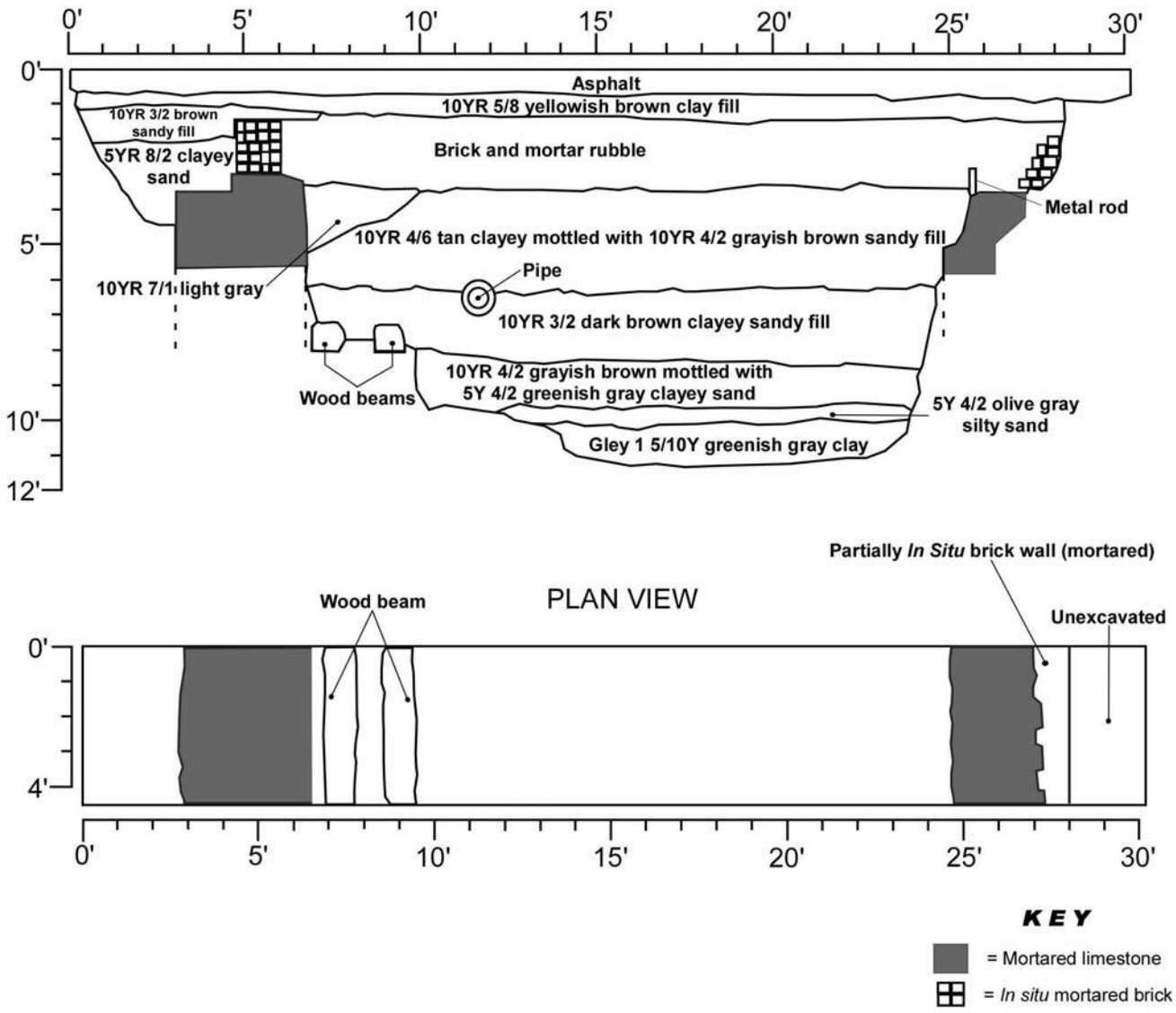


Figure 4.9. Trench 5, Section 4, west wall profile and trench floor plan view.

Photograph 4.22. Trench 5, Section 4: west wall profile, facing southwest. Note limestone foundation, wood timbers and brick rubble (*PCI 2002).*

Photograph 4.23. Trench 5, Section 4: southern end of brick wall exposed in west wall of trench, facing west *(PCI 2002).*

Photograph 4.24. Trench 5, Section 4: northern end of brick wall exposed in west wall of trench, facing west *(PCI 2002).*

Photograph 4.25. Trench 5, Section 4: limestone foundation with wood timbers at base, facing south-southeast *(PCI 2002).*

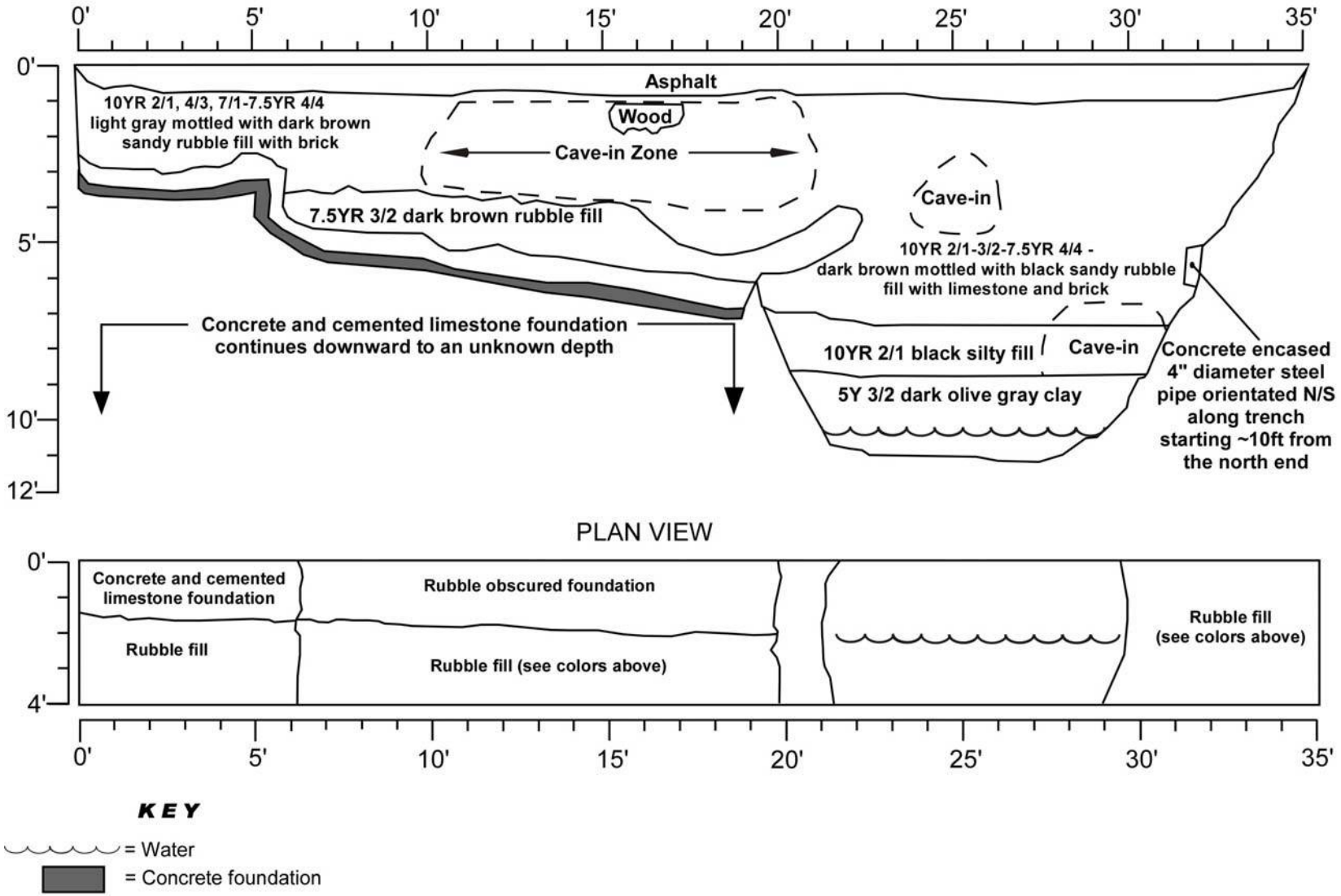


Figure 4.10. Trench 6, Section 1, west wall profile and trench floor plan view.

Photograph 4.26. Trench 6, Section 1: profile of west wall, facing northwest. Note unstable cave-in/slumping *(PCI 2002).*

Photograph 4.27. Trench 6, Section 1: concrete and cemented limestone feature, facing down and west *(PCI 2002).*

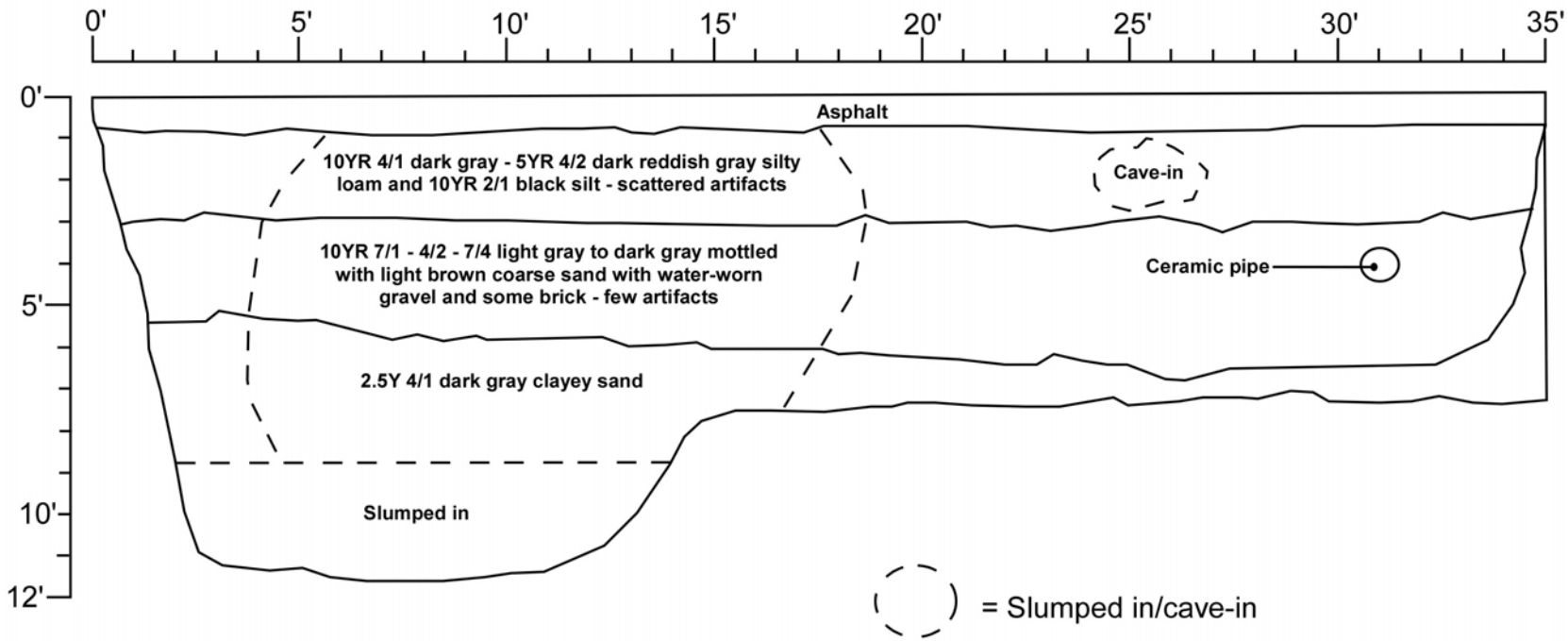


Figure 4.11. Trench 6, Section 2, west wall profile.

Photograph 4.29. Trench 6, Section 2: Trench 6, Section 2: west wall profile showing stratigraphy and cave-in/slumping of loose packed fill, facing northwest *(PCI 2002).*

Photograph 4.30. Trench 6, Section 2: close up view of cave-in/slumping of loose packed fill of west trench wall, facing west *(PCI 2002).*

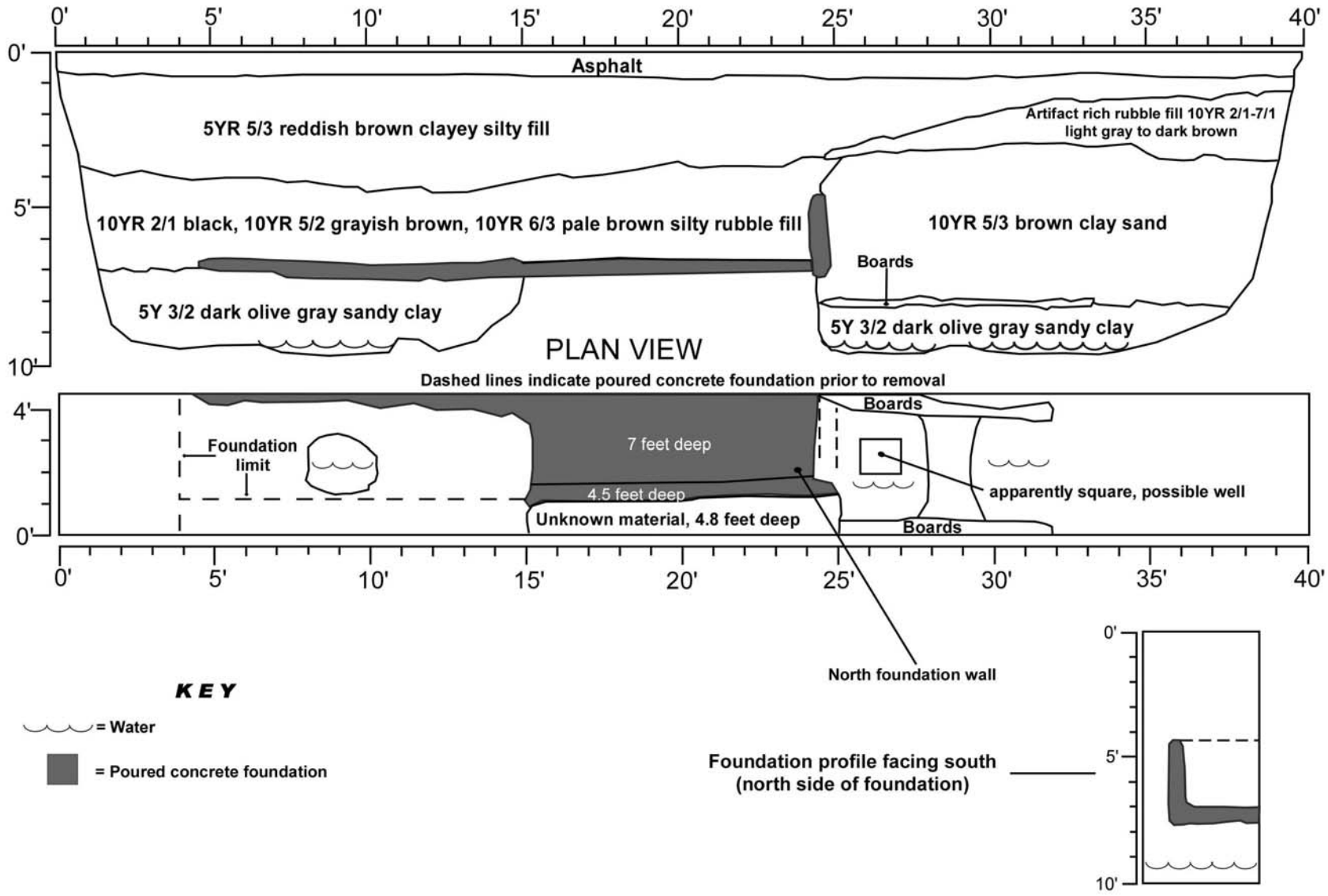


Figure 4.12. Trench 6, Section 3, west wall profile and trench floor plan view.

Photograph 4.31. Trench 6, Section 3: west wall profile, facing northwest *(PCI 2002).*

Photograph 4.32. Trench 6, Section 3: poured concrete foundation, facing southeast *(PCI 2002).*

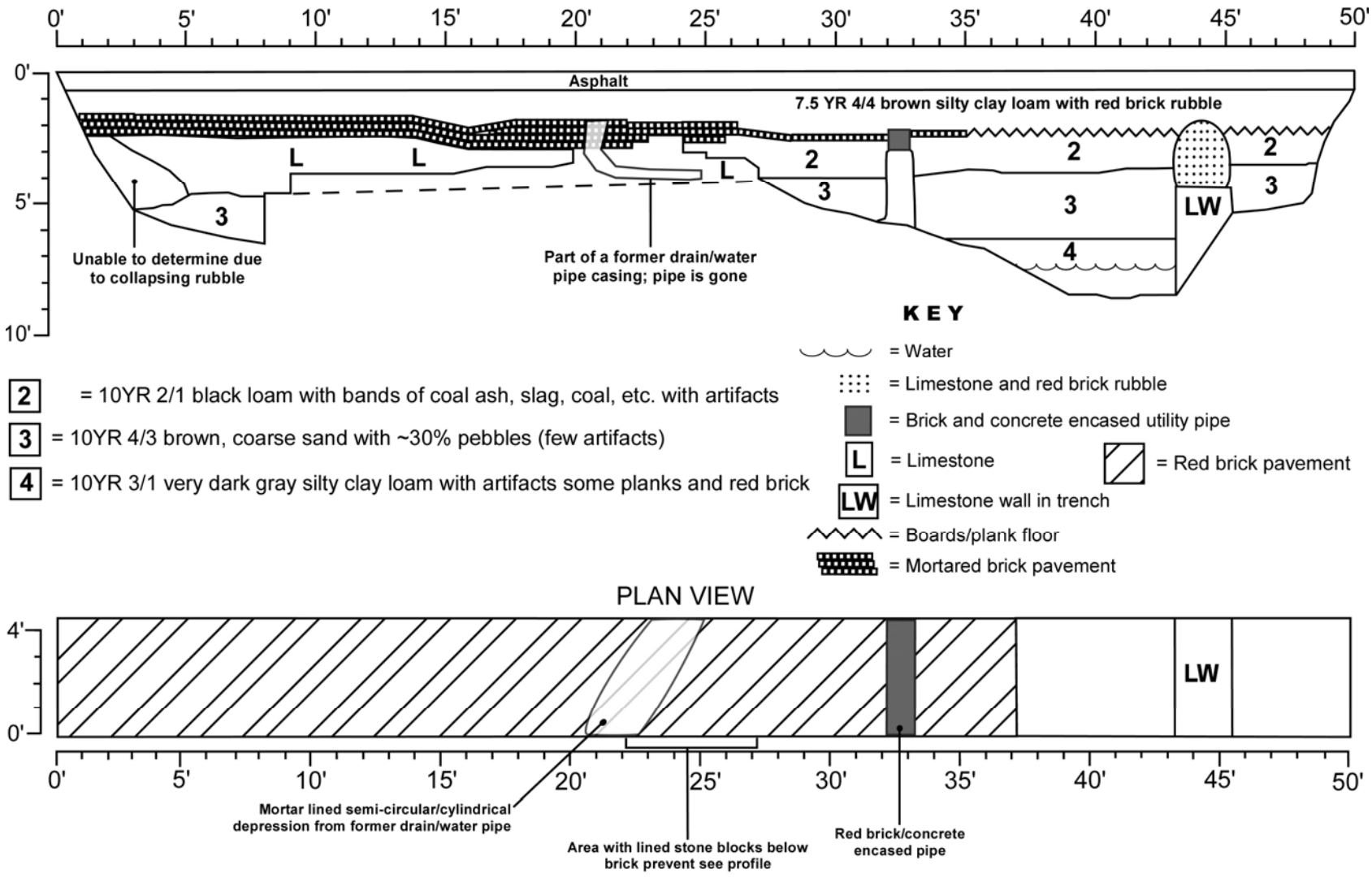


Figure 4.13. Trench 7, Section 1, east wall profile and plan view of the brick pavement.

Photograph 4.34. Trench 7, Section 1: brick pavement with stone-slag-asphalt aggregate surface layer partially intact. Located across northern part of trench, facing south *(PCI 2002).*

Photograph 4.35. Trench 7, Section 1: alternate view of brick pavement in northern part of trench, facing northeast *(PCI 2002).*

Photograph 4.36. Trench 7, Section 1: plan view if eastern portion of brick pavement after removal of aggregate surface layer, facing down and east *(PCI 2002).*

Photograph 4.37. Trench 7, Section 1; plan view of center portion of brick pavement after aggregate layer removal, facing down and east *(PCI 2002).*

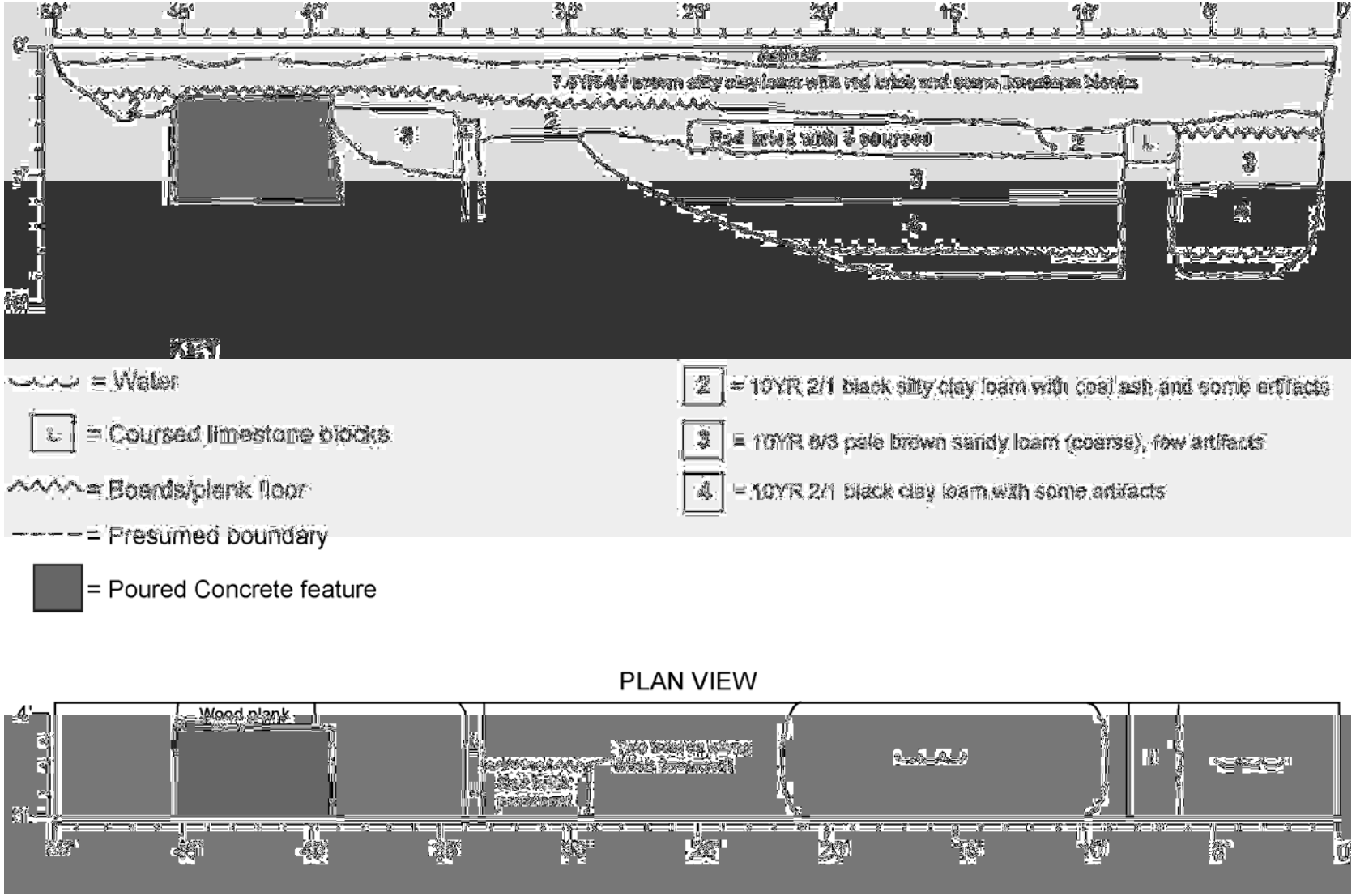
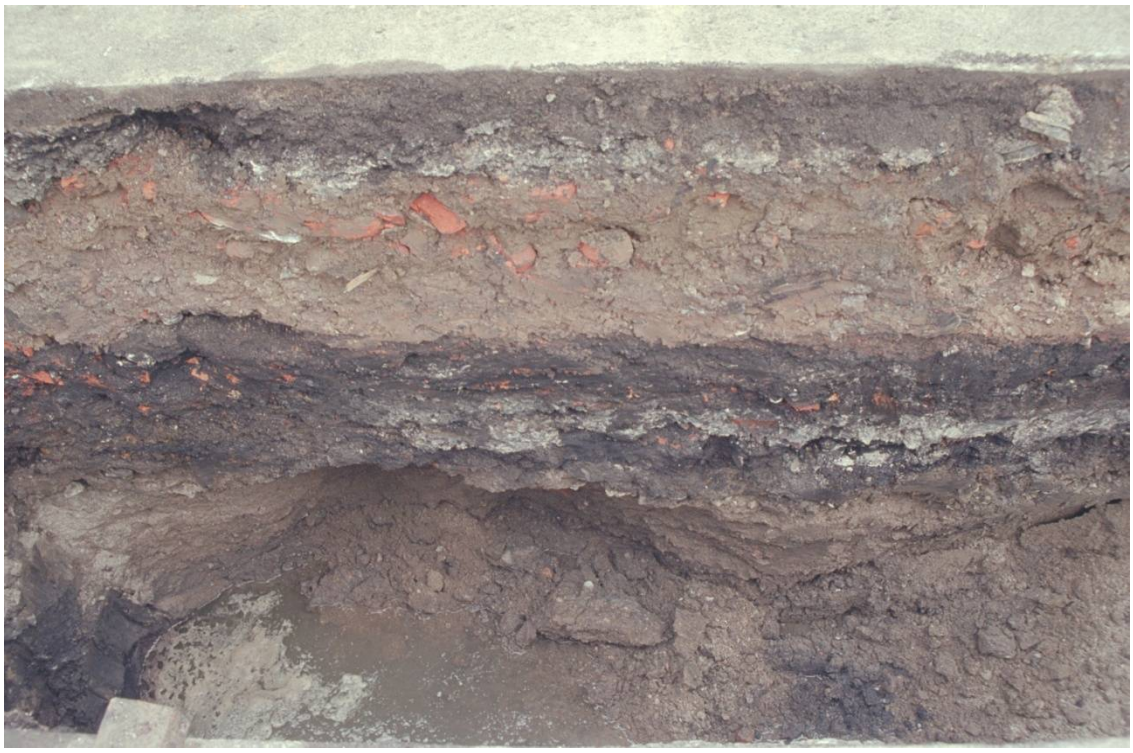


Figure 4.14. Trench 7, Section 2, west wall profile and trench floor plan view.



Photograph 4.43. Trench 7, Section 2: east wall profile showing fill stratigraphy and cave-in/slumping, facing east (*PCI 2002).*

Photograph 4.44. Trench 7, Section 2: view showing west wall profile along length of trench, facing southwest *(PCI 2002).*

Photograph 4.45. Trench 7, Section 2: exposed wood floor in south half of trench, facing south-southwest *(PCI 2002).*

Photograph 4.46. Trench 7, Section 2: alternate view of exposed wood floor in southern half of trench, facing north-northeast *(PCI 2002).*

Photograph 4.51. Trench 7, Section 2: mortared brick wall uncovered in west wall of trench, facing southwest *(PCI 2002).*

Photograph 4.52. Trench 7, Section 2: profile of mortared brick wall located in west wall of trench, facing west *(PCI 2002).*

present in sections of Trenches 1 and 5. No oil-contaminated soils will be removed from the excavations and no physical contact will be made with these soils if they are present.

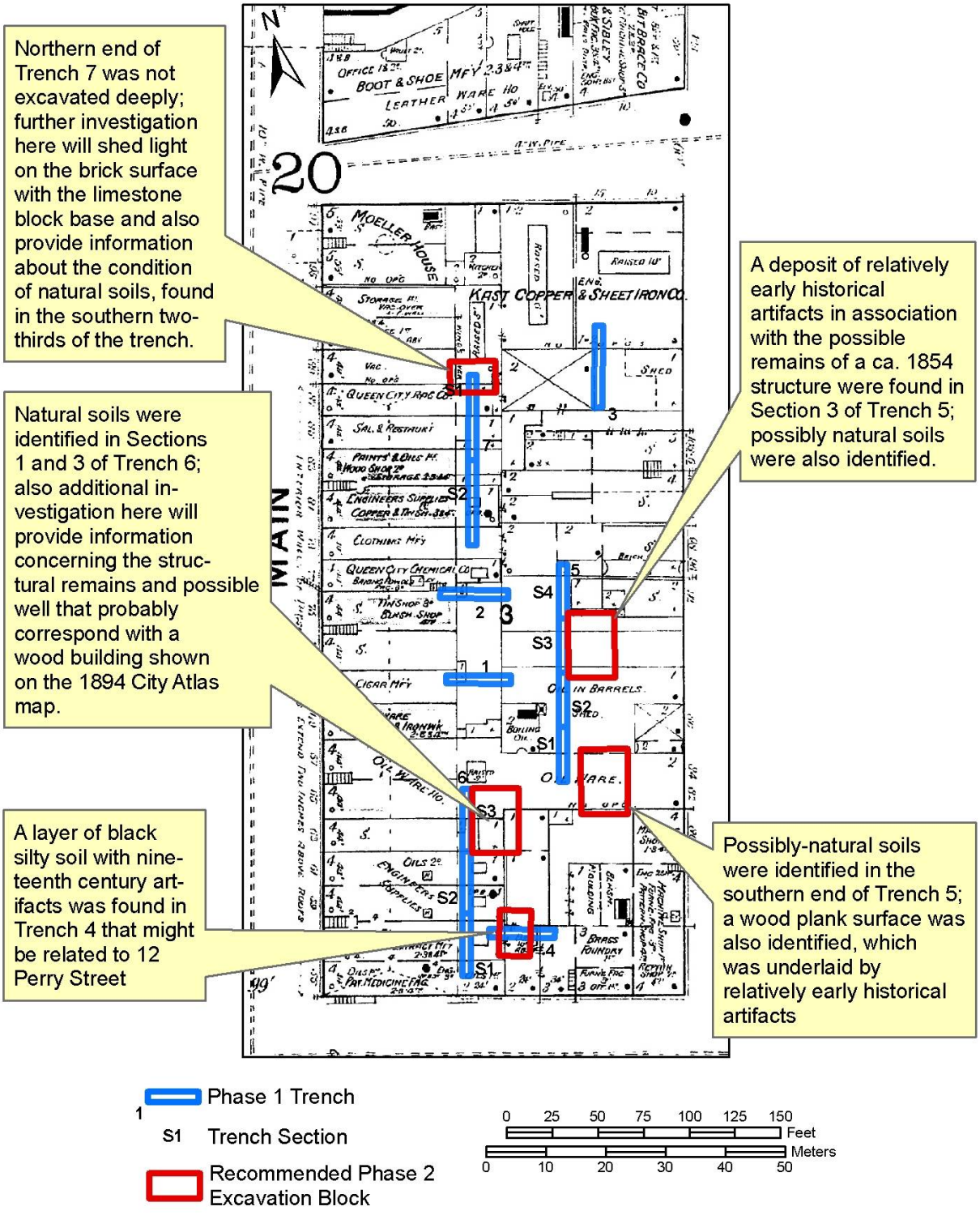


Figure 5.1. Possible configuration of recommended Phase 2 archaeological excavation blocks at the Webster Block relative to Phase 1 trenches *(base map: Sanborn 25)*.

APPENDIX C
ASBESTOS TEST PIT SAMPLING REPORT

STOHL ENVIRONMENTAL
ENVIRONMENTAL CONSULTANTS

4169 Allendale Parkway
Buffalo, New York 14219
(P) 716-312-0070 (F) 716-312-8092
www.stohlenvironmental.com

A MEMBER OF THE STOHL GROUP OF COMPANIES

November 23, 2012

Cody A. Martin
C&S Companies
GIS Technician / Environmental Scientist
90 Broadway
Buffalo, New York 14203

Re: Suspect Asbestos Debris Bulk Sampling
Webster Block
Area Surrounded by Main Street, Washington Street, Scott Street, and Perry Street
Buffalo, New York
File 2012-639

Dear Mr. Martin:

At your direction, Stohl Environmental, LLC performed limited and client defined asbestos sampling of suspect friable materials of Webster Block parking lot underground materials on October 31, 2012. Materials sampled from test pits were submitted to an accredited laboratory and analyzed by the Polarized Light Microscopy (PLM) method. The client defined the materials to be sampled as "obvious layers of friable asbestos resultant from prior manufacturing from plants such as Celotex." Construction and demolition debris, if any, was excluded from the scope of work performed by Stohl Environmental. A summary of the results can be found on the following pages.

An asbestos survey as defined by NYS Code Rule 56 or Federal regulations was not performed. The scope of Stohl Environmental's work was limited to sampling and analysis of client defined suspect friable asbestos containing materials found only in the four pre-designated Test Pit locations.

If after reviewing this letter you have any questions, or if we can be of assistance in any other way, please do not hesitate to call. Thank you for the opportunity to be of continued service to C&S Companies.

Sincerely,
Stohl Environmental, LLC

Chris Stohl
Managing Partner
Enc.

STOHL ENVIRONMENTAL
ENVIRONMENTAL CONSULTANTS

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Webster Block

Stohl Environmental inspectors observed excavation activities of the Webster Block parking lot surrounded by Main Street, Washington Street, Scott Street, and Perry Street on October 31, 2012. Suspect friable asbestos containing materials were identified, sampled, and analyzed by an accredited laboratory. The following are the lab results:

Test Pit # 1

Bulk Samples Collected of Suspect ACM Debris – Red / Gray Approximately 4' Below Grade

Sample Number:	Material Description:	PLM Result:
1031-TP1-1-1.1	Suspect ACM Debris – Red	NAD
1031-TP1-1-2.1	Suspect ACM Debris – Red	NAD
1031-TP1-1-3.1	Suspect ACM Debris – Red	NAD
1031-TP1-1-1.2	Suspect ACM Debris – Gray	NAD
1031-TP1-1-2.2	Suspect ACM Debris – Gray	NAD
1031-TP1-1-3.2	Suspect ACM Debris – Gray	NAD

Photo # 1

Photo # 2

STOHL ENVIRONMENTAL
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Buffalo, New York 14219
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Test Pit # 2

Bulk Samples Collected of Suspect ACM Debris – White Approximately 3.5' Below Grade

Sample Number:	Material Description:	PLM Result:
1031-TP2-1-1	Suspect ACM Debris – White	NAD
1031-TP2-1-2	Suspect ACM Debris – White	NAD
1031-TP2-1-3	Suspect ACM Debris – White	NAD

Photo # 1

Photo # 2

Bulk Samples Collected of Suspect Non-Metal Pipe Approximately 6' Below Grade

Sample Number:	Material Description:	PLM Result:
1031-TP2-2-1	Non-Metal Pipe	NAD
1031-TP2-2-2	Non-Metal Pipe	NAD

Photo # 3

STOHL ENVIRONMENTAL
ENVIRONMENTAL CONSULTANTS

4169 Allendale Parkway
Buffalo, New York 14219
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www.stohlenvironmental.com

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Test Pit # 3

Bulk Samples Collected of Suspect ACM Debris on Pipes – White Approximately 4' Below Grade

Sample Number:	Material Description:	PLM Result:
1031-TP3-1-1	Suspect ACM Debris on Pipes – White	NAD
1031-TP3-1-2	Suspect ACM Debris on Pipes – White	NAD
1031-TP3-1-3	Suspect ACM Debris on Pipes – White	NAD

Photo # 1

Photo # 2

Bulk Samples Collected of Suspect ACM Debris – Gray Approximately 8' Below Grade

Sample Number:	Material Description:	PLM Result:
1031-TP3-2-1	Suspect ACM Debris – Gray	Trace
1031-TP3-2-2	Suspect ACM Debris – Gray	Trace
1031-TP3-2-3	Suspect ACM Debris – Gray	Trace

Photo # 3

STOHL ENVIRONMENTAL
ENVIRONMENTAL CONSULTANTS

4169 Allendale Parkway
Buffalo, New York 14219
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www.stohlenvironmental.com

A MEMBER OF THE STOHL GROUP OF COMPANIES

Test Pit # 4

Bulk Samples Collected of Suspect ACM Debris – Brown Approximately 6' Below Grade

Sample Number:	Material Description:	PLM Result:
1031-TP4-1-1	Suspect ACM Debris on Pipes – Brown	Trace
1031-TP4-1-2	Suspect ACM Debris on Pipes – Brown	Trace
1031-TP4-1-3	Suspect ACM Debris on Pipes – Brown	Trace

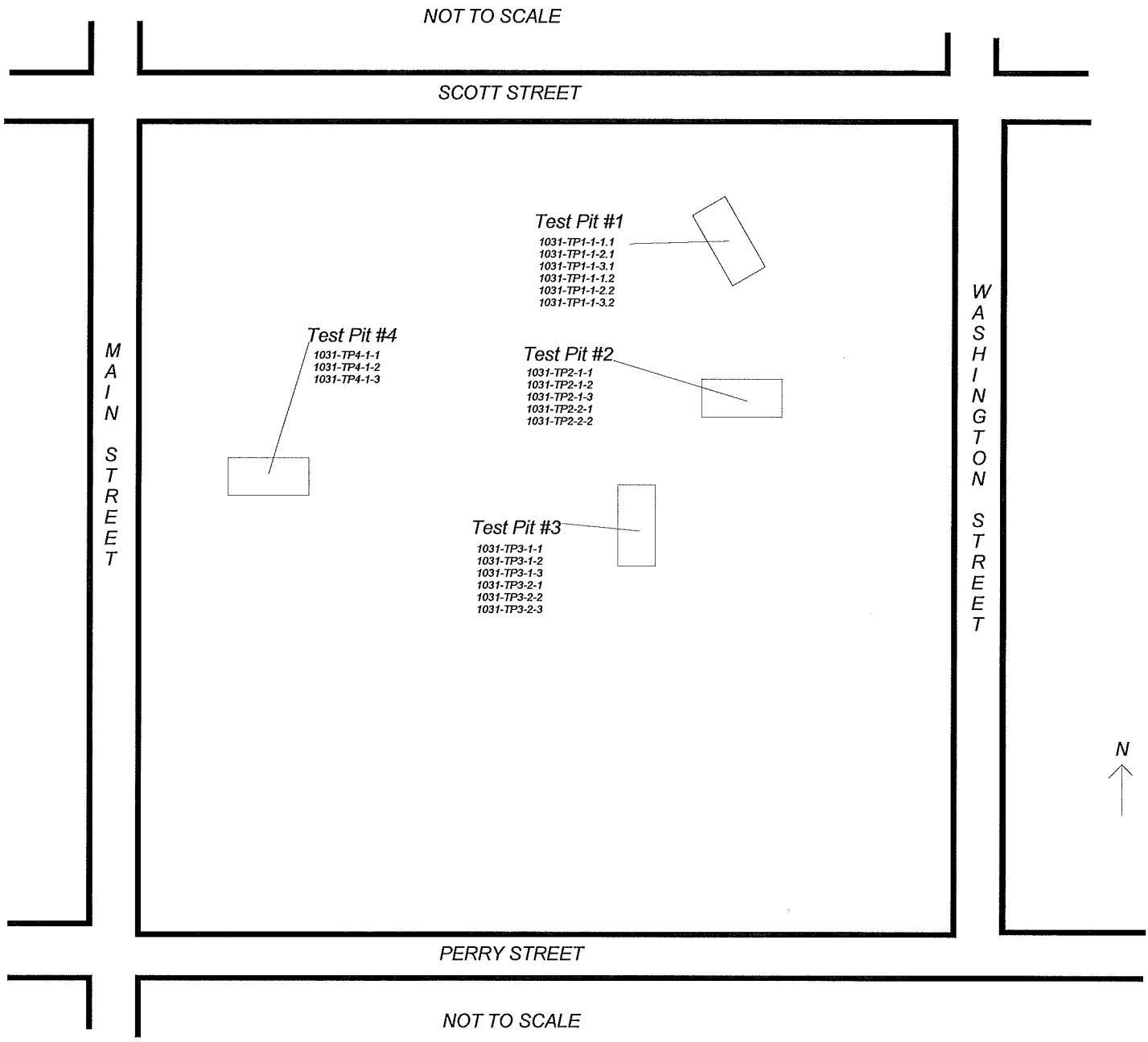
Photo # 1	Photo # 2
	

NAD = No Asbestos Detected
Trace = Less than 1% asbestos by laboratory analysis; considered non-ACM

Stohl Environmental, LLC.

C&S Companies
Webster Block
Parking Lot Area Surrounded by:
Main St., Washington St., Scott St., and Perry St.
Buffalo, New York
Conditions as of October 31,2012
Sample Location Drawing

Stohl Env File # 2012-631



AmeriSci Richmond
13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: (804) 763-1200 • FAX: (804) 763-1800

PLM Bulk Asbestos Report

Stohl Environmental, LLC.
Attn: Alexander Russo
4169 Allendale Parkway
Suite 100
Blasdell, NY 14219

Date Received 11/01/12 **AmeriSci Job #** 112111025
Date Examined 11/06/12 **P.O. #**
ELAP # 10984 **Page** 1 **of** 4
RE: 2012-631; C&S Engineers; Webster Block

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1031-TP1-1-1	112111025-01.1	*No*	NAD
1	**Location:** Suspect ACM Debris - Gray; Test Pit 1 - Approximately 4' Down		(by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Red, Heterogeneous, Non-Fibrous, Brick **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP1-1-1	112111025-01.2	*No*	NAD
1	**Location:** Suspect ACM Debris - Gray; Test Pit 1 - Approximately 4' Down		(by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Mortar **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP1-1-2	112111025-02.1	*No*	NAD
1	**Location:** Suspect ACM Debris - Gray; Test Pit 1 - Approximately 4' Down		(by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Red, Heterogeneous, Non-Fibrous, Brick **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP1-1-2	112111025-02.2	*No*	NAD
1	**Location:** Suspect ACM Debris - Gray; Test Pit 1 - Approximately 4' Down		(by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Mortar **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP1-1-3	112111025-03.1	*No*	NAD
1	**Location:** Suspect ACM Debris - Gray; Test Pit 1 - Approximately 4' Down		(by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Red, Heterogeneous, Non-Fibrous, Brick **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

2012-631; C&S Engineers; Webster Block

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1031-TP1-1-3 1	112111025-03.2 **Location:** Suspect ACM Debris - Gray; Test Pit 1 - Approximately 4' Down	***No***	NAD (by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Mortar **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP2-1-1 2	112111025-04 **Location:** Suspect ACM Debris - White; Test Pit 2 - Approximately 3.5' Down	***No***	NAD (by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: White, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP2-1-2 2	112111025-05 **Location:** Suspect ACM Debris - White; Test Pit 2 - Approximately 3.5' Down	***No***	NAD (by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: White, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP2-1-3 2	112111025-06 **Location:** Suspect ACM Debris - White; Test Pit 2 - Approximately 3.5' Down	***No***	NAD (by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: White, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP2-2-1 3	112111025-07 **Location:** Non Metal Pipe; Test Pit 2 - Approximately 6' Down	***No***	NAD (by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Brown/Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP2-2-2 3	112111025-08 **Location:** Non Metal Pipe; Test Pit 2 - Approximately 6' Down	***No***	NAD (by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Brown/Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

2012-631; C&S Engineers; Webster Block

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1031-TP3-1-1	112111025-09	*No*	NAD
4	**Location:** Suspect ACM Debris On Pipe - White; Test Pit 3 - Approximately 4' Down		(by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP3-1-2	112111025-10	*No*	NAD
4	**Location:** Suspect ACM Debris On Pipe - White; Test Pit 3 - Approximately 4' Down		(by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP3-1-3	112111025-11	*No*	NAD
4	**Location:** Suspect ACM Debris On Pipe - White; Test Pit 3 - Approximately 4' Down		(by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP3-2-1	112111025-12	*Yes*	Trace (<1 %)
5	**Location:** Suspect ACM Debris - Gray; Test Pit 3 - Approximately 8' Down		(by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Off-White/Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <1 % pc **Other Material:** Non-fibrous 99.4 %			
1031-TP3-2-2	112111025-13	*Yes*	Trace (<0.25 % pc)
5	**Location:** Suspect ACM Debris - Gray; Test Pit 3 - Approximately 8' Down		(ELAP 198.1; 400pc) by Gordon T. Saleeby on 11/06/12
Analyst Description: Off-White/Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <0.25 % pc **Other Material:** Non-fibrous 100 %			
1031-TP3-2-3	112111025-14	*Yes*	Trace (<0.25 % pc)
5	**Location:** Suspect ACM Debris - Gray; Test Pit 3 - Approximately 8' Down		(ELAP 198.1; 400pc) by Gordon T. Saleeby on 11/06/12
Analyst Description: Off-White/Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <0.25 % pc **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

2012-631; C&S Engineers; Webster Block

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1031-TP4-1-1	112111025-15	*Yes*	Trace (<0.25 % pc)
6	**Location:** Suspect ACM Debris - Brown; Test Pit 4 - Approximately 6' Down		(ELAP 198.1; 400pc) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <0.25 % pc **Other Material:** Non-fibrous 100 %			
1031-TP4-1-2	112111025-16	*Yes*	Trace (<0.25 % pc)
6	**Location:** Suspect ACM Debris - Brown; Test Pit 4 - Approximately 6' Down		(ELAP 198.1; 400pc) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <0.25 % pc **Other Material:** Non-fibrous 100 %			
1031-TP4-1-3	112111025-17	*Yes*	Trace (<0.25 % pc)
6	**Location:** Suspect ACM Debris - Brown; Test Pit 4 - Approximately 6' Down		(ELAP 198.1; 400pc) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <0.25 % pc **Other Material:** Non-fibrous 100 %			

Reporting Notes:

Analyzed by: Gordon T. Saleeby Date NOV 6, 2012

*NAD = no asbestos detected, Detection Limit <1%, Reporting Limits: CVES = 1%, 400 Pt Ct = 0.25%, 1000 Pt Ct = 0.1%; "Present" or NVA = "No Visible Asbestos" are observations made during a qualitative analysis; NA = not analyzed; NA/PS = not analyzed / positive stop; PLM Bulk Asbestos Analysis by EPA 600/M4-82-020 per 40 CFR 763 (NVLAP Lab Code 101904-0) and ELAP PLM Analysis Protocol 198.1 for New York friable samples (198.6 for NOB samples)(NYSDOH ELAP Lab # 10984); CA ELAP Lab # 2508; Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar NOB materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (also see EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94). NIST Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the laboratory. This PLM report relates ONLY to the items tested.

Reviewed By:_____

112111025

Chain of Custody Document

ENVIRONMENTAL CONSULTANTS - A MEMBER OF THE STOHL GROUP OF COMPANIES
4169 ALLENDALE PKWY. BUFFALO, NEW YORK 14219
☎ (716) 312-0070 ■ (716) 312-8092
www.stohlenvironmental.com

Submitted to: (Lab Name) AmeriSci, VA

STOHL Job # 2012-631

Client: C&S Engineers Contact: Cody Martin

Building: Webster Block Location: Washington & Main Street

LEAD
Wipes: _____ Soil: _____ Bulk: _____
ASTM wipes were used

PCB's
EPA 8082 _____

Turnaround
RUSH _____ Hr
☐ 24 Hour ☐ 48 Hour
☐ 72 Hour ☑ 5 Day

Sample #	Description of Sample	Location of Sample
1031-TP1-1-1	Suspect ACM Debris - Gray	Test Pit 1 - Approximately 4' Down
1031-TP1-1-2	Suspect ACM Debris - Gray	Test Pit 1 - Approximately 4' Down
1031-TP1-1-3	Suspect ACM Debris - Gray	Test Pit 1 - Approximately 4' Down
1031-TP2-1-1	Suspect ACM Debris - White	Test Pit 2 - Approximately 3.5' Down
1031-TP2-1-2	Suspect ACM Debris - White	Test Pit 2 - Approximately 3.5' Down
1031-TP2-1-3	Suspect ACM Debris - White	Test Pit 2 - Approximately 3.5' Down
1031-TP2-2-1	Non Metal Pipe	Test Pit 2 - Approximately 6' Down
1031-TP2-2-2	Non Metal Pipe	Test Pit 2 - Approximately 6' Down
1031-TP3-1-1	Suspect ACM Debris on Pipes - White	Test Pit 3 - Approximately 4' Down
1031-TP3-1-2	Suspect ACM Debris on Pipes - White	Test Pit 3 - Approximately 4' Down
1031-TP3-1-3	Suspect ACM Debris on Pipes - White	Test Pit 3 - Approximately 4' Down
1031-TP3-2-1	Suspect ACM Debris - Gray	Test Pit 3 - Approximately 8' Down
1031-TP3-2-2	Suspect ACM Debris - Gray	Test Pit 3 - Approximately 8' Down
1031-TP3-2-3	Suspect ACM Debris - Gray	Test Pit 3 - Approximately 8' Down
1031-TP4-1-1	Suspect ACM Debris - Brown	Test Pit 4 - Approximately 6' Down
1031-TP4-1-2	Suspect ACM Debris - Brown	Test Pit 4 - Approximately 6' Down
1031-TP4-1-3	Suspect ACM Debris - Brown	Test Pit 4 - Approximately 6' Down

RECEIVED
NOV 01 2012
By

Note 1: Stop at first positive for homogeneous materials. Perform full NYS ELAP PLM/TEM Protocol for all samples.

Notes:

Please e-mail lab results to labs@stohlenv.com ☒ If checked, also e-mail lab results to arusso@stohlenv.com

Sampled By: _____ Print Name Alexander Russo Date: 10-31-12

Relinquished By: _____ Print Name Alexander Russo Date: 10-31-12

Received By: _____ Date: _____

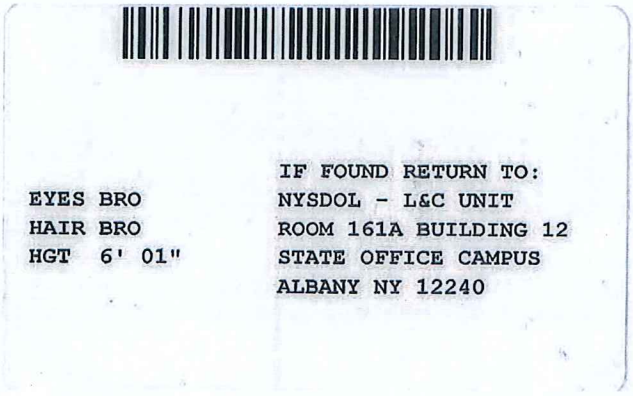
STOHL ENVIRONMENTAL
ENVIRONMENTAL CONSULTANTS

4169 Allendale Parkway
Buffalo, New York 14219
(P) 716-312-0070 (F) 716-312-8092
www.stohlenvironmental.com

A MEMBER OF THE STOHL GROUP OF COMPANIES

ALEXANDER RUSSO


STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE
ALEXANDER R RUSSO
CLASS(EXPIRES)
C ATEC(02/13) D INSP(02/13)
G SUPR(02/13) H PM (02/13)
CERT# 11-08188
DMV# 633720271
MUST BE CARRIED ON ASBESTOS PROJECTS


EYES BRO
HAIR BRO
HGT 6' 01"
IF FOUND RETURN TO:
NYSDOL - L&C UNIT
ROOM 161A BUILDING 12
STATE OFFICE CAMPUS
ALBANY NY 12240

NYS ASBESTOS CERTIFICATIONS

PROJECT MONITOR

AIR MONITOR

SUPERVISOR

INSPECTOR

STOHL ENVIRONMENTAL
ENVIRONMENTAL CONSULTANTS

4169 Allendale Parkway
Buffalo, New York 14219
(P) 716-312-0070 (F) 716-312-8092
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NEW YORK STATE - DEPARTMENT OF LABOR
DIVISION OF SAFETY AND HEALTH
LICENSE AND CERTIFICATE UNIT
STATE CAMPUS BUILDING 12
ALBANY, NY 12240

ASBESTOS HANDLING LICENSE

Stohl Environmental, LLC
Suite 100
4169 Allendale Parkway

Blasdell, NY 14219

FILE NUMBER: 00-0041
LICENSE NUMBER: 29408
LICENSE CLASS: FULL
DATE OF ISSUE: 01/26/2012
EXPIRATION DATE: 02/28/2013

Duly Authorized Representative – Christopher C Stohl:

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

Maureen A. Cox, Director
FOR THE COMMISSIONER OF LABOR

SH 432 (4-07)

C&S Companies
90 Broadway
Buffalo, NY 14203
p: (716) 847-1630
f: (716) 847-1454
www.cscos.com

November 26, 2012

David Zygaj
Vice President of Legal Affairs
Buffalo Sabres
First Niagara Center
One Seymour H. Knox III Plaza,
Buffalo, NY 14203-3096

and

Chris Miller
Director
ICON Venue Group / Romani Group, Inc.
7300 Carmel Executive Park, Suite 325
Charlotte, NC 28226
(agent for HARBORcenter Development LLC)

Re: RESULTS: HARBORcenter Development Asbestos Sampling

Dear Mr. Zygaj and Mr. Miller:

C&S Engineers, Inc. ("C&S") is providing the results of an assessment for asbestos-containing materials at 75 Main Street, the Webster Block ("Site").

Historical maps of the Site from 1950 and 1981 show that the northern portion of the block was occupied by a commercial insulation company. Some maps indicate that a portion of the facility contained an asbestos warehouse. Based on the historical use, C&S conducted an assessment of the subsurface conditions to identify if asbestos-containing material ("ACM") fill was deposited on site as a result of the operations or demolition of the facility.

Scope of Work

Task 1: Test pits and Sampling

Four test pits were excavated on-site to native material (a depth of 12-14 feet below). Test pits were approximately 12 feet long by 6 feet wide. Excavated soils were visually screened for deposits of ACM fill.

After excavation excess soil was placed back into the hole and compacted. Gravel was placed on the top 6 inches to provide a usable surface.

Task 2: Asbestos Analysis

Material removed from the pit was assessed by a New York State Department of Labor-certified Asbestos Inspector, provided by Stohl Environmental. Layers of fill material that were identified to be potentially ACM were sampled for analysis. Each material sample collected was subject to a two stage analysis by the lab (AmeriSci, Richmond Virginia).

Every sample was analyzed by the lab for a quantitative answer (is asbestos present or not). For samples that showed evidence of the presence of asbestos, a secondary qualitative analysis was conducted to determine the percentage of asbestos. If a sample has more than 1% asbestos by weight of the sample size, the material is considered "Asbestos Containing."

Field Observations and Asbestos Analysis Results

Four test pits were excavated in the area formerly occupied by the asbestos warehouse and insulation facilities. Figure 1 shows the Test Pit locations and the approximate areas of the former facilities of concern. Material excavated in the pits contained various amounts of hard fill and soil. Bulk materials of suspect asbestos content were sampled from each pit. All materials sampled were heterogeneous in deposition. There were no homogenous layers of distinct bulk fill that would indicate past land disposal practices of unused materials, however there were 8 different suspect ACMs identified in the pits.

Where possible – multiple samples of the same material were submitted to conform to standard asbestos screening practices. Materials identified as potentially asbestos were associated with bricks, mortar, cementatious piping and potential block insulation material

The following table lists each sample by test pit and the analytical results. A copy of the laboratory report is attached to this letter.

TABLE 1.0
Asbestos Analytical Results

Test Pit	Sample ID	Description	Depth (ft)	Result	Regulated ACM
TP-1	TP1-1-1.1	Red brick, non-fibrous	4	None detected	No
	TP1-1-1.2	Lt. grey mortar, non-fibrous	4	None detected	No
	TP1-1-2.1	Red brick, non-fibrous	4	None detected	No
	TP1-1-2.2	Lt. grey mortar, non-fibrous	4	None detected	No
	TP1-1-3.1	Red brick, non-fibrous	4	None detected	No
	TP1-1-3.1	Lt. grey mortar, non-fibrous	4	None detected	No
TP-2	TP2-1-1	White bulk suspect ACM	3.5	None detected	No
	TP2-1-2	White bulk suspect ACM	3.5	None detected	No
	TP2-1-3	White bulk suspect ACM	3.5	None detected	No
	TP2-2-1	Non-metal pipe, brown/grey	6	None detected	No
	TP2-2-2	Non-metal pipe, brown/grey	6	None detected	No
TP-3	TP3-1-1	grey suspect ACM on pipe	4	None detected	No
	TP3-1-2	grey suspect ACM on pipe	4	None detected	No
	TP3-1-3	grey suspect ACM on pipe	4	None detected	No
	TP3-2-1	Lt grey bulk suspect ACM	8	**<1% chrysotile**	**No**
	TP3-2-2	Lt grey bulk suspect ACM	8	**<0.25% chrysotile**	**No**
	TP3-2-3	Lt grey bulk suspect ACM	8	**<0.25% chrysotile**	**No**
TP-4	TP4-1-1	Lt grey bulk suspect ACM	6	**<0.25% chrysotile**	**No**
	TP4-1-2	Lt grey bulk suspect ACM	6	**<0.25% chrysotile**	**No**
	TP4-1-3	Lt grey bulk suspect ACM	6	**<0.25% chrysotile**	**No**

Closure

C&S excavated 4 pits across the Site, targeting areas of known asbestos use. Excavation areas did not encounter layers of suspect asbestos debris fill, however, 8 different material types were identified as suspect ACM within the material removed from the ground.

From these pits, a total of 20 samples were collected from 8 suspect materials and analyzed for asbestos content. No asbestos was detected in 16 of the 20 analyses. Chrysoltile was identified in the remaining 4 samples analyzed, however, at a concentration of less than 1% in each sample. Therefore none of the materials identified and sampled qualify as an Asbestos Containing Material.

If you have any questions, please contact me at 716.847.1630.

Sincerely,
C&S ENGINEERS, INC.

Mark Colmerauer
Regional Environmental Service Manager

Encl: Figure 1 – Test Pit Locations
Asbestos Analysis Results

cc: Paul Meosky, Hodgson Russ LLP
Terry Gilbride. Hodgson Russ LLP

Please Reply To:

AmeriSci Richmond
13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: (804) 763-1200 • FAX: (804) 763-1800

FACSIMILE TELECOPY TRANSMISSION

To:	Alexander Russo Stohl Environmental, LLC.	**From:**	Gordon T. Saleeby
		AmeriSci Job #:	112111025
Fax #:		**Subject:**	ELAP-PLM/TEM 5 day Results
		Client Project:	2012-631; C&S Engineers; Webster Block
Email:	labs@stohlenv.com,arusso@stohlenv.com		

Date: Tuesday, November 06, 2012
Time: 14:12:57
Comments:

Number of Pages: 6 (including cover sheet)

AmeriSci Richmond
13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: (804) 763-1200 • FAX: (804) 763-1800

PLM Bulk Asbestos Report

Stohl Environmental, LLC.
Attn: Alexander Russo
4169 Allendale Parkway
Suite 100
Blasdell, NY 14219

Date Received 11/01/12 **AmeriSci Job #** 112111025
Date Examined 11/06/12 **P.O. #**
ELAP # 10984 **Page** 1 **of** 4
RE: 2012-631; C&S Engineers; Webster Block

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Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Mortar **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
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See Reporting notes on last page

PLM Bulk Asbestos Report

2012-631; C&S Engineers; Webster Block

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Analyst Description: White, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
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Analyst Description: Brown/Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
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Analyst Description: Brown/Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

2012-631; C&S Engineers; Webster Block

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
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4	**Location:** Suspect ACM Debris On Pipe - White; Test Pit 3 - Approximately 4' Down		(by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
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Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP3-1-3	112111025-11	*No*	NAD
4	**Location:** Suspect ACM Debris On Pipe - White; Test Pit 3 - Approximately 4' Down		(by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1031-TP3-2-1	112111025-12	*Yes*	Trace (<1 %)
5	**Location:** Suspect ACM Debris - Gray; Test Pit 3 - Approximately 8' Down		(by NYS ELAP 198.1) by Gordon T. Saleeby on 11/06/12
Analyst Description: Off-White/Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <1 % pc **Other Material:** Non-fibrous 99.4 %			
1031-TP3-2-2	112111025-13	*Yes*	Trace (<0.25 % pc)
5	**Location:** Suspect ACM Debris - Gray; Test Pit 3 - Approximately 8' Down		(ELAP 198.1; 400pc) by Gordon T. Saleeby on 11/06/12
Analyst Description: Off-White/Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <0.25 % pc **Other Material:** Non-fibrous 100 %			
1031-TP3-2-3	112111025-14	*Yes*	Trace (<0.25 % pc)
5	**Location:** Suspect ACM Debris - Gray; Test Pit 3 - Approximately 8' Down		(ELAP 198.1; 400pc) by Gordon T. Saleeby on 11/06/12
Analyst Description: Off-White/Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <0.25 % pc **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

2012-631; C&S Engineers; Webster Block

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1031-TP4-1-1	112111025-15	***Yes***	Trace (<0.25 % pc)
6	**Location:** Suspect ACM Debris - Brown; Test Pit 4 - Approximately 6' Down		(ELAP 198.1; 400pc) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types: Chrysotile <0.25 % pc			
Other Material: Non-fibrous 100 %			
1031-TP4-1-2	112111025-16	***Yes***	Trace (<0.25 % pc)
6	**Location:** Suspect ACM Debris - Brown; Test Pit 4 - Approximately 6' Down		(ELAP 198.1; 400pc) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types: Chrysotile <0.25 % pc			
Other Material: Non-fibrous 100 %			
1031-TP4-1-3	112111025-17	***Yes***	Trace (<0.25 % pc)
6	**Location:** Suspect ACM Debris - Brown; Test Pit 4 - Approximately 6' Down		(ELAP 198.1; 400pc) by Gordon T. Saleeby on 11/06/12
Analyst Description: Lt. Gray, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types: Chrysotile <0.25 % pc			
Other Material: Non-fibrous 100 %			

Reporting Notes:

Analyzed by: Gordon T. Saleeby Date NOV 6, 2012

*NAD = no asbestos detected, Detection Limit <1%, Reporting Limits: CVES = 1%, 400 Pt Ct = 0.25%, 1000 Pt Ct = 0.1%; "Present" or NVA = "No Visible Asbestos" are observations made during a qualitative analysis; NA = not analyzed; NA/PS = not analyzed / positive stop; PLM Bulk Asbestos Analysis by EPA 600/M4-82-020 per 40 CFR 763 (NVLAP Lab Code 101904-0) and ELAP PLM Analysis Protocol 198.1 for New York friable samples (198.6 for NOB samples)(NYSDOH ELAP Lab # 10984); CA ELAP Lab # 2508; Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar NOB materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (also see EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94). NIST Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the laboratory. This PLM report relates ONLY to the items tested.

Reviewed By:_____

112111025

Chain of Custody Document

STOHL ENVIRONMENTAL

ENVIRONMENTAL CONSULTANTS - A MEMBER OF THE STOHL GROUP OF COMPANIES
4169 ALLENDALE PKWY. BUFFALO, NEW YORK 14219
☎ (718) 312-0070 ■ (716) 312-8092
www.stohlenvironmental.com

Submitted to: (Lab Name) AmeriSci, VA

STOHL Job # 2012-631

Client: C&S Engineers Contact: Cody Martin

Building: Webster Block Location: Washington & Main Street

LEAD	PCB's	Turnaround
Wipes: _____ Soil: _____ Bulk: _____	EPA 8082 _____	RUSH _____ Hr ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☑ 5 Day
ASTM wipes were used		

Sample #	Description of Sample	Location of Sample
1031-TP1-1-1	Suspect ACM Debris - Gray	Test Pit 1 - Approximately 4' Down
1031-TP1-1-2	Suspect ACM Debris - Gray	Test Pit 1 - Approximately 4' Down
1031-TP1-1-3	Suspect ACM Debris - Gray	Test Pit 1 - Approximately 4' Down
1031-TP2-1-1	Suspect ACM Debris - White	Test Pit 2 - Approximately 3.5' Down
1031-TP2-1-2	Suspect ACM Debris - White	Test Pit 2 - Approximately 3.5' Down
1031-TP2-1-3	Suspect ACM Debris - White	Test Pit 2 - Approximately 3.5' Down
1031-TP2-2-1	Non Metal Pipe	Test Pit 2 - Approximately 6' Down
1031-TP2-2-2	Non Metal Pipe	Test Pit 2 - Approximately 6' Down
1031-TP3-1-1	Suspect ACM Debris on Pipes - White	Test Pit 3 - Approximately 4' Down
1031-TP3-1-2	Suspect ACM Debris on Pipes - White	Test Pit 3 - Approximately 4' Down
1031-TP3-1-3	Suspect ACM Debris on Pipes - White	Test Pit 3 - Approximately 4' Down
1031-TP3-2-1	Suspect ACM Debris - Gray	Test Pit 3 - Approximately 8' Down
1031-TP3-2-2	Suspect ACM Debris - Gray	Test Pit 3 - Approximately 8' Down
1031-TP3-2-3	Suspect ACM Debris - Gray	Test Pit 3 - Approximately 8' Down
1031-TP4-1-1	Suspect ACM Debris - Brown	Test Pit 4 - Approximately 6' Down
1031-TP4-1-2	Suspect ACM Debris - Brown	Test Pit 4 - Approximately 6' Down
1031-TP4-1-3	Suspect ACM Debris - Brown	Test Pit 4 - Approximately 6' Down

RECEIVED
NOV 01 2012
By

Note 1: Stop at first positive for homogeneous materials. Perform full NYS ELAP PLM/TEM Protocol for all samples.

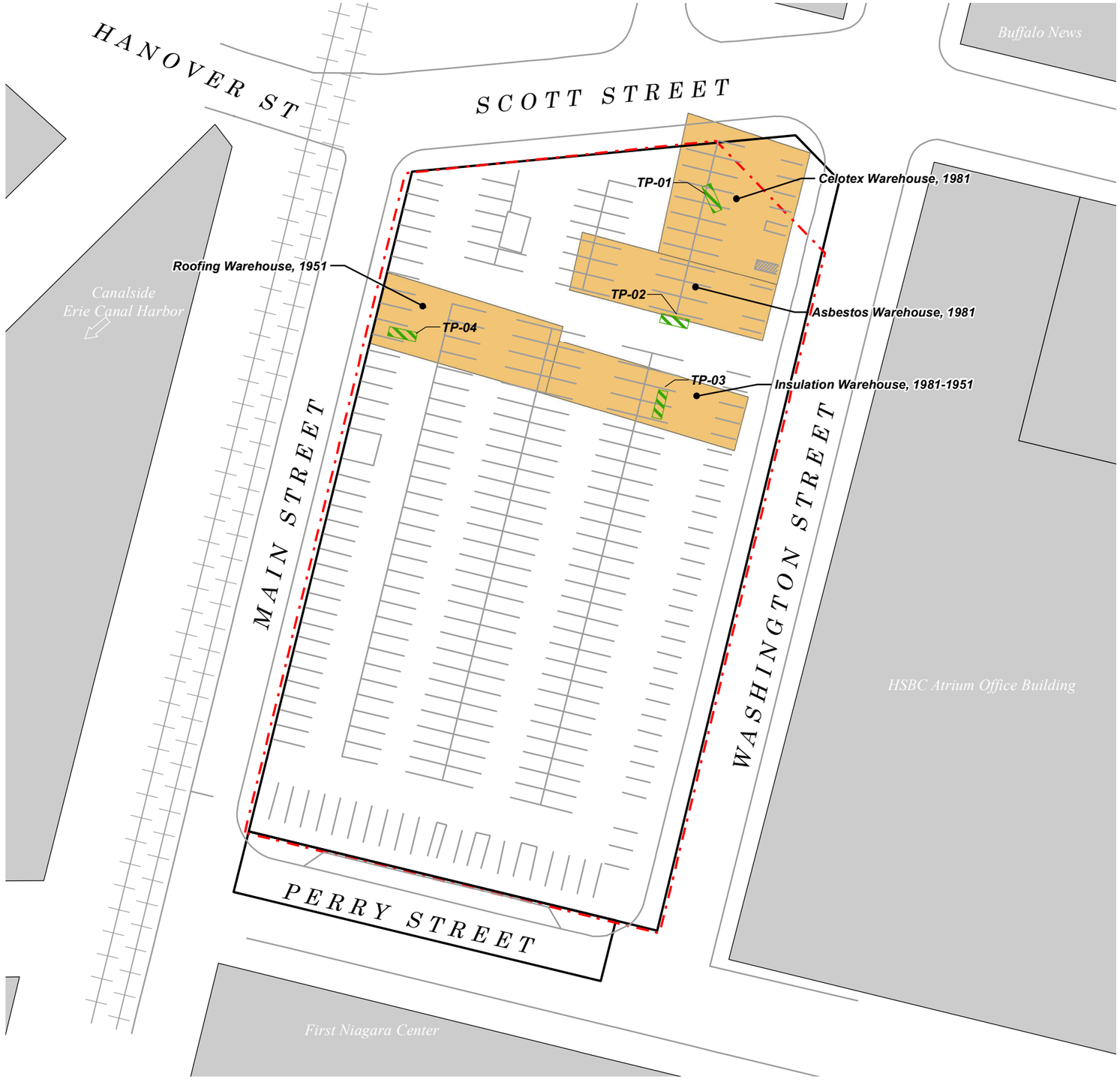
Notes:

Please e-mail lab results to labs@stohlenv.com ☒ If checked, also e-mail lab results to arusso@stohlenv.com

Sampled By: _____ Print Name Alexander Russo Date: 10-31-12

Relinquished By: _____ Print Name Alexander Russo Date: 10-31-12

Received By: _____ Date: _____



Location Map

Legend

- Parcel Boundary
- BCP Boundary
- Test Pits
- Historic Property Boundaries

Label Legend

"Oil Storage" = Label denoted on Sanborn Maps

"1889" = Date of Sanborn Map with denoted feature

Notes

1) Source: EDR-Sanborn Maps 1889 through 1981.

2) Historic property lines digitized from 1889 - 1981 Sanborn Fire Insurance Maps.

3) Coordinate System: NAD 1983 StatePlane NY East FIPS 3103
Projection: Transverse Mercator
Datum: North American 1983
Units: Foot US

0 60 120 Feet

C&S COMPANIES®
C&S Engineers, Inc.
90 Broadway
Buffalo, New York 14203
Phone: 716-847-1630
Fax: 716-847-1454
www.cscos.com

HARBORcenter Development LLC
1 Seymour H. Knox III Plaza
Buffalo, NY 14203

N

WEBSTER BLOCK - ASBESTOS SAMPLING

CITY OF BUFFALO, NY

No.	DATE	REVISIONS

PROJECT NO:	M86.001.001
DATE:	October 24, 2012
SCALE:	1" = 60'
DRAWN BY:	CAM
DESIGNED BY:	CAM
CHECKED BY:	MJC

TEST PIT LOCATIONS

FIGURE 1

Path: F:\Project\M86- HARBORcenter Development LLC\M86001001 - HARBORcenter\Environmental\CADD-GIS\GIS\Projects\ASBESTOS_TEST_PITS.mxd

APPENDIX D
CITIZEN PARTICIPATION PLAN

New York State Department of Environmental Conservation

Brownfield Cleanup Program

Citizen Participation Plan

for

Proposed HARBORcenter at 75 Main Street

75 Main Street (Webster Block)
Buffalo, Erie County, New York

March 2013

Contents

* * * * *

Note: The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

Applicant: **HARBORcenter Development, LLC**
Site Name: **HARBORcenter (Site)**
Site Address: **75 Main Street**
Site County: **Erie**
Site Number: **C915270**

1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants that conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at: http://www.dec.ny.gov/chemical/8450.html .

2. Citizen Participation Activities

Why NYSDEC Involves the Public and Why It Is Important

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

Involving citizens affected and interest in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment

- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process

- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process

- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community

- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

Project Contacts

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

Locations of Reports and Information

The locations of the reports and information related to the site's investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC web site. If this occurs, NYSDEC will inform the public in fact sheets distributed about the site and by other means, as appropriate.

Site Contact List

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the site (such as fieldwork), as well as availability of project documents and announcements about public comment periods. The site contact list includes, at a minimum:

- chief executive officer and planning board chairperson of each county, city, town and village in which the site is located;
- residents, owners, and occupants of the site and properties adjacent to the site;
- the public water supplier which services the area in which the site is located;
- any person who has requested to be placed on the site contact list;
- the administrator of any school or day care facility located on or near the site for purposes of posting and/or dissemination of information at the facility;
- location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

CP Activities

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.

- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

Technical Assistance Grant

NYSDEC must determine if the site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the site, as described in Section 5.

If the site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the site.

For more information about TAGs, go online at http://www.dec.ny.gov/regulations/2590.html

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows on the next page:

Citizen Participation Requirements (Activities)	Timing of CP Activity(ies)
Application Process:	
• Prepare site contact list • Establish document repositories	At time of preparation of application to participate in the BCP.
• Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period • Publish above ENB content in local newspaper • Mail above ENB content to site contact list • Conduct 30-day public comment period	When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time.
After Execution of Brownfield Site Cleanup Agreement:	
• Prepare Citizen Participation (CP) Plan	Before start of Remedial Investigation
Before NYSDEC Approves Remedial Investigation (RI) Work Plan:	
• Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan • Conduct 30-day public comment period	Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet.
After Applicant Completes Remedial Investigation:	
• Distribute fact sheet to site contact list that describes RI results	Before NYSDEC approves RI Report
Before NYSDEC Approves Remedial Work Plan (RWP):	
• Distribute fact sheet to site contact list about proposed RWP and announcing 30-day public comment period • Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager) • Conduct 30-day public comment period	Before NYSDEC approves RWP. Thirty day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 30-day public comment period.
Before Applicant Starts Cleanup Action:	
• Distribute fact sheet to site contact list that describes upcoming cleanup action	Before the start of cleanup action.
After Applicant Completes Cleanup Action:	
• Distribute fact sheet to site contact list that announces that cleanup action has been completed and that summarizes the Final Engineering Report • Distribute fact sheet to site contact list announcing issuance of Certificate of Completion (COC)	At the time NYSDEC approves Final Engineering Report. These two fact sheets are combined if possible if there is not a delay in issuing the COC.

3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the site. Additional major issues of public concern may be identified during the course of the site's investigation and cleanup process.

Soil is contaminated with unregulated industrial fill that has been deposited over 192 years of occupation on the site. The Site is covered predominantly by an asphalt surface and is used for parking reducing exposure to contaminated soils. Soil contamination is present from 2 to 10 feet below grade. Volatile compounds have not been found within soil or groundwater above NYSDEC standards that would indicated a vapor exposure hazard. Therefore, vapor exposure is not a risk during the excavation of the site.

Contaminated groundwater is present at levels above NYSDEC standards. However, the City of Buffalo bans the use of groundwater for drinking water so there is little exposure the public from groundwater use.

The presence of the contamination is limiting the future use and re-investment opportunities on the parcel. Stakeholders in the remediation of the Site include the City of Buffalo, First Niagara Center, local residents and users of adjacent buildings. See Appendix B for a contact list of stakeholders.

4. Site Information

Appendix C contains a map identifying the location of the site.

Site Description

Location: 75 Main Street, Buffalo, Erie County
Setting: Urban
Site size: 2.01 acres
Adjacent properties:

- **East (office building)**
- **South (First Niagara Center)**
- **West (Canalside)**
- **North (hotel)**

History of Site Use, Investigation, and Cleanup

From the late 1800s to the early 1900s, the Erie Canal Harbor District was a major commercial waterway for the City of Buffalo. As part of the Erie Canal Harbor District, the Site was within an area of dense commercial and industrial development. Subsurface soil has been impaired from 192 years of industrial and commercial uses along with unregulated deposition of backfill. Fill material extends horizontally across the entire site and approximately 10 feet below grade.

Previous investigations on-site have revealed deposits of ash, coal and slag throughout the entire extent of the site. These deposits correlate with the following historic uses:

- Tin Shop/Ironwork
- Blacksmith
- Copper and Tin Smith
- Nickel Plating Shop
- Chemical Company
- Foundry
- Coal burning for heating furnaces

Two areas of petroleum-impacted soil contamination were discovered along the eastern property boundary, adjacent to Washington Street, and at the southwest corner of the property. Petroleum product was observed in both areas. This petroleum contamination likely originated from the following historic uses:

- Paint/oil Storage
- Chemical Company
- Oil Refining
- Historic above and/or underground gasoline tanks

The contamination is contained within the boundaries of Main, Scott, Washington and Perry Streets. As summarized above there is no current active health risk from the contamination:

- Soil contamination is present from 2 to 10 feet below grade.
    - No subsurface structures are present on the Site, therefore, vapor exposure is not a risk, and
    - The Site is covered predominantly by an asphalt surface educing exposure to contaminated soils.
- The City of Buffalo bans the use of groundwater for drinking water so there is little exposure the public from groundwater use.

No active or passive remediation has taken place on-site.

5. Investigation and Cleanup Process

Application

The Applicants have applied for and been accepted into New York's Brownfield Cleanup Program as a Volunteer. This means that the Applicants were not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination onsite, and must conduct a qualitative exposure assessment, a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the site.

The Applicants in its Application proposes that the site will be used for commercial purposes.

To achieve this goal, the Applicants will conduct cleanup activities at the site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC and the Applicants set forth the responsibilities of each party in conducting these activities at the site.

Remedy Selection

When the investigation of the Site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicants may recommend in its investigation report that no action is necessary at the Site. In this case, NYSDEC would make the investigation report available for public comment for 30 days. NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a Certificate of Completion (described below) to the Applicants.

or

2. The Applicants may recommend in its investigation report that action needs to be taken to address Site contamination. After NYSDEC approves the investigation report, the Applicants may then develop a cleanup plan, officially called a Remedial Work Plan. The Remedial Work Plan describes the Applicants' proposed remedy for addressing contamination related to the Site.

When the Applicants submit a proposed Remedial Work Plan for approval, NYSDEC would announce the availability of the proposed plan for public review during a 30-day public comment period.

Cleanup Action

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy.

The Applicants may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH oversee the activities. When the Applicants complete cleanup activities, they will prepare a final engineering report that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the Site.

Certificate of Completion

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the Site, it will approve the final engineering report. NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved, and relieves the Applicants from future liability for Site-related contamination, subject to certain conditions. The Applicants would be eligible to redevelop the Site after it receives a COC.

Site Management

Site management is the last phase of the Site cleanup program. This phase begins when the COC is issued. Site management may be conducted by the Applicants under NYSDEC oversight, if contamination will remain in place. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the Site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An institutional control is a non-physical restriction on use of the Site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the Site suitable for some, but not all uses.

An engineering control is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that is pumping and treating groundwater. Site management continues until NYSDEC determines that it is no longer needed.

Appendix A
Project Contacts and Locations of Reports and Information

Project Contacts

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

New York State Department of Environmental Conservation (NYSDEC):

David Locey
Project Manager
NYSDEC Region 9
Division of Environmental Remediation
270 Michigan Avenue
Buffalo, NY 14203-2999
716.851.7220

Kristen Davidson
Citizen Participation Specialist
NYSDEC Region 9
270 Michigan Avenue
Buffalo, NY 14203-2915
716.851.7220

New York State Department of Health (NYSDOH):
Matthew Forcucci
Project Manager
NYSDOH
584 Delaware Avenue
Buffalo, NY 14202
(716) 847-4501

Locations of Reports and Information

The facilities identified below are being used to provide the public with convenient access to important project documents:

Buffalo and Erie County Central Library
1 Lafayette Square
Buffalo, NY 14203
Attn: April Tompkins
Phone: 716.858.7180

NYSDEC 9
270 Michigan Avenue
Buffalo, NY 14203
Attn: David Locey
Phone: 716.851.7220
Hours: Monday to Friday 9 am to 5 pm
(call for appointment)

Appendix B Site Contact List

1. Local Government - City of Buffalo

Erie County Executive:

Mark Poloncarz
Edward A. Rath County Office Building
95 Franklin Street, 6th Floor
Buffalo, NY 14202
http://www2.erie.gov/exec/index.php?q=email-mark

Chief Executive Officer – City of Buffalo:

Mayor Byron W. Brown
City of Buffalo
201 City Hall
Buffalo, New York 14202
Mayor@city-buffalo.com

Planning Board Chairman:
James A Morrell, Chairman
City of Buffalo Planning Board
901 City Hall
Buffalo, NY 14202
(716) 851-5035
mgrunzweig@city-buffalo.com

Zoning Board of Appeals:

James A. Lewis, Chairman
City of Buffalo Zoning Board of Appeals
Room 901, City Hall
Buffalo, NY 14202
(716) 851-5082

2. Residents, Owners and Occupants of Property and Property Adjacent to Site:

Erie Canal Harbor Development Corp.
95 Perry Street
Buffalo, NY 14203
(716) 846-8200

Erie County Industrial Development Agency
143 Genesee Street

Buffalo, NY 14203
(716) 856-6525

Buffalo Urban Renewal Agency
214 City Hall
Buffalo, NY 14202
(716) 851-5051

City of Buffalo
Division of Real Estate
901 City Hall
Buffalo, NY 14202
(716) 851-5261

3. Local Media:

Local Newspaper:

Buffalo News
1 News Plaza
Buffalo NY 14240
(716) 849-3434
http://www.buffalonews.com/classifieds/

Local Television:

WGRZ – TV Channel 2
259 Delaware Avenue
Buffalo, NY 14202
(716) 849-2200
http://www.wgrz.com/news/default.aspx

WIVB – TV Channel 4
2077 Elmwood Avenue
Buffalo, NY 14207
(716) 874-4410
http://www.wivb.com/subindex/news

WKBW – TV Channel 7
7 Broadcast Plaza
Buffalo, NY 14202
(716) 840-7777
http://www.wkbw.com/

Radio:

WBEN 930 AM Radio
500 Corporate Parkway
Amherst, NY 14226
(716) 843-0600
http://www.wben.com

WBFO 88.7 FM Radio
3435 Main Street
Buffalo, NY 14214
(716) 829-6000
http://www.wbfo.org/

Websites:

City of Buffalo website:
http://www.ci.buffalo.ny.us/

4. Local Water Supplier:

City of Buffalo Division of Water
65 Niagara Square, Room 602 City Hall
Buffalo, NY 14202
(716) 856-4664

Buffalo Water Authority
(operated by Veolia Water)
281 Exchange Street
Buffalo, NY 14204
(716) 847-1065

5. Persons Requesting to be Placed on Contact List:

To Be Completed as Necessary

6. School and Day Care Facilities:

Schools:

Marvel E. Ross-Jones
Bryant & Stratton College
465 Main Street, Suite 400
Buffalo, NY 14203
(716) 884-9120

Jack Quinn
Erie Community College
City Campus
121 Ellicott Street
Buffalo, NY 14203
(716) 851-1001

James Weimer
Public School ("PS") 302 Emerson School of Hospitality
70 West Chippewa Street
Buffalo ,NY 14202
(716) 816-2018

Daniel Zak
PS 304 Hutchinson Central Technical High School
256 South Elmwood Avenue
Buffalo, NY 14201
(716) 816-3888

Susan Doyle
PS 415 Middle Early College High School
290 Main Street
Buffalo, NY 14202
(716) 851-3763

David Hills
PS 95 Waterfront Elementary School
95 Fourth Street
Buffalo, NY 14202
(716) 816-3900

Day Care Facilities:

Brenda Feidt
ASC/ECC Child Development Center
121 Ellicott Street
Buffalo, NY 14203
(716) 851-1150

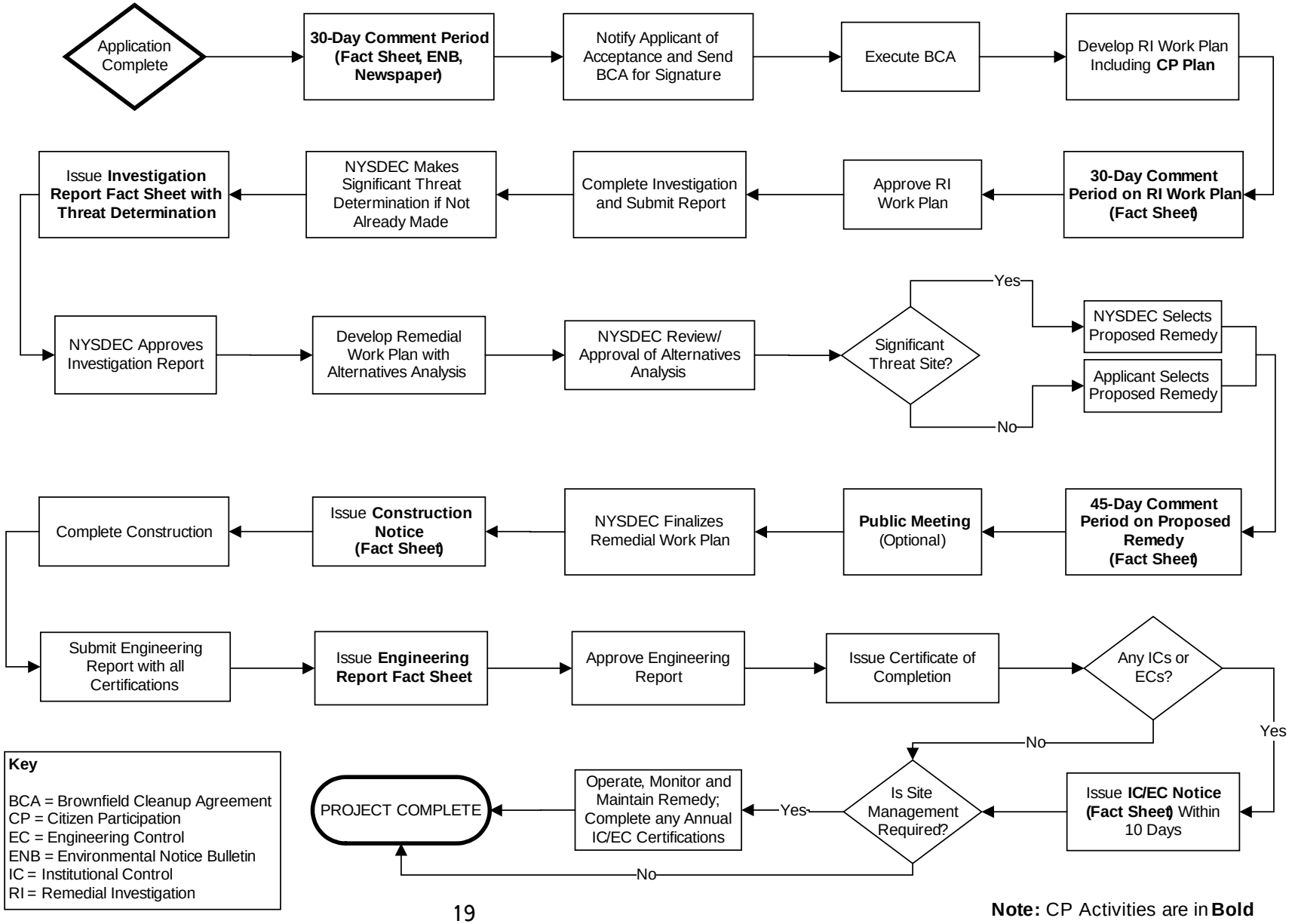
Lisa Mattucci
Bethel Head Start, Inc – EOC Center
465 Washington Street
Buffalo, NY 14203
(716) 878-0220

Ida Swiada
The Children's Place of Buffalo & Erie County
77 West Eagle Street
Buffalo, NY 14202
(716) 858-7540

Kelli Simpson
HSBC Family Center
95 Washington Street (Atrium Building)
Buffalo, NY 14203
(716) 841-5437

Appendix C Site Location Map

Appendix D– Brownfield Cleanup Program Process



Note: CP Activities are in **Bold**

APPENDIX E
COMMUNITY AIR MONITORING PLAN

Community Air Monitoring Plan

for

Proposed HARBORcenter Building
75 Main Street
Buffalo, New York 14203

Site No. C915270

December 7, 2012

Community Air Monitoring Plan

Overview

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

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Based on over 10 years of monitoring and investigation, this site contamination is known to be limited to petroleum VOCs.

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

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

<u>VOC Monitoring, Response Levels and Actions</u>

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment

should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate, such as isobutylene. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 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/m3 of the upwind level and in preventing visible dust migration.

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

Fugitive Dust and Particulate Monitoring

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

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

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

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

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number;
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;

(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50$_o$ C (14 to 122$_o$ F); and
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

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

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative, this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM-10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed.

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

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

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

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

APPENDIX F
HEALTH AND SAFETY PLAN

Health and Safety Plan for Brownfield Site Investigation

HARBORcenter Brownfield Site
75 Main Street
Buffalo, NY 14203

Site ID # C915270

Prepared by

C&S Engineers, Inc.
90 Broadway
Buffalo, New York 14203

March 2013

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FIGURES

ATTACHMENTS

APPENDICES

SECTION 1 – GENERAL INFORMATION

The Health and Safety Plan (HASP) described in this document will address health and safety considerations for all those activities that personnel employed by C&S Engineers, Inc., may be engaged in during site investigation and remediation work at the HARBORcenter Brownfield Site located at 75 Main Street in Buffalo, Erie County, New York (Site). Figure 1 shows the approximate location of the Site in downtown Buffalo, New York. This HASP will be implemented by the Health and Safety Officer (HSO) during site work.

Compliance with this HASP is required of all C&S personnel who enter this Site. The content of the HASP may change or undergo revision based upon additional information made available to the health, safety, and training (H&S) committee, monitoring results or changes in the technical scope of work. Any changes proposed must be reviewed by the H&S committee.

Responsibilities

Project Manager…….	Mark Colmerauer Phone: (716) 847-1630 Cell: (716) 570-3457
Site Health and Safety Officer……...	TBD
Emergency Coordinator…….	TBD
Health and Safety Manager……	TBD

Emergency Phone Numbers

Emergency Medical Service	911
Police: Buffalo Police Department (NYPD)	911
Hospital: Buffalo General Hospital	(716) 859-5600
Fire: Buffalo Fire Department	911
National Response Center	(800) 424-8802
Poison Control Center	(800) 222-1222
Center for Disease Control	(800) 311-3435
NYSDEC Region 9 (Buffalo, New York)	(716) 851-7220
C&S Engineers	(716) 847-1630
HARBORcenter Development	(716) 855-4428
Site Superintendent (Mortenson Construction)	TBD
Project Field Office Trailer	TBD

SECTION 2 - HEALTH AND SAFETY PERSONNEL

2.0 Health and Safety Personnel Designations

The following information briefly describes the health and safety designations and general responsibilities for this Site.

2.1 Project Manager (PM)

The PM is responsible for the overall project including the implementation of the HASP. Specifically, this includes allocating adequate manpower, equipment, and time resources to conduct Site activities safely.

2.2 Health and Safety Manager

- Has the overall responsibility for coordinating and reporting all health and safety activities and the health and safety of Site Workers.
- Must have completed, at a minimum, the OSHA 30-Hour Construction Safety Training, and either the 24-Hour training course for the Occasional Hazardous Waste Site Worker or the 40-Hour training course for the Hazardous Waste Operations Worker that meets OHSA 29 CFR 1910.
- Must have completed the 8-Hour Site supervisor/manager's course for supervisors and managers having responsibilities for hazardous waste Site operations and management.
- Directs and coordinates health and safety monitoring activities.
- Ensures that field teams utilize proper personal protective equipment (PPE).
- Conducts initial on-site specific training prior to Site Workers commencing work.
- Conducts and documents daily and periodic safety briefings.
- Ensures that field team members comply with this HASP.
- Immediately notifies the Construction Manager (CM) Project Manager and Superintendent of all accident/incidents.

- Determines upgrading or downgrading of PPE based on Site conditions and/or real time monitoring results.

- Ensures that monitoring instruments are calibrated daily or as the manufacturer's instructions determine.

- Reports to the CM Project Manager and Superintendent to provide summaries of field operations and progress.

- Submits and maintains all documentation required in this HASP and any other pertinent health and safety documentation.

2.3 Health and Safety Officer (HSO)

- Must be designated to the Health and Safety Manager by each Subcontractor as a Competent Person having, at a minimum, the OSHA 30-Hour Construction Safety Training

- Must schedule and attend a Pre-Construction Safety Meeting with the Health and Safety Manager to discuss the Subcontractor Safety Requirements and must attend the Weekly Subcontractor Coordination Meeting.

- Responsible for ensuring that their lower tier contractors comply with project safety requirements.

- Must make frequent and regular inspections of their work areas and activities and ensure hazards that are under their control are corrected immediately and all other hazards are reported to the Construction Manager's Project Manager and Health and Safety Manager.

- Must report all work related injuries, regardless of severity, to the Construction Manager's Project Manager and the Health and Safety Manager within 24 hours after they occur.

2.4 Emergency Coordinator

- The Emergency Coordinator or his on-site designee will, in concert with HARBORcenter Development, will implement the emergency response procedures whenever conditions at the Site warrant such action.

- The Emergency Coordinator or his on-site designee will be responsible for assuring the evacuation, emergency treatment, emergency transport of C&S personnel as necessary, and notification of emergency response units (refer to phone listing in the beginning of this HASP) and the appropriate management staff.

2.5 Site Workers

- Report any unsafe or potentially hazardous conditions to the Health and Safety Manager.

- Maintain knowledge of the information, instructions, and emergency response actions contained in the HASP.

- Comply with rules, regulations, and procedures as set forth in this HASP, including any revisions that are instituted.

- Prevent unauthorized personnel from entering work Site.

SECTION 3 - PERTINENT SITE INFORMATION

3.1 Site Location and General History

The HARBORcenter Brownfield Site is located on approximately 2.01 acres, which includes one parcel and a section of a public street, and has a street address 75 Main Street, Erie County, New York. The Site is within a highly urbanized area of the City of Buffalo. Further information concerning the Site is presented below.

Site Description

The Site is comprised of one tax parcel, 75 Main Street, and a section of a public street.

The Site includes a section of Washington Street. This section is a City of Buffalo Street and has no publicly available property information. This section of Washington Street runs concurrently with the eastern property line of 75 Main Street to the intersection of Washington and Perry (418 ft) and extends east 33 ft to the centerline of Washington Street. (see Figure 2: Site Aerial Photo)

The Site serves as parking space for the surrounding commercial office buildings and for visitors to the First Niagara Center. The Site boundary is bordered by the following streets:

North- Scott Street

East- Washington Street

South- Perry Street

West- Main Street

Site History and Suspect Recognized Environmental Conditions

From the late 1800s to the early 1900s, the Erie Canal Harbor District was a major commercial waterway for the City of Buffalo. As part of the Erie Canal Harbor District, the Site was within an area of dense commercial and industrial development. Subsurface soil has been impaired from 192 years of industrial and commercial uses along with unregulated deposition of backfill. Fill material extends horizontally across the entire Site and approximately 10 feet below grade. Previous investigations on-site have revealed deposits of ash, coal and slag throughout the entire extent of the Site. These deposits correlate with the following historic uses:

- Tin Shop/Ironwork
- Blacksmith
- Copper and Tin Smith
- Nickel Plating Shop
- Chemical Company
- Foundry
- Coal burning for heating furnaces

Two areas of petroleum-impacted soil contamination were discovered along the eastern property boundary, adjacent to Washington Street, and at the southwest corner of the property. Petroleum

product was observed in both areas. This petroleum contamination likely originated from the following historic uses:

- Paint/oil Storage
- Chemical Company
- Oil Refining
- Historic above and/or underground gasoline tanks

The extent of soil contamination is generally limited to the horizontal and vertical extent of the fill material layer. Fill deposits are heterogeneous and consist of a mixture of sand, silt, clay, ash/cinders, organic matter and demolition debris. Layers of ash/cinders have been observed to be 3 to 4 feet thick with scattered deposits of coal, slag, coal tar and petroleum impacted soil.

Due to the heterogeneous nature of the fill material no defined point sources of contamination can be identified. General sources of contamination are numerous and are related to previous commercial and industrial activities and unregulated depositions of urban fill across the Site.

Sampling indicates that the fill material contains concentrations of semi-volatile compounds (SVOC) and metals are above NYS Department of Environmental Conservation standards. Following is the list of metals that are above the standards:

- Arsenic
- Barium
- Cadmium
- Chromium (trivalent)
- Copper
- Lead
- Mercury
- Manganese
- Zinc

Exceedances of SVOCs typically occur in discrete deposits of ash or soil intermixed with ash/cinders. Samples indicate that detected SVOCs present in these deposits are classified as polycyclic aromatic hydrocarbons (PAH). PAH compounds are usually associated with burning of organic material (i.e. wood, coal or petroleum products).

Exposure pathway concerns with these contaminates are generally through skin absorption, ingestion and inhalation of airborne dust particles. Following guidelines described in this HASP will reduce exposure.

SECTION 4 - HAZARD ASSESSMENT AND HAZARD COMMUNICATION

Hazards to workers during a site work include typical construction-related hazards such as slip-trip-fall, equipment malfunction, faulty electrical grounding, and heat/cold/excessive noise exposure. In addition to those typical construction-related hazards, there is also the potential for chemical exposures associated with environmental conditions. The most likely routes of chemical exposure during site work tasks include skin adsorption and inhalation of airborne dust particles.

It is difficult to draw a correlation between the concentrations of contaminants found in one media and the potential for exposure to these contaminants to site workers. However, their potential presence indicates that the potential for exposure to these compounds exist, and the requirements for protective measures and monitoring of exposure is based on this potential. Pertinent information, including Material Safety Data Sheets (MSDS), regarding chemicals suspected to have been used at the Site or potentially present at the Site, are provided in Appendix A.

SECTION 5 - TRAINING

5.1 Site-specific Training

Training will be provided that specifically addresses the activities, procedures, monitoring, and equipment for the Site operations prior to going on site. Training will include familiarization with Site and facility layout, known and potential hazards, and emergency services at the Site, and details all provisions contained within this HASP. This training will also allow Site Workers

to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

5.2 Safety Briefings

C&S project personnel will be given briefings by the HSO on a daily or as needed basis to further assist Site Workers in conducting their activities safely. Pertinent information will be provided when new operations are to be conducted. Changes in work practices must be implemented due to new information made available, or if Site or environmental conditions change. Briefings will also be given to facilitate conformance with prescribed safety practices. When conformance with these practices is not occurring or if deficiencies are identified during safety audits, the project manager will be notified.

SECTION 6 - ZONES

Four types of Site activity zones are identified for the Brownfield investigation activities, including the Exclusion Zone, Contamination Reduction Zone, Remediation Zone and the Support Zone. Prior to commencement of field work a further definition of where these zones will be set up will be established.

6.1 Exclusion Zone

The area where the unexpected condition is discovered would be considered the Exclusion Zone (EZ). All excavation and handling of contaminated materials generated as a result of the discovery of an unexpected condition would take place within the EZ. This zone will be clearly delineated by hay bales, jersey barriers, and/or similar methods. Safety tape may be used as secondary delineation within the EZ. The zone delineation markings may be opened in areas for varying lengths of time to accommodate equipment operation or specific construction activities. The Site Safety Manager/Director may establish more than one EZ where different levels of protection may be employed or where different hazards exist. Site Workers will not be allowed in the EZ without:

- A buddy (co-worker);
- Appropriate PPE in accordance with OSHA regulations;

- Medical authorization; and
- Training certification in accordance with 29 CFR 1910.120.

6.2 Contamination Reduction Zone

A Contamination Reduction Zone (CRZ) will be established between the EZ and the property limits. The CRZ contains the Contamination Reduction Corridor (CRC) and provides an area for decontamination of Site equipment. The CRZ will be used for general Site entry and egress, in addition to access for heavy equipment and emergency support services. Site Workers will not be allowed in the CRZ without:

- A buddy (co-worker);
- Appropriate PPE in accordance with OSHA regulations;
- Medical authorization; and
- Training certification in accordance with 29 CFR 1910.120.

In addition, the CRZ will include a Site Worker Cleaning Area that will include a field wash station for Site Workers, equipment, and PPE to allow Site Workers to wash their hands, arms, neck, and face after exiting areas of grossly contaminated soil or hazardous materials. All Site Workers will be required to pass through the Site Worker Cleaning Area and wash their hands and remove any loose fill and soils from their clothing and boots prior to exiting the CRZ.

6.3 Remediation Zone

A Remediated Zone (RZ) will be established in portions of the Site where the remediation has been completed and only general construction work will be performed. Setup of the RZ will consist of implementing several measures designed to reduce the risk of workers' exposure and prevent non-trained workers from entering the non-remediated zone. Non-trained workers will work only in areas where the potential for exposure has been minimized by removal of all hazardous materials. The remediated zone will then be separated from the non-remediated zone by installing and maintaining temporary plywood or other construction fences along the boundary between the two zones. If potentially impacted material is uncovered in the RZ, all

non-trained workers will be removed and the Site Safety Manager/Director will assess the potential risks. If, at any other time, the risk of exposure increases while non-trained workers are present in the RZ, the non-trained workers will be removed. At all times, when non- trained workers are present in the RZ, air monitoring for the presence of VOCs will be conducted in the RZ, as well as at the fence line of the non-remediated zone.

6.4 Support Zone

The Support Zone (SZ) will be an uncontaminated area that will be the field support area for the Site operations. The SZ will contain the temporary project trailers and provide for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated equipment or materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples. Meteorological conditions will be observed and noted from this zone, as well as those factors pertinent to heat and cold.

SECTION 7 - PERSONAL PROTECTIVE EQUIPMENT

7.1 General

The level of protection to be worn by field personnel will be defined and controlled by the HSO. Depending upon the type and levels of material present or anticipated at the site, varying degrees of protective equipment will be needed. If the possible hazards are unknown, a reasonable level of protection will be taken until sampling and monitoring results can ascertain potential risks. The levels of protection listed below are based on USEPA Guidelines. A list of the appropriate clothing for each level is also provided.

Level A protection must be worn when a reasonable determination has been made that the highest available level of respiratory, skin, eye, and mucous membrane protection is needed. It should be noted that while Level A provides maximum available protection, it does not protect against all possible hazards. Consideration of the heat stress that can arise from wearing Level A protection should also enter into the decision making process. Level A protection includes:

- Open circuit, pressure-demand self-contained breathing apparatus (SCBA)
- Totally encapsulated chemical resistant suit
- Gloves, inner (surgical type)

- Gloves, outer, chemical protective
- Boots, chemical protective

Level B protection must be used when the highest level of respiratory protection is needed, but hazardous material exposure to the few unprotected areas of the body (e.g., the back of the neck) is unlikely. Level B protection includes:

- Open circuit, pressure-demand SCBA or pressure airline with escape air bottle
- Chemical protective clothing: Overalls and long sleeved jacket; disposal chemical resistant coveralls; coveralls; one or two piece chemical splash suit with hood
- Gloves, inner (surgical type)
- Gloves, outer, chemical protective
- Boots, chemical protective

Level C must be used when the required level of respiratory protection is known, or reasonably assumed to be, not greater than the level of protection afforded by air purifying respirators; and hazardous materials exposure to the few unprotected areas of the body (e.g.., the back of the neck) is unlikely. Level C protection includes:

- Full or half face air-purifying respirator
- Chemical protective clothing: Overalls and long-sleeve jacket; disposable chemical resistant coveralls; coveralls; one or two piece chemical splash suit
- Gloves, inner (surgical type)
- Gloves, outer, chemical protective
- Boots, chemical protective

Level D is the basic work uniform. It cannot be worn on any site where respiratory or skin hazards exist. Level D protection includes:

- Safety boots/shoes
- Safety glasses
- Hard hat with optional face shield

Note that the use of SCBA and airline equipment is contingent upon the user receiving special training in the proper use and maintenance of such equipment.

7.2 Personal Protective Equipment – Site Specific

Level D with some modification will be required when working in the work zone on this Site. In addition to the basic work uniform specified by Level D protection, Nitrile gloves will be required when contact with soil or ground water is likely. Hearing protection will be worn when power equipment is used to perform subsurface investigation work. An upgrade to a higher level (Level C) of protection may occur if determined necessary by the HSO.

SECTION 8 - MONITORING PROCEDURES

8.1 Monitoring During Site Operations

All Site environmental monitoring should be accompanied by periodic meteorological monitoring of appropriate climatic conditions.

8.1.1 Drilling Operations (Monitoring Well Installation and Subsurface Borings) and Test Pit Excavations

Monitoring will be performed by the HSO or drilling observer during the conduct of work. A photoionization detector (PID) equipped with a 10.0 eV lamp will be utilized to monitor for the presence of volatile organic vapors within the breathing zone, the borehole, and subsurface samples upon their retrieval. Drill cuttings and excavation spoils will also be monitored by use of the PID. The PID will be field checked for calibration accuracy three times per day (morning, lunch, and end of day. If subsurface conditions warrant, a combustible gas indicator (CGI) with oxygen alarm may also be used to monitor the borehole for the presence of combustible gases. Similar monitoring of fluids produced during well development will also be conducted.

8.1.2 Interim Remedial Measures

If future Interim Remedial Measures (IRM) occurs, monitoring will be performed during excavation and sampling operations when C&S personnel are within the work zone. Although historical information previously obtained at the Site indicates low level of volatile organic vapors and compounds, a photoionization detector (PID) will be used during subsurface activities. If an IRM is performed, the, the remedial contractor will be required to employ dust control practices during work.

8.2 Action Levels

If readings on the PID exceed 10 ppm for more than fifteen minutes consecutively, then personal protective equipment should be upgraded to Level C. The air purifying respirator used with Level C protective equipment must be equipped with organic vapor cartridges. If readings on the explosive gas meter are within a range of 10%-25% of the LEL then continuous monitoring will be implemented. Readings above 25% of the LEL indicate the potential for an explosive condition. Sources of ignition should be removed and the Site should be evacuated.

8.3 Personal Monitoring Procedures

Personal monitoring shall be performed as a contingency measure in the event that VOC concentrations are consistently above the 10 ppm action level as detected by the PID. If the concentration of VOCs is above this action level, then amendments to the HASP must be made before work can continue at the Site.

SECTION 9 - COMMUNICATIONS

A phone will be located on Site to be utilized by personnel conducting investigation and IRM efforts. Cell phones will be the primary means of communicating with emergency support services/facilities.

SECTION 10 - SAFETY CONSIDERATIONS FOR SITE OPERATIONS

10.1 General

Standard safe work practices that will be followed include:

- Do not climb over/under drums, or other obstacles.
- Do not enter the work zone alone.
- Practice contamination avoidance, on and off-site.
- Plan activities ahead of time, use caution when conducting concurrently running activities.
- No eating, drinking, chewing or smoking is permitted in work zones.
- Due to the unknown nature of waste placement at the Site, extreme caution should be practiced during excavation activities.
- Apply immediate first aid to any and all cuts, scratches, abrasions, etc.

- Be alert to your own physical condition. Watch your buddy for signs of fatigue, exposure, etc.
- A work/rest regimen will be initiated when ambient temperatures and protective clothing create a potential heat stress situation.
- No work will be conducted without adequate natural light or without appropriate supervision.
- Task safety briefings will be held prior to onset of task work.
- Ignition of flammable liquids within or through improvised heating devices (barrels, etc.) or space heaters is forbidden.
- Entry into areas of spaces where toxic or explosive concentrations of gases or dust may exist without proper equipment is prohibited.
- Any injury or unusual health effect must be reported to the Site health and safety officer.
- Prevent splashing or spilling of potentially contaminated materials.
- Use of contact lenses is prohibited while on site.
- Beards and other facial hair that would impair the effectiveness of respiratory protection are prohibited if respiratory protection is necessary.
- Field crew members should be familiar with the physical characteristics of investigations, including:
  - Wind direction in relation to potential sources
  - Accessibility to co-workers, equipment, and vehicles
  - Communication
  - Hot zones (areas of known or suspected contamination)
  - Site access
  - Nearest water sources
- The number of personnel and equipment in potentially contaminated areas should be minimized consistent with site operations.

10.2 Field Operations

10.2.1 Intrusive Operations

The HSO or designee will be present on-site during all intrusive work, e.g., drilling operations, excavations, trenching, and will provide monitoring to oversee that appropriate levels of protection and safety procedures are utilized by C&S Engineers, Inc., personnel. The use of salamanders or other equipment with an open flame is prohibited and the use of protective clothing, especially hard hats and boots, will be required during drilling or other heavy equipment operations.

10.2.2 Excavations and Excavation Trenching

Guidance relating to safe work practices for C&S employees regarding excavations and excavating/trenching operation is presented in Appendix B of this HASP.

SECTION 11 - DECONTAMINATION PROCEDURES

Decontamination involves physically removing contaminants and/or converting them chemically into innocuous substances. Only general guidance can be given on methods and techniques for decontamination. Decontamination procedures are designed to:

- Remove contaminant(s).
- Avoid spreading the contamination from the work zone.
- Avoid exposing unprotected personnel outside of the work zone to contaminants.

Contamination avoidance is the first and best method for preventing spread of contamination from a hazardous site. Each person involved in site operations must practice the basic methods of contamination avoidance listed below. Additional precautions may be required in the HASP.

- Know the limitations of all protective equipment being used.
- Do not enter a contaminated area unless it is necessary to carry out a specific objective.
- When in a contaminated area, avoid touching anything unnecessarily.
- Walk around pools of liquids, discolored areas, or any area that shows evidence of possible contamination.
- Walk upwind of contamination, if possible.
- Do not sit or lean against anything in a contaminated area. If you must kneel (e.g., to take samples), use a plastic ground sheet.

- If at all possible, do not set sampling equipment directly on contaminated areas. Place equipment on a protective cover such as a ground cloth.
- Use the proper tools necessary to safely conduct the work.

Specific methods that may reduce the chance of contamination are:

- Use of remote sampling techniques.
- Opening containers by non-manual means.
- Bagging monitoring instruments.
- Use of drum grapplers.
- Watering down dusty areas.

Equipment which will need to be decontaminated includes tools, monitoring equipment, and personal protective equipment. Items to be decontaminated will be brushed off, rinsed, and dropped into a plastic container supplied for that purpose. They will then be washed with a detergent solution and rinsed with clean water. Monitoring instruments may be wrapped in plastic bags prior to entering the field in order to reduce the potential for contamination. Instrumentation that is contaminated during field operations will be carefully wiped down. Heavy equipment, if utilized for operations where it may be contaminated, will have prescribed decontamination procedures to prevent contaminant materials from potentially leaving the Site. On-site contractors, such as drillers or backhoe operators, will be responsible for decontaminating all construction equipment prior to demobilization.

SECTION 12 – DISPOSAL PROCEDURES

All discarded materials, waste materials, or other objects shall be handled in such a way as to reduce or eliminate the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left on-site. All potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary and segregated for proper disposal. All contaminated waste materials shall be disposed of as required by the provisions included in the contract and consistent with regulatory provisions. All non-contaminated materials shall be collected and bagged for appropriate disposal. Investigation derived waste will be managed consistent with the work plan for this Site and DER-10 Technical Guidance for Site Investigation and Remediation dated May 2010.

SECTION 13 - EMERGENCY RESPONSE PROCEDURES

As a result of the hazards at the Site, and the conditions under which operations are conducted, there is the possibility of emergency situations. This section establishes procedures for the implementation of an emergency plan.

13.1 Emergency Coordinator

Emergency Coordinator: .....TBD.....Work Phone: TBD

The Emergency Coordinator or his on-site designee will, in concert with HARBORcenter Development will implement the emergency response procedures whenever conditions at the Site warrant such action. The Emergency Coordinator or his on-site designee will be responsible for assuring the evacuation, emergency treatment, emergency transport of C&S personnel as necessary, and notification of emergency response units (refer to phone listing in the beginning of this HASP) and the appropriate management staff.

13.2 Evacuation

In the event of an emergency situation, such as fire, explosion, significant release of toxic gases, etc., all personnel will evacuate and assemble in a designated assembly area. The Emergency Coordinator or his on-site designee will have authority to contact outside services as required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The Emergency Coordinator or his on-site designee must see that access for emergency equipment is provided and that all ignition sources have been shut down once the emergency situation is established. Once the safety of all personnel is established, the Fire Department and other emergency response groups will be notified by telephone of the emergency.

13.3 Potential or Actual Fire or Explosion

Immediately evacuate the Site and notify local fire and police departments, and other appropriate emergency response groups, if LEL values are above 25% in the work zone or if an actual fire or explosion has taken place.

13.4 Environmental Incident (spread or release of contamination)

Control or stop the spread of contamination if possible. Notify the Emergency Coordinator and the Project Manager. Other appropriate response groups will be notified as appropriate.

13.5 Personnel Injury

Emergency first aid shall be applied on-site as necessary. Then, decontaminate (en route if necessary) and transport the individual to nearest medical facility if needed. The ambulance/rescue squad shall be contacted for transport as necessary in an emergency. The directions to the hospital are shown in Section 1 of this HASP and a map is shown in Attachment A.

13.6 Personnel Exposure

- *Skin Contact*: Use copious amounts of soap and water. Wash/rinse affected area thoroughly, and then provide appropriate medical attention. Eyes should be thoroughly rinsed with water for at least 15 minutes.
- *Inhalation*: Move to fresh air and/or, if necessary, decontaminate and transport to emergency medical facility.
- *Ingestion*: Decontaminate and transport to emergency medical facility.
- *Puncture Wound/Laceration*: Decontaminate, if possible, and transport to emergency medical facility.

13.7 Adverse Weather Conditions

In the event of adverse weather conditions, the HSO will determine if work can continue without sacrificing the health and safety of field workers.

13.8 Incident Investigation and Reporting

In the event of an incident, procedures discussed in the Medical Emergency/Incident Response Protocol, presented in Appendix D of this HASP, shall be followed.

SECTION 14 - COMMUNITY RELATIONS

14.1 Community Health and Safety Plan

14.1.1 Community Health and Safety Monitoring

As part of the site work, three general types of efforts are scheduled, including, non-intrusive reconnaissance tasks, sampling or monitoring tasks (monitoring point sampling), and intrusive tasks (test trenching, subsurface borings, monitoring well installation). During completion of general reconnaissance and sampling or monitoring tasks, potential for health and safety risks to off-site landowners or the local community are not anticipated.

During completion of intrusive efforts at or adjacent to the Site, health and safety monitoring efforts will be concentrated on the area or areas in which intrusive efforts are being completed. Since the air pathway is the most available and likely avenue for the release of potential contaminants to the atmosphere at or near the Site, in addition to limiting public or community access to the areas in which intrusive efforts are completed, health and safety measures will primarily consist of monitoring the air pathway for worker exposure.

14.1.2 Community Air Monitoring Plan

Efforts will be taken to complete field work in a manner which will minimize the creation of airborne dust or particulates. Under dry conditions, work areas may be wetted to control dust. During periods of extreme wind, intrusive field work may be halted until such time as the potential for creating airborne dust or particulate matter as a result of investigation activities is limited. Periodic monitoring following the guidelines of the site's Community Air Monitoring Plan (see Appendix F of the IRM) will be implemented during all non-intrusive Site investigation activities, including surface soil and sediment sampling, and collection of groundwater samples from groundwater monitoring wells.

During completion of Site investigation, a community air monitoring plan meeting the requirements of the site's Community Air Monitoring Plan (see Appendix F of the IRM) will be implemented for the duration of intrusive activities. These additional air monitoring activities will include establishment of background conditions, continuous monitoring for volatile organic compounds and/or particulates at the downwind work area (exclusion zone) perimeter, recording

of monitoring data, and institution and documentation of Response Levels and appropriate actions in accordance with NYSDOH guidance.

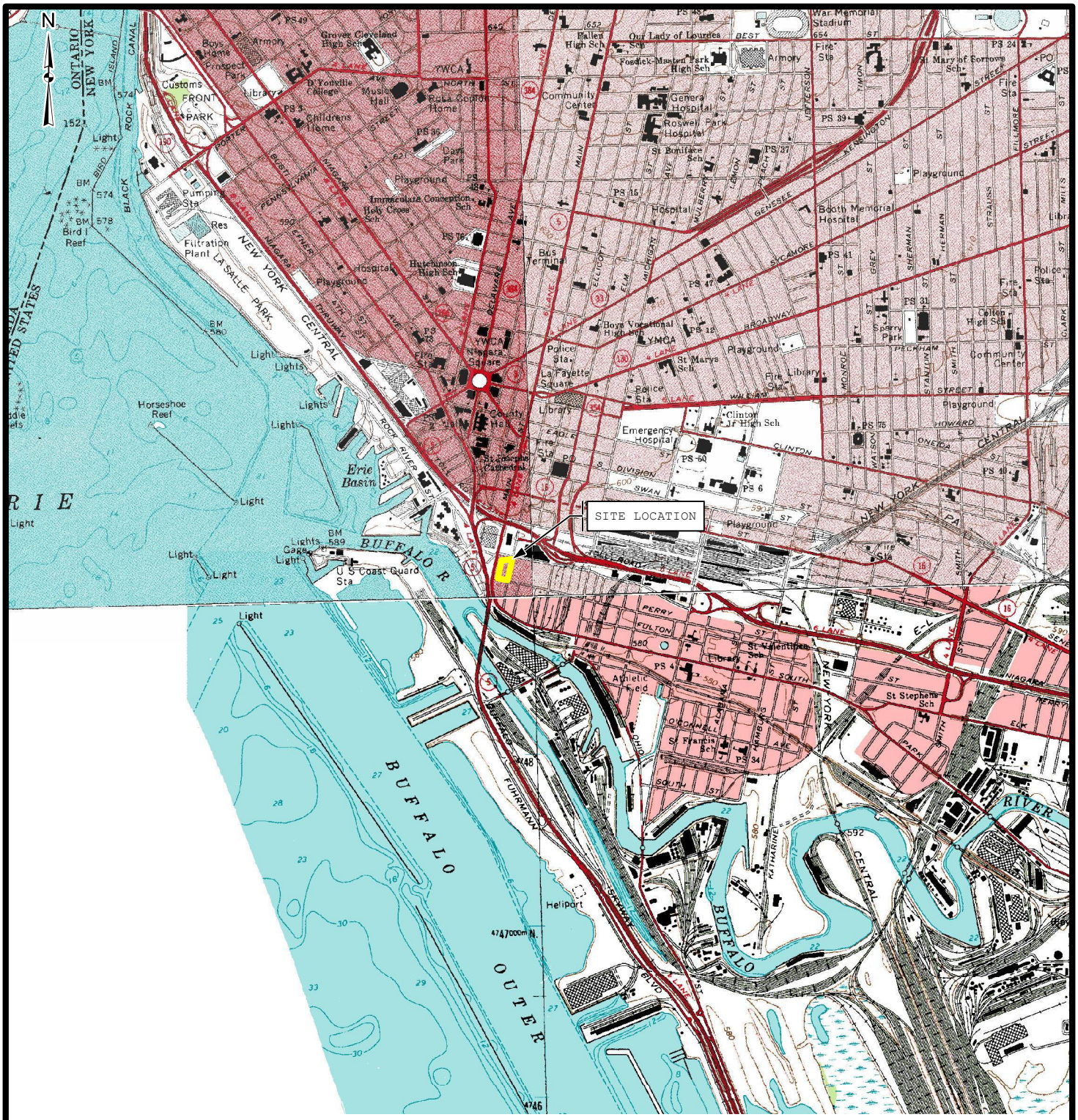
SECTION 15 - AUTHORIZATIONS

Personnel authorized to enter the Site while operations are being conducted must be approved by the HSO. Authorization will involve completion of appropriate training courses, medical examination requirements, and review and sign-off of this HASP. No C&S personnel should enter the work zone alone. Each site visitor should check in with the HSO or Project Manager prior to entering the work zones.

FIGURE 1

SITE LOCATION MAP

C&S ENGINEERS



SOURCE: USGS 7.5' Quadrangles - Buffalo NE, New York - 1965 and Buffalo NW, New York - 1995.

0 1,000 2,000 4,000 Feet

HARBORcenter Development LLC
1 Seymour H. Knox III Plaza
Buffalo, NY 14203

SITE LOCATION

C&S Engineers, Inc.
90 Broadway
Syracuse, New York 14203
Phone: 716-847-1630
Fax: 716-847-1454
www.cscos.com

WEBSTER BLOCK - BROWNFIELD CLEANUP
75 MAIN STREET
BUFFALO, ERIE COUNTY, NEW YORK

FIGURE 1

ACP-NY F:\PROJECT\510NY051\GIS\ArcMap\SiteLocation.mxd Date: 9/21/2010 10:21:50 AM Name: 5mccabs

FIGURE 2

SITE AERIAL PHOTO

C&S ENGINEERS

Location Map

Legend

- Parcel Boundary
- BCP Boundary

Notes

1) Digital orthophotographs obtained from NYS GIS Clearinghouse. City of Buffalo, 2008. 12 in Resolution.

2) Coordinate System: NAD 1983 StatePlane NY West FIPS 3103
Projection: Transverse Mercator
Datum: North American 1983
Units: Foot US

0 60 120 Feet

C&S COMPANIES®
C&S Engineers, Inc.
90 Broadway
Buffalo, New York 14203
Phone: 716-847-1630
Fax: 716-847-1454
www.cscos.com

HARBORcenter Development LLC
1 Seymour H. Knox III Plaza
Buffalo, NY 14203

N

WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM
CITY OF BUFFALO, NY

No.	DATE	REVISIONS

PROJECT NO:	M86.001.001
DATE:	October 24, 2012
SCALE:	1" = 60'
DRAWN BY:	CAM
DESIGNED BY:	CAM
CHECKED BY:	MJC

SITE AERIAL PHOTO

FIGURE 2

Path: F:\Project\M86- HARBORcenter Development LLC\M86001001 - HARBORcenter\Environmental\CADD-GIS\GIS\Projects\PROPERTY_MAP.mxd

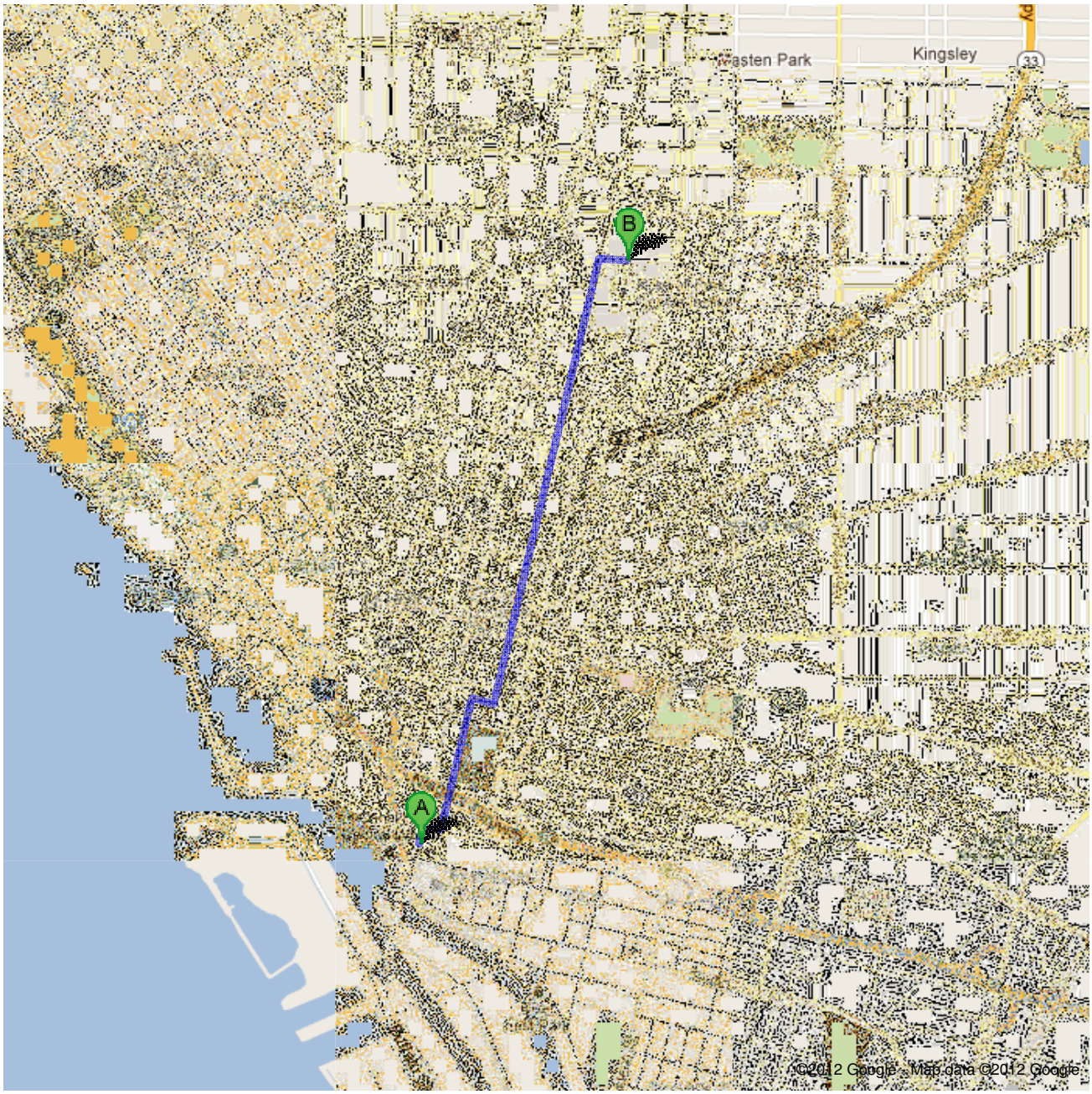
ATTACHMENT A

MAP TO HOSPITAL

C&S ENGINEERS

Google

Directions to 100 High St, Buffalo, NY 14203
1.9 mi – about **10 mins**



A 75 Main St, Buffalo, NY 14203

1.	Head **north** on **Main St** toward **Marine Dr**	go 210 ft total 210 ft
2.	Turn right onto **Scott St**	go 266 ft total 476 ft
3.	Take the 1st left onto **Washington St** About 2 mins	go 0.4 mi total 0.5 mi
4.	Turn right onto **S Division St**	go 331 ft total 0.5 mi
5.	Take the 1st left onto **Ellicott St** About 6 mins	go 1.3 mi total 1.8 mi
6.	Turn right onto **High St** Destination will be on the left	go 417 ft total 1.9 mi

B 100 High St, Buffalo, NY 14203

Appendix A

MSDS SITE INVESTIGATION SUSPECTED CONTAMINANTS

C&S ENGINEERS

3E Company
3207 Grey Hawk Court, Suite 200
Carlsbad, CA 92010
U.S. Toll Free: 1-800-451-8346 or 1-760-602-8703
North America: 1-800-931-0537/Mexico 00-1-800-931-0537 or 1-760-602-8822
Fax: 1-760-602-8888
Email: msds@3ecompany.com

Material Safety Data Sheet Transmittal Form

November 30, 2012

Request #: 252577
Processed By: cleal

Recipient:

CODY MARTIN

Email: CMARTIN@CSCOS.COM

Requester:

CODY MARTIN
EMPLOYEE
Email: CMARTIN@CSCOS.COM
Phone: 716-847-1630

Thank you for using 3E's MSDS Paperless Compliance™ service. This service may eliminate the requirement to maintain MSDS on site. Below is a list of the MSDS you requested. Please verify that the MSDS sheet(s) enclosed/attached match what you have ordered.

PID/VID	Manufacturer ORDERED/Actual	Product Name ORDERED/Actual	UPC	Item
v4395696	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	BENZO(A)ANTHRACENE/Benzo[a]anthracene Solution		
v5115657	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	BENZO(A)PYRENE/Benzo[a]pyrene Solution		
v5565005	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	BENZO(B)FLUORANTHENE/Benzo[b]fluoranthene Solution		
v5031501	GENERIC/AccuStandard Inc.	BENZO(K)FLUORANTHENE/Benzo(K)fluoranthene		
v5315474	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	CHRYSENE/Chrysene		
v5573134	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	FLUORANTHENE/Fluoranthene		
v5271196	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	FLUORENE/Fluorene		

PID/VID	Manufacturer ORDERED/Actual	Product Name ORDERED/Actual	UPC	Item
v5449738	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	NAPHTHALENE/Naphthalene		
v5417972	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	PHENANTHRENE/Phenanthrene Solution		
v5517673	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	PYRENE/Pyrene		
v5380102	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	ARSENIC/Arsenic		
p2365951	GENERIC/PolyOne Corporation	BARIUM/Barium		
p2650854	GENERIC/Sigma-Aldrich	CADMIUM/Cadmium		
v3360110	GENERIC/Hach Co.	CHROMIUM (TRIVALENT)/Chromium Trivalent Standard Solution 12,5 Mg/L As Cr+3		
v5445185	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	COPPER/Copper		
v5485116	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	LEAD/Lead		
v5523794	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	MERCURY/Mercury		
v5418301	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	MANGANESE/Manganese		
v5418715	GENERIC/Sigma Aldrich Chemical Company Inc. / SAFC	ZINC/Zinc		
p3030098	GENERIC/AccuStandard, Inc.	INDENO (1,2,3-CD)PYRENE/Indeno(1,2,3-Cd)pyrene		

END OF ORDER DETAIL - Request# 252577

Material Safety Data Sheet

Version 3.3
Revision Date 01/12/2011
Print Date 01/16/2011

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Benz[a]anthracene solution

Product Number : 48651
Brand : Supelco
Product Use : For laboratory research purposes.

Supplier : Sigma-Aldrich Canada, Ltd
2149 Winston Park Drive
OAKVILLE ON L6H 6J8
CANADA

Manufacturer : Sigma-Aldrich Corporation
3050 Spruce St.
St. Louis, Missouri 63103
USA

Telephone : +19058299500
Fax : +19058299292
Emergency Phone # (For both supplier and manufacturer) : 1-800-424-9300
Preparation Information : Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

Target Organs

Liver, pancreas, Blood, Central nervous system, Heart, Kidney

WHMIS Classification

D1B	Toxic Material Causing Immediate and	Toxic
D2A	Serious Toxic Effects	Carcinogen
D2B		Moderate skin irritant

HMIS Classification

Health hazard: 2
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 1

Potential Health Effects

Inhalation May be harmful if inhaled. Causes respiratory tract irritation.
Skin Harmful if absorbed through skin. Causes skin irritation.
Eyes Causes eye irritation.
Ingestion Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : $C_{18}H_{12}$

CAS-No.	EC-No.	Index-No.	Concentration
Methylene chloride			
75-09-2	200-838-9	602-004-00-3	>= 99.98 - <= 100 %
Benz[a]anthracene			
56-55-3	200-280-6	601-033-00-9	<= 0.02 %

4. FIRST AID MEASURES

General advice
Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

5. FIRE-FIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products

no data available**Explosion data - sensitivity to mechanical impact**
no data available

Explosion data - sensitivity to static discharge
no data available

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Avoid breathing vapors, mist or gas.

Environmental precautions
Do not let product enter drains.

Methods and materials for containment and cleaning up
Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Heat sensitive.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Methylene chloride	75-09-2	TWA	25 ppm	Canada. British Columbia OEL

Remarks	IARC "2B" applies to substances deemed possibly carcinogenic to humans.			
		TWAE V	50 ppm 175 mg/m3	Canada. Ontario OELs
		TWA	50 ppm 174 mg/m3	Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)
		TWA	50 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Central Nervous System impairment Carboxyhemoglobinemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans: The agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that may not be relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence does not suggest that the agent is lilkely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.			
		TWAE V	50 ppm 174 mg/m3	Canada. Quebec OELs
	A substance to which exposure must be reduced to a minimum in accordance with section 42 Carcinogenic effect suspected in humans			

Personal protective equipment

Respiratory protection
Respiratory protection not required. For nuisance exposures use type OV/AG (US) or type ABEK (EU EN 14387) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
General industrial hygiene practice.

Specific engineering controls
Use mechanical exhaust or laboratory fumehood to avoid exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid
Colour	no data available

Safety data

pH	no data available
Melting/freezing point	no data available
Boiling point	no data available

Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Bases, Alkali metals, Strong acids and strong bases, Strong oxidizing agents, Amines, Vinyl compounds, Aluminum, Magnesium

Hazardous decomposition products
no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
Eyes: no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Methylene chloride)

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	Harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure
Dichloromethane is metabolized in the body producing carbon monoxide which increases and sustains carboxyhemoglobin levels in the blood, reducing the oxygen-carrying capacity of the blood., Acts as a simple asphyxiant by displacing air., anesthetic effects, Breathing difficulties, Headache, Dizziness, Prolonged or repeated contact with skin may cause:, defatting, Dermatitis, Contact with eyes can cause:, Redness, Blurred vision, Provokes tears.

Synergistic effects
no data available

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity

no data available

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 1593 Class: 6.1 Packing group: III
Proper shipping name: Dichloromethane
Reportable Quantity (RQ): 1000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 1593 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: DICHLOROMETHANE
Marine pollutant: No

IATA
UN-Number: 1593 Class: 6.1 Packing group: III
Proper shipping name: Dichloromethane

15. REGULATORY INFORMATION

DSL Status
This product contains the following components listed on the Canadian NDSL list. All other components are on the Canadian DSL list.

	CAS-No.
Benz[a]anthracene	56-55-3

WHMIS Classification

D1B	Toxic Material Causing Immediate and	Toxic
D2A	Serious Toxic Effects	Carcinogen
D2B		Moderate skin irritant

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

16. OTHER INFORMATION

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Version 3.3
Revision Date 11/22/2011
Print Date 01/24/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Benzo[*a*]pyrene solution
Product Number	:	48665
Brand	:	Supelco
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Carcinogen, Target Organ Effect, Harmful by ingestion., Irritant

Target Organs

Liver, pancreas, Blood, Central nervous system, Heart, Kidney

GHS Classification
Acute toxicity, Oral (Category 4)
Skin irritation (Category 2)
Eye irritation (Category 2B)
Carcinogenicity (Category 2)

GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)

H302	Harmful if swallowed.
H315 + H320	Causes skin and eye irritation.
H351	Suspected of causing cancer.

Precautionary statement(s)

P281	Use personal protective equipment as required.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical hazards:	1

NFPA Rating

Health hazard: 2
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. Causes respiratory tract irritation.
Skin Harmful if absorbed through skin. Causes skin irritation.
Eyes Causes eye irritation.
Ingestion Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : $C_{20}H_{12}$ $C_{20}H_{12}$
Molecular Weight : 252.31 g/mol

Component		Classification	Concentration
Methylene chloride			
CAS-No. EC-No. Index-No.	75-09-2 200-838-9 602-004-00-3	Carc. 2; H351	-

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

4. FIRST AID MEASURES

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store under inert gas.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Remarks	Potential Occupational Carcinogen See Appendix A			
Methylene chloride	75-09-2	TWA	50 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Central Nervous System impairment Carboxyhemoglobinemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans: The agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that may not be relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence does not suggest that the agent is likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.			
	Substance listed; for more information see OSHA document 1910.1052			
	See 1910.1052			
Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen: Human data are accepted as adequate in quality but are conflicting or insufficient to classify the agent as a confirmed human carcinogen; OR, the agent is carcinogenic in experimental animals at dose(s), by route(s) of exposure, at site(s), of histologic type(s), or by mechanism(s) considered relevant to worker exposure. The A2 is used primarily when there is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals with relevance to humans.			
Benzo[a]pyrene	50-32-8	TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.2 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	0.2 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Bases, Alkali metals, Strong acids and strong bases, Strong oxidizing agents, Amines, Vinyl compounds, Aluminum, Magnesium

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
Eyes: no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Methylene chloride)

NTP: Reasonably anticipated to be a human carcinogen (Methylene chloride)

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	Harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure

Dichloromethane is metabolized in the body producing carbon monoxide which increases and sustains carboxyhemoglobin levels in the blood, reducing the oxygen-carrying capacity of the blood., Acts as a simple asphyxiant by displacing air., anesthetic effects, Breathing difficulties, Headache, Dizziness, Prolonged or repeated contact with skin may cause:, defatting, Dermatitis, Contact with eyes can cause:, Redness, Blurred vision, Provokes tears.

Synergistic effects
no data available

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity

no data available

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1593 Class: 6.1 Packing group: III
Proper shipping name: Dichloromethane, solution
Reportable Quantity (RQ): 1000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1593 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: DICHLOROMETHANE, SOLUTION
Marine pollutant: No

IATA
UN number: 1593 Class: 6.1 Packing group: III
Proper shipping name: Dichloromethane, solution

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen, Target Organ Effect, Harmful by ingestion., Irritant

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01
Benzo[a]pyrene	50-32-8	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01
Benzo[a]pyrene	50-32-8	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-09-28
Benzo[a]pyrene	50-32-8	1990-01-01

16. OTHER INFORMATION

Text of H-code(s) and R-phrase(s) mentioned in Section 3

Carc.	Carcinogenicity
H351	Suspected of causing cancer.

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Version 3.4
Revision Date 01/19/2012
Print Date 11/06/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Benzo[*b*]fluoranthene solution
Product Number	:	48637
Brand	:	Supelco
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Target Organ Effect, Toxic by inhalation., Toxic by ingestion, Toxic by skin absorption, Irritant

Target Organs

Eyes, Kidney, Liver, Heart, Central nervous system

GHS Classification
Flammable liquids (Category 2)
Acute toxicity, Oral (Category 3)
Acute toxicity, Inhalation (Category 3)
Acute toxicity, Dermal (Category 3)
Skin irritation (Category 2)
Eye irritation (Category 2A)
Specific target organ toxicity - single exposure (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H225	Highly flammable liquid and vapour.
H301 + H311	Toxic if swallowed or in contact with skin
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H331	Toxic if inhaled.
H370	Causes damage to organs.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P280	Wear protective gloves/ protective clothing.

P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P307 + P311	IF exposed: Call a POISON CENTER or doctor/ physician.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical hazards:	0

NFPA Rating

Health hazard:	2
Fire:	3
Reactivity Hazard:	0

Potential Health Effects

Inhalation	Toxic if inhaled. Causes respiratory tract irritation.
Skin	Toxic if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : $C_{20}H_{12}$ $C_{20}H_{12}$

Molecular Weight : 252.31 g/mol

Component		Classification	Concentration
Methanol			
CAS-No. EC-No. Index-No.	67-56-1 200-659-6 603-001-00-X	Flam. Liq. 2; Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2; STOT SE 1; H225, H301 + H311 + H331, H315, H319, H370	-

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Methanol	67-56-1	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Headache Eye damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Danger of cutaneous absorption			
		STEL	250 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Headache Eye damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Danger of cutaneous absorption			
		TWA	200 ppm 260 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation			
		STEL	250 ppm 325 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation			
		TWA	200 ppm 260 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m3 is approximate.			
		TWA	200 ppm 260 mg/m3	USA. NIOSH Recommended Exposure Limits
	Potential for dermal absorption			

		ST	250 ppm 325 mg/m3	USA. NIOSH Recommended Exposure Limits
	Potential for dermal absorption			

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	no data available
Boiling point	no data available
Flash point	11 °C (52 °F) - closed cup
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available

Evaporation rate no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions

Vapours may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

Materials to avoid
Acids, Oxidizing agents, Alkali metals, Acid chlorides, Acid anhydrides, Reducing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
Eyes: no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	Toxic if inhaled. Causes respiratory tract irritation.
Ingestion	Toxic if swallowed.
Skin	Toxic if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure
Methyl alcohol may be fatal or cause blindness if swallowed., Cannot be made non-poisonous., Effects due to ingestion may include:, Nausea, Dizziness, Gastrointestinal disturbance, Weakness, Confusion., Drowsiness, Unconsciousness, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity

no data available

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1230 Class: 3 Packing group: II
Proper shipping name: Methanol, solution
Reportable Quantity (RQ): 5000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1230 Class: 3 (6.1) Packing group: II EMS-No: F-E, S-D
Proper shipping name: METHANOL, SOLUTION
Marine pollutant: No

IATA
UN number: 1230 Class: 3 (6.1) Packing group: II
Proper shipping name: Methanol, solution

15. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Target Organ Effect, Toxic by inhalation., Toxic by ingestion, Toxic by skin absorption, Irritant

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01
Benz[e]acephenanthrylene	205-99-2	2007-03-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01
Benz[e]acephenanthrylene	205-99-2	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01
Benz[e]acephenanthrylene	205-99-2	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Benz[e]acephenanthrylene	205-99-2	2007-09-28

16. OTHER INFORMATION

Text of H-code(s) and R-phrase(s) mentioned in Section 3

Acute Tox.	Acute toxicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H370	Causes damage to organs.
Skin Irrit.	Skin irritation
STOT SE	Specific target organ toxicity - single exposure

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

Company: AccuStandard, Inc.
125 Market Street
New Haven, CT 06513

Date MSDS Printed: 2/24/2011
Preparation Date: 2/24/2011
Information Phone Number: 203-786-5290
Emergency Phone Number: 203-786-5290
Hours: Mon. to Fri. 8am-5pm

Catalog Number: **APP-9-018**
Product Name: Benzo(k)fluoranthene
Synonyms: N/A
Formula: N/A
Molecular Weight: N/A

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

Component(s) (2)	CAS #	Appr. %	ACGIH-TLV (mg/m3) TWA	ACGIH-TLV (mg/m3) STEL	skin	OSHA-PEL (mg/m3) TWA	OSHA-PEL (mg/m3) STEL	skin
Benzo(k)fluoranthene	207-08-9	0.01						
Methanol	67-56-1	99.99	262	328	x	260		

Always follow safe Industrial Hygiene practices when handling this product

SECTION 3 - HAZARDS IDENTIFICATION

Health and Environmental Hazards/Symptoms of Exposure:

Over exposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure.

After ingestion or inhalation, initial symptoms may be only that of mild intoxication, but may become severe after 12 or 18 hours.

May cause eye, kidney, liver, and skin damage.

May cause central nervous system damage.

POISON: May be fatal or cause blindness if swallowed.

Fetal development abnormalities and effects on embryo or fetus have been reported from prolonged exposure to methanol in laboratory tests involving pregnant rats.

Potential Health Effects:

Irritating to eyes.

Irritating to skin.

Toxic if absorbed through skin.

Irritating to mucous membrane and upper respiratory system.

Toxic if inhaled.

Toxic if swallowed.

Routes of Entry:

Inhalation, ingestion or skin contact.

Carcinogenicity:

Contains one or more components that are classified (ACGIH, IARC, NTP, OSHA) as a possible cancer hazard in quantities less than 0.1%.

SECTION 4 - FIRST AID MEASURES

Emergency First Aid:

Get medical assistance for all cases of overexposure.

Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

Eye contact: Immediately flush with plenty of water. After initial flushing, remove and contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.

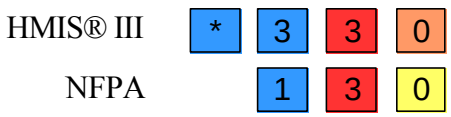
Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.

SECTION 5 - FIRE FIGHTING MEASURES

Flammable Properties:

Flash Point: 52 °F (11 °C) (tcc)
Flammable Limits LEL (%): 6.7
Flammable Limits UEL (%): 36.5
Autoignition Temperature: 385 °C



Dangerous fire and explosive hazard.

Containers can build up pressure if exposed to heat.

Vapors can travel to a source of ignition and flash back.

During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media:

Use alcohol foam, carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

Fire Fighting Procedures:

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Spill Response:

Wear suitable protective equipment listed under Exposure Controls / Personal Protection. Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards. Contain the release and eliminate its source, if this can be done without risk. Dispose as hazardous waste. Comply with Federal, State and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tightly closed container.

Store in a cool area away from ignition sources and oxidizers.

Avoid breathing vapors or mists.

Use with adequate ventilation.

Do not get in eyes, on skin or clothing.

Avoid prolonged or repeated exposure.

This product should only by used by persons trained in the safe handling of hazardous chemicals.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls and Personal Protection Equipment (PPE):

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your safety equipment supplier). Engineering and/or administrative controls should be implemented to reduce exposure.

Material should be handled or transferred in an approved fume hood or with adequate ventilation.

Protective gloves must be worn to prevent skin contact.

(Chloroprene, natural rubber, nitrile, or equivalent)

Safety glasses with side shields must be worn at all times.

General Hygiene Considerations:

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear liquid

Odor: N/A

pH: N/A

Vapor Pressure: 97 mmHg (20 °C)

Vapor Density (Air = 1): 1.1 g/L
Boiling Point: 65 °C
Melting Point: -93.9 °C
Solubility in Water: Very soluble
Specific Gravity (H_2O = 1): 0.791 g/cm3
Flash Point: 52 °F (11 °C) (tcc)
Explosion Limits (%): 6.7 to 36.5
Autoignition Temperature: 385 °C
Percent Volatile: 99.9+
Evaporation Rate (BuAc = 1): 5.9
Molecular Weight: N/A
Molecular Formula: N/A

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable
Conditions To Avoid: Heat; Contact with ignition sources
Materials To Avoid: Acids
Oxidizers

Alkali metals; Reducing agents
Hazardous Decomposition: Oxides of carbon; Formaldehyde
Hazardous Polymerization: Will not occur

SECTION 11 - TOXICOLOGICAL INFORMATION

See section 3 for specific toxicological information for the ingredients of this product.

SECTION 12 - ECOLOGICAL INFORMATION

By complying with sections 6 and 7 there will be no release to the environment.

SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

DOT UN Number: UN1230 Shipping Class: 3 Packing Group: II Methanol, Flammable liquid
Flammable

SECTION 15 - REGULATORY INFORMATION

In addition to Federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

This product is subject to SARA section 313 reporting requirements.

WARNING: This product contains chemical(s) known to the state of California to cause cancer.

Not all components are listed on the TSCA Inventory. For laboratory, reasearch and development use only. Not for manufacturing or commercial purposes.

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI and CHIPs regulations.

The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. The manufacturer will not assume any liability for the accuracy and completeness of this information. Final determination of the suitability of the material is the responsibility of the user. Although certain hazards are described herein, the user should not presume that these are the only hazards that exist. Since conditions and manner of use are outside of the manufactureres control, we make
NO WARRANTY OF MERCHANTABILITY, EXPRESSED OR IMPLIED, AND ASSUME NO LIABILITY RESULTING FROM ITS USE.

Legend : N/A = Not Available ND = Not Determined NR = Not Regulated

* * * End of Document * * *

Material Safety Data Sheet

Version 3.3
Revision Date 04/12/2012
Print Date 05/18/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Chrysene

Product Number : 27220
Brand : Fluka
Product Use : For laboratory research purposes.

Supplier : Sigma-Aldrich Canada, Ltd
2149 Winston Park Drive
OAKVILLE ON L6H 6J8
CANADA

Manufacturer : Sigma-Aldrich Corporation
3050 Spruce St.
St. Louis, Missouri 63103
USA

Telephone : +1 9058299500
Fax : +1 9058299292
Emergency Phone # (For both supplier and manufacturer) : 1-800-424-9300
Preparation Information : Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

WHMIS Classification

D2A	Very Toxic Material Causing Other Toxic Effects	Carcinogen
D2B	Toxic Material Causing Other Toxic Effects	Mutagen

GHS Classification

Germ cell mutagenicity (Category 2)
Carcinogenicity (Category 1B)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 4)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H341	Suspected of causing genetic defects.
H350	May cause cancer.
H400	Very toxic to aquatic life.
H413	May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P201	Obtain special instructions before use.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.

HMIS Classification

Health hazard: 0
Chronic Health Hazard: *

Flammability: 0
Physical hazards: 0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Ingestion May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : $C_{18}H_{12}$
Molecular Weight : 228.29 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Chrysene			
218-01-9	205-923-4	601-048-00-0	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

Explosion data - sensitivity to mechanical impact
no data available

Explosion data - sensitivity to static discharge
no data available

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Immersion protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 480 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

Splash protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 30 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 873000, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an Industrial Hygienist familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Eye protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Specific engineering controls
Use mechanical exhaust or laboratory fumehood to avoid exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	solid
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 252 - 254 °C (486 - 489 °F) - lit.
Boiling point	448 °C (838 °F) - lit.
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	insoluble
Partition coefficient: n-octanol/water	log Pow: 5.73
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50

no data available

Other information on acute toxicity
LD50 Intraperitoneal - mouse - > 320 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.
In vitro tests showed mutagenic effects

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Chrysene)

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: GC0700000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1.90 mg/l - 2 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life.

no data available

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Chrysene)
Reportable Quantity (RQ): 100 lbs
Marine pollutant:
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Chrysene)
Marine pollutant: No

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Chrysene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

WHMIS Classification

D2A	Very Toxic Material Causing Other Toxic Effects	Carcinogen
D2B	Toxic Material Causing Other Toxic Effects	Mutagen

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

16. OTHER INFORMATION

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Version 5.1
Revision Date 10/09/2012
Print Date 11/16/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Fluoranthene

Product Number : F807
Brand : Aldrich
Product Use : For laboratory research purposes.

Supplier : Sigma-Aldrich Canada, Ltd
2149 Winston Park Drive
OAKVILLE ON L6H 6J8
CANADA

Manufacturer : Sigma-Aldrich Corporation
3050 Spruce St.
St. Louis, Missouri 63103
USA

Telephone : +1 9058299500
Fax : +1 9058299292
Emergency Phone # (For both supplier and manufacturer) : 1-800-424-9300
Preparation Information : Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

WHMIS Classification

D2B Toxic Material Causing Other Toxic Effects Mutagen

GHS Classification

Acute toxicity, Dermal (Category 5)
Acute toxicity, Oral (Category 4)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)
H302 Harmful if swallowed.
H313 May be harmful in contact with skin.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P501 Dispose of contents/ container to an approved waste disposal plant.

HMIS Classification

Health hazard: 1
Flammability: 1
Physical hazards: 0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.

Skin	Harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : Benzo[*j*,*k*]fluorene

Formula : $C_{16}H_{10}$
Molecular Weight : 202.25 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Fluoranthene			
206-44-0	205-912-4	-	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

Explosion data - sensitivity to mechanical impact
no data available

Explosion data - sensitivity to static discharge
no data available

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator.For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Immersion protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 480 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

Splash protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 30 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 873000, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an Industrial Hygienist familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Eye protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Specific engineering controls
Use mechanical exhaust or laboratory fumehood to avoid exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	solid
Colour	no data available

Safety data

pH	no data available

Melting point/freezing point	Melting point/range: 105 - 110 °C (221 - 230 °F) - lit.
Boiling point	384 °C (723 °F) - lit.
Flash point	198.0 °C (388.4 °F) - closed cup
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 2,000 mg/kg

Inhalation LC50
no data available

Dermal LD50
LD50 Dermal - rabbit - 3,180 mg/kg

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (Fluoranthene)
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	Harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: LL4025000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.0077 mg/l - 96 h
	NOEC - Cyprinodon variegatus (sheepshead minnow) - 560 mg/l - 96 h
Toxicity to daphnia	Immobilization EC50 - Daphnia magna (Water flea) - > 0.005 - < 0.01 mg/l - 3 d

and other aquatic invertebrates

Immobilization EC50 - Daphnia magna (Water flea) - 0.78 mg/l - 20 h

NOEC - Daphnia magna (Water flea) - 0.085 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life with long lasting effects.

no data available

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Fluoranthene)
Reportable Quantity (RQ): 100 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

WHMIS Classification

D2B Toxic Material Causing Other Toxic Effects Mutagen

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

16. OTHER INFORMATION

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Version 3.2
Revision Date 01/17/2012
Print Date 04/25/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Fluorene
Product Number	:	418196
Brand	:	Aldrich
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
No known OSHA hazards

Not a dangerous substance according to GHS.

HMIS Classification

Health hazard: 1
Flammability: 1
Physical hazards: 0

NFPA Rating

Health hazard: 1
Fire: 1
Reactivity Hazard: 0

Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula	:	C13H10
Molecular Weight	:	166.22 g/mol

No ingredients are hazardous according to OHSA criteria.

4. FIRST AID MEASURES

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

5. FIREFIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Avoid dust formation. Avoid breathing vapors, mist or gas.

Environmental precautions
Do not let product enter drains.

Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
General industrial hygiene practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	crystalline
Colour	white

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 111 - 114 °C (232 - 237 °F) - lit.
Boiling point	298 °C (568 °F) - lit.
Flash point	151.0 °C (303.8 °F) - closed cup
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50

no data available

Other information on acute toxicity
LD50 Intraperitoneal - mouse - > 2.0 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: LL5670000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Fish - 0.82 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	Remarks: no data available
Toxicity to algae	EC50 - Algae - 3.4 mg/l - 96 h

Persistence and degradability
no data available

Bioaccumulative potential

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 24 h Bioconcentration factor (BCF): 512

Mobility in soil
Adsorbs on soil.

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Fluorene)
Reportable Quantity (RQ): 5000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Fluorene)
Marine pollutant: No

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Fluorene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

OSHA Hazards
No known OSHA hazards

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Fluorene	86-73-7	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Fluorene	86-73-7	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Fluorene	86-73-7	2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Version 3.1
Revision Date 01/19/2012
Print Date 05/30/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Naphthalene
Product Number	:	70211
Brand	:	Fluka
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable solid, Carcinogen, Highly toxic by inhalation, Toxic by ingestion, Irritant

Target Organs

Eyes, Blood, Kidney, Lungs, Central nervous system, Liver, Heart

GHS Classification
Flammable solids (Category 1)
Acute toxicity, Oral (Category 4)
Acute toxicity, Inhalation (Category 2)
Skin irritation (Category 2)
Eye irritation (Category 2B)
Carcinogenicity (Category 2)
Acute aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H228	Flammable solid.
H302	Harmful if swallowed.
H315 + H320	Causes skin and eye irritation.
H330	Fatal if inhaled.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P273	Avoid release to the environment.

P281	Use personal protective equipment as required.
P284	Wear respiratory protection.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.

HMIS Classification

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	2
Physical hazards:	2

NFPA Rating

Health hazard:	4
Fire:	2
Reactivity Hazard:	2

Potential Health Effects

Inhalation	May be fatal if inhaled. Causes respiratory tract irritation.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : $C_{10}H_8$

Molecular Weight : 128.17 g/mol

Component		Concentration
Naphthalene		
CAS-No.	91-20-3	-
EC-No.	202-049-5	
Index-No.	601-052-00-2	

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Flammable in the presence of a source of ignition, through friction or retained heat. Keep away from heat/sparks/open flame/hot surface. No smoking.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Naphthalene	91-20-3	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Eye & Upper Respiratory Tract irritation Hematologic effects Eye damage Not classifiable as a human carcinogen Danger of cutaneous absorption			
		STEL	15 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Eye & Upper Respiratory Tract irritation Hematologic effects Eye damage Not classifiable as a human carcinogen Danger of cutaneous absorption			
		TWA	10 ppm 50 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	15 ppm 75 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	10 ppm 50 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m3 is approximate.			
		TWA	10 ppm 50 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	15 ppm 75 mg/m3	USA. NIOSH Recommended Exposure Limits

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	solid
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 79.5 - 81 °C (175.1 - 178 °F)
Boiling point	218 °C (424 °F) - lit.
Flash point	80.0 °C (176.0 °F) - closed cup
Flammability (solid, gas)	The substance or mixture is a flammable solid with the category 1.
Ignition temperature	526 °C (979 °F)
Autoignition temperature	526.0 °C (978.8 °F)
Lower explosion limit	0.9 %(V)
Upper explosion limit	5.9 %(V)
Vapour pressure	1.3 hPa (1.0 mmHg) at 53.0 °C (127.4 °F) 0.04 hPa (0.03 mmHg) at 25.0 °C (77.0 °F)
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 3.30
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 490.0 mg/kg

Inhalation LC50
LC50 Inhalation - rat - 1 h - > 340 mg/m3
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation. Behavioral:Somnolence (general depressed activity).

Dermal LD50
LD50 Dermal - rabbit - 20,000 mg/kg

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
Eyes - rabbit - Mild eye irritation

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Naphthalene)
	2B - Group 2B: Possibly carcinogenic to humans (Naphthalene)
NTP:	Reasonably anticipated to be a human carcinogen (Naphthalene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be fatal if inhaled. Causes respiratory tract irritation.
Ingestion	Toxic if swallowed.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure
Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer., Naphthalene is retinotoxic and systemic absorption of its vapors above 15ppm, may result in:, cataracts, optic neuritis, corneal injury, Eye irritation, Ingestion may provoke the following symptoms:, hemolytic anemia, hemoglobinuria, Nausea, Headache, Vomiting, Gastrointestinal disturbance, Convulsions, anemia, Kidney injury may occur., Seizures., Coma.

Synergistic effects
no data available

Additional Information
RTECS: QJ0525000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.9 - 9.8 mg/l - 96.0 h
	LC50 - Pimephales promelas (fathead minnow) - 1 - 6.5 mg/l - 96.0 h
	NOEC - other fish - 1.8 mg/l - 3.0 d
	LOEC - other fish - 3.2 mg/l - 3.0 d
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1.00 - 3.40 mg/l - 48 h
Toxicity to algae	EC50 - No information available. - 33.00 mg/l - 24 h

Persistence and degradability

Bioaccumulative potential

Bioaccumulation	Fish - Bioconcentration factor (BCF): 427 - 1,158

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1334 Class: 4.1 Packing group: III
Proper shipping name: Naphthalene, refined
Reportable Quantity (RQ): 100 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1334 Class: 4.1 Packing group: III EMS-No: F-A, S-G
Proper shipping name: NAPHTHALENE, REFINED
Marine pollutant: No

IATA
UN number: 1334 Class: 4.1 Packing group: III
Proper shipping name: Naphthalene, refined

15. REGULATORY INFORMATION

OSHA Hazards
Flammable solid, Carcinogen, Highly toxic by inhalation, Toxic by ingestion, Irritant

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Naphthalene	91-20-3	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Naphthalene	91-20-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Naphthalene	91-20-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date

Naphthalene	91-20-3	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Naphthalene	91-20-3	1990-01-01

16. OTHER INFORMATION

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Version 3.2
Revision Date 01/19/2012
Print Date 03/26/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Phenanthrene solution
Product Number	:	40079
Brand	:	Supelco
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Target Organ Effect, Toxic by inhalation., Toxic by ingestion, Toxic by skin absorption, Irritant

Target Organs

Eyes, Kidney, Liver, Heart, Central nervous system

GHS Classification
Flammable liquids (Category 2)
Acute toxicity, Oral (Category 3)
Acute toxicity, Inhalation (Category 3)
Acute toxicity, Dermal (Category 3)
Skin irritation (Category 2)
Eye irritation (Category 2A)
Specific target organ toxicity - single exposure (Category 1)
Acute aquatic toxicity (Category 2)
Chronic aquatic toxicity (Category 2)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H225	Highly flammable liquid and vapour.
H301 + H311	Toxic if swallowed or in contact with skin
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H331	Toxic if inhaled.
H370	Causes damage to organs.
H411	Toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P307 + P311	IF exposed: Call a POISON CENTER or doctor/ physician.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical hazards:	0

NFPA Rating

Health hazard:	2
Fire:	3
Reactivity Hazard:	0

Potential Health Effects

Inhalation	Toxic if inhaled. Causes respiratory tract irritation.
Skin	Toxic if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Component		Classification	Concentration
Methanol			
CAS-No. EC-No. Index-No.	67-56-1 200-659-6 603-001-00-X	Flam. Liq. 2; Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2; STOT SE 1; H225, H301 + H311 + H331, H315, H319, H370	60 - 100 %

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

4. FIRST AID MEASURES

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage temperature: 2 - 8 °C

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Methanol	67-56-1	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Headache Eye damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Danger of cutaneous absorption			
		STEL	250 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Headache Eye damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Danger of cutaneous absorption			
		TWA	200 ppm 260 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation			
		STEL	250 ppm 325 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation			
		TWA	200 ppm 260 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m3 is approximate.			

		TWA	200 ppm 260 mg/m3	USA. NIOSH Recommended Exposure Limits
	Potential for dermal absorption			
		ST	250 ppm 325 mg/m3	USA. NIOSH Recommended Exposure Limits
	Potential for dermal absorption			
Phenanthrene	85-01-8	TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.2 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid
Colour	colourless

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: -98 °C (-144 °F)
Boiling point	64 - 65 °C (147 - 149 °F) at 1,013 hPa (760 mmHg)
Flash point	11 °C (52 °F) - closed cup
Ignition temperature	no data available
Autoignition temperature	385 °C (725 °F)
Lower explosion limit	6 %(V)
Upper explosion limit	36 %(V)
Vapour pressure	130.23 hPa (97.68 mmHg) at 20 °C (68 °F) 547 hPa (410 mmHg) at 50 °C (122 °F)

Density	0.791 g/cm3
Water solubility	completely miscible
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions

Vapours may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

Materials to avoid
Acids, Oxidizing agents, Alkali metals, Acid chlorides, Acid anhydrides, Reducing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
Eyes: no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (Phenanthrene)
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	Toxic if inhaled. Causes respiratory tract irritation.
Ingestion	Toxic if swallowed.
Skin	Toxic if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure
Methyl alcohol may be fatal or cause blindness if swallowed., Cannot be made non-poisonous., Effects due to ingestion may include:, Nausea, Dizziness, Gastrointestinal disturbance, Weakness, Confusion., Drowsiness, Unconsciousness, May cause convulsions.

Synergistic effects
no data available

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity

no data available

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1230 Class: 3 Packing group: II
Proper shipping name: Methanol, solution
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1230 Class: 3 (6.1) Packing group: II EMS-No: F-E, S-D
Proper shipping name: METHANOL, SOLUTION
Marine pollutant: No

IATA
UN number: 1230 Class: 3 (6.1) Packing group: II
Proper shipping name: Methanol, solution

15. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Target Organ Effect, Toxic by inhalation., Toxic by ingestion, Toxic by skin absorption, Irritant

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01
Phenanthrene	85-01-8	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Phenanthrene	85-01-8	1990-01-01

16. OTHER INFORMATION

Text of H-code(s) and R-phrase(s) mentioned in Section 3

Acute Tox.	Acute toxicity

Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H370	Causes damage to organs.
Skin Irrit.	Skin irritation
STOT SE	Specific target organ toxicity - single exposure

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Version 4.4
Revision Date 09/19/2012
Print Date 10/04/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Pyrene
Product Number	:	185515
Brand	:	Aldrich
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Carcinogen

Target Organs

Liver, Blood, Kidney

Other hazards which do not result in classification
Rapidly absorbed through skin.

GHS Classification
Acute toxicity, Oral (Category 5)
Skin irritation (Category 3)
Eye irritation (Category 2B)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 4)

GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)

H303	May be harmful if swallowed.
H316	Causes mild skin irritation.
H320	Causes eye irritation.
H400	Very toxic to aquatic life.
H413	May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P273	Avoid release to the environment.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

HMIS Classification

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	1
Physical hazards:	0

NFPA Rating

Health hazard:	0
Fire:	1
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : Benzo[def]phenanthrene

Formula : $C_{16}H_{10}$

Molecular Weight : 202.25 g/mol

Component		Concentration
Pyrene		
CAS-No.	129-00-0	-
EC-No.	204-927-3	

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Pyrene	129-00-0	TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.2 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.2 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000

Personal protective equipment

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator.For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Immersion protection
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: > 480 min
Material tested:Camatril® (Aldrich Z677442, Size M)

Splash protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 30 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 873000, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an Industrial Hygienist familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Eye protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	crystalline
Colour	yellow

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 145 - 148 °C (293 - 298 °F) - lit.
Boiling point	390.0 - 395.0 °C (734.0 - 743.0 °F)
Flash point	> 200.0 °C (> 392.0 °F)
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	1.21 g/cm3
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 4.88
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 2,700 mg/kg
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Conjunctive irritation. Behavioral:Excitement. Behavioral:Muscle contraction or spasticity.

Inhalation LC50
LC50 Inhalation - rat - 170.0 mg/m3
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Conjunctive irritation. Behavioral:Excitement. Behavioral:Muscle contraction or spasticity.

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
Skin - rabbit - Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Mild eye irritation

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (Pyrene)
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	Known to be human carcinogen (Pyrene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
Inhalation studies in animals have caused:, Liver toxicity, pulmonary pathologies, intragastric pathologies, neutropenia, leukopenia, anemia, Contact with skin can cause:, hyperemia, weight loss, hematopoietic changes, Dermatitis, Chronic effects, leukocytosis

Synergistic effects
no data available

Additional Information
RTECS: UR2450000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - > 2 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.002 - 0.003 mg/l - 48 h

Persistence and degradability

Bioaccumulative potential

Bioaccumulation	other fish - 48 h Bioconcentration factor (BCF): 4,810

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

Very toxic to aquatic life.

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Avoid release to the environment.

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Pyrene)
Reportable Quantity (RQ): 5000 lbs
Marine pollutant:
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Pyrene)
Marine pollutant: No

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Pyrene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen

SARA 302 Components
The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
Pyrene	129-00-0	2007-03-01

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Pyrene	129-00-0	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Pyrene	129-00-0	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Pyrene	129-00-0	2007-03-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Pyrene	129-00-0	1990-01-01

16. OTHER INFORMATION

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Version 4.1
Revision Date 01/17/2012
Print Date 03/07/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Arsenic
Product Number	:	267961
Brand	:	Aldrich
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards

Carcinogen, Target Organ Effect, Toxic by inhalation., Harmful by ingestion.

Target Organs

Skin, Lungs

GHS Classification

Acute toxicity, Oral (Category 4)
Acute toxicity, Inhalation (Category 3)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H302	Harmful if swallowed.
H331	Toxic if inhaled.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P273	Avoid release to the environment.
P311	Call a POISON CENTER or doctor/ physician.
P501	Dispose of contents/ container to an approved waste disposal plant.

HMIS Classification

Health hazard: 2
Chronic Health Hazard: *
Flammability: 0

Physical hazards: 0

NFPA Rating

Health hazard: 2
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation Toxic if inhaled. May cause respiratory tract irritation.
Skin Harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Ingestion Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : As
Molecular Weight : 74.92 g/mol

Component		Concentration
Arsenic		
CAS-No.	7440-38-2	-
EC-No.	231-148-6	
Index-No.	033-001-00-X	

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Arsenic oxides

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Arsenic	7440-38-2	TWA	0.01 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Lung cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen			
		C	0.0020 mg/m3	USA. NIOSH Recommended Exposure Limits
	Potential Occupational Carcinogen See Appendix A 15 minute ceiling value			

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	powder
Colour	grey

Safety data

pH	no data available

Melting point/freezing point	Melting point/range: 817 °C (1,503 °F) - lit.
Boiling point	613 °C (1,135 °F) - lit.
Flash point	not applicable
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	5.727 g/mL at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
Heat. Exposure to air may affect product quality.

Materials to avoid
Oxidizing agents, Halogens, Palladium undergoes a violent reaction with arsenic, Zinc, Platinum oxide, Nitrogen trichloride, Bromine azide

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Arsenic oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 763 mg/kg
Remarks: Behavioral:Ataxia. Diarrhoea

LD50 Oral - mouse - 145 mg/kg
Remarks: Behavioral:Ataxia. Diarrhoea

Inhalation LC50
Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

IARC:	1 - Group 1: Carcinogenic to humans (Arsenic)
NTP:	Known to be human carcinogen (Arsenic)

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	Toxic if inhaled. May cause respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	Harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer.

Synergistic effects
no data available

Additional Information
RTECS: CG0525000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 9.9 mg/l - 96.0 h
Toxicity to daphnia and other aquatic	EC50 - Daphnia magna (Water flea) - 3.8 mg/l - 48 h

invertebrates

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1558 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: ARSENIC
Marine pollutant: No

IATA
UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen, Target Organ Effect, Toxic by inhalation., Harmful by ingestion.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Arsenic	7440-38-2	2008-10-10

16. OTHER INFORMATION

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

1. PRODUCT AND COMPANY IDENTIFICATION

POLYONE CORPORATION
33587 Walker Road, Avon Lake, OH 44012

Telephone	:	Product Stewardship (770) 271-5902
Emergency telephone	:	**CHEMTREC 1-800-424-9300 (24hrs for spill, leak, fire, exposure or accident).**
Product name	:	BARIUM
Product code	:	CC10104946WE
Chemical Name	:	Mixture
CAS-No.	:	Mixture
Product Use	:	Industrial Applications

2. COMPOSITION/INFORMATION ON REGULATED INGREDIENTS

Components	CAS-No.	Weight %
Barium sulfate	7727-43-7	10 - 30

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

This mixture has not been evaluated as a whole. Information provided on the health effects of this product is based on individual components. All ingredients are bound and potential for hazardous exposure as shipped is minimal. However, some vapors may be released upon heating and the end-user (fabricator) must take the necessary precautions (mechanical ventilation, respiratory protection, etc.) to protect employees from exposure.

POTENTIAL HEALTH EFFECTS

Routes of Exposure: : Inhalation, Ingestion, Skin contact

Acute exposure

Inhalation	:	Resin particles, like other inert materials, can be mechanically irritating.
Ingestion	:	May be harmful if swallowed.
Eyes	:	Resin particles, like other inert materials, are mechanically irritating to eyes.
Skin	:	Experience shows no unusual dermatitis hazard from routine handling.

Chronic exposure : Refer to Section 11 for Toxicological Information.

Medical Conditions Aggravated by Exposure: : None known.

4. FIRST AID MEASURES

Inhalation	:	Move to fresh air in case of accidental inhalation of fumes from overheating or combustion. When symptoms persist or in all cases of doubt seek medical advice.
Ingestion	:	Do not induce vomiting without medical advice. When symptoms persist or in all cases of doubt seek medical advice.
Eyes	:	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If eye irritation persists, seek medical attention.
Skin	:	Wash off with soap and plenty of water. If skin irritation persists seek medical attention.

5. FIRE-FIGHTING MEASURES

Flash point	:	Not applicable
Flammable Limits		
Upper explosion limit	:	Not applicable
Lower explosion limit	:	Not applicable
Autoignition temperature	:	Not applicable
Suitable extinguishing media	:	Carbon dioxide blanket, Water spray, Dry powder, Foam.
Special Fire Fighting Procedures	:	Fullface self-contained breathing apparatus (SCBA) used in positive pressure mode should be worn to prevent inhalation of airborne contaminants.
Unusual Fire/Explosion Hazards	:	Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), other hazardous materials, and smoke are all possible.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	Wear appropriate personal protection during cleanup, such as impervious gloves, boots and coveralls.
Environmental precautions	:	Should not be released into the environment. The product should not be allowed to enter drains, water courses or the soil.
Methods for cleaning up	:	Clean up promptly by sweeping or vacuum. Package all material in plastic, cardboard or metal containers for disposal. Refer to Section 13 of this MSDS for proper disposal methods.

7. HANDLING AND STORAGE

Handling	:	Take measures to prevent the build up of electrostatic charge. Heat only in areas with appropriate exhaust ventilation.
Storage	:	Keep containers dry and tightly closed to avoid moisture absorption

and contamination. Keep in a dry, cool place.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Respiratory protection	:	No personal respiratory protective equipment normally required.
Eye/Face Protection	:	Safety glasses with side-shields
Hand protection	:	Protective gloves
Skin and body protection	:	Long sleeved clothing
Additional Protective Measures	:	Safety shoes
General Hygiene Considerations	:	Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Engineering measures	:	Heat only in areas with appropriate exhaust ventilation. Provide appropriate exhaust ventilation at machinery.

Exposure limit(s)

Components	Value	Exposure time	Exposure type	List:
Barium sulfate	10 mg/m3	Time Weighted Average (TWA):		ACGIH
	5 mg/m3	PEL:	Respirable fraction.	OSHA Z1
	15 mg/m3	PEL:	Total dust.	OSHA Z1

9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Solid	Evaporation rate	:	Not applicable
Appearance	:	pellets	Specific Gravity	:	Not determined
Color	:	NO PIGMENT	Bulk density	:	Not established
Odour	:	Very faint	Vapour pressure	:	Not applicable
Melting point/range	:	Not determined	Vapour density	:	Not applicable
Boiling Point:	:	Not applicable	pH	:	Not applicable
Water solubility	:	Insoluble			

10. STABILITY AND REACTIVITY

Stability	:	Stable.
Hazardous Polymerization	:	Will not occur.
Conditions to avoid	:	Keep away from oxidizing agents and open flame. To avoid thermal decomposition, do not overheat.
Incompatible Materials	:	Incompatible with strong acids and oxidizing agents.

Hazardous decomposition products	:	Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), other hazardous materials, and smoke are all possible.

11. TOXICOLOGICAL INFORMATION

This mixture has not been evaluated as a whole for health effects. Exposure effects listed are based on existing health data for the individual components which comprise the mixture.

Toxicity Overview
This product contains the following components which in their pure form have the following characteristics:

CAS-No.	Chemical Name	Effect	Target Organ
7727-43-7	Barium sulfate	Irritant	Respiratory system.
		Systemic effects	Eyes, Respiratory system.

12. ECOLOGICAL INFORMATION

Persistence and degradability	:	Not readily biodegradable.
Environmental Toxicity	:	Chemicals are not readily available as they are bound within the polymer matrix.
Bioaccumulation Potential	:	Chemicals are not readily available as they are bound within the polymer matrix.
Additional advice	:	No data available

13. DISPOSAL CONSIDERATIONS

Product	:	Like most thermoplastic plastics the product can be recycled. Where possible recycling is preferred to disposal or incineration. The generator of waste material has the responsibility for proper waste classification, transportation and disposal in accordance with applicable federal, state/provincial and local regulations.
Contaminated packaging	:	Recycling is preferred when possible. The generator of waste material has the responsibility for proper waste classification, transportation and disposal in accordance with applicable federal, state/provincial and local regulations.

14. TRANSPORT INFORMATION

U.S. DOT Classification	:	Not regulated for transportation.
ICAO/IATA (air)	:	Refer to specific regulation.
IMO / IMDG (maritime)	:	Refer to specific regulation.

15. REGULATORY INFORMATION

US Regulations:

OSHA Status : Classified as hazardous based on components.

TSCA Status : All components of this product are listed on or exempt from the TSCA Inventory.

US. EPA CERCLA Hazardous Substances (40 CFR 302)

Not applicable

California Proposition 65 : Not applicable

SARA Title III Section 302 Extremely Hazardous Substance

Unless specific chemicals are identified under this section, this product is Not Applicable under this regulation

SARA Title III Section 313 Toxic Chemicals:

Unless specific chemicals are identified under this section, this product is Not Applicable under this regulation

Canadian Regulations:

National Pollutant Release Inventory (NPRI)

Not applicable

WHMIS Classification : Not controlled.

DSL : All components of this product are on the Canadian Domestic Substances List (DSL) or are exempt.

National Inventories:

Australia AICS : Listed

China IECS : Listed

Europe EINECS : Listed

Japan ENCS : Not determined

Korea KECI	:	Listed
Philippines PICCS	:	Listed

16. OTHER INFORMATION

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Material Safety Data Sheet

Version 3.3
Revision Date 01/17/2012
Print Date 07/24/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Cadmium
Product Number	:	00623
Brand	:	Fluka
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Carcinogen, Target Organ Effect, Highly toxic by inhalation, Toxic by ingestion, Reproductive hazard, Mutagen

Target Organs

Lungs, Kidney

GHS Classification
Acute toxicity, Oral (Category 3)
Acute toxicity, Inhalation (Category 2)
Germ cell mutagenicity (Category 2)
Carcinogenicity (Category 1B)
Reproductive toxicity (Category 2)
Specific target organ toxicity - repeated exposure (Category 1)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H301	Toxic if swallowed.
H330	Fatal if inhaled.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.

P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P284	Wear respiratory protection.
P310	Immediately call a POISON CENTER or doctor/ physician.
P501	Dispose of contents/ container to an approved waste disposal plant.

HMIS Classification

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical hazards:	0

NFPA Rating

Health hazard:	4
Fire:	0
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be fatal if inhaled. May cause respiratory tract irritation.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : Cd
Molecular Weight : 112.41 g/mol

Component		Concentration
Cadmium		
CAS-No.	7440-43-9	-
EC-No.	231-152-8	
Index-No.	048-002-00-0	

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Cadmium/cadmium oxides

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Cadmium	7440-43-9	TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z2
Remarks	Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.			
		CEIL	0.3 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.			
		TWA	0.0020 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Suspected human carcinogen			
		TWA	0.01 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen			
		TWA	0.002 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen			
	See 1910.1027. See Table Z-2 for the exposure limits for any operations or sectors where the exposure limits in 1910.1027 are stayed or are otherwise not in effect.			
		TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.			

		CEIL	0.6 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.			
	Potential Occupational Carcinogen See Appendix A			

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	powder
Colour	light grey

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 320.9 °C (609.6 °F)
Boiling point	765 °C (1,409 °F) at 1,013 hPa (760 mmHg)
Flash point	not applicable
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	8.650 g/cm3
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available

Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Oxidizing agents, acids

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Cadmium/cadmium oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 225 mg/kg

Inhalation LC50
LC50 Inhalation - rat - 30 h - 25 mg/m3
Remarks: Lungs, Thorax, or Respiration:Dyspnea.

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
In vitro tests showed mutagenic effects

Carcinogenicity

Possible human carcinogen

IARC:	1 - Group 1: Carcinogenic to humans (Cadmium)
NTP:	Known to be human carcinogen (Cadmium)
	Known to be human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Cadmium)
OSHA:	1910.1027 (Cadmium)

Reproductive toxicity

Suspected human reproductive toxicant

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
no data available

Potential health effects

Inhalation	May be fatal if inhaled. May cause respiratory tract irritation.
Ingestion	Toxic if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
Damage to the lungs., Kidney injury may occur., prolonged or repeated exposure can cause:, Vomiting, Diarrhoea, Lung irritation

Synergistic effects
no data available

Additional Information
RTECS: EU9800000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	mortality LOEC - Oncorhynchus mykiss (rainbow trout) - 0.0015 mg/l - 96 h
	LC50 - Pimephales promelas (fathead minnow) - 1.0 µg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	mortality NOEC - Daphnia - 0.019 mg/l - 24 h
	mortality LOEC - Daphnia - 0.039 mg/l - 24 h
	EC50 - Daphnia magna (Water flea) - 0.024 mg/l - 48 h
Toxicity to algae	Growth inhibition IC50 - Chaetoceros sp. - 0.028 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 72 d Bioconcentration factor (BCF): 55

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

Very toxic to aquatic life with long lasting effects.

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3288 Class: 6.1 Packing group: I
Proper shipping name: Toxic solid, inorganic, n.o.s. (Cadmium)
Reportable Quantity (RQ): 10 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 3288 Class: 6.1 Packing group: I EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, INORGANIC, N.O.S. (Cadmium)
Marine pollutant: No

IATA
UN number: 3288 Class: 6.1 Packing group: I
Proper shipping name: Toxic solid, inorganic, n.o.s. (Cadmium)

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen, Target Organ Effect, Highly toxic by inhalation, Toxic by ingestion, Reproductive hazard, Mutagen

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Cadmium	7440-43-9	1993-04-24

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Cadmium	7440-43-9	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Cadmium	7440-43-9	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Cadmium	7440-43-9	1993-04-24

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Cadmium	7440-43-9	2009-02-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Cadmium	7440-43-9	2009-02-01

16. OTHER INFORMATION

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Date Printed 1/25/09
MSDS No: M00718

SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product Name: Chromium Trivalent Standard Solution 12,5 mg/l as Cr^{+3}
Catalog Number: 1425700

HACH LANGE GmbH
Willstätterstrasse 11
40549 Düsseldorf, Germany
+49-(0)211-52880

Emergency Telephone Numbers:
(Poison Information Center Mainz)
(+49 (0) 6131 19240) 24 HR

SDS Number: M00718
Responsible Person:
Safety Data Sheet written::
Chemical Name: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
Use of the substance/preparation: Standard solution
CAS No.: Not applicable
Hazard: Practically non-toxic. May cause eye irritation. Contains a recognized carcinogen.
Date of MSDS Preparation:
Day: 09
Month: April
Year: 2007
Additional Emergency Response Numbers: Austria: +49 (0)6131 19240, Belgium: +32-(0)70-245245, France: +33-(0)1-40370404, Italy: +39-02-66101029, Netherlands: +31-(0)30-2748888, Switzerland: +41-(0)1-2515151
Additional European Addresses:
Austria:
Belgium:
Denmark:
France:
Ireland:
Italy:
Netherlands:
Spain:
Sweden:
Switzerland:
United Kingdom:

2. HAZARDS IDENTIFICATION

Emergency Overview:
Appearance: Clear, colorless liquid
Odor: None
EU Symbols: Not applicable
R PHRASES: Not applicable

Protective Equipment:

Potential Health Effects:

Eye Contact (EC): May cause irritation

Skin Contact (EC): No effects are anticipated

Skin Absorption (EC): No effects anticipated

Target Organs (SA E): Not applicable

Ingestion (EC): Practically non-toxic No Effects Anticipated

Target Organs (Ing E): Not applicable

Inhalation: No effects anticipated

Target Organs (Inh E): Not applicable

Medical Conditions Aggravated: None reported

Chronic Effects: Chronic overexposure may cause eye irritation

Cancer / Reproductive Toxicity Information:

An ingredient of this mixture is: IARC Group 1: Recognized Carcinogen

Sulfuric Acid - The IARC evaluation was based on exposure to the mist or vapor of concentrated sulfuric acid generated during chemical processes.

Additional Cancer / Reproductive Toxicity Information: None reported

Toxicologically Synergistic Products: None reported

3. COMPOSITION / INFORMATION ON INGREDIENTS

Demineralized Water

EEC Number: 2317912
CAS No.: 7732-18-5
Percent Range: > 99,0
Percent Range Units: volume / volume
Ingredient EEC Symbol: Not applicable
Ingredient R phrase(s): Not applicable
TLV: Not established
PEL: Not established
EU Occupational Exposure Limits: Not established

Other component

EEC Number: Not applicable
CAS No.: Not applicable
Percent Range: < 1,0
Percent Range Units: weight / weight
Ingredient EEC Symbol: Not applicable
Ingredient R phrase(s): Not applicable
TLV: Not established
PEL: Not established
EU Occupational Exposure Limits: Not established

Potassium Chromium Sulfate

EEC Number: 2336280
CAS No.: 10279-63-7
Percent Range: < 0,1
Percent Range Units: weight / volume
Ingredient EEC Symbol: Not applicable
Ingredient R phrase(s): Not applicable
TLV: 0,5 mg/m³ as Cr
PEL: 0,5 mg/m³ as Cr
EU Occupational Exposure Limits: Under scientific discussion

Sulfuric Acid
EEC Number: 2316395
CAS No.: 7664-93-9
Percent Range: < 1,0
Percent Range Units: weight / weight
Ingredient EEC Symbol: Not applicable
Ingredient R phrase(s): Not applicable
TLV: 1 mg/m³ (TWA); 3 mg/m³ (STEL)
PEL: 1 mg/m³
EU Occupational Exposure Limits: 0,1 mg/m^3

4. FIRST AID MEASURES

Eye Contact: Immediately flush eyes with water for 15 minutes. Call physician.
Skin Contact (First Aid): Wash skin with plenty of water.
Ingestion (First Aid): Give large quantities of water. Call physician immediately.
Inhalation: None required.

5. FIRE FIGHTING MEASURES

Flammable Properties: Material will not burn.
Hazardous Combustion Products: This material will not burn.
Fire / Explosion Hazards: None reported
Static Discharge: None reported.
Mechanical Impact: None reported
Extinguishing Media: Use media appropriate to surrounding fire conditions
Extinguishing Media NOT To Be Used: Not applicable
Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:
Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.
Containment Technique: Absorb spilled liquid with non-reactive sorbent material. Stop spilled material from being released to the environment.
Clean-up Technique: Cover spilled material with an alkali, such as soda ash or sodium bicarbonate. Scoop up slurry into a large beaker. Adjust to a pH between 6 and 9. Use sulfuric or citric acid to lower pH. Use soda ash or sodium bicarbonate to increase pH. Dispose of material in an E.P.A. approved hazardous waste facility. Decontaminate the area of the spill with a soap solution.
Evacuation Procedure: Evacuate as needed to perform spill clean-up. If conditions warrant, increase the size of the evacuation.

7. HANDLING AND STORAGE

Handling: Avoid contact with eyes Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.
Storage: Keep container tightly closed when not in use.
Special Packaging Instructions: Not applicable

Use of the substance/preparation: Standard solution

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have an eyewash station nearby. Maintain general industrial hygiene practices when using this product.
Personal Protective Equipment:
Eye Protection: safety glasses with top and side shields
Skin / Hand Protection: disposable latex gloves
Inhalation Protection: adequate ventilation
Precautionary Measures: Avoid contact with: eyes Wash thoroughly after handling.
TLV: Not established
PEL: Not established
EU Occupational Exposure Limits: Not established

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: Clear, colorless liquid
Physical State: Liquid
Odor: None
pH: 1,0
Vapor Pressure: Not determined
Vapor Density (air = 1): Not determined
Boiling Point: ~100°C
Melting Point: Not applicable
Flash Point: Not applicable
Method: Not applicable
Autoignition Temperature: Not applicable
Flammability Limits:
Lower Explosion Limits: Not applicable
Upper Explosion Limits: Not applicable
Specific Gravity (water = 1): 0,991
Evaporation Rate (water = 1): 0,95
Volatile Organic Compounds Content: Not applicable
Partition Coefficient (n-octanol / water): Not applicable
Solubility:
Water: Miscible
Acid: Miscible
Other: Not determined
Metal Corrosivity:
Steel: 0,371 in/yr
Aluminum: 0,151 in/yr

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.
Conditions to Avoid: Extreme temperatures
Reactivity / Incompatibility: Incompatible with: caustics
Hazardous Decomposition: None reported
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:
LD50: None reported
LC50: None reported
Dermal Toxicity Data: None reported
Skin and Eye Irritation Data: None reported
Mutation Data: None reported
Reproductive Effects Data: None reported
--

Ingredient Toxicological Data: Sulfuric acid: Oral rat LD50 = 2140 mg/kg; Inhalation rat LC50 = 87 ppm/4H; Eye irritation rabbit 1380 µg - SEVERE; Eye irritation rabbit 100 mg rinse - SEVERE

An ingredient of this mixture is: IARC Group 1: Recognized Carcinogen
Sulfuric Acid - The IARC evaluation was based on exposure to the mist or vapor of concentrated sulfuric acid generated during chemical processes.

12. ECOLOGICAL INFORMATION

Product Ecological Information: --
No ecological data available for this product.
Ingredient Ecological Information: Sulfuric acid: 48-hour TLm in flounder is 100-300 ppm

13. DISPOSAL CONSIDERATIONS

NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information. In Europe: Chemical and analysis solutions must be disposed of in compliance with the respective national regulations. Product packaging must be disposed of in compliance with the country-specific regulations or must be passed to a packaging return system.

14. TRANSPORT INFORMATION

I.C.A.O.:
I.C.A.O. Proper Shipping Name: Corrosive Liquid, Acidic, Inorganic, N.O.S. (<10% Sulphuric Acid in Solution)
ICAO Hazard Class: 8
ICAO Subsidiary Risk: NA
ICAO UN/ID Number: UN3264
ICAO Packing Group: III

I.M.O.:
I.M.O. Proper Shipping Name: Corrosive Liquid, Acidic, Inorganic, N.O.S. (<10% Sulphuric Acid in Solution)
I.M.O. Hazard Class: 8
I.M.O. Subsidiary Risk: NA
I.M.O. UN Number: UN3264
I.M.O. Packing Group: III

A.D.R.:
A.D.R. Proper Shipping Name: Corrosive Liquid, Acidic, Inorganic, N.O.S. (<10% Sulphuric Acid in Solution)
A.D.R Hazard Class: 8

A.D.R. Subsidiary Risk: NA
A.D.R. UN-Number:: 3264
A.D.R. Packing Group: III
Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories:
EEC Inventory Status: All ingredients used to make this product are listed on EINECS / ELINCS.
EEC Number: Not applicable
EEC LABEL COPY:
EU Symbols: Not applicable
R PHRASES: Not applicable
S PHRASES: Not applicable

16. OTHER INFORMATION

References: 29 CFR 1900 - 1910 (Code of Federal Regulations - Labor). CCINFO RTECS. Canadian Centre for Occupational Health and Safety. Hamilton, Ontario Canada: 30 June 1993. IARC Monographs on the Evaluation of the Carcinogenic Risks to Humans. World Health Organization (Volumes 1-42) Supplement 7. France: 1987. List of Dangerous Substances Classified in Annex I of the EEC Directive (67/548) - Classification, Packaging and Labeling of Dangerous Substances, Amended July 1992. Sixth Annual Report on Carcinogens, 1991. U.S. Department of Health and Human Services. Rockville, MD: Technical Resources, Inc. 1991. Technical Judgment. TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992.
Use of the substance/preparation: Standard solution
Revision Summary: Updates in Section(s) 14,

Legend:

NA - Not Applicable	w/w - weight/weight
ND - Not Determined	w/v - weight/volume
NV - Not Available	v/v - volume/volume

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

Material Safety Data Sheet

Version 4.3
Revision Date 05/17/2012
Print Date 07/21/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Copper
Product Number	:	326445
Brand	:	Aldrich
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
No known OSHA hazards

Not a dangerous substance or mixture according to the Globally Harmonised System (GHS).

HMIS Classification

Health hazard: 0
Flammability: 0
Physical hazards: 0

NFPA Rating

Health hazard: 0
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms	:	Environmental hazard is applicable to copper powders, with particle size > 10µm and <1 mm. COPPER - non flammable forms
Formula	:	Cu
Molecular Weight	:	63.55 g/mol

No ingredients are hazardous according to OSHA criteria.

4. FIRST AID MEASURES

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

5. FIREFIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Copper oxides

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Avoid dust formation. Avoid breathing vapors, mist or gas.

Environmental precautions
Do not let product enter drains.

Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

Store under inert gas. Air sensitive.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Immersion protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 480 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

Splash protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 30 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 873000, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an Industrial Hygienist familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Eye protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
General industrial hygiene practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	Bars
Colour	light red

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 1,083.4 °C (1,982.1 °F) - lit.
Boiling point	2,567 °C (4,653 °F) - lit.
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	8.94 g/mL at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong acids, Strong oxidizing agents, Acid chlorides, Halogens

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Copper oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
LD50 Intraperitoneal - mouse - 3.5 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
Symptoms of systemic copper poisoning may include: capillary damage, headache, cold sweat, weak pulse, and kidney and liver damage, central nervous system excitation followed by depression, jaundice, convulsions, paralysis, and coma. Death may occur from shock or renal failure. Chronic copper poisoning is typified by hepatic cirrhosis, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson's disease. It has also been reported that copper poisoning has lead to hemolytic anemia and accelerates arteriosclerosis.

Synergistic effects
no data available

Additional Information
RTECS: GL5325000

12. ECOLOGICAL INFORMATION

Toxicity

no data available

Persistence and degradability

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

OSHA Hazards
No known OSHA hazards

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Copper	7440-50-8	

New Jersey Right To Know Components

	CAS-No.	Revision Date
Copper	7440-50-8	

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Version 4.4
Revision Date 09/13/2012
Print Date 09/24/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Lead
Product Number	:	695912
Brand	:	Aldrich
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards

Carcinogen, Target Organ Effect, Harmful by ingestion., Teratogen

Target Organs

Nerves., Blood, Kidney, Female reproductive system., Male reproductive system.

GHS Classification

Acute toxicity, Oral (Category 4)
Carcinogenicity (Category 2)
Reproductive toxicity (Category 2)
Specific target organ toxicity - repeated exposure (Category 2)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)

H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P501	Dispose of contents/ container to an approved waste disposal plant.

HMIS Classification

Health hazard: 1
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating

Health hazard: 1
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin Harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Ingestion Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : Pb
Molecular Weight : 207.2 g/mol

Component		Concentration
Lead group entry Annex I		
CAS-No.	7439-92-1	-
EC-No.	231-100-4	

4. FIRST AID MEASURES

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Lead oxides

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Remarks	See 1910.1025			
Lead group entry Annex I	7439-92-1	TWA	0.05 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Confirmed animal carcinogen with unknown relevance to humans			
		TWA	0.05 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Central Nervous System impairment Hematologic effects Peripheral Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans			
		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
	See Appendix C			

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Immersion protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 480 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

Splash protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 30 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 873000, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an Industrial Hygienist familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Eye protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	Shot
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 327.4 °C (621.3 °F) - lit.
Boiling point	1,740 °C (3,164 °F) - lit.
Flash point	not applicable
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong acids

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Lead oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

Genotoxicity in vivo - rat - Inhalation
Cytogenetic analysis

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Lead group entry Annex I)
NTP:	Reasonably anticipated to be a human carcinogen (Lead group entry Annex I)
	Reasonably anticipated to be a human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Lead group entry Annex I)
OSHA:	1910.1025 (Lead group entry Annex I)

Reproductive toxicity
Reproductive toxicity - rat - Inhalation
Effects on Newborn: Biochemical and metabolic.
Reproductive toxicity - rat - Oral
Effects on Newborn: Behavioral.
Reproductive toxicity - mouse - Oral
Effects on Fertility: Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated). Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea).

Teratogenicity

Developmental Toxicity - rat - Inhalation
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

Developmental Toxicity - rat - Oral
Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow). Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Developmental Toxicity - rat - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Developmental Toxicity - mouse - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Suspected human reproductive toxicant

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	Harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
anemia

Synergistic effects
no data available

Additional Information
RTECS: OF7525000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	mortality LOEC - Oncorhynchus mykiss (rainbow trout) - 1.19 mg/l - 96.0 h
	LC50 - Micropterus dolomieui - 2.2 mg/l - 96.0 h
	mortality NOEC - Salvelinus fontinalis - 1.7 mg/l - 10.0 d
Toxicity to daphnia and other aquatic invertebrates	mortality LOEC - Daphnia - 0.17 mg/l - 24 h
	mortality NOEC - Daphnia - 0.099 mg/l - 24 h
Toxicity to algae	mortality EC50 - Skeletonema costatum - 7.94 mg/l - 10 d

Persistence and degradability
no data available

Bioaccumulative potential

Bioaccumulation	Oncorhynchus kisutch - 2 Weeks Bioconcentration factor (BCF): 12

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Lead group entry Annex I)
Reportable Quantity (RQ): 10 lbs
Marine pollutant:
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Lead group entry Annex I)
Marine pollutant: No

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Lead group entry Annex I)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen, Target Organ Effect, Harmful by ingestion., Teratogen

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Lead group entry Annex I	7439-92-1	1994-04-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Lead group entry Annex I	7439-92-1	1994-04-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Lead group entry Annex I	7439-92-1	1994-04-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Lead group entry Annex I	7439-92-1	1994-04-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Lead group entry Annex I	7439-92-1	1989-07-10

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Lead group entry Annex I	CAS-No. 7439-92-1	Revision Date 1989-07-10

16. OTHER INFORMATION

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Version 3.4
Revision Date 04/09/2012
Print Date 10/02/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Mercury
Product Number	:	215457
Brand	:	Sigma-Aldrich
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Target Organ Effect, Highly toxic by inhalation, Respiratory sensitiser, Teratogen, Reproductive hazard

Target Organs

Kidney

GHS Classification
Acute toxicity, Inhalation (Category 1)
Respiratory sensitization (Category 1)
Reproductive toxicity (Category 1A)
Specific target organ toxicity - repeated exposure, Inhalation (Category 1)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H330	Fatal if inhaled.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P273	Avoid release to the environment.
P284	Wear respiratory protection.
P310	Immediately call a POISON CENTER or doctor/ physician.

P501 Dispose of contents/ container to an approved waste disposal plant.

HMIS Classification

Health hazard: 4
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating

Health hazard: 4
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be fatal if inhaled. May cause respiratory tract irritation.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Ingestion May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : Hg
Molecular Weight : 200.59 g/mol

Component		Concentration
Mercury		
CAS-No.	7439-97-6	-
EC-No.	231-106-7	
Index-No.	080-001-00-0	

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Mercury/mercury oxides.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. In some instances, a mercury spill kit may be used. Please consult with your site EHS representative to determine the most appropriate clean up method.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store under inert gas.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Mercury	7439-97-6	C	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits
Remarks	Potential for dermal absorption			
		CEIL	1.0mg/10m3	USA. Occupational Exposure Limits (OSHA) - Table Z2
		TWA	0.05 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation			
		TWA	0.025 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Central Nervous System impairment Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption			
		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
	Potential for dermal absorption			

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Immersion protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm

Break through time: > 480 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

Splash protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 30 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 873000, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an Industrial Hygienist familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: -38.87 °C (-37.97 °F) - lit.
Boiling point	356.6 °C (673.9 °F) - lit.
Flash point	not applicable
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	< 0.01 hPa (< 0.01 mmHg) at 20 °C (68 °F) 1 hPa (1 mmHg) at 126 °C (259 °F)
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	6.93 - (Air = 1.0)
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents, Ammonia, Azides, Nitrates, Chlorates, Copper

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Mercury/mercury oxides.
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (Mercury)
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

Teratogenicity

Presumed human reproductive toxicant

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
no data available

Potential health effects

Inhalation	May be fatal if inhaled. May cause respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
Mercury accumulates in almost all tissues, especially in the:, Kidney, Effects due to ingestion may include:, Nausea, Vomiting, Diarrhoea, intestinal bleeding

Synergistic effects
no data available

Additional Information
RTECS: OV4550000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Labeo rohita - 0.018 mg/l - 96.0 h

Persistence and degradability
no data available

Bioaccumulative potential

Bioaccumulation	Carassius auratus (goldfish) - 1,789 d Bioconcentration factor (BCF): 155,986

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

IMDG
UN number: 2809 Class: 8 Packing group: III EMS-No: F-A, S-B
Proper shipping name: MERCURY
Marine pollutant: No

IATA
UN number: 2809 Class: 8 Packing group: III

Proper shipping name: Mercury

15. REGULATORY INFORMATION

OSHA Hazards
Target Organ Effect, Highly toxic by inhalation, Respiratory sensitiser, Teratogen, Reproductive hazard

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Mercury	7439-97-6	2007-09-28

16. OTHER INFORMATION

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Version 3.1
Revision Date 01/17/2012
Print Date 04/10/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Manganese
Product Number	:	266159
Brand	:	Aldrich
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Water Reactive, Target Organ Effect, Reproductive hazard

Target Organs

Nerves., Lungs

GHS Classification
Substances, which in contact with water, emit flammable gases (Category 1)
Skin irritation (Category 3)
Eye irritation (Category 2B)
Acute aquatic toxicity (Category 3)

GHS Label elements, including precautionary statements

Pictogram

Signal word DangerDanger

Hazard statement(s)

H260	In contact with water releases flammable gases which may ignite spontaneously.
H316	Causes mild skin irritation.
H320	Causes eye irritation.
H402	Harmful to aquatic life.
H260	In contact with water releases flammable gases which may ignite spontaneously.
H316	Causes mild skin irritation.
H320	Causes eye irritation.
H402	Harmful to aquatic life.

Precautionary statement(s)

P223	Keep away from any possible contact with water, because of violent reaction and possible flash fire.
P231 + P232	Handle under inert gas. Protect from moisture.
P223	Keep away from any possible contact with water, because of violent reaction and

	possible flash fire.
P231 + P232	Handle under inert gas. Protect from moisture.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P370 + P378	In case of fire: Use sand for extinction.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P422	Store contents under inert gas.

HMIS Classification

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	3
Physical hazards:	2

NFPA Rating

Health hazard:	0
Fire:	0
Reactivity Hazard:	2
Special hazard.:	W

Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : Mn
Molecular Weight : 54.94 g/mol

Component		Concentration
Manganese		
CAS-No. EC-No.	7439-96-5 231-105-1	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Suitable extinguishing media
Dry powder Carbon dioxide (CO2)

Extinguishing media which shall not be used for safety reasons
Water

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Manganese/manganese oxides

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Moisture sensitive. Keep in a dry place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Manganese	7439-96-5	TWA	0.2 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Central Nervous System impairment Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC)			
		C	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Ceiling limit is to be determined from breathing-zone air samples.			
		TWA	1 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	3 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3 mg/m3	USA. NIOSH Recommended Exposure Limits

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
impervious clothing, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	powder
Colour	grey

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 1,244 °C (2,271 °F)
Boiling point	1,962 °C (3,564 °F) at 1,013 hPa (760 mmHg)
Flash point	not applicable
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	7.300 g/cm3
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions

Reacts violently with water.

Conditions to avoid
Exposure to moisture.

Materials to avoid
acids, Halogens, Bases, Phosphorus, Sulphur oxides, Peroxides

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Manganese/manganese oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 9,000 mg/kg

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
Skin - rabbit - Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Mild eye irritation - 24 h

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

Carcinogenicity - rat - Intramuscular
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Tumorigenic:Tumors at site or application.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

May cause reproductive disorders.

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
Men exposed to manganese dusts showed a decrease in fertility. Chronic manganese poisoning primarily involves the central nervous system. Early symptoms include languor, sleepiness and weakness in the legs. A stolid mask-like appearance of the face, emotional disturbances such as uncontrollable laughter and a spastic gait with tendency to fall in walking are findings in more advanced cases. High incidence of pneumonia has been found in workers exposed to the dust or fume of some manganese compounds.

Synergistic effects
no data available

Additional Information
RTECS: OO9275000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 40 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Harmful to aquatic life.

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3208 Class: 4.3 Packing group: I
Proper shipping name: Metallic substance, water-reactive, n.o.s. (Manganese)
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 3208 Class: 4.3 Packing group: I EMS-No: F-G, S-N
Proper shipping name: METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S. (Manganese)
Marine pollutant: No

IATA
UN number: 3208 Class: 4.3 Packing group: I
Proper shipping name: Metallic substance, water-reactive, n.o.s. (Manganese)
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

OSHA Hazards
Water Reactive, Target Organ Effect, Reproductive hazard

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

SARA 311/312 Hazards
Reactivity Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Version 4.4
Revision Date 05/17/2012
Print Date 07/17/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Zinc
Product Number	:	243469
Brand	:	Sigma-Aldrich
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
No known OSHA hazards

GHS Classification
Self-heating substances (Category 1)
Substances, which in contact with water, emit flammable gases (Category 2)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H251	Self-heating: may catch fire.
H261	In contact with water releases flammable gases.

Precautionary statement(s)

P231 + P232	Handle under inert gas. Protect from moisture.
P235 + P410	Keep cool. Protect from sunlight.
P422	Store contents under inert gas.

HMIS Classification

Health hazard:	0
Flammability:	0
Physical hazards:	0

NFPA Rating

Health hazard:	0
Fire:	0
Reactivity Hazard:	0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.

Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula	:	Zn
Molecular Weight	:	65.39 g/mol

No ingredients are hazardous according to OSHA criteria.

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Dry powder

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Zinc/zinc oxides

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Immersion protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 480 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

Splash protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 30 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 873000, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an Industrial Hygienist familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	granular
Colour	grey

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 420 °C (788 °F) - lit.
Boiling point	907 °C (1,665 °F) - lit.
Flash point	no data available
Ignition temperature	no data available
Autoignition	The substance or mixture is classified as self heating with the category 1.

temperature	
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	7.133 g/cm3 at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions

Reacts violently with water.

Conditions to avoid
Exposure to moisture.

Materials to avoid
Acids, Strong bases, chlorides, Fluorine, Nitrates, Carbon disulfide

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Zinc/zinc oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity

no data available

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

OSHA Hazards
No known OSHA hazards

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Zinc	7440-66-6	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Zinc	7440-66-6	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Zinc	7440-66-6	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

M A T E R I A L S A F E T Y D A T A S H E E T

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

Company: AccuStandard, Inc.
125 Market Street
New Haven, CT 06513

Date MSDS Printed: 2/23/2011
Preparation Date: 2/23/2011
Information Phone Number: 203-786-5290
Emergency Phone Number: 203-786-5290
Hours: Mon. to Fri. 8am-5pm

Catalog Number: **H-157N**
Product Name: Indeno(1,2,3-cd)pyrene
Synonyms: o-Phenylenepyrene; IP; 2,3-Phenylenepyrene
Formula: $C_{22}H_{12}$ Molecular Weight: 276.34

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

Component(s) (1)	CAS #	Appr. %	ACGIH-TLV (mg/m3) TWA	ACGIH-TLV (mg/m3) STEL skin	OSHA-PEL (mg/m3) TWA	OSHA-PEL (mg/m3) STEL skin
Indeno(1,2,3-cd)pyrene	193-39-5	100				

Always follow safe Industrial Hygiene practices when handling this product

SECTION 3 - HAZARDS IDENTIFICATION

Health and Environmental Hazards/Symptoms of Exposure:

Harmful.

Cancer hazard.

Environmental hazard.

Potential Health Effects:

May be irritating to eyes.

May be irritating to skin.

May be harmful if absorbed through the skin.

May be irritating to mucous membrane and upper respiratory system.

Harmful if inhaled.

Harmful if swallowed.

Routes of Entry:

Inhalation, ingestion or skin contact.

Carcinogenicity:

This product is or contains a component that is classified (ACGIH, IARC, NTP, OSHA) as a possible cancer hazard.

SECTION 4 - FIRST AID MEASURES

Emergency First Aid:

Get medical assistance for all cases of overexposure.

Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

Eye contact: Immediately flush with plenty of water. After initial flushing, remove and contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.

Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

Ingestion: Call a physician or poison control center immediately. If conscious, give water freely.

SECTION 5 - FIRE FIGHTING MEASURES

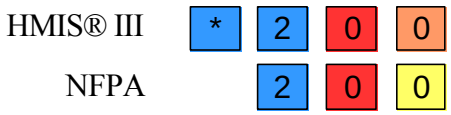
Flammable Properties:

Flash Point: 477 °F / 247 °C

Flammable Limits LEL (%): N/A

Flammable Limits UEL (%): N/A

Autoignition Temperature: N/A



During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media:

Use alcohol foam, carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

Fire Fighting Procedures:

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Spill Response:

Wear a self-contained breathing apparatus and appropriate Personal protection. Prevent contact with skin or eyes. Ventilate area. Avoid raising dust. Take up and containerize for proper disposal. Flush spill area with water. Comply with Federal, State, and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tightly closed container.

Store in a cool dry place.

Use with adequate ventilation.

Do not breathe dust.

Do not get in eyes, on skin or clothing.

Avoid prolonged or repeated exposure.

This product should only by used by persons trained in the safe handling of hazardous chemicals.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls and Personal Protection Equipment (PPE):

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your safety equipment supplier). Engineering and/or administrative controls should be implemented to reduce exposure.

Material should be handled or transferred in an approved fume hood or with adequate ventilation.

Compatible chemical-resistant protective gloves must be worn to prevent skin contact.

Safety glasses with side shields must be worn at all times.

General Hygiene Considerations:

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Solid
Odor: N/A
pH: N/A
Vapor Pressure: N/A
Vapor Density (Air = 1): N/A
Boiling Point: 497 - 498 °C
Melting Point: 150 - 153 °C
Solubility in Water: Insoluble
Specific Gravity (H_2O = 1): 1.38 g/cm3
Flash Point: 477 °F / 247 °C
Explosion Limits (%): N/A to N/A
Autoignition Temperature: N/A
Percent Volatile: N/A
Evaporation Rate (BuAc = 1): N/A
Molecular Weight: 276.34
Molecular Formula: $C_{22}H_{12}$

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable
Conditions To Avoid: Excessive heat
Materials To Avoid: Oxidizers
Hazardous Decomposition: Oxides of carbon

Hazardous Polymerization: Will not occur

SECTION 11 - TOXICOLOGICAL INFORMATION

See section 3 for specific toxicological information for the ingredients of this product.

SECTION 12 - ECOLOGICAL INFORMATION

By complying with sections 6 and 7 there will be no release to the environment.

SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

DOT UN Number: NR Shipping Class: NR Packing Group: NR Environmentally hazardous substance, solid, n.o.s.

HARMFUL

SECTION 15 - REGULATORY INFORMATION

In addition to Federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

WARNING: This product contains chemical(s) known to the state of California to cause cancer.

This product is subject to SARA section 313 reporting requirements.

The CAS number of this product is listed on the TSCA Inventory. For laboratory, reasearch and development use only. Not for manufacturing or commercial purposes.

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI and CHIPs regulations.

The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. The manufacturer will not assume any liability for the accuracy and completeness of this information. Final determination of the suitability of the material is the responsibility of the user. Although certain hazards are described herein, the user should not presume that these are the only hazards that exist. Since conditions and manner of use are outside of the manufactureres control, we make
NO WARRANTY OF MERCHANTABILITY, EXPRESSED OR IMPLIED, AND ASSUME NO LIABILITY RESULTING FROM ITS USE.

Legend : N/A = Not Available ND = Not Determined NR = Not Regulated

* * * End of Document * * *

Appendix B

EXCAVATION/TRENCHING GUIDELINE

C&S ENGINEERS

C&S ENGINEERS, INC. HEALTH & SAFETY GUIDELINE #14
EXCAVATION/TRENCHING OPERATIONS

TABLE OF CONTENTS

C&S ENGINEERS, INC.
EXCAVATION/TRENCHING OPERATIONS

1.0 PURPOSE

To establish safe operating procedures for excavation/trenching operations at C&S work sites.

2.0 SCOPE

Applies to all C&S activity where excavation or trenching operations take place.

3.0 DEFINITIONS

Excavation — Any manmade cavity or depression in the earth's surface, including its sides, walls, or faces, formed by earth removal and producing unsupported earth conditions by reasons of the excavation.

Trench — A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.

4.0 RESPONSIBILITY EMPLOYEES

Employees — All employees must understand and follow the procedures outlined in this guideline during all excavation and trenching operations.

Health and Safety Coordinator/Officer (HSC/HSO) - The HSC/HSO is responsible for ensuring that these procedures are implemented at each work site.

5.0 GUIDELINES

5.1 Hazards Associated With Excavation/Trenching

The principal hazards associated with excavation/trenching are:

- Suffocation, crushing, or other injury from falling material.
- Damage/failure of installed underground services and consequent hazards.
- Tripping, slipping, or falling.
- Possibility of explosive, flammable, toxic, or oxygen-deficient atmosphere in excavation.

5.2 Procedures Prior to Excavation

1. Underground Utilities

   - Determine the presence and location of any underground chemical or utility pipes, electrical, telephone, or instrument wire or cables.
   - If the local DigSafely NY is unable to locate private/domestic or plant utilities, then an independent utility locating service must be contacted and mobilized to the site.
   - Identify the location of underground services by stakes, markers or paint.
   - Arrange to de-energize or isolate underground services during excavation. If not possible, or if location is not definite, method of excavation shall be established to minimize hazards by such means as:

     a) Use of hand tools in area of underground services.
     b) Insulating personnel and equipment from possible electrical contact.
     c) Use of tools or equipment that will reduce possibility of damage to underground services and hazard to worker.

2. Identify Excavation Area — Areas to be excavated shall be identified and segregated by means of barricades, ropes, and/or signs to prevent access of unauthorized personnel and equipment. Suitable means shall be provided to make barriers visible at all times.
3. Surface Water Provide means of diverting surface water from excavation.
4. Shoring/Bracing — Shoring or bracing that may be required for installed equipment adjacent to the excavation shall be designed by a competent person.
5. Structural Ramps — Structural ramps that are used solely by employees as a means of access to or egress from the excavation shall be designed by a competent person.

5.3 Procedures For Doing The Excavation

1. **Determine the need for shoring/sloping** — the type of soil will establish the need for shoring, slope of the excavation, support systems, and equipment to be used. The soil condition may change as the excavation proceeds. Appendices A, B, C, D, E, and F of the OSHA Excavation Regulation, 29 CFR 1926 Subpart P, are to be used in defining shoring and sloping requirements.

2. **Mobile equipment** — For safe use of mobile industrial equipment in or near the excavation, the load carrying capacity of soil shall be established and suitable protection against collapse of soil provided by the use of mats, barricades, restricting the location of equipment, or shoring.

3. Excavated material (spoil) shall be stored at least two (2) feet from the edge of the excavation.

4. All trench (vertical sides) excavations greater than five (5) feet deep shall be shored.

5. The excavation shall be inspected daily for changes in conditions, including the presence of ground water, change in soil condition, or effects of weather such as rain or freeze. A safe means of continuing the work shall be established based on changes in condition. Typically test trench excavations made as part of an environmental subsurface nvestigation are made and backfilled the same day.

6. Appropriate monitoring for gas, toxic, or flammable materials will be conducted to establish the need for respiratory equipment, ventilation, or other measures required to continue the excavation safely.

7. Adequate means of dewatering the excavation shall be provided by the contractor as required.

8. A signal person shall be provided to direct powered equipment if working in the excavation with other personnel.

9. A signal person shall be provided when backfilling excavations to direct powered equipment working in the excavation with other personnel.

10. Warning vests will be worn when employees are exposed to public vehicular traffic.

11. Employees shall stand away from vehicles being loaded or unloaded, and shall not be permitted underneath loads handled by lifting or dragging equipment.

12. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available if hazardous atmospheric conditions exist or may be expected to develop. The specifics will be determined by the HSC/HSM.

13. Walkways or bridges with standard guardrail shall be provided where employees or equipment are required or permitted to cross over excavations.

5.4 Entering the Excavation

No C&S Engineers, Inc., employee shall enter an excavation which fails to meet the requirements of Section 5.3 of this guideline.

6.0 REFERENCES

29 CFR 1926, Subpart P - Excavations

7.0 ATTACHMENTS

29 CFR 1926 Subpart P - Appendices A, B, F

• **Part Number:**	1926
• **Part Title:**	Safety and Health Regulations for Construction
• **Subpart:**	P
• **Subpart Title:**	Excavations
• **Standard Number:**	1926 Subpart P App A
• **Title:**	Soil Classification

(a) Scope and application - (1) Scope. This appendix describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets for requirements, and describes acceptable visual and manual tests for use in classifying soils.

(2) Application. This appendix applies when a sloping or benching system is designed in accordance with the requirements set fo 1926.652(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for excav designed as a method of protection from cave-ins in accordance with appendix C to subpart P of part 1926, and when aluminum shoring is designed in accordance with appendix D. This Appendix also applies if other protective systems are designed and selec from data prepared in accordance with the requirements set forth in 1926.652(c), and the use of the data is predicated on the us classification system set forth in this appendix.

(b) Definitions. The definitions and examples given below are based on, in whole or in part, the following; American Society for T Materials (ASTM) Standards D653-85 and D2488; The Unified Soils Classification System; The U.S. Department of Agriculture (US Textural Classification Scheme; and The National Bureau of Standards Report BSS-121.

"Cemented soil" means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

"Cohesive soil" means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sideslopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

"Dry soil" means soil that does not exhibit visible signs of moisture content.

"Fissured" means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

"Granular soil" means gravel, sand, or silt (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

"Layered system" means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

"Moist soil" means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

"Plastic" means a property of a soil which allows the soil to be

deformed or molded without cracking, or appreciable volume change.
"Saturated soil" means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or sheer vane.
"Soil classification system" means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the characteristics of the deposits and the environmental conditions of exposure.
"Stable rock" means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.
"Submerged soil" means soil which is underwater or is free seeping.
"Type A" means cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:
(i) The soil is fissured; or
(ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
(iii) The soil has been previously disturbed; or
(iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
(v) The material is subject to other factors that would require it to be classified as a less stable material.
"Type B" means:
(i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or
(ii) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
(iii) Previously disturbed soils except those which would otherwise be classed as Type C soil.
(iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
(v) Dry rock that is not stable; or
(vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.
"Type C" means:
(i) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or
(ii) Granular soils including gravel, sand, and loamy sand; or
(iii) Submerged soil or soil from which water is freely seeping; or
(iv) Submerged rock that is not stable, or
(v) Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.
"Unconfined compressive strength" means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.
"Wet soil" means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

(c) Requirements - (1) Classification of soil and rock deposits. Each soil and rock deposit shall be classified by a competent perso Rock, Type A, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.

(2) Basis of classification. The classification of the deposits shall be made based on the results of at least one visual and at least analysis. Such analyses shall be conducted by a competent person using tests described in paragraph (d) below, or in other reco methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Depart Agriculture textural classification system.

(3) Visual and manual analyses. The visual and manual analyses, such as those noted as being acceptable in paragraph (d) of thi shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify prc properties, factors, and conditions affecting the classification of the deposits.

(4) Layered systems. In a layered system, the system shall be classified in accordance with its weakest layer. However, each laye classified individually where a more stable layer lies under a less stable layer.

(5) Reclassification. If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any w changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumst

(d) Acceptable visual and manual tests. - (1) Visual tests. Visual analysis is conducted to determine qualitative information regarc excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil take samples from excavated material.

(i) Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the amounts of the particle sizes. Soil that is primarily composed of fine-grained material material is cohesive material. Soil composec of coarse-grained sand or gravel is granular material.

(ii) Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does nc clumps is granular.

(iii) Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tens could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of m ground and are indications of potentially hazardous situations.

(iv) Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground s and to identify previously disturbed soil.

(v) Observed the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slop the excavation. Estimate the degree of slope of the layers.

(vi) Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water see the sides of the excavation, or the location of the level of the water table.

(vii) Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the s the excavation face.

(2) Manual tests. Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil a provide more information in order to classify soil properly.

(i) Plasticity. Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8-inch in diameter. Cohe material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of 1/8-inch be held on one end without tearing, the soil is cohesive.

(ii) Dry strength. If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is g combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clu only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps wh break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the s considered unfissured.

(iii) Thumb penetration. The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive so test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designatior "Standard Recommended Practice for Description of Soils (Visual - Manual Procedure).") Type A soils with an unconfined compre strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great eff soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molde finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicat excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influe flooding), the classification of the soil must be changed accordingly.

(iv) Other strength tests. Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetron using a hand-operated shearvane.

(v) Drying test. The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesi and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.5 six inches (15.24 cm) in diameter until it is thoroughly dry:

(A) If the sample develops cracks as it dries, significant fissures are indicated.

(B) Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil ha cohesive material content. The soil can be classified as an unfissured cohesive material and the unconfined compressive strength determined.

(C) If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the t pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cc fissures. If they pulverize easily into very small fragments, the material is granular.

Next Standard (1926 Subpart P App B)

Regulations (Standards - 29 CFR) - Table of Contents

U.S. Department of Labor | Occupational Safety & Health Administration | 200 Constitution Ave., NW, Washington, D
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www.OSHA.gov

• **Part Number:**	1926
• **Part Title:**	Safety and Health Regulations for Construction
• **Subpart:**	P
• **Subpart Title:**	Excavations
• **Standard Number:**	1926 Subpart P App B
• **Title:**	Sloping and Benching

(a) ***Scope and application***. This appendix contains specifications for sloping and benching when used as methods of protecting working in excavations from cave-ins. The requirements of this appendix apply when the design of sloping and benching protectiv is to be performed in accordance with the requirements set forth in § 1926.652(b)(2).

(b) ***Definitions***.

Actual slope means the slope to which an excavation face is excavated.

Distress means that the soil is in a condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phen the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slu material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the fa excavation; and ravelling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the excavation and trickling or rolling down into the excavation.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site condi protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).

Short term exposure means a period of time less than or equal to 24 hours that an excavation is open.

(c) ***Requirements*** -- (1) ***Soil classification***. Soil and rock deposits shall be classified in accordance with appendix A to subpart I 1926.

(2) ***Maximum allowable slope***. The maximum allowable slope for a soil or rock deposit shall be determined from Table B-1 of tl appendix.

(3) ***Actual slope***. (i) The actual slope shall not be steeper than the maximum allowable slope.

(ii) The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occur slope shall be cut back to an actual slope which is at least ½ horizontal to one vertical (½H:1V) less steep than the maximum allo slope.

(iii) When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person sh determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure that such achieved. Surcharge loads from adjacent structures shall be evaluated in accordance with § 1926.651(i).

(4) ***Configurations***. Configurations of sloping and benching systems shall be in accordance with Figure B-1.

TABLE B-1
MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V)(1) FOR EXCAVATIONS LESS THAN 20 FEET DEEP(3)
STABLE ROCK	VERTICAL (90°)
TYPE A (2)	3/4:1 (53°)
TYPE B	1:1 (45°)
TYPE C	1 ½:1 (34°)

Footnote(1) Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angle rounded off.

Footnote(2) A short-term maximum allowable slope of 1/2H:1V (63°) is allowed in excavations in Type A soil that are 12 feed (3.67 m) or l depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53°).

Footnote(3) Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

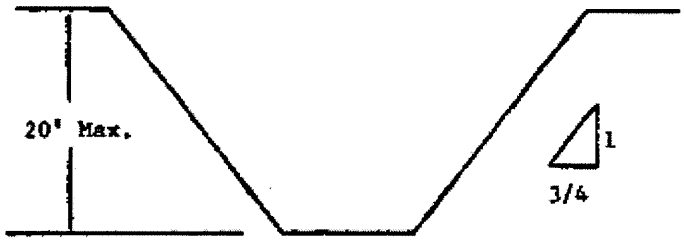
Figure B-1

Slope Configurations

(All slopes stated below are in the horizontal to vertical ratio)

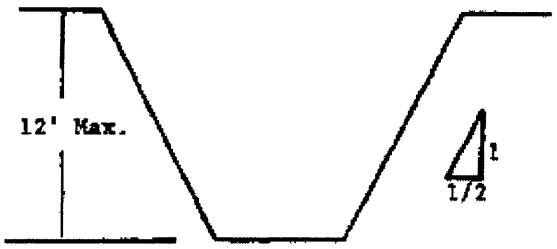
B-1.1 Excavations made in Type A soil.

1. All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of ¾:1.



SIMPLE SLOPE -- GENERAL

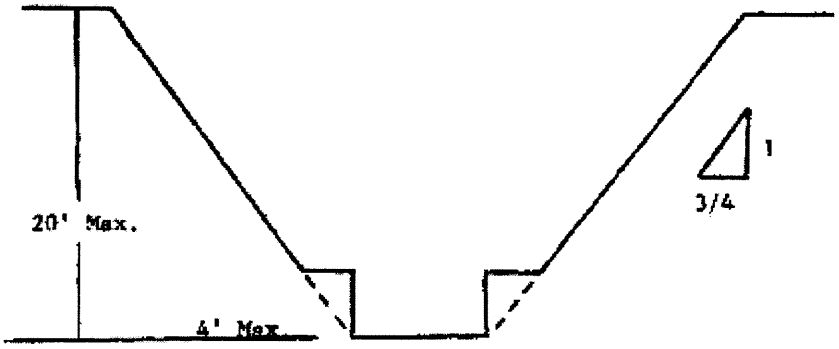
Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have maximum allowable slope of ½:1.



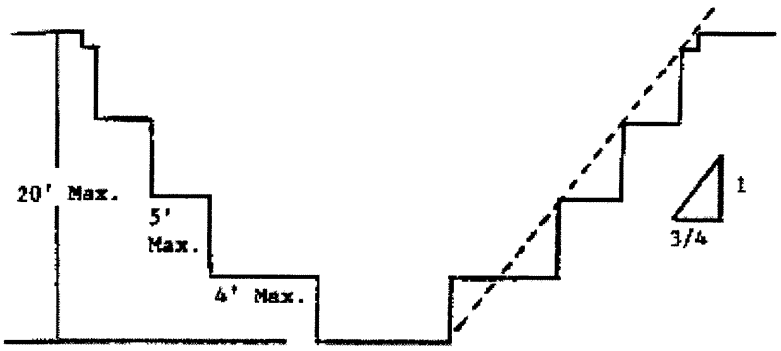
SIMPLE SLOPE -- SHORT TERM

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 3/4 to 1 and maximum bench dimens

follows:

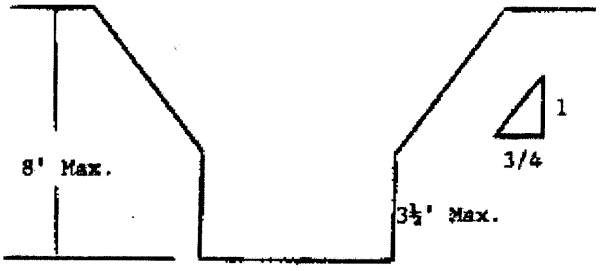


SIMPLE BENCH



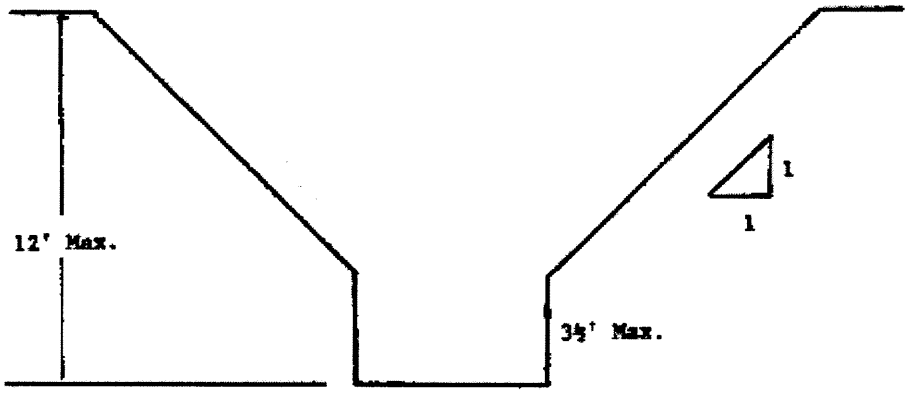
MULTIPLE BENCH

3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical sid feet.



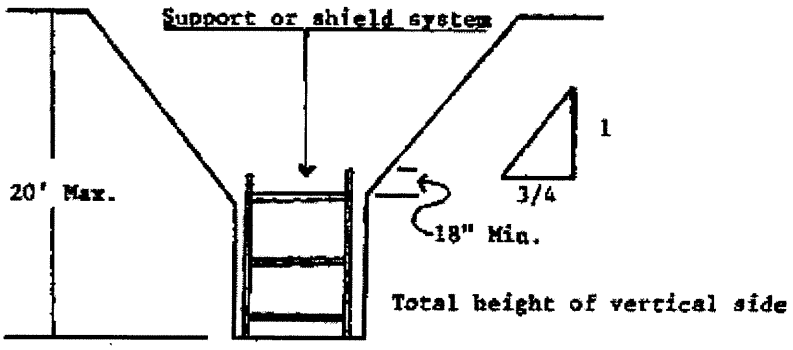
UNSUPPORTED VERTICALLY SIDED LOWER PORTION -- MAXIMUM 8 FEET IN DEPTH)

All excavations more than 8 feet but not more than 12 feet in depth with unsupported vertically sided lower portions shall have a r allowable slope of 1:1 and a maximum vertical side of 3½ feet.



UNSUPPORTED VERTICALLY SIDED LOWER PORTION -- MAXIMUM 12 FEET IN DEPTH)

All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maxi allowable slope of ¾:1. The support or shield system must extend at least 18 inches above the top of the vertical side.

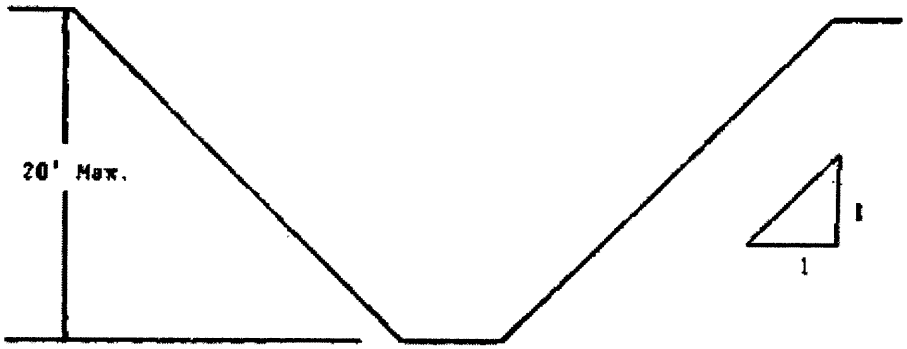


SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION

4. All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other opt permitted under § 1926.652(b).

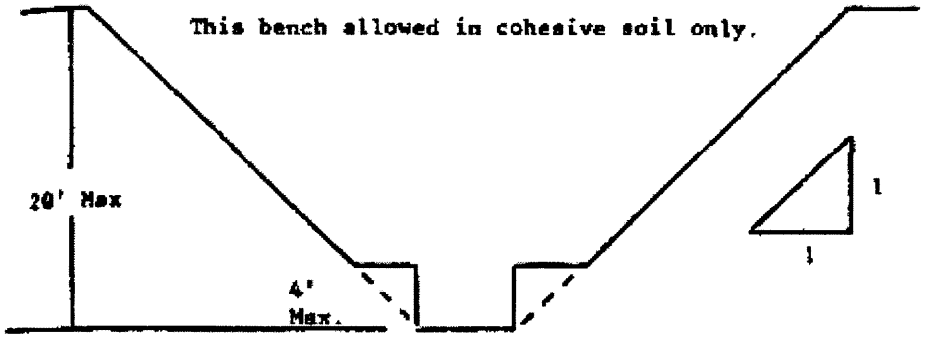
B-1.2 Excavations Made in Type B Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.

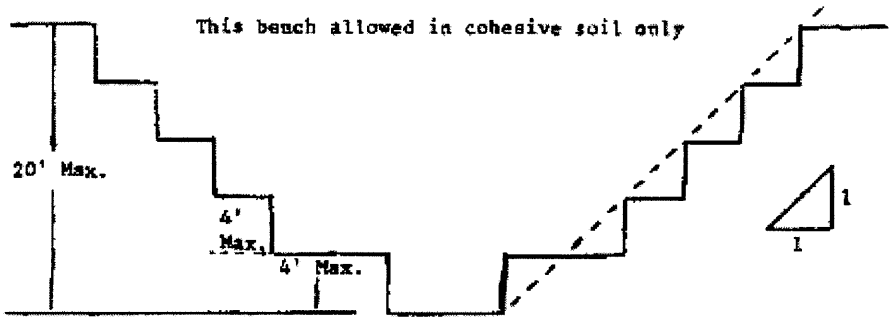


SIMPLE SLOPE

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions

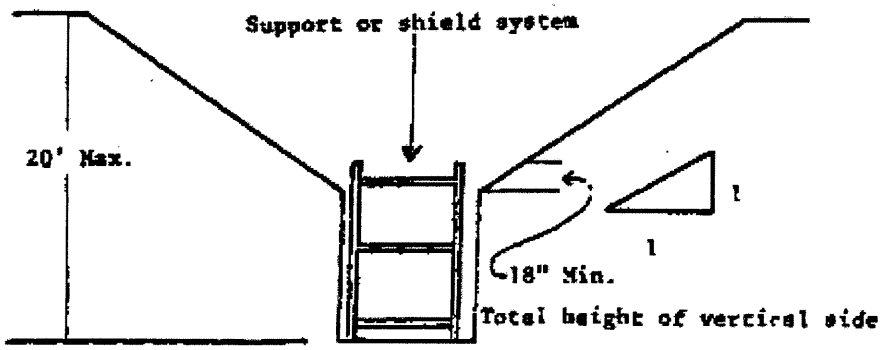


SINGLE BENCH



MULTIPLE BENCH

3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at le inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.

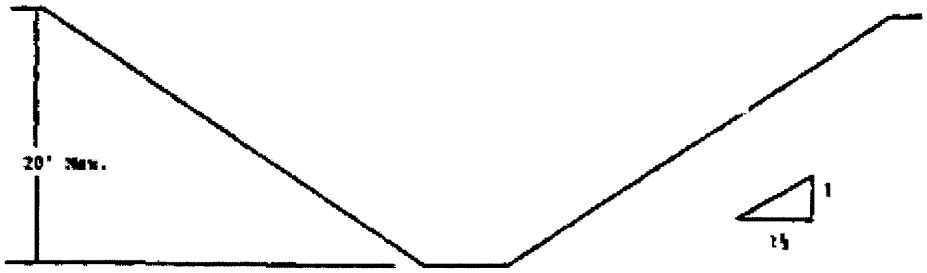


VERTICALLY SIDED LOWER PORTION

4. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

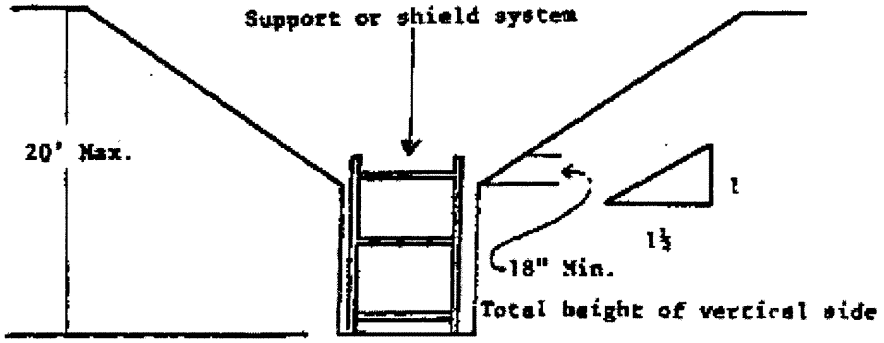
B-1.3 Excavations Made in Type C Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1½:1.



SIMPLE SLOPE

2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at le inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1½:1.

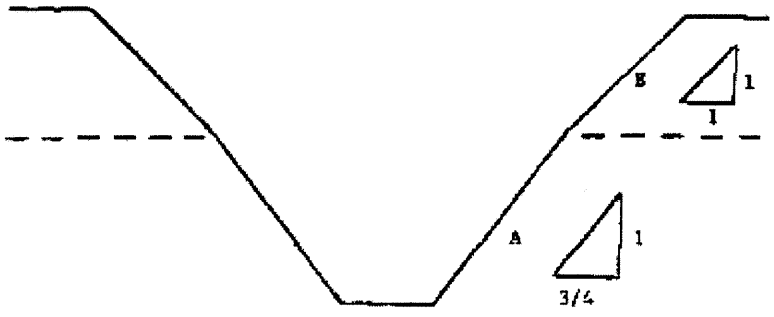


VERTICAL SIDED LOWER PORTION

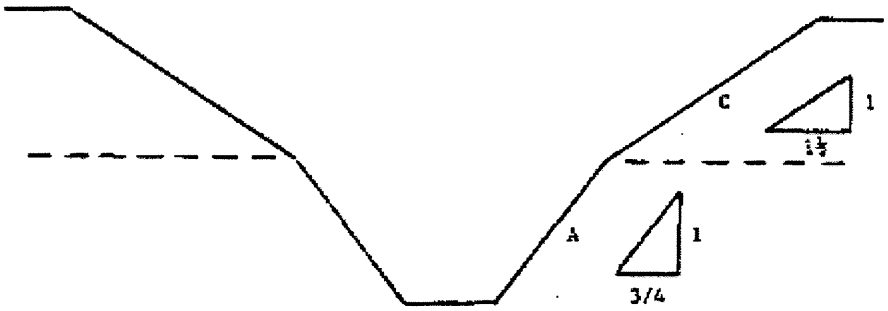
3. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

B-1.4 Excavations Made in Layered Soils

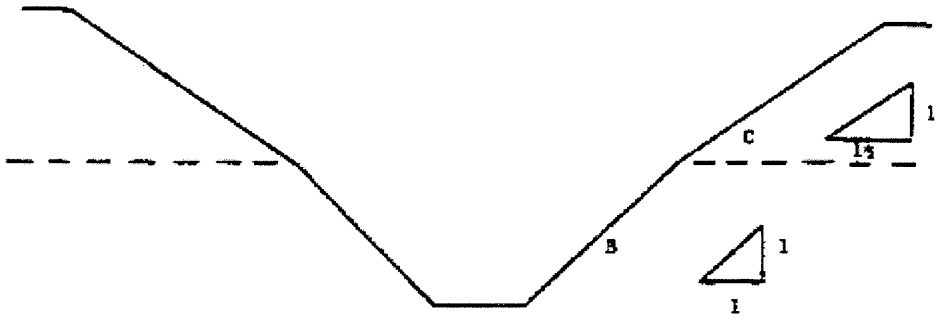
1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth b



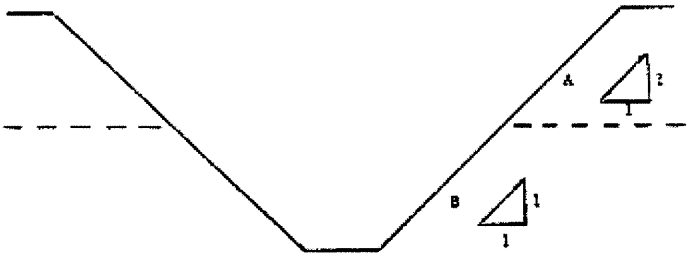
B OVER A



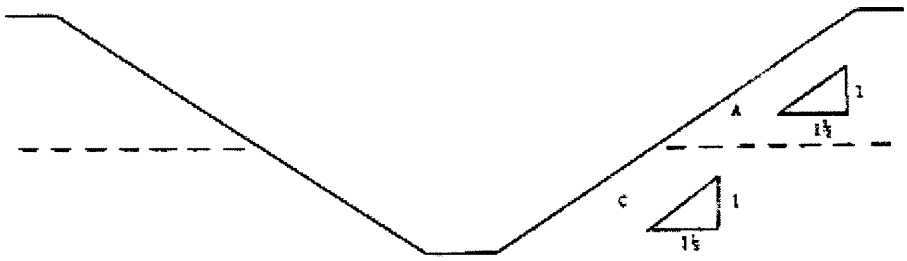
C OVER A



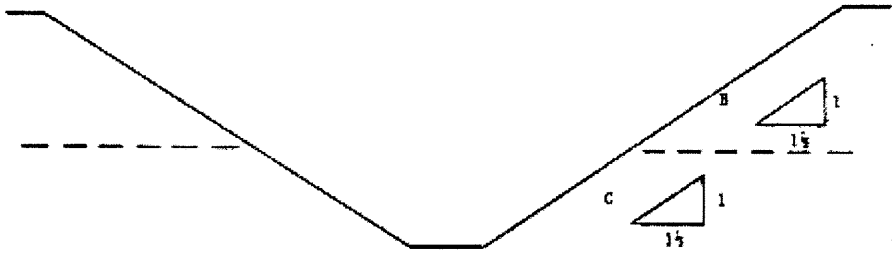
C OVER B



A OVER B



A OVER C



B OVER C

2. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

Next Standard (1926 Subpart P App C)

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• **Part Number:**	1926
• **Part Title:**	Safety and Health Regulations for Construction
• **Subpart:**	P
• **Subpart Title:**	Excavations
• **Standard Number:**	1926 Subpart P App F
• **Title:**	Selection of Protective Systems

The following figures are a graphic summary of the requirements contained in subpart P for excavations 20 feet or less in depth. Prc systems for use in excavations more than 20 feet in depth must be designed by a registered professional engineer in accordance wit 1926.652(b) and (c).

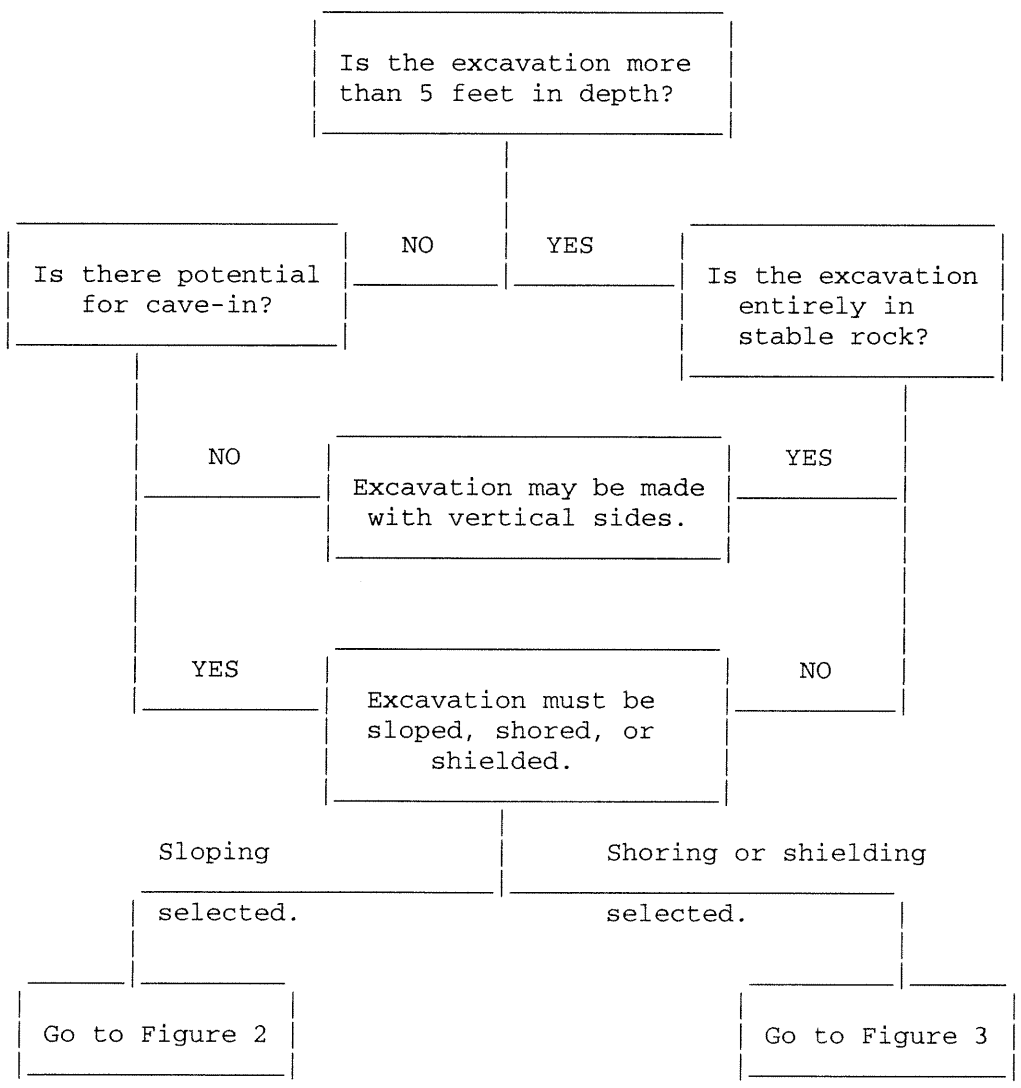

FIGURE 1 - PRELIMINARY DECISIONS

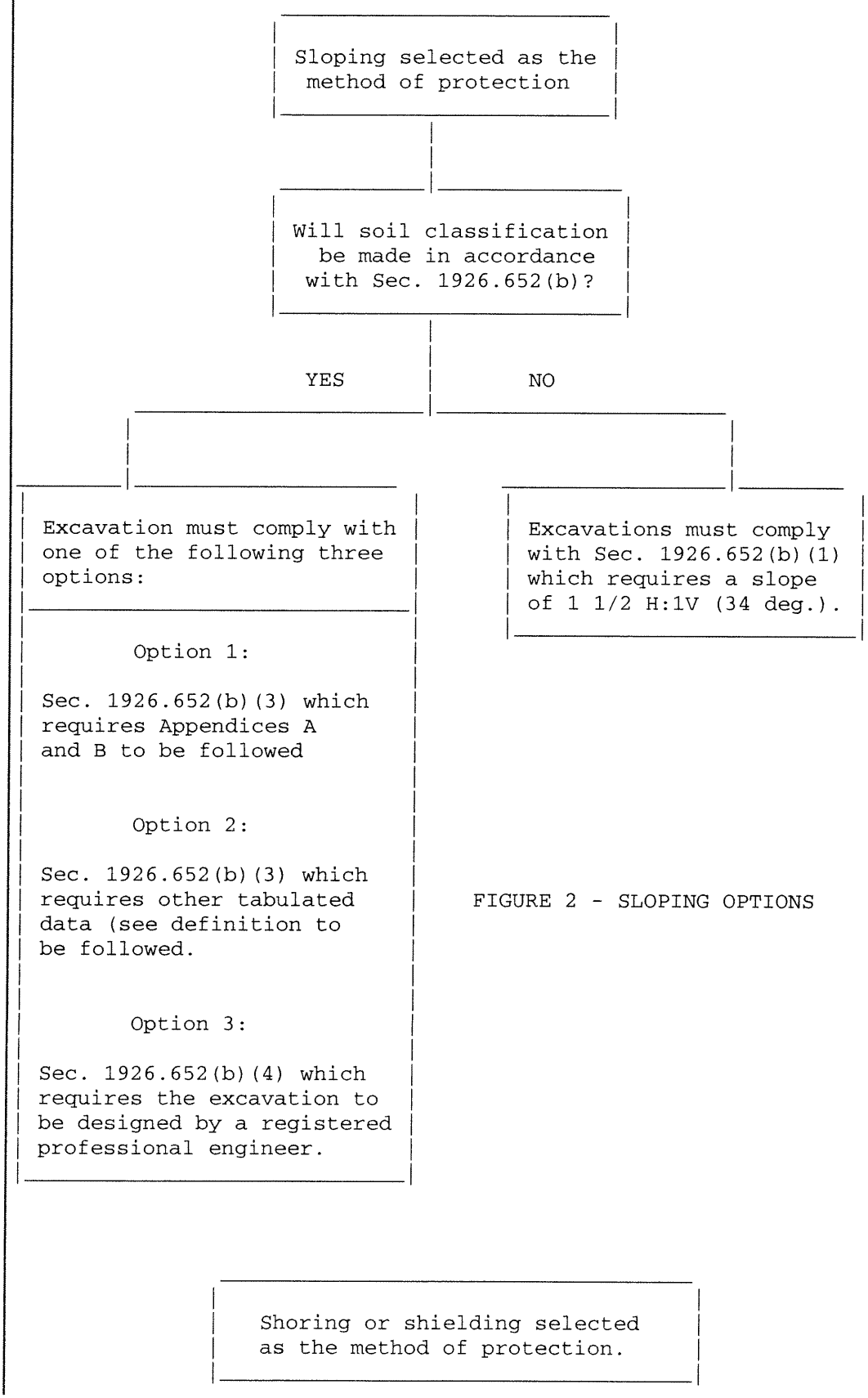

FIGURE 2 - SLOPING OPTIONS

Shoring or shielding selected as the method of protection.

Soil Classification is required when shoring or shielding is used. The excavation must comply with one of the following four options:

Option 1

Sec. 1926.652(c)(1) which requires Appendices A and C to be followed (e.g. timber shoring).

Option 2

Sec. 1926.652(c)(2) which requires manufacturers data to be followed (e.g. hydraulic shoring, trench jacks, air shores, shields).

Option 3

Sec. 1926.652(c)(3) which requires tabulated data (see definition) to be followed (e.g. any system as per the tabulated data).

Option 4

Sec. 1926.652(c)(4) which requires the excavation to be designed by a registered professional engineer (e.g. any designed system).

FIGURE 3 - SHORING AND SHIELDING OPTIONS

Next Standard (1926 Subpart Q)

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Appendix C

GUIDANCE ON INCIDENT INVESTIGATION

AND REPORTING

C&S ENGINEERS

MEDICAL EMERGENCY/INCIDENT RESPONSE PROTOCOL

1.0 PURPOSE

From time to time employees of C & S Engineers, Inc. will sustain an injury while working on the job. While every effort is being made to prevent this, in the event of an injury or illness on the job, the following procedures will be implemented. This format may also be utilized in the event of a property damage incident.

2.0 SCOPE

This guideline applies to all C & S Engineers, Inc. job sites and employees.

3.0 GUIDELINES

Upon notification or awareness of an incident/accident with injuries or illness the Emergency Coordinator or his On-Site Designee will:

1. Ensure that the injured employee is receiving immediate first aid and medical care.
2. Notify Emergency Services (911) if injuries are severe.
3. Stabilize the work area; ensure that no one else can be injured.
4. Notify the Project Manager at the earliest possible convenience**.**
5. Notify the Owner/Client at the earliest possible convenience.

To assist the Health and Safety Manager in the root cause analysis, the Emergency Coordinator or his On-Site Designee will also make an attempt to:

1. Obtain the names and phone numbers of witnesses.
2. Preserve the accident scene if possible for analysis.

Injury Management

1. If the patient is stable with non-life threatening injuries, the foreman will ensure the employee is transported to Mount St. Mary's Hospital of Niagara Falls.

   At no time will an injured employee drive themselves to medical care.

2. If the patient has serious or life threatening injuries, the emergency coordinator or his on-site designee will notify the emergency services for the area for treatment and transport to a hospital or emergency room. Serious injuries can be considered but not limited to head injuries, loss of consciousness, severe laceration or amputation, fractured bones, burns and eye injuries.

3. Following the treatment and care of the injured employee, the emergency coordinator or his on-site designee and the project manager will initiate the completion of the first injury report. The Health & Safety Manager will assist.

Project Manager

1. Upon notification of a personal injury or illness on the job site, will notify C & S Engineers, Inc, President and Corporate Legal and C&S Companies Health and Safety Manager.
2. Will report to the worksite to initiate the first injury report.
3. Will report to the treatment facility to check on the well being of the injured employee. The project manager will ensure that the treatment facility is aware that this is a workers compensation case.
4. Will assist the Health and Safety Manager in the analysis of the incident.

Health & Safety Manager

1. Upon notification of the personal injury will determined if it is necessary to report to the treatment facility or the accident site, depending on the nature of the injuries and the circumstances of the accident.
2. Will report to the worksite to begin a root cause analysis investigation of the accident. The investigation may include interview of witnesses, field crew , and project manager, the photographing of the scene, reconstruction of the accident scene, using test instruments and taking measurements. The Health and Safety Manager may draw diagrams from the information learned.
3. The Health and Safety Manager will work with the owner/client as necessary to investigate the accident.
4. The Health & Safety manager will ensure that the site is safe to resume work.
5. The Health & Safety Manager shall initiate the New York State Compensation form requirements (C-2) and forward a copy of the C-2 to the C & S Engineers, Inc. controller for transmittal to the Compensation Carrier within 8 hrs of notification of the incident or by the end of the next business day.
6. The Health and Safety manager, upon completion of the investigation, will provide the Project Manager with a written investigative report (copy to the President)
7. The accident will be reviewed at the next Project Managers meeting with the intent to prevent further or similar events on other projects.
8. The Health & Safety Manager will assess the incident to determine OSHA record ability and make record if necessary on the OSHA 300 form, within five working days.

Incident Response

1.0 PURPOSE

To prevent the occurrence of accidents on C&S Engineers, Inc., work sites and to establish a procedure for investigation and reporting of incidents occurring in, or related to C&S work activities.

2.0 SCOPE

Applies to all incidents related to C&S Engineers, Inc. work activities.

3.0 DEFINITIONS

Accident - An undesired event resulting in personal injury and/or property damage, and/or equipment failure.

Fatality - An injury or illness resulting in death of the individual.

Incident - Any occurrence which results in, or could potentially result in, the need for medical care or property damage. Such incidents shall include lost time accidents or illness, medical treatment cases, unplanned exposure to toxic materials or any other significant occurrence resulting in property damage or in "near misses."

Incidence Rate - the number of injuries, illnesses, or lost workdays related to a common exposure base of 100 full-time workers. The rate is calculated as:

N/EH x 200,000

N = number of injuries and illnesses or lost workday cases; EH = total hours worked by all associates during calendar year. 200,000 = base for 100 full-time equivalent workers (working 40 hours per week, 50 weeks per year).

Injury - An injury such as a cut, fracture, sprain, amputation, etc. which results from a work accident or from a single instantaneous event in the work environment.

Lost Workday Case - A lost workday case occurs when an injured or ill employee experiences days away from work beginning with the next scheduled work day. Lost workday cases do not occur unless the employee is effected beyond the day of injury or onset of illness.

Recordable Illness - An illness that results from the course of employment and must be entered on the OSHA 300 Log and Summary of Occupational Injuries and Illnesses. These illnesses require medical treatment and evaluation of work related injury. For example, dermatitis, bronchitis, irritation of eyes, nose, and throat can result from work and non-work related incidents.

Recordable Injury - An injury that results from the course of employment and must be entered on the OSHA 300 Log and Summary of Occupational Injuries and Illnesses. These injuries require medical treatment; may involve loss of consciousness; may result in restriction of work or motion or transfer to another job; or result in a fatality.

Near Miss - An incident which, if occurring at a different time or in a different personnel or equipment configuration, would have resulted in an incident.

4.0 RESPONSIBILITIES

Employees - It shall be the responsibility of all C&S Engineers, Inc. employees to report all incidents as soon as possible to the HSC, regardless of the severity.

Human Resources - has overall responsibility for maintaining accident/ incident reporting and investigations according to current regulations and recording injuries/ illness on the OSHA 300 log, and posting the OSHA 300 log.

Emergency Coordinator - It is the responsibility of the Emergency Coordinator to investigate and prepare an appropriate report of all accidents, illnesses, and incidents occurring on or related to C&S Engineers, Inc. work. The Emergency Coordinator shall complete Attachment A within 24 hours of the incident occurrence.

Health and Safety Manager (HSM) - It is the responsibility of the HSM to investigate and prepare an appropriate report of all lost time injuries and illnesses and significant incidents occurring on or related to C&S Companies. The HSM shall maintain the OSHA 300 form.

Project Managers (PM) - It shall be the PM's responsibility to promptly correct any deficiencies in personnel, training, actions, or any site or equipment deficiencies that were determined to cause or contribute to the incident investigated.

5.0 GUIDELINES

5.1 Incident Investigation

The Project Manager will immediately investigate the circumstances surrounding the incident and will make recommendations to prevent recurrence. The HSM shall be immediately notified by telephone if a serious accident/ incident occurs. The incident shall be evaluated to determine whether it is OSHA recordable. If the incident is determined to be OSHA 300 recordable, it shall be entered on the OSHA 300 form.

The Project Manager with assistance from the HSM must submit to the office an incident report form pertaining to any incident resulting in injury or property damage.

5.2 Incident Report

The completed incident report must be completed by the Project Manager within 12 hours of the incident and distributed to the HSM, and Human Resources. This form shall be maintained by Human Resources for at least five years for all OSHA recordable cases. This form serves as an equivalent to the OSHA 101 form.

5.3 Incident Follow-up Report

The Incident Follow-Up Report (Attachment B) shall be distributed with the Incident Report within one week of the incident. Delay in filing this report shall be explained in a brief memorandum.

5.4 Reporting of Fatalities or Multiple Hospitalization Accidents

Fatalities or accidents resulting in the hospitalization of three or more employees must be reported to OSHA verbally or in writing within 8 hours. The report must contain 1) circumstances surrounding the accident(s), 2) the number of fatalities, and 3) the extent of any injuries.

5.5 OSHA 300A Summary Form

Recordable cases must be entered on the log within six workdays of receipt of the information that a recordable case has occurred. The OSHA log must be kept updated to within 45 calendar days.
OSHA 300 forms must be updated during the 5 year retention period, if there is a change in the extent or outcome of an injury or illness which affects an entry on a log. If a change is necessary, the original entry should be lined out and a corrected entry made on that log. New entries should be made for previously unrecorded cases that are discovered or for cases that initially weren't recorded but were found to be recordable after the end of the year. Log totals should also be modified to reflect these changes.

5.5.1 Posting

The log must be summarized at the end of the calendar year and the summary must be posted from February 1 through May 31.

5.6 OSHA 300A

Facilities selected by the Bureau of Labor Statistics (BLS) to participate in surveys of occupational injuries and illnesses will receive the OSHA 300A. The data from the annual summary on the OSHA 300 log should be transferred to the OSHA 300A, other requested information provided and the form returned as instructed by the BLS.

5.7 Access to OSHA Records

All OSHA records (accident reporting forms and OSHA 300 logs) should be available for inspection and copying by authorized Federal and State government officials.

Employees, former employees, and their representatives must be given access for inspection and copying to only the log, OSHA No. 300, for the establishment in which the employee currently works or formerly worked.

6.0 REFERENCES

29 CFR Part 1904

7.0 ATTACHMENTS

Attachment A - Incident Investigation Form
Attachment B - Incident Follow-Up Report
Attachment C - Establishing Recordability

ATTACHMENT A

INCIDENT INVESTIGATION FORM

Accident investigation should include:

Location: _____

Time of Day: _____

Accident Type: _____

Victim: _____

Nature of Injury: _____

Released Injury: _____

Hazardous Material: _____

Unsafe Acts: _____

Unsafe Conditions: _____

Policies, Decisions: _____

_____

Personal Factors: _____

_____

Environmental Factors: _____

_____

_____

ATTACHMENT B

Date _____

Foreman: _____

INCIDENT FOLLOW-UP REPORT

Date of Incident: _____

Site: _____

Brief description of incident: _____

_____

_____

_____

_____

Outcome of incident: _____

_____

_____

_____

Physician's recommendations: _____

_____

_____

_____

Date the injured returned to work: _____

Project Manager Signature: _____

Date: _____

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

ATTACHMENT C

ESTABLISHING RECORDABILITY

1. Deciding whether to record a case and how to classify the case.

   Determine whether a fatality, injury or illness is recordable.

   A fatality is recordable if:

   - Results from employment

   An injury is recordable if:

   - Results from employment and
   - It requires medical treatment beyond first aid or
   - Results in restricted work activity or job transfer, or
   - Results in lost work day or
   - Results in loss of consciousness

   An illness is recordable if:

   - It results from employment

2. Definition of "Resulting from Employment"

   Resulting from employment is when the injury or illness results from an event or exposure in the work environment. The work environment is primarily composed of: 1) The employer's premises, and 2) other locations where associates are engaged in work-related activities or are present as a condition of their employment.

   The employer's premises include company rest rooms, hallways, cafeterias, sidewalks and parking lots. Injuries occurring in these places are generally considered work related.

   The employer's premises EXCLUDES employer controlled ball fields, tennis courts, golf courses, parks, swimming pools, gyms, and other similar recreational facilities, used by associates on a voluntary basis for their own benefit, primarily during off work hours.

   Ordinary and customary commute, is not generally considered work related.

   Employees injured or taken ill while engaged in consuming food, as part of a normal break or activity is not considered work related. Employees injured or taken ill as the result of smoking, consuming illegal drugs, alcohol or applying make up are generally not considered work related. Employee injured by un authorized horseplay is generally not considered work related, however, an employee injured as a result of a fight or other workplace violence act, may be considered work related.

Associates who travel on company business are considered to be engaged in work related activities all the time they spend in the interest of the company. This includes travel to and from customer contacts, and entertaining or being entertained for purpose of promoting or discussing business. Incidents occurring during normal living activities (eating, sleeping, recreation) or if the associate deviates from a reasonably direct route of travel are not considered OSHA recordable.

3. Distinction between Medical Treatment and First Aid.

First aid is defined as any one-time treatment, and any follow up visit for the purpose of observation, of minor scratches, cuts, burns, splinters, etc., which do not ordinarily require medical care. Such one time treatment, and follow up visit for the purpose of observation, is considered first aid even though provided by a physician or registered professional personnel.

Medical Treatment (recordable)

a) They must be treated only by a physician or licensed medical personnel.

b) They impair bodily function (i.e. normal use of senses, limbs, etc.).

c) They result in damage to physical structure of a non superficial nature (fractures).

d) They involve complications requiring follow up medical treatment.

APPENDIX G
SAMPLING PLAN AND RATIONALE

TABLE 3.2-1
SAMPLING PLAN
WEBSTER BLOCK - BROWNFIELD CLEANUP PROGRAM

Matrix	Parameter[1]	Location	Samples	Estimated Number of QC Samples		Total
				Matrix Spike / Duplicate[2]	Blind Duplicate[2]	
Remedial Investigation						
Soil/Fill	Full Analysis	Test Pits	96	10	10	116
Groundwater	Full Analysis	MW-01 through MW-9	8	1	1	10
					Total Samples to be Collected	**126**
Interim Remedial Measure						
Soil/Fill	Full Analysis	Sidewall[3]	35	4	4	43
	Full Analysis	Bottom[4]	10			10
					Total Samples to be Collected	**53**
				Total Samples for Remediation		**179**

Notes:

1) Full Analysis = Samples will be analyzed using EPA SW-846 methodology for:
   a. Volatile Organic Compounds (EPA Method 8260)
   b. Semi-volatile Organic Compounds (EPA Method 8270)
   c. TAL Metals (EPA Method 6010)
   d. TAL Metals Filtered (EPA Method 6010 - Groundwater Only)

2) Approximately 10% of samples will be collected for QA/QC procedures.

3) Confirmatory sidewall samples will be collected for each 30 linear feet. Approximately a total of 1,201 linear feet of sidewall is expected.

4) Confirmatory bottom of excavation samples (collected during the Remedial Investigation) will be collected for each 2500 sq ft (50 x 50 foot squrare block). The site is approximately 87,556 sq ft. If a significant amount of fill is left behind after excavation samples will be collected for each 900 sq ft (30 x 30 foot square block).