FINAL

Environmental Management Plan (EMP)
Brownfield Site Cleanup
425 & 435 Mount Hope Avenue and 562 Ford Street
Rochester, New York

City of Rochester
Department of Environmental Services
Division of Environmental Quality
30 Church Street
Rochester, New York 14604

January 2012

Revised May 2012

O'BRIEN & GERE

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

This Environmental Management Plan (EMP) has been prepared on behalf of the City of Rochester (City) for use and implementation by entities involved with potential redevelopment and/or restoration of the property located at 425 & 435 Mt. Hope Avenue and 562 Ford Street, City of Rochester, Monroe County, New York (referred to herein as "Site" or "the Site"). The City remediated the Site to allow the New York State Department of Environmental Conservation (NYSDEC) to close or inactivate Spill No. 0070378.

The Site consists of approximately 1.71-acres of parkland located on the west side of Mount Hope Avenue and the north side of Ford Street (see **Figure 1** for a depiction of the Site location). Historically, the Site was used as a gasoline station and as an automotive repair shop. The structures formerly present at the Site have been demolished. Most recently, the Site has been used as a City park, is expected to be reused as such, and is also expected to remain under ownership of the City.

As determined from several previous subsurface investigations, two known areas of petroleum contamination existed at the Site, which were subsequently excavated and disposed of off Site as part of a NYSDEC-approved Corrective Action Plan (CAP) (*i.e.,* O'Brien & Gere's CAP dated April 2009). Further information related to the previous Site investigations are presented in Section 2.0 of O'Brien & Gere's April 2009 CAP. Remaining soil/fill and groundwater present at the Site may contain residual petroleum constituents and/or elevated concentrations of volatile organic compounds (VOCs). Petroleum-contaminated soil/fill has been encountered at the Site from depths ranging from approximately 2 ft below ground surface (bgs) up to, and potentially deeper than, 16 feet (ft) bgs (O'Brien & Gere's subcontractor excavated to a maximum depth of approximately 16 ft bgs and visual/olfactory observations and photoionization detector (PID) readings of the excavation floor indicate that there are several areas with residual petroleum impact). Further details regarding the Site's history are presented in Section 1.1.

NOTE: The format of this EMP may not follow the Site Management Plan template referenced in the current version of *NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation* (DER 10), dated May 3, 2010.

1.1 SITE HISTORY

Historically, the Site has been used for industrial and commercial purposes from at least 1892 through at least 1971. These uses included automotive sales, automotive repair, and a gasoline service station. In addition, a portion of the Site was used for the Erie Canal feeder and Lehigh Valley Railroad. Former structures on the Site included a used auto sales building, an auto repair shop structure, and a gas station building. At least 10 underground storage tanks (USTs), reportedly used for gasoline storage, were used at the Site. The gasoline station and used auto sales dealership operated on the Site from 1938 through 1971. The auto repair shop was located on Site in 1971. The Site is currently used as parkland and is zoned as "open-space."

The subsurface investigations (as presented in Section 2.0 of O'Brien & Gere's April 2009 CAP and within O'Brien & Gere's *Remedial Construction/Closure Report*, dated January 2012) conducted at the Site include the excavation of a test pits, the advancement and sampling of test borings, and the installation and sampling of overburden groundwater monitoring wells. The locations of the test borings, test pits, and overburden groundwater monitoring wells are depicted on **Figures 2 and 3**. This intrusive work was performed to characterize subsurface environmental conditions, delineate the horizontal and vertical extent of contamination at the Site, and to monitor any future potential contaminant migration.

Based on laboratory analysis, soil/fill and groundwater on portions of the Site contain VOCs at concentrations in exceedance of the NYSDEC "*Technical and Operational Guidance Series (TOGS) Memorandum 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations class GA, type H source for Drinking Water* (groundwater)" dated June 1998 (as amended by errata sheet dated January 2009 and addendum April 2000 and June 2004), *"Spill Technology and Remediation Series (STARS) Memo #1 soil guidance values"*, and *Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives"* (RSCOs) dated January 1994 (latest amendment December 20, 2000).

1.2 SITE CORRECTIVE ACTIONS

Previous Site investigations along with the historical use of the Site as an automotive repair and gasoline service station prompted the preparation and implementation of a CAP. O'Brien & Gere's April 2009 CAP was implemented at the Site and included the following corrective actions:

- The excavation of petroleum-impacted soil/fill within the vadose (unsaturated) zone present in two source areas at the Site. The excavated soil/fill was subsequently transported off Site for disposal
- The installation and sampling of nine overburden groundwater monitoring wells
- The installation and operation of a 36 point oxygen injection system within the footprint of the two former source areas to remediate *in-situ* the petroleum impacts to groundwater
- Groundwater monitoring
- Residual petroleum-impacted soil/fill was left in-place in several areas at the Site; specifically, around the MCPW structures (36 in. CIP sewer pipe and the sewer vault) due to their request for setbacks
- Residual petroleum-impacted soil/fill was left in-place at the limits of each source area excavation at depths of approximately 13 ft bgs for Source Area No. 1 and approximately 16 ft bgs for Source Area No. 2 as depicted on **Figures 2 and 3**
- Petroleum-impacted groundwater is present at the Site

1.3 PURPOSE

The Site contains petroleum contamination left in-place after completion of the corrective action implemented as detailed in Section 1.2. This EMP provides a detailed description of all procedures required to manage remaining contamination and exposure at the Site after complete of the corrective action, including: guidance for performing monitoring, testing, characterization, handling, and managing petroleum-impacted soil/fill and/or groundwater that may be encountered at the Site during future redevelopment and/or restoration. This EMP provides a detailed description of all procedures required for Site personnel to manage residual contamination at the Site. This EMP also identifies how to dispose of, or re-use these materials in accordance with applicable regulations if these materials are encountered and/or disturbed. As stated above, it is O'Brien & Gere's understanding that the Site will remain as City-owned parkland and that other redevelopment beyond Site restoration activities is not anticipated at this time.

1.4 REVISIONS

At this time, there have been no revisions to this EMP.

2.0 FUTURE SITE USE

The Site was most recently used as City-owned parkland and is currently zoned as "open-space." The City Parks Department intends to install park improvements (new lighting and conduit, benches, sidewalks, and trees) following the completion of remedial activities at the Site. As of the date of this EMP, the continued future use of the Site will remain as City-owned parkland with no permanent structures or buildings being constructed on the Site.

Therefore, the design and construction of engineering controls for future structures (surface caps, vapor barriers, sump collection systems, operation monitoring and maintenance procedures, etc.); the establishment, maintenance and recording of institutional controls (deed restrictions or covenants); or the certification regarding the continued effectiveness of any institutional and/or engineering controls required on a yearly basis will not be required at this time.

Future development plans for the Site must be reviewed to evaluate if modifications to this EMP, if any, are necessary and appropriate. Modifications to this EMP must be proposed in writing to the City and the appropriate regulatory authorities (*i.e.*, NYSDEC). Approved changes will be appended to the existing, NYSDEC-approved EMP.

3.0 ENVIRONMENTAL MANAGEMENT PLAN

This EMP provides details regarding the disposal and/or re-use of residual impacted materials (*i.e.*, soil/fill and/or groundwater) that may be encountered and/or disturbed at the Site during redevelopment and/or restoration, and also includes applicable procedures for preventing emissions and reducing impacts to these materials in accordance with applicable regulations. This EMP is intended for any personnel working at the Site.

This EMP describes below the methods used for:

- Sampling and analysis of environmental media
- Reporting requirements

Currently, the only redevelopment and/or restoration anticipated to occur at the Site is the installation of park lighting, sidewalks, bike paths, and other miscellaneous restoration by the City. During this work, trenching will be used, thereby creating the potential for disturbance of limited amounts of soil/fill. Some of this soil/fill may contain residual amounts of petroleum. This residual soil is considered non-hazardous and can be re-used on Site if it meets criteria established in NYSDEC STARS Memo #1. If it does not meet the appropriate criteria, it must be disposed of off Site at a licensed landfill.

Depending on the type and extent of redevelopment and/or restoration to occur at the Site, additional investigative studies may be warranted, along with subsequent modifications to this EMP, if necessary. Note, modifications to this EMP shall be approved in writing by the City and NYSDEC and amended herein.

As part of this EMP, the City and NYSDEC must be notified in writing at least 15 days prior to performing any Site activities that have the potential to encounter and/or disturb contaminated materials. A detailed description of the work to be performed, including the location and extent, shall be included in the written notification. As of the date of this EMP, the following should be contacted:

City of Rochester, Division of Environmental Quality, Department of Environmental Services

Joseph Biondolillo, Senior Environmental Specialist

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Backfill of Former Source Area Excavations

During the course of the corrective action implementation at the Site by O'Brien & Gere, the two source area excavations were backfilled to existing grade using a combination of excavated clean soils and some off Site soils. The off Site soil used for backfill was imported by O'Brien & Gere from a stockpile on a City-owned property addressed as 1315 South Plymouth Avenue, Rochester, New York. Prior to importation to the Site, several soil samples from this "clean" soil stockpile were collected and subsequently submitted to a laboratory for analysis. As shown on **Table 1**, analytical laboratory results indicate the presence of several Target Analyte List (TAL) metals and semi-volatile organic compounds (SVOCs) in exceedance of the NYSDEC TAGM 4046 RSCOs. Based on the City's experience with the environmental cleanup of other contaminated sites in this area, the metals and SVOC concentrations detected are indicative of typical background concentrations. The City and NYSDEC deemed this soil acceptable for Site backfill. Areas where this backfill was used are indicated by the source area excavation limits depicted on **Figures 2 and 3**; specifically at approximate depths of 6 in. to 13 ft in Source Area No. 1 and 6 in. to 16 ft in Source Area No. 2.

3.1 AIR MONITORING ACTIVITIES

Air monitoring at the Site should be conducted by an environmental professional during redevelopment and/or restoration activities where disturbance of potentially contaminated materials is anticipated in order to document the materials encountered in these disturbed areas.

VOC monitoring using a PID fitted with a 10.6 eV lamp will be conducted during redevelopment/restoration activities. PID readings of more than 5 parts per million (ppm) exceeding background measurements will be indicative of the presence of VOCs. Petroleum-impacted materials will need to be addressed as detailed in Section 3.2 and 3.3. A real-time particulate meter (PDR 1000 or equivalent) will be used during redevelopment and/or restoration activities to monitor for air particulates. All readings shall be recorded and documented using the Air Monitoring Log presented in **Appendix A**. The Health and Safety Plan (HASP) (presented in **Appendix B**) and the Community Air Monitoring Plan (CAMP) (presented in **Appendix C**), provide additional air monitoring details. If PDR readings exceed 150 micrograms per cubic meter ($\mu g/m^3$) over a 15 minute time-weighted period, Site controls may need to be implemented at the direction of the environmental professional (*e.g.*, dust suppression, modify work procedures, upgrade personal protective equipment [PPE], etc.) until particulate levels drop below the established action level of 150 $\mu g/m^3$.

3.2 PETROLEUM-IMPACTED SOIL/FILL

Petroleum-impacted soil/fill material may be encountered during redevelopment and/or restoration activities at the Site. As presented on **Tables 2 and 3**, petroleum related volatile organic compounds remain in the soil above NYSDEC recommended soil cleanup objectives. Petroleum-impacted soil/fill material was observed at many subsurface investigation locations (*i.e.*, test pits, test borings, groundwater monitoring wells, excavations, etc.) that were advanced and installed at the Site. The soil/fill materials primarily consist of a combination of silt, sand, gravel, cinders, brick chunks, pieces of asphalt, concrete chunks, boulders, rocks, a thin black layer of ash, etc. Based on O'Brien & Gere's April 2009 CAP, soil/fill classification guidelines are defined below:

- "Non petroleum-impacted" soil/fill will be defined by no evidence of petroleum staining, petroleum-like odors, or PID readings less than 25 parts per million-volume (ppm-v) above background.
- "Potential petroleum-impacted" soil/fill will be defined by slight petroleum staining, low to moderate petroleum-like odors, and PID readings of approximately 26-199 ppm-v.
- "Petroleum-impacted" soil fill/fill as defined by petroleum staining, strong petroleum-like odors, and PID readings greater than 200 ppm. This material will be transported and disposed of off Site at a permitted landfill.

Soil/fill material used as backfill during contaminated soil excavation will also be encountered during redevelopment and/or restoration. The backfill material consists of medium brown sand and gravel, silt, some small rocks, and a majority of brown topsoil. As stated in Section 3.0, some metals and SVOCs were detected in concentrations exceeding TAGM RSCOs in this backfill, but these exceedances are considered indicative of background concentrations by the City based on their experience with other environmental cleanup sites in the area.

3.2.1 Handling of Petroleum-Impacted Soil/Fill

Petroleum-impacted soil/fill encountered during redevelopment and/or restoration activities should be removed, and placed on 8-mil thick poly sheeting. The City and NYSDEC should be notified of any contamination encountered, including approximate quantities and location(s). Any disposal or treatment of petroleum-impacted soil/fill staged on Site must be performed within 60 calendar days, unless otherwise authorized by the NYSDEC.

3.2.2 Analytical Laboratory Testing

Suspected petroleum-impacted soil/fill will be tested for NYSDEC STARS-list VOCs using United States Environmental Protection Agency (USEPA) Method 8260 and any potential testing required by the NYSDEC or a NYSDEC-approved disposal facility (*i.e.*, landfill). If laboratory testing results indicates that the soil/fill is below NYSDEC STARS soil guidance values, the material can be re-used on Site. If the laboratory results exceed NYSDEC STARS soil guidance values, the material will require off Site disposal or on Site treatment (*i.e.*, aeration

biopile). After the soils have aerated via a biopile, a second round of sampling may occur. If the laboratory results are below STARS, the material may be re-used on Site.

3.2.3 Petroleum-Impacted Soil/Fill Disposal

Petroleum-impacted soil/fill requiring off Site disposal must be disposed of at a NYSDEC-approved landfill. Appropriately permitted transporters of petroleum-impacted soil/fill must be approved by the off Site disposal facility. Analytical laboratory characterization testing must be conducted and meet any requirements of the disposal facility.

3.2.4 Petroleum-Impacted Soil/Fill Re-use

As stated in Section 3.2.2, soil/fill that does not exceed NYSDEC STARS soil guidance values can be re-used on Site. Petroleum-impacted soil/fill in exceedance of NYSDEC STARS soil guidance values can be staged on Site and allowed to aerate in an attempt at reducing VOC concentrations. Upon retesting, if the soil/fill laboratory results are below NYSDEC STARS, they may be re-used on Site.

3.3 CONTAMINATED GROUNDWATER

Petroleum-impacted groundwater was encountered while conducting subsurface investigations and remedial activities at the Site. As presented in **Table 4**, petroleum related volatile organic compounds remain in the groundwater above NYSDEC groundwater standards. Therefore, information is provided below detailing the handling and disposal or treatment of petroleum-impacted groundwater, in the event it is encountered during redevelopment and/or restoration activities.

3.3.1 Handling and Disposal of Impacted Groundwater

If necessary, impacted groundwater encountered and requiring management during redevelopment activities will be collected (using appropriate hoses and pumps) and stored on Site in a frac tank and discharged to the Monroe County Pure Waters (MCPW) sewer system, if possible. The following steps will be taken to receive permission from MCPW to discharge the accumulated construction water:

- Written notification to MCPW of intent to discharge to its sewer system
- Completion of a Permit Application for the discharge of accumulated construction water
- Sampling and analysis of accumulated construction water as required and specified by MCPW
- If required by MCPW (based on laboratory data), treatment of construction water by activated carbon absorption or other methods
- Following approval, conduct a Site visit with a MCPW representative and select a sewer manhole for discharge of accumulated construction water
- Discharge of accumulated construction water to the selected MCPW manhole.

In the event that water cannot be discharged to the MCPW sewer, arrangements will be made to transport it to an approved off Site disposal facility, pending facility-specific characterization requirements. Transporters must have appropriate permits.

3.3.2 Analytical Laboratory Testing

Contaminated groundwater encountered during redevelopment and/or restoration activities will require analytical testing prior to disposal or treatment. If discharging to a sewer, MCPW will require an application, analysis (specific requirements would need to be obtained from MCPW), and monitoring if discharging to a MCPW sewer system. If disposing of at an approved off Site disposal facility, the facility will have specific characterization requirements to be analyzed for.

3.4 UNANTICIPATED CONTAMINATION

If unanticipated materials or contamination (*e.g.*, underground storage tanks, drums, staining, sheen, etc.) are encountered at the Site that significantly differs from the information detailed above, the area(s) should be secured, and the City and NYSDEC notified of the situation in order to develop suitable characterization, laboratory analysis, health and safety procedures, handling, disposal, and/or treatment procedures. Analytical

testing requirements will be based on the specific requirements of an approved disposal facility (*i.e.*, landfill) and/or NYSDEC. If unanticipated contaminated materials have a similar characterization to that of previously encountered petroleum-impacted materials, they can be treated in the same fashion as detailed above in Sections 3.2 and 3.3.

3.5 HEALTH AND SAFETY PLAN

A Site-specific HASP has previously been developed as part O'Brien & Gere's April 2009, NYSDEC-approved CAP and is included in **Appendix B** of this EMP. The HASP details potential Site hazards and appropriate worker procedures and response. The HASP included herein is specifically intended for O'Brien & Gere personnel. Entities working on the Site are responsible for preparation and implementation of their own Site-specific HASP. At a minimum, entities shall meet or exceed the O'Brien & Gere HASP requirements.

3.6 DUST SUPPRESSION

Dust suppression may be required during redevelopment and/or restoration activities either based on visual observations or during implementation of the Site-specific HASP (*i.e.*, Community Air Monitoring Plan [CAMP]). If so, the following procedures may be implemented (as referenced in NYSDEC TAGM #4031):

- Applying water to haul roads
- Wetting equipment and excavation faces
- Spraying water on buckets during excavation and dumping
- Hauling materials in properly tarped or watertight containers
- Restricting vehicle/equipment speeds
- Reducing the trench size and/or number of trenches
- Or other approved methods covering excavated areas and exposed areas of petroleum-impacted material.

Dust suppression will continue until air monitoring indicates that dust levels are below established guidance values.

As mentioned previously, entities working on the Site are responsible for preparing their own Site-specific HASP. As part of the HASP, the CAMP should be prepared in accordance with Appendix 1A of DER-10, Generic Community Air Monitoring Plan as presented in **Appendix C**.

3.7 ACCESS CONTROLS

If unanticipated contamination is encountered, the area(s) will be temporarily fenced off to restrict access/exposure. Fencing will be used as appropriate, including, but not limited to, keeping the fencing in place until excavation(s) are backfilled, or over extended periods of time (*i.e.,* weekends, holidays, etc.).

3.8 EROSION CONTROLS

During redevelopment and/or restoration, erosion and siltation control measures (*e.g.*, silt fence) may need to be implemented to mitigate surface runoff.

4.0 FUTURE MANAGEMENT

While some residual petroleum-impacted soil/fill remains below the ground surface at the Site, this impact appears to be minimal and poses no significant risk to human health or the environment. Some elevated concentrations of residual petroleum-impacted soil/fill were left in-place both above and around the MCPW 36 in. sewer pipe and MCPW sewer vault. The intent of excavation activities conducted at the Site was to address vadose zone contamination, and as such, some residual petroleum-impacted soil/fill was also left in-place within the saturated zone. These soils could not be excavated due to setback restrictions (*i.e.*, approximately 2 ft around the MCPW 36 inch sewer pipe and approximately 10 ft around the MCPW sewer vault) imposed by the MCPW to prevent damage from occurring to the structures. The locations of these utilities are depicted on **Figure 2**. The intent of the CAP was to remove vadose zone source materials. Accordingly, elevated concentrations of petroleum-impacted soil/fill were left in-place in the saturated zone at the Site.

For work that could potentially disturb impacted soil/fill and/or groundwater, entities conducting this work should be made aware of any potential hazards that could be encountered at the Site. The City will be responsible for assuring that anyone performing intrusive work at the Site follows this EMP.

Tables

Table 1

Summary of Staged Stockpile Soil Sample Results
425 & 435 Mt. Hope Avenue and 562 Ford Street
Rochester, New York

	Chemical Name	CAS No.	STARS #1 TCLP Alternative Guidance Value Ca 1 (ppb)	STARS # 1 Human Health Guidance Value Ch (ppb)	Sample ID												
					PP-01-051809 (ppb)	PP-02-052209 (ppb) (resample PP-01-051899)	PP-03-052209 (ppb)	PP-04-060209 (ppb) (resample PP-03-052209)	PP-05-060809 (ppb) (resample PP-03-052209)	PP-06-G1-071409 (ppb)	PP-06-G2-071409 (ppb)	PP-06-C1-071409 (ppb)	PP-06-G3-071409 (ppb)	SP-1 (ppb)	SP-2 (ppb)	SP-3 (ppb)	Composite (ppb)
Volatile Organic Compounds	Benzene	71-43-2	14	24,000	**45.5**	<8.53 ND	**68.2**	<9.74 ND	<9.28 ND	<8.94 ND	**10.4**	<8.80 ND	<8.71 ND	<7.17 ND	<6.82 ND	<7.72 ND	<7.67 ND
	Ethylbenzene	100-41-4	100	8,000,000	**64.8**	**12.1**	**195**	<9.74 ND	<9.28 ND	<8.94 ND	<9.97 ND	<8.80 ND	<8.71 ND	<7.17 ND	<6.82 ND	<7.72 ND	<7.67 ND
	Toluene	108-88-3	100	20,000,000	**11.1**	<8.53 ND	**28.7**	<9.74 ND	<9.28 ND	<8.94 ND	<9.97 ND	<8.80 ND	<8.71 ND	<7.17 ND	<6.82 ND	<7.72 ND	<7.67 ND
	o-Xylene	95-47-6	100	200,000,000	**117**	**35.9**	**265**	**16**	<9.28 ND	<8.94 ND	<9.97 ND	<8.80 ND	<8.71 ND	<7.17 ND	<6.82 ND	<7.72 ND	<7.67 ND
	m-Xylene	108-38-3	100	200,000,000	**339**	**96.9**	**822**	**48.2**	<9.28 ND	<8.94 ND	<9.97 ND	<8.80 ND	<8.71 ND	<7.17 ND	<6.82 ND	<7.72 ND	<7.67 ND
	p-Xylene	106-42-3	100	***													
	Mixed Xylenes	N/A	100	200,000,000	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
	Isopropylbenzene	98-82-8	100	***	<42.3 ND	<42.7 ND	<44.0 ND	<48.7 ND	<46.4 ND	<44.7 ND	<49.9 ND	<44.0 ND	<43.6 ND	<35.8 ND	<34.1 ND	<38.6 ND	<38.3 ND
	n-Propylbenzene	103-65-1	100	***	**34.4**	<8.53 ND	**51.8**	**15.9**	<9.28 ND	<44.7 ND	<9.97 ND	<8.80 ND	**26.6**	<7.17 ND	<6.82 ND	<7.72 ND	<7.67 ND
	p-Isopropyltoluene	99-87-6	100	***	<42.3 ND	<42.7 ND	<44.0 ND	<48.7 ND	<46.4 ND	<44.7 ND	<49.9 ND	<44.0 ND	**59.4**	<35.8 ND	<34.1 ND	<38.6 ND	<38.3 ND
	1,2,4-Trimethylbenzene	95-63-6	100	***	**248**	**53.3**	**256**	**459**	<9.28 ND	<8.94 ND	<9.97 ND	<8.80 ND	**98.7**	<7.17 ND	<6.82 ND	<7.72 ND	<7.67 ND
	1,3,5-Trimethylbenzene	108-67-8	100	***	**104**	**38.7**	**114**	**182**	<9.28 ND	<8.94 ND	<9.97 ND	<8.80 ND	**91.7**	<7.17 ND	<6.82 ND	<7.72 ND	<7.67 ND
	n-Butylbenzene	104-51-8	100	***	<42.3 ND	<42.7 ND	<44.0 ND	<48.7 ND	<46.4 ND	<44.7 ND	<49.9 ND	<44.0 ND	<43.6 ND	<35.8 ND	<34.1 ND	<38.6 ND	<38.3 ND
	sec-Butylbenzene	135-98-8	100	***	<8.46 ND	<8.53 ND	<8.81 ND	**12.6**	<9.28 ND	<8.94 ND	<9.97 ND	<8.80 ND	**47.5**	<7.17 ND	<6.82 ND	<7.72 ND	<7.67 ND
	Naphthalene	91-20-3	200	300,000	<21.1 ND	<21.3 ND	<22.0 ND	**90.2**	<23.2 ND	<22.3 ND	<24.9 ND	<22.0 ND	<21.8 ND	<17.9 ND	<17.1 ND	<19.3 ND	<19.2 ND
	Methyl tert butyl ether (MTBE)	1634-04-4	1,000	***	<8.46 ND	<8.53 ND	<8.81 ND	<9.74 ND	<9.28 ND	<8.94 ND	<9.97 ND	<8.80 ND	<8.71	<7.17 ND	<6.82 ND	<7.72 ND	<7.67 ND
	PID Headspace Reading (ppm)				**6**	**3.1**	**42.6**	**5.8**	**3.2**	**0.2**	**0.3**	**NA**	**177**	**NA**	**NA**	**NA**	**NA**
					1st staged "potentially-impacted" soil pile		2nd staged "potentially-impacted" soil pile			3rd staged "potentially-impacted" soil pile				4th staged "potentially-impacted" soil pile Sampled by City of Rochester on August 31, 2009			

Notes
See Endnotes for Table 1

Table 2
Source Area 1 - Summary of Sidewall Confirmatory Soil Sampling Results
425 & 435 Mt. Hope Avenue and 562 Ford Street
Rochester, New York

	Chemical Name	CAS No.	Rec. Soil Cleanup Objective (ppb)	Source Area 1														
				SW-10-060909 (ppb)	SW-11-061509 (ppb)	TB-316-062309 (ppb)	TB-306-062309 (ppb)	TB-309-062309 (ppb)	SW-12-063009 (ppb)	SW-13-070909 (ppb)	FS-1-070909 (ppb)	SW-14-071309 (ppb)	SW-15-071409 (ppb)	SW-16-071409 (ppb)	SW-17-072009 (ppb)	SW-18-072109 (ppb)	SW-19-072109 (ppb)	SW-20-072109 (ppb)
Volatile Organic Compounds	Benzene	71-43-2	60 or MDL	**1,160**	**34.3**	**46.9**	<37.4 ND	**99.2**	**42**	**<95.7 ND**	<8.25 ND	<20.3 ND	<16.1 ND	<8.34 ND	<18.7 ND	**45.9**	**29.7**	<9.55 ND
	Ethylbenzene	100-41-4	5,500	**46,200 E**	<10.6 ND	**61.3**	**297**	**243**	**19.2**	**1,550**	<8.25 ND	**32.6**	<16.1 ND	<8.34 ND	**36.6**	<7.91 ND	<9.68 ND	<9.55 ND
	Toluene	108-88-3	1,500	**11,600**	<10.6 ND	<9.49 ND	<37.4 ND	<66.1 ND	<6.59 ND	<95.7 ND	<8.25 ND	<20.3 ND	<16.1 ND	<8.34 ND	<18.7 ND	<7.91 ND	<9.68 ND	<9.55 ND
	m,p-Xylene	N/A	1,200[1]	**61,000 E**	<10.6 ND	**101**	**1,940**	**396**	**38.1**	**4,510**	<8.25 ND	**57.6**	**24.1**	<8.34 ND	**112**	**32.1**	**94.5**	**86.9**
	o-Xylene	N/A	1,200[1]	**27,600 E**	<10.6 ND	**14.9**	**87.6**	<66.1 ND	<6.59 ND	**429**	<8.25 ND	<20.3 ND	<16.1 ND	<8.34 ND	<18.7 ND	**9.57**	**26.3**	<9.55 ND
	Isopropylbenzene	98-82-8	2,300	**9,970**	<53.2 ND	<47.4 ND	**259**	<331 ND	<33.0 ND	**2,320**	<41.2 ND	**220**	<80.5 ND	<41.7 ND	<93.3 ND	<39.6 ND	<48.4 ND	<47.8 ND
	n-Propylbenzene	103-65-1	3,700	**29,400 E**	**35.2**	**65**	**525**	**158**	**12.5**	**3,350**	<8.25 ND	**421**	<16.1 ND	<8.34 ND	**109**	**44.4**	**22.1**	<9.55 ND
	p-Isopropyltoluene	99-87-6	10,000*	**2,420**	<53.2 ND	<47.4 ND	**227**	<331 ND	<33.0 ND	**1,940**	<41.2 ND	**494**	<80.5 ND	<41.7 ND	<93.3 ND	<39.6 ND	<48.4 ND	<47.8 ND
	1,2,4-Trimethylbenzene	95-63-6	10,000*	**42,500 E**	**15.8**	**372**	**4,020**	**681**	**63.1**	**29,900**	**8.75**	**1,470**	**29**	<8.34 ND	**1,080**	**467**	**484**	**122**
	1,3,5-Trimethylbenzene	108-67-8	3,300	**29,900 E**	**69.8**	**270**	**943**	<66.1 ND	**52.6**	**11,000**	**21.1**	**42.8**	<16.1 ND	<8.34 ND	**148**	**30.2**	**85.2**	**137**
	n-Butyl-Benzene	104-51-8	10,000*	<685 ND	<53.2 ND	<47.4 ND	<187 ND	<331 ND	<33.0	<478 ND	<41.2 ND	<102 ND	<80.5 ND	<41.7 ND	<93.3 ND	<39.6 ND	<48.4 ND	<47.8 ND
	sec-Butyl-Benzene	135-98-8	10,000*	**3,910**	**14.9**	**36.4**	**129**	<66.1 ND	<6.59 ND	**1,560**	<8.25 ND	**337**	<16.1 ND	<8.34 ND	**34.9**	**15.4**	**21.7**	**9.91**
	tert-Butyl-Benzene	98-06-6	10,000*	<342 ND	<26.6 ND	<23.7 ND	<93.5 ND	<165 ND	<16.5 ND	<239 ND	<20.6 ND	<50.8	<40.3 ND	<20.9 ND	<46.7 ND	<19.8 ND	<24.2 ND	<23.9 ND
	Naphthalene	91-20-3	13,000	**29,600 E**	<26.6 ND	**31.4**	**215**	<165 ND	<16.5 ND	**5,520**	**32.5**	<50.8 ND	<40.3 ND	<20.9 ND	**442**	**46.3**	**27**	<23.9 ND
	Methyl tert butyl ether (MTBE)	1634-04-4	120	<137 ND	<10.6 ND	<9.49 ND	<37.4 ND	<66.1 ND	<6.59 ND	<95.7 ND	<8.25 ND	<20.3 ND	<16.1	<8.34	<18.7 ND	<7.91 ND	<9.68 ND	<9.55 ND
	PID Headspace Reading (ppm)			**958**	**10.1**	**87.9**	**330**	**103**	**20.8**	**1,080**	**1.6**	**1,075**	**28.8**	**1.1**	**100**	**62**	**85**	**23.8**
	Depth Collected (ft. bgs.)			**8**	**10**	**6-8**	**10-12**	**10-11.4**	**11**	**9.5**	**12**	**9.5**	**9.5**	**9**	**10**	**10**	**10**	**10**

Notes
See Endnotes for Table 2

Table 3
Source Area 2 - Summary of Sidewall Confirmatory Soil Sampling Results
425 & 435 Mt. Hope Avenue and 562 Ford Street
Rochester, New York

	Chemical Name	CAS No.	Rec. Soil Cleanup Objective (ppb)	Source Area 2								
				SW-01-051909 (ppb)	SW-02-051909 (ppb)	SW-03-051909 (ppb)	SW-04-052009 (ppb)	SW-05-052209 (ppb)	SW-06-052209 (ppb)	SW-07-052709 (ppb)	SW-08-052909 (ppb)	SW-09-052909 (ppb)
Volatile Organic Compounds	Benzene	71-43-2	60 or MDL	**9.56**	<6.75 ND	**62.6**	**27.6**	**20.3**	<12.4 ND	<9.32 ND	**32.8**	<6.62 ND
	Ethylbenzene	100-41-4	5,500	**69.8**	<6.75 ND	**300**	**53.6**	**93.2**	**15.6**	<9.32 ND	**77.7**	**12.5**
	Toluene	108-88-3	1,500	<8.66 ND	<6.75 ND	<23.7 ND	<8.89 ND	**18.5**	<12.4 ND	<9.32 ND	<8.99 ND	<6.62 ND
	m,p-Xylene	N/A	1,200[1]	**55.3**	**8.95**	**998**	**491**	**386**	<12.4 ND	<9.32 ND	**106**	**22.7**
	o-Xylene	N/A	1,200[1]	<8.66 ND	<6.75 ND	<23.7 ND	**36.8**	**79.7**	<12.4 ND	<9.32 ND	<8.99 ND	<6.62 ND
	Isopropylbenzene	98-82-8	2,300	<43.3 ND	<33.7 ND	<118 ND	<44.4 ND	<46.3 ND	<62.2 ND	<46.6 ND	<44.9 ND	<33.1 ND
	n-Propylbenzene	103-65-1	3,700	**77.7**	<6.75 ND	**147**	**110**	**51.2**	**23.4**	<9.32 ND	**55.1**	**12.2**
	p-Isopropyltoluene	99-87-6	10,000*	<43.3 ND	<33.7 ND	<118 ND	<44.4 ND	<46.3 ND	<62.2 ND	<46.6 ND	<44.9 ND	<33.1 ND
	1,2,4-Trimethylbenzene	95-63-6	10,000*	**650**	<6.75 ND	**967**	**1,000**	**455**	<12.4 ND	<9.32 ND	**188**	**48.1**
	1,3,5-Trimethylbenzene	108-67-8	3,300	**55.5**	<6.75 ND	**342**	**234**	**179**	<12.4 ND	<9.32 ND	**140**	**44.7**
	n-Butyl-Benzene	104-51-8	10,000*	<43.3 ND	<33.7 ND	<118 ND	<44.4 ND	<46.3 ND	<62.2 ND	<46.6 ND	<44.9 ND	<33.1 ND
	sec-Butyl-Benzene	135-98-8	10,000*	<8.66 ND	<6.75 ND	<23.7 ND	<8.89 ND	**10.7**	<12.4 ND	<9.32 ND	**11.2**	<6.62 ND
	tert-Butyl-Benzene	98-06-6	10,000*	<21.8 ND	<16.9 ND	<59.2 ND	<22.2 ND	<23.1 ND	<31.1 ND	<23.3 ND	<22.5 ND	<16.6 ND
	Naphthalene	91-20-3	13,000	**299**	<16.9 ND	<59.2 ND	**24.7**	<23.1 ND	<31.1 ND	<23.3 ND	<22.5 ND	<16.6 ND
	Methyl tert butyl ether (MTBE)	1634-04-4	120	<8.66 ND	<6.75 ND	<23.7 ND	<8.89 ND	<9.26 ND	<12.4 ND	<9.32 ND	<8.99 ND	<6.62 ND
	PID Headspace Reading (ppm)			**25**	**17**	**61**	**8.9**	**19.8**	**110**	**40.9**	**66**	**12**
	Depth Collected (ft. bgs.)			**21**	**8**	**8.5**	**10**	**12**	**11**	**12**	**12**	**12**

Notes
See Endnotes for Table 3

Table 4
City of Rochester Division of Environmental Quality
425 435 Mt. Hope Avenue, 562 Ford Street
Historical VOC Concentrations in Groundwater
(results in ug/L or ppb)

	Groundwater Target Compounds Sample Results												T.O.G.s 1.1.1
Constituent	MW-103	MW-104	MW-201	IP-33	MW-202	MW-203	MW-204	MW-205	MW-206	MW-207	MW-208	MW-209	Guidance Value(1)
MTBE													
8/5/2009	ND	ND	ND	Not sampled	ND	ND	ND	ND	ND	ND	ND	ND	10.00
9/21/2010	ND	ND	Not sampled	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.00
12/30/2010	ND	ND	Not sampled	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.00
3/15/2011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.00
6/27/2011	ND	ND	Not sampled	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.00
10/6/2011	ND	ND	Not sampled	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.00
12/14/2011	ND	ND	ND	ND	Not sampled	Not sampled	ND	Not sampled	Not sampled	ND	Not sampled	Not sampled	10.00
3/14/2012	ND	ND	ND	ND	Not sampled	Not sampled	ND	Not sampled	Not sampled	ND	Not sampled	Not sampled	10.00
Benzene													
8/5/2009	**26.70**	**378.00**	**6,350.00**	Not sampled	ND	0.89	**22,700.00**	ND	ND	**88.80**	ND	ND	1.00
9/21/2010	**19.50**	**559.00**	Not sampled	**4,520.00**	ND	ND	**278.00**	ND	ND	**4.78**	ND	ND	1.00
12/30/2010	**2.51**	**49.60**	Not sampled	**891.00**	ND	ND	**179.00**	ND	ND	**121.00**	ND	ND	1.00
3/15/2011	ND	ND	ND	**175.00**	ND	ND	**158.00**	ND	ND	**3.91**	ND	ND	1.00
6/27/2011	**4.95**	**5.55**	Not sampled	**11.70**	ND	ND	**964.00**	ND	ND	**45.70**	ND	ND	1.00
10/6/2011	ND	**32.00**	ND	**ND**	ND	ND	**2.64**	ND	ND	ND	ND	ND	1.00
12/14/2011	ND	**100.00**	ND	**ND**	Not sampled	Not sampled	**1,050.00**	Not sampled	Not sampled	ND	Not sampled	Not sampled	1.00
3/14/2012	ND	**2.59**	**141.00**	ND	Not sampled	Not sampled	**843.00**	Not sampled	Not sampled	**11.10**	Not sampled	Not sampled	1.00
Total BTEX													
8/5/2009	48.26	397.98	6,350.00	Not sampled	ND	0.89	27,017.00	ND	ND	7,559.80	ND	ND	N/A
9/21/2010	36.76	559.00	Not sampled	12,769.00	ND	ND	295.88	ND	ND	137.68	ND	ND	N/A
12/30/2010	2.50	49.60	Not sampled	3,363.00	ND	ND	214.50	ND	ND	2,792.00	ND	ND	N/A
3/15/2011	ND	ND	ND	538.70	ND	ND	207.45	ND	ND	63.01	ND	ND	N/A
6/27/2011	4.95	5.55	Not sampled	34.60	ND	ND	1,376.50	ND	ND	1,263.10	ND	ND	N/A
10/6/2011	ND	32.00	ND	ND	ND	ND	2.60	ND	ND	ND	ND	ND	N/A
12/14/2011	ND	105.20	ND	ND	Not sampled	Not sampled	1,149.40	Not sampled	Not sampled	ND	Not sampled	Not sampled	N/A
3/14/2012	ND	2.60	272.30	ND	Not sampled	Not sampled	1,436.20	Not sampled	Not sampled	133.20	Not sampled	Not sampled	N/A
Total Volatile Aromatics													
8/5/2009	81.56	487.18	6,350.00	Not sampled	ND	0.89	27,017.00	ND	ND	8,849.80	ND	ND	N/A
9/21/2010	67.71	621.00	Not sampled	16,087.00	ND	ND	295.88	ND	ND	157.77	ND	ND	N/A
12/30/2010	2.50	49.60	Not sampled	4,598.60	ND	ND	214.50	ND	ND	4,023.70	ND	ND	N/A
3/15/2011	ND	ND	ND	565.24	ND	ND	207.45	ND	ND	106.93	ND	ND	N/A
6/27/2011	4.95	14.15	Not sampled	39.90	ND	ND	1,392.50	ND	ND	1,647.60	ND	ND	N/A
10/6/2011	ND	36.70	ND	11.10	ND	ND	2.60	ND	ND	ND	ND	ND	N/A
12/14/2011	ND	113.90	ND	ND	Not sampled	Not sampled	1,457.60	Not sampled	Not sampled	ND	Not sampled	Not sampled	N/A
3/14/2012	ND	2.60	313.30	ND	Not sampled	Not sampled	1,173.90	Not sampled	Not sampled	175.90	Not sampled	Not sampled	N/A

(1) - New York State Department of Environmental CoNot sampledervation (NYSDEC) June 1998 Division of Water Technical and Operational and Guidance Series 1.1.1 (TOGS 1.1.1) Ambient Groundwater Standards and Guidance Values as ammended by April 2000 Supplemental Table.

Bold text denotes analyte was detected above NYSDEC Groundwater Standards

"ND" denotes analyte was not detected above the reported laboratory detection limit

"NA" denotes Not Applicable "Not sampled" denotes well not sampled

Figures

FIGURE 1

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LEGEND

Parcels

NOTE:

2009 AERIAL PHOTOGRAPH OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE

CITY OF ROCHESTER
BROWNFIELD SITE CLEANUP
425 & 435 MT. HOPE AVENUE AND 562 FORD STREET
ROCHESTER, NEW YORK

SITE LOCATION PLAN

N

0 50 100 200
Feet

SEPTEMBER 2011
11862/43868

O'BRIEN & GERE

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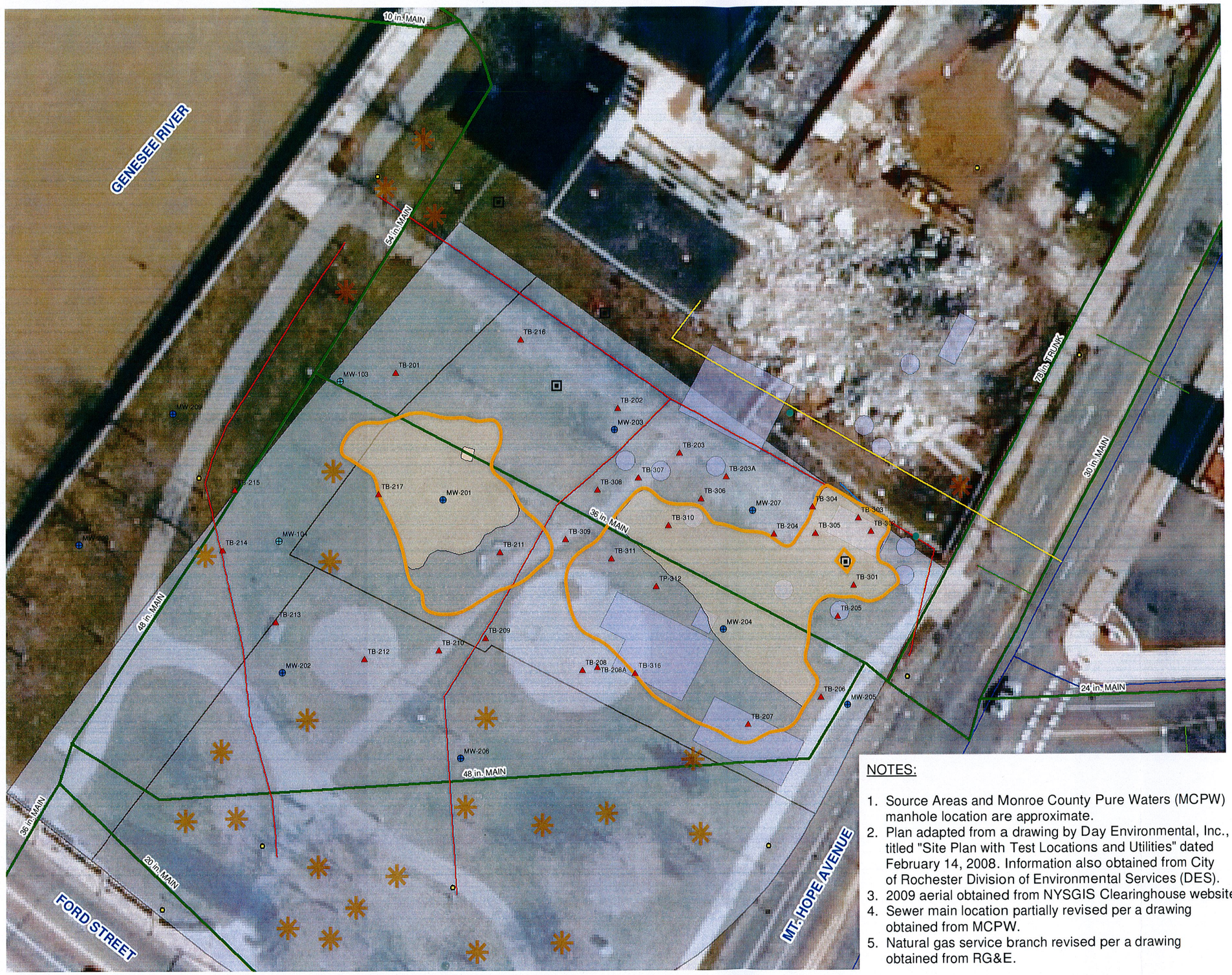

NOTES:

1. Source Areas and Monroe County Pure Waters (MCPW) manhole location are approximate.
2. Plan adapted from a drawing by Day Environmental, Inc., titled "Site Plan with Test Locations and Utilities" dated February 14, 2008. Information also obtained from City of Rochester Division of Environmental Services (DES).
3. 2009 aerial obtained from NYSGIS Clearinghouse website.
4. Sewer main location partially revised per a drawing obtained from MCPW.
5. Natural gas service branch revised per a drawing obtained from RG&E.

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FIGURE 2

N

LEGEND

- Excavation Floor PID >1,000 ppm
- MCPW 18-inch Storm Drain
- Source Area Excavation Limits
- Catch Basins
- Sanitary Sewer
- Trees
- Lightpoles
- Revised Natural Gas Service Branch
- Revised Sewer Mains
- Electric Line GPS
- Storm Lateral
- Water Main
- MCPW Manhole
- Sanborn Features
- Parcels
- January 2009 OBG TesT Borings (200 Series)
- Jan/June 2009 OBG Test Borings (300 Series)
- Existing DAY Monitoring Wells
- July 2009 OBG Monitoring Wells

CITY OF ROCHESTER
BROWNFIELD SITE CLEANUP
425 & 435 MT. HOPE AVENUE
AND 562 FORD STREET

AS-BUILT VADOSE ZONE SOURCE REMOVAL EXCAVATION PLAN

0 25 50 100
Feet

MAY 2012
11862/43868

O'BRIEN & GERE

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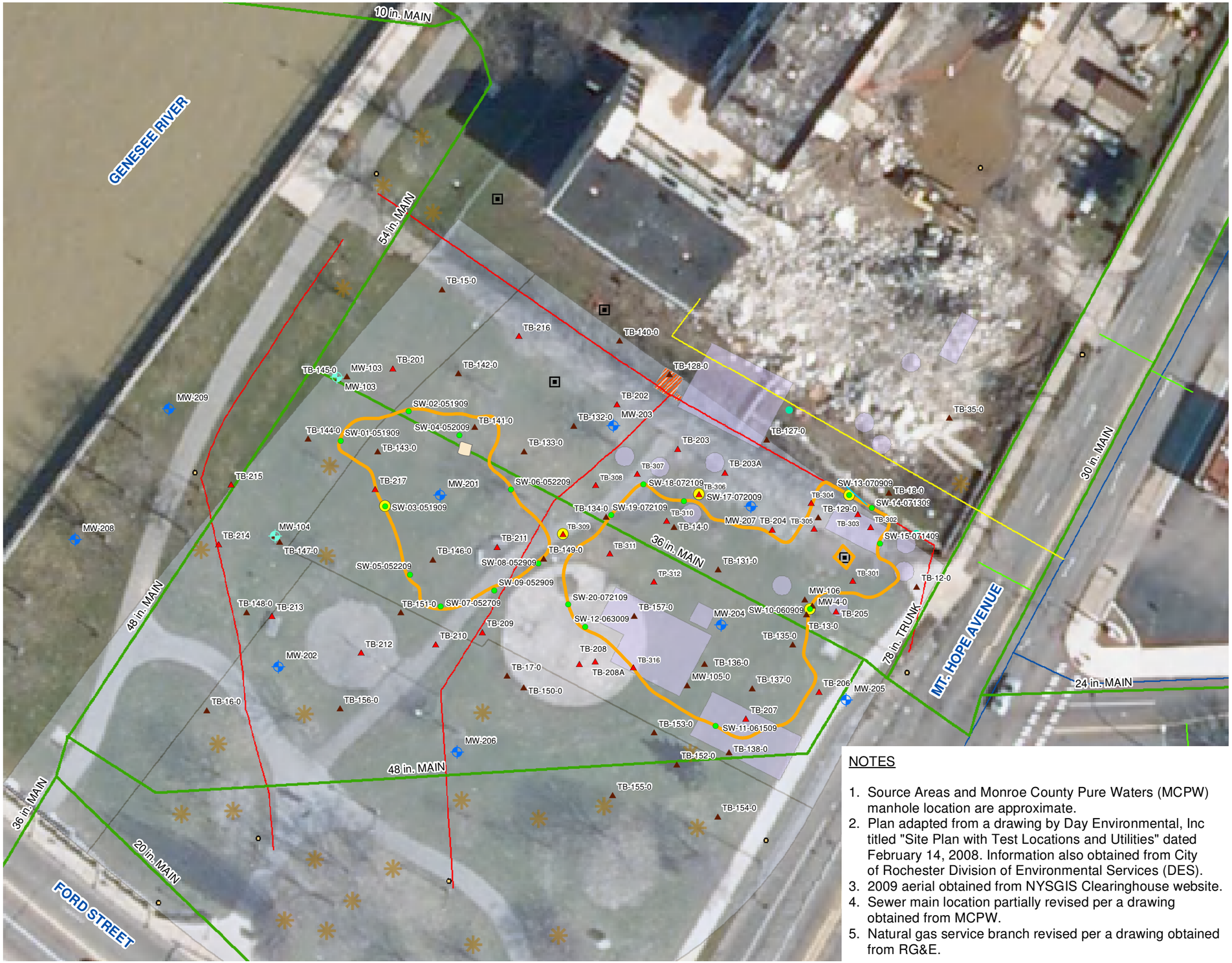

FIGURE 3

N

LEGEND

- Source Area Excavation Limits
- MCPW 18-inch Storm Drain
- MCPW Manhole
- July 2009 OBG Monitoring Wells
- Existing DAY Monitoring Wells
- Confirmatory Sidewall Sample
- Jan/June 2009 OBG Test Borings
- DAY Test Borings
- SOIL SAMPLE RESULT EXCEEDS SCOs
- Catch Basins
- Sanitary Sewer
- Trees
- Lightpoles
- Revised Natural Gas Service Branch
- Revised Sewer Mains
- Electric Line GPS
- Storm Lateral
- Water Main
- Sanborn Features
- 550 Gallon UST
- Parcels

CITY OF ROCHESTER
BROWNFIELD SITE CLEANUP
425 & 435 MT. HOPE AVENUE
AND 562 FORD STREET
ROCHESTER, NEW YORK

AS-BUILT VADOSE ZONE SOURCE REMOVAL EXCAVATION PLAN

0 20 40 80
Feet

MAY 2012
11862.43868

O'BRIEN & GERE

NOTES

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Appendix A

Air Monitoring Log

O'BRIEN & GERE

Air Monitoring Log

File Name: 30_11-AIR_MONITORING_LOG.doc
Revised: July 30, 2003

Client:		Date of Sampling:	
Project Name:		Approx. Temp Range:	
Project Location:		Approx. Wind Dir:	
Job µ:		Weather Conditions:	
Instrument Used:			
Instruments Serial µ:			
Sampler/Monitor Name:		Signature:	
SSHC Review:		Signature:	

Site Activities:
Work Area Activities:
Level of Protection (specify PPE) in Sampling Area:

	Time (Hrs)	Location	Conc. (mg/m^3)	TWA (mg/m^3)	Dust ($\mu g/m^3$)	VOC (ppm)	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

-- Keep 1 copy of Air Monitoring Result on site for the project duration --

Appendix B

Health and Safety Plan

(HASP)

Health and Safety Plan (HASP)

Brownfield Site Cleanup
425 & 435 Mt Hope Ave
and 562 Ford St
Rochester, New York
NYSDEC Spill No. 0070378

O'Brien & Gere Project Number: 11862/43868

City Agreement Number: 032176

City of Rochester
Department of Environmental Services
Division of Environmental Quality
30 Church Street
Rochester, New York 14604

February 2, 2009

O'BRIEN & GERE

TABLE OF CONTENTS

List of Tables

List of Figures

List of Exhibits

List of Attachments

1. Introduction

This Health and Safety Plan (HASP) has been developed to provide both general procedures and specific requirements to be followed by O'Brien & Gere Engineers, Inc. (O'Brien & Gere) personnel while implementing remedial activities at the 425 and 435 Mt Hope Ave and 562 Ford Street Brownfield Site located in the City of Rochester, Monroe County, New York (the "Site").

This HASP describes the responsibilities, training requirements, protective equipment, and standard operating procedures to be used by O'Brien & Gere personnel to address potential health and safety hazards while working at the Site. This Plan specifies procedures and equipment to be used by O'Brien & Gere personnel during work activities and emergency response to minimize exposures of O'Brien & Gere personnel to hazardous materials.

The health and safety considerations of subcontractors to O'Brien & Gere will be set forth in HASPs provided by each subcontractor. This Plan will be provided to subcontractors for informational use and reference when preparing their HASP(s) however O'Brien & Gere will not be responsible for the health and safety of subcontractor's employees. The subcontractor's HASP will be provided to O'Brien & Gere prior to the start of the subcontractor's work.

1.1. Site Location and Description

The Site is currently used as a public park consisting of three contiguous parcels located at 425 and 435 Mt Hope Ave and 562 Ford Street in the City of Rochester, Monroe County, New York (Figure 1). The Site encompasses approximately 1.71 acres. Historic uses of the Site have included automotive repair and a gasoline/service station. At least seven underground storage tanks (USTs), reportedly for gasoline storage, were historically present at the Site. The Site is located within a mixed commercial/residential area.

1.2. Implementation of Health and Safety Plan

The requirements and guidelines presented in this HASP are based on a review of available information and an evaluation of potential Site hazards. This HASP incorporates by reference the applicable Occupational Safety and Health Administration (OSHA) requirements in 29 CFR Part 1910 and 29 CFR Part 1926. The protective equipment selection was made according to Subpart I of 29 CFR 1910. O'Brien & Gere personnel are required to read this HASP before beginning work on Site. This HASP will be available for inspection and review by O'Brien & Gere employees while work activities are underway.

This HASP is specifically intended for guiding the conduct of O'Brien & Gere while performing Site activities defined in the Corrective Action Plan (CAP). Although this HASP can be made available to interested persons for informational purposes, O'Brien & Gere does not assume responsibility for the interpretations or activities of any persons or entities other than employees of O'Brien & Gere.

The health and safety considerations of subcontractors to O'Brien & Gere will be set forth in HASPs provided by each subcontractor. Documentation of the subcontractor's HASP will be obtained prior to the start of the subcontractor's work.

1.3. Project Organization

All personnel involved in the remedial activities at the Site implicitly have a part in implementing the HASP. Among them, the Project Officer, the Project Manager, the Corporate Associate for Safety and Health, the Site Safety and Health Coordinator (SSHC), and the Site Supervisor have specifically designated responsibilities. Their names and telephone numbers are listed in Table 1-1. Other key O'Brien & Gere project personnel, the project's organization, and other primary contacts for the project are presented in the CAP.

Key project personnel and their responsibilities with regard to the sampling activities are discussed below.

Project Officer

Douglas M. Crawford, P.E. is the Project Officer. The Project Officer is responsible for the overall administration and technical execution of the project. The Project Officer is further responsible for the acquisition and delegation of resources necessary for project completion and HASP implementation.

Project Manager

Kevin D. Ignaszak, P.E. is the Project Manager. The Project Manager reports to the Project Officer and is directly responsible for the technical progress and financial control of the project.

Corporate Associate for Safety and Health

Mr. Jeff Parsons, C.I.H. is the Corporate Associate for Safety and Health. Mr. Parsons will be responsible for implementation of this HASP. Procedural changes and modifications to this HASP must be approved by Mr. Parsons.

Site Safety and Health Coordinator

Anthony DiNardo, E.I.T. is the Site Safety and Health Coordinator (SSHC) for the project. The SSHC reports to the O'Brien & Gere Project Manager, coordinates his activities with the O'Brien & Gere Corporate Associate for Safety and Health and establishes operating standards and coordinates overall project safety and health activities for the Site. The SSHC reviews project plans and revisions to plans to determine that safety and health procedures are maintained throughout the investigation. The SSHC audits the effectiveness of the HASP on a continuing basis and suggests changes, if necessary, to the Project Manager.

Specifically, the SSHC is responsible for the conducting the following actions:

- Maintain a complete copy of the HASP at the Site during all Site activities
- Familiarize Site workers with the HASP prior to initiating work
- Conduct on Site health and safety training and briefing sessions
- Document the availability, use, and maintenance of personal protective and other safety or health equipment

- Maintain safety awareness among O'Brien & Gere employees on Site and communicating safety and health matters to them

- Review field activities for performance in a manner consistent with O'Brien & Gere policy and this HASP

- Monitor health and safety conditions during field activities

- Coordinate with emergency response personnel and medical support facilities

- Notify the Corporate Associate for Safety and Health and the Project Manager of the need to initiate corrective actions in the event of an emergency, an accident, or identification of a potentially unsafe condition

- Notify the Corporate Associate for Safety and Health and the Project Manager of an emergency, an accident, the presence of a potentially unsafe condition, a health or safety problem encountered, or an exception to this HASP

- Recommend improvements in safety and health measures to the Corporate Associate for Safety and Health and the Project Manager, and

- Conduct safety and health performance and system audits.

The SSHC has the authority to recommend that the Project Manager, after consultation with the Corporate Associate for Safety and Health, take the following actions:

- Suspend field activities or otherwise limit exposures if the health or safety of any O'Brien & Gere employee appears to be endangered

- Notify O'Brien & Gere personnel to alter work practices that the SSHC deems to not protect them, and

- Suspend an O'Brien & Gere employee from field activities for violating the requirements of this HASP.

Site Supervisor

The Site Supervisor, designated by the O'Brien & Gere Project Manager, will be responsible for implementing the project tasks specified in the CAP. The Site Supervisor will be responsible for overall Site coordination and will correspond with on Site subcontractors and O'Brien & Gere field staff. The Site Supervisor will report directly to the Project Manager or designee.

Table 1-1 *Project Personnel*

Name and Title	***Telephone***
O'Brien & Gere Key Project Personnel	
Douglas M. Crawford, P.E. Project Officer Syracuse, New York	(315) 437-6100
Kevin D. Ignaszak, P.E. Project Manager Rochester, New York	(585) 263-2820
Jeff Parsons Corporate Associate for Safety and Health Syracuse, New York	(315) 437-6100 (315) 391-0638 (cell)
Anthony DiNardo Site Safety & Health Coordinator Rochester, New York	(585) 263-2820
City of Rochester Key Project Personnel	
Joseph Biondolillo Sr. Environmental Specialist / Project Manager Rochester, New York	(585) 428-6649
Jane Forbes Environmental Specialist Rochester, New York	(585) 428-7892
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2. Hazard Analysis

General Site chemical, environmental and physical hazards are summarized in Section 2.1. Health and safety considerations for specific field tasks, detailed in the CAP, are presented in separate subsections as outlined below:

- Excavation (i.e., installation of test trenches, excavation of petroleum-impacted soil/fill) - Section 2.2
- Monitoring well, soil boring and oxygen injection point installation and sampling - Section 2.3

The potential health and safety hazards and the hazard and contaminant control procedures for each field task are discussed in the sections below. A pre-work job safety analysis has been completed based on the current scope of work and is included as Attachment A.

2.1. General Site Hazards

2.1.1. Chemical Hazards

Chemical hazards associated with the anticipated project tasks are related to inhalation, ingestion, and skin exposure to Site constituents of potential concern (COPCs). Site COPCs are considered to mainly include petroleum constituents present in soil and ground water at the Site resulting from the Sites historic use (i.e., an automobile service and gasoline station). There is also a potential risk of exposure to oxygen displacing gases (e.g., sulfur dioxide) that may be released from the subsurface as a result of drilling activities.

The potential for unprotected Site personnel for sustained inhalation and or ingestion of COPCs during intrusive Site operations is low to moderate. The potential for unprotected personnel for dermal contact with soils or water containing COPCs during drilling and sampling operations is moderate to high. Best Management Practices (BMPs) including limiting potential exposures by limiting the time spent in the immediate vicinity of intrusive activities, appropriate hand washing and proper use of personnel protective equipment will be used to reduce potential exposure to Site contaminants.

Materials Safety Data Sheets (MSDSs) for the following COPCs are provided in Exhibit 1:

- Benzene
- Toluene
- Ethylbenzene
- Xylene

2.1.2. Potential Environmental and Physical Hazards

Prior to initiating activities at the Site, the Site conditions will be discussed with all Site workers. Hazards will be identified and protective measures will be explained.

Environmental hazards, in addition to Site contaminants, include Site fauna and flora. Aggressive fauna, such as ticks, fleas, mosquitoes, bees, wasps, spiders and snakes may be present at the Site. Poison ivy and poison oak may also be present.

Physical Hazards involved with field activities are primarily associated with the Site environment and the movement of vehicles and mechanized equipment at the Site. The work area presents hazards of slips, trips, and falls from scattered debris and irregular walking surfaces. Weather related hazards include wet, muddy, slick, walking surfaces and unstable soil, sunburn, lightning, rain, snow, ice, and heat and cold related illnesses. There exists a potential for incidents involving personnel struck by or struck against objects resulting in fractures, cuts, punctures, or abrasions. Walking and working surfaces at the Site may present slip, trip, and fall hazards.

Material handling may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion and laceration hazards. A common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or hand (or entire appendage or body) gets caught between two objects. Extreme care must be taken when loading and unloading material. Proper lifting technique must be employed.

Working surfaces that are slippery can increase the likelihood of back injuries, overexertion injuries, and slips and falls. All personnel should frequently inspect working surfaces and keep working surfaces clear of debris and moisture.

2.1.3. Hazard and Contaminant Control

For each field task, Level D personal protective equipment (PPE) will initially be worn. Protective equipment will also include steel toe boots with good treads and personnel will be reminded to remain alert of the area where they are walking to decrease the chance of slipping. Eye protection will be worn to minimize the potential for injury to the eyes. The specific requirements for PPE are presented in Section 4.

The primary contaminant exposure hazards for each task are summarized below in Section 2.2 and 2.3. Continuous air monitoring will be conducted during specific field activities as described in Section 6. If odors are detected during field activities, air monitoring with a photo ionization detector (PID) should be conducted to evaluate the concentrations that are present. Action levels for upgrading PPE are presented in Section 6.3.

Field equipment will be inspected and in proper working condition. Mechanical assistance will be provided for large lifting tasks. A Ground Fault Circuit Interrupter (GFCI) will be used on all electric power tools and extension cords in outdoor work locations. Electrical extension cords will be protected or guarded from damage (e.g., cuts from other machinery) and be maintained in good condition.

2.2. Test Trenching and Soil Excavation

2.2.1. Potential Health Hazards

Hazards generally associated with test trenching and excavation include damage to property, utilities and human life due to misuse of heavy equipment. These hazards may include noise (levels exceeding the OSHA PEL of 90 dBA that are both a hazard and a hindrance to communication), carbon monoxide from

the excavator and support equipment exhaust and subsurface and overhead facilities (e.g., overhead electrical and buried gas lines) that the excavator arm or bucket may encounter. Moving the excavator over uneven terrain may cause the vehicle to roll over and cause property damage and injury to Site personnel. High-pressure hydraulic lines used on excavators are hazardous when they are in disrepair or incorrectly assembled.

Hazards associated with the test trench/excavation itself include falling from the ground level to the excavation bottom, being buried by soil from collapse of the excavation side wall, inhalation/ingestion of COPCs, and skin exposure to soils containing COPCs.

Some excavation may occur along the shoulders of public roadways. Appropriate traffic control measures will be implemented, which may include the use of cones, flagmen, and/or traffic control signs at the work area(s).

2.2.2. Hazard and Contaminant Control

Level D PPE Requirements presented in Section 4 apply to this task. Personnel must wear hard hats and ear muffs and/or earplugs when working near operating heavy machinery.

O'Brien & Gere personnel will remain upwind from the machinery exhausts to the extent practicable unless required by sampling work. The breathing zone will be periodically monitored for volatile organic vapors using a PID during excavation activities. Subsequent monitoring and respirator wear will be in accordance with Chapter 6 of this HASP.

O'Brien & Gere personnel will stay away from heavy equipment to the extent possible and maintain verbal and/or visual contact with the operator prior to approaching equipment.

The following are excavation safety requirements, which must be implemented per the O'Brien & Gere Excavation Safety Procedure:

- Assume soil is Type C unless soil testing indicates otherwise and such testing is documented on a *Soil Analysis Checklist*. Standard sloping and benching will follow a 1.5:1.0 (H:V) cutback associated with Type C soil

- No personnel will enter the excavation under any circumstances until the SSHC has confirmed that the excavation is safe to enter (e.g., appropriate sloping of side walls, use of shoring)

- Prior to excavating proximal to an engineered structure (e.g., building or foundation) a qualified engineers must evaluate how the excavation could affect the stability of the adjacent structure(s)

- All excavation spoils will be kept a minimum of 2' from the edge of the excavation

- Fall protection will be provided around excavations. Fall protection will consist of solid barricades (e.g., saw horses or portable chain link) or soft barricades (e.g., safety fence) off-set at a minimum of 6' from the edge

- Pedestrian Barricades – Portable chain link fence (minimum 48" height) or equivalent will be used to protect pedestrians. If pedestrian traffic is re-routed to avoid excavations, pedestrian

detours must be accessible to bicyclists, handicapped persons, and other pedestrian in the area who may have special needs

- Traffic Barricades – Any excavation activities that affect public or private roads must be equipped with traffic safety devices as required by the *Manual on Uniform Traffic Control Devices*. If flaggers are used on public roads, they must received DOT Flagger Training

- Locate underground utilities and hand dig when within 3' of utility locations to make the final determination where the utility is located. Do not attempt to uncover utilities using excavator buckets or other heavy equipment, and

- Maintain 20' clearance to overhead power lines unless additional safety precautions are implemented as required by O'Brien & Gere. Additional safety precautions may include shielding, dedicated spotter, etc.

Additional details regarding hazard and containment control practices associated with excavations are provided in Section 2.1.5 of the Corporate Safety Manual presented herein as Attachment B.

2.3. Monitoring Well and Soil Boring Installation and Sampling

A component of field operations will consist of the installation of soil borings, monitoring wells, oxygen injection points and the collection of soil and ground water samples. The physical hazards of these tasks are primarily associated with operation of the drill rig and contact with potentially contaminated soil and water during sample collection.

Steel drums may be used to contain soil spoils generated from drilling activities or purge water generated during ground water sampling. Field personnel should be aware of physical hazards associated with the opening of drums, which can include pinching of hands and fingers. Drums will be staged on level, firm ground to minimize the potential that they may fall or roll.

When opening sealed drums, a PID will be used to monitor the breathing zone around the drum to evaluate potential exposure. If PID readings are noted in the breathing zone at levels above background, the sampler will leave the area and recheck the breathing zone at a later time to allow potential vapors to dissipate. Care will be taken to minimize the potential for dermal contact with drum contents. General PPE requirements presented in Section 4 apply to this task.

2.3.1. Potential Health Hazards

Physical hazards generally associated with drilling include noise (levels exceeding the OSHA PEL of 90 dBA that are both a hazard and a hindrance to communication), carbon monoxide from the drill rig exhaust, overhead and underground facilities (*e.g.*, overhead electrical wires and underground gas pipes), moving parts on the drill rig that may catch clothing and free or falling parts from the drill rig boom that may cause head injury. Moving the drill rig over uneven terrain may cause the vehicle to roll over or get stuck in a rut or mud. High-pressure hydraulic lines and air lines used on drill rigs are hazardous when they are in disrepair or incorrectly assembled.

During the retrieval of augers, down hole tooling, and the collection of samples, the possibility exists for contact with subsurface materials that may contain COPCs.

There is the potential for arm and back strain during the purging of the wells, collection of samples and from handling sampling equipment and materials.

2.3.2. Hazard and Contaminant Control

Level D PPE requirements presented Section 4 apply to this task. Personnel must wear hard hats and ear muffs and/or earplugs when working near operating heavy machinery. Prior to approaching a drill rig, loose clothing will be secured and the boom position will be checked.

O'Brien & Gere personnel will remain upwind from the vehicle exhausts to the extent practicable unless required by sampling work. If odors are observed during field activities, air monitoring with a photo ionization detector (PID) should be conducted to evaluate the concentrations that are present. Action levels for upgrading PPE are present in section 6.1.

The drilling subcontractor will be required to inspect chains, lines, cables, and high-pressure lines daily for weak spots, frays, and other signs of wear. The drilling subcontractor will be required to make repairs as necessary. To avoid contact with overhead lines, the drilling subcontractor will be required to lower the drill rig boom prior to moving the rig. The drilling subcontractor will be required to verify the location of underground utilities with both the facility and the local power and utility companies prior to drilling. Overhead and underground utilities will be considered "live" until verified otherwise.

Back strain can be prevented by employing proper lifting and bailing techniques. Heavy equipment, such as pumps and generators, will only be lifted with the legs, preferably using two or three personnel.

Table 2-1. *Personal Protection Requirements for the CAP Field Activities*

Task	Description of Primary Health Concerns	PPE Level	Monitoring	Action Level
Test Trenching / Excavation	Inhalation due to volatilization or dust, absorption by skin contact.	Level D (Section 4)	Organic vapor and particulate monitoring (Section 6.1)	See section 6.3 of HASP.
Installation of Wells and Soil Borings	Inhalation due to volatilization or dust, absorption by skin contact.	Level D (Section 4)	Organic vapor and particulate monitoring (Section 6.1)	See section 6.3 of HASP.
Soil and Ground Water Sampling	Inhalation due to volatilization, absorption by skin contact.	Level D (Section 4)	Organic vapor monitoring (Section 6.1), if odors observed.	See section 6.3 of HASP.

Notes:
PID = photoionization detector
HASP = Health and Safety Plan
Sections referred to in parentheses ( ) are found in this HASP.

3. Personnel Training

3.1. Site Workers

O'Brien & Gere employees performing on Site activities must have completed a training course of at least 40 hours meeting the requirements of 29 CFR 1910.120(e) for safety and health at hazardous waste operations. If the course was completed more than 12 months before the date of Site work, completion of an approved, 8 hour, refresher course on health and safety at hazardous waste operations is required.

3.2. Emergency Response Personnel

O'Brien & Gere employees who respond to emergency situations involving health and safety hazards must be trained in how to respond to such emergencies in accordance with the provisions of 29 CFR 1910.120(l). Skills such as cardiopulmonary resuscitation (CPR), mouth-to-mouth rescue breathing and basic first aid skills may be necessary. Off Site personnel who respond to emergencies on Site will be briefed on potential Site hazards by the SSHC before being permitted to enter the buffer and exclusion zones.

3.3. Site-Specific Training

Site-specific training will be provided to each O'Brien & Gere employee and reviewed before implementing field assignments. O'Brien & Gere personnel will be briefed daily by the Site Supervisor or by the SSHC as to the potential hazards that may be encountered during that day. Topics will include:

- Availability of this HASP
- General Site hazards and specific hazards in the work areas
- Selection, use, testing, and care of the body, eye, hand, foot and respiratory protective equipment being worn and the limitations of each
- Emergency response procedures and requirements
- Emergency notification procedures and evacuation routes to be followed, and
- Procedures for obtaining emergency assistance and medical attention.

3.4. Training Certification

A record of employee training completion will be maintained by the SSHC for each O'Brien & Gere employee who is trained. This record will include the dates of the completion of worker training, supervisor training, refresher training, emergency response training, and Site-specific training for on Site O'Brien & Gere employees

4. Personnel Protection

The basic level of PPE to be used during field activities associated with implementation of the CAP will be OSHA Level D. PPE may be upgraded based on air monitoring results and observations made by on-Site O'Brien & Gere personnel, based on the recommendations of the SSHC, Project Manager and/or Corporate Associate for Safety and Health.

If the SSHC determines that field measurements or observations indicate that a potential exposure is greater than the protection afforded by the PPE, equipment or procedures specified in this or other sections of this HASP, O'Brien & Gere's work will be temporarily stopped and the SSHC will coordinate the required actions to resume work (e.g., upgrade in PPE, use of respiratory protection and/or modification(s) to the HASP). O'Brien & Gere personnel will be removed from the Work Zone (see Section 7.2.1) until the exposure has been reduced or the level of protection has been increased.

O'Brien & Gere respirator users have been trained, medically approved, and fit tested to use respiratory protection. Respirators, issued to O'Brien & Gere personnel, are approved for protection against dust and organic vapors by the National Institute for Occupational Safety and Health (NIOSH). Respirators are issued for the exclusive use of one worker and will be cleaned and disinfected after each use by the worker. Respirator users must check the fit of the respirator before each day's use to see that it seals properly. The respirator must seal against the face so that the wearer receives air only through the air purifying cartridges attached to the respirator. No facial hair that interferes with the effectiveness of a respirator will be permitted on personnel required to wear respiratory PPE. Cartridges and filters for air-purifying respirators will be changed at the end of each workday that an air-purifying respirator is worn, unless the SSHC or Corporate Associate for Safety and Health modifies the cartridge change our frequency. The user will inspect the integrity of air-purifying respirators daily and record the inspection per the O'Brien & Gere Quality Assurance Manual (QAM).

4.1. Protective Equipment Description

The level of personal protective equipment is categorized as Level A, B, C, or D, based upon the degree of protection required. For each level, hard hats will be required if dangers related to overhead objects may be present. For drilling and excavation activities, hard hats will be worn at all times. For other tasks, hard hats will be worn, as necessary. The following is a brief summary of the three levels that may be used on this Site.

Level C - The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air-purifying respirators are met. The level of skin protection (e.g., use of chemical resistant coveralls, outer gloves) will be dependent on the likelihood for skin exposure and the concentrations of the applicable chemicals of concern. The following may constitute Level C equipment:

- NIOSH approved full-face air purifying respirator with organic vapor/acid gases cartridges and P100 filters
- Chemical-resistant clothing if needed and particular to the hazard present (e.g., polyethylene coated overalls, chemical-splash suit, disposable chemical-resistant overalls) with ankles and cuffs taped closed
- High visibility overshirt/vest
- Gloves, outer, nitrile, chemical-resistant, if necessary

- Gloves, sampling (inner), nitrile, chemical-resistant
- Gloves, inner, cut resistant (e.g., Kevlar)
- Shoes, with steel toe and shank meeting ANSI requirements
- Boots, outer neoprene or Chemical resistant (latex or neoprene) boot covers, if necessary
- Hearing protection, if necessary
- Hard hat, if necessary, and
- Face shield when not wearing a full-face respirator.

Modified Level D - A work uniform providing additional skin protection when respiratory protection is not necessary. The following may constitute Modified Level D equipment:

- Chemical-resistant clothing (polyethylene coated overalls, chemical-splash suit, disposable chemical-resistant overalls) with ankles and cuffs taped closed, if necessary
- Gloves, outer, nitrile, chemical-resistant, if necessary
- Gloves, inner, nitrile, chemical-resistant
- Gloves, inner, cut resistant (e.g., Kevlar)
- Shoes, with steel toe and shank meeting ANSI requirements
- Boots, outer neoprene or chemical resistant (latex or neoprene) boot covers, if necessary
- Safety Glasses with side shields
- Hearing protection, if necessary
- Hard hat, if necessary
- Escape mask (optional), and
- Face shield when not wearing other eye protection.

Level D - A work uniform affording minimal protection, used for nuisance contamination only and essentially does not provide respiratory or skin protection. The following may constitute Level D equipment:

- Coveralls or other appropriate high visibility work clothing
- Shoes, with steel toe and shank meeting ANSI requirements
- Optional chemical resistant boot covers
- Safety glasses with side shields and/or chemical splash goggles
- Gloves, nitrile if handling wet materials
- Gloves, inner, cut resistant (e.g., Kevlar) if handling materials that may abrade or puncture skin
- Leather Work Gloves

- Hearing protection, if necessary
- Hard hat, if necessary, and
- Escape mask (optional).

4.2. Protective Equipment Failure

If an individual experiences a failure or other alteration of PPE that may affect its protective ability, that person is to leave the work area immediately. The Project Manager or the SSHC must be notified and, after reviewing the situation, must determine the effect of the failure on the continuation of on-going operations. If the Project Manager or the SSHC determine that the failure affects the safety of workers, the work Site, or the surrounding environment, workers are to be evacuated until corrective actions have been taken. The SSHC will not allow re-entry until the equipment has been repaired or replaced and the cause of the failure has been identified.

5. Medical Monitoring

5.1. Medical Surveillance Program

O'Brien & Gere has implemented a medical monitoring program in accordance with 29 CFR 1910.120. The O'Brien & Gere program is designed to monitor and reduce health risks to employees potentially exposed to hazardous materials and to provide baseline medical data for each employee involved in work activities. It is also designed to determine the employee's ability to wear personal protective equipment such as chemical resistant clothing and respirators.

Medical examinations are administered on a pre/post-employment and annual basis and as warranted by symptoms of exposure or specialized activities. The examining physician is required to make a report to O'Brien & Gere of any medical condition that would increase the employee's risk when wearing a respirator or other PPE. O'Brien & Gere maintain Site personnel medical records as required by 29 CFR 1910.120 and by 29 CFR 1910.1020, as applicable.

O'Brien & Gere employees performing on Site activities have or will receive medical tests as regulated by 29 CFR 1910.120. Where medical requirements of 29 CFR 1910.120 overlap those of 29 CFR 1910.134, the more stringent of the two will be enforced.

5.2. Respirator Clearance

Employees who wear or may wear respiratory protection have been provided respirators as required by 29 CFR 1910.134. This standard requires that an individual's ability to wear respiratory protection be medically certified before performing designated duties.

6. Site Air Monitoring

6.1. General

Field activities associated with implementation of the CAP may cause potentially hazardous conditions, in the form of vapors, dusts, or mists that can enter the body through ingestion, inhalation, adsorption and direct contact. Air monitoring will be performed to ensure appropriate personal protective measures are employed during specific Site activities. Results of air monitoring will be recorded on the appropriate daily field forms/logs presented in Appendix C of the CAP.

Action levels have been established for activity cessation, site evacuation, emergency response, and determination of personal protection levels. Section 4 discusses the minimal personal protection required for specific Site activities. Table 6-1 lists action levels, airborne concentrations, and associated personal protection levels. Changes to these specified levels are dependent on the results of air monitoring, as described below and must be approved by the Corporate Associate for Safety and Health.

6.2. Monitoring

6.2.1. Organic Vapor and Particulates

Organic vapors

Health and safety air monitoring during remedial field activities will consist of real-time organic vapor monitoring according to the provisions of Section 2 and Table 6-1. During intrusive activities, organic vapors will be monitored continuously within the Work Zone (near the breathing zone of Site workers) with a portable PID equipped with a 10.2 electron volt detector to evaluate the presence and concentration of organic vapors. Anticipated intrusive activities for the Site will include:

- Installation of test pits
- Excavation of petroleum impacted soils
- Installation of soil borings, monitoring wells and oxygen injection points, and
- Collection of soil and ground water samples.

Organic monitoring will be conducted in the breathing zone and, if workers are wearing respiratory protective equipment, outside the face piece. The monitoring strategies may change if work tasks or operations change. Monitoring instruments will be checked for appropriate response and calibrated, in accordance with the manufacturer's instructions, before use each sampling day.

Particulates

Field health and safety air monitoring during intrusive activities associated with the remedial work at the Site will also consist of real-time particulate monitoring. During intrusive activities, the Work Zone will be monitored continuously with a portable dust monitor capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating readings over a period of 15-minutes for comparison to the airborne particulate action level. In addition, dust generation and migration will be visually assessed during work activities.

Particulate monitoring will be conducted in the breathing zone. The monitoring strategies may change if work tasks or operations change. Monitoring instruments will be checked for appropriate response and calibrated, in accordance with the manufacturer's instructions, before use each sampling day.

6.3. Action Levels

Action levels presented in this section are intended primarily for the protection of workers implementing the CAP field activities. The action levels are used to determine when activities should stop, to evaluate when Site evacuation is necessary, to select emergency response levels, and to change PPE levels.

6.3.1. Organic Vapors and Particulates

Organic vapors and/or particulates may be released during intrusive activities such as excavation or soil boring and monitoring well installation. A PID will be used to evaluate the presence of organic vapors. A dust meter will be used to evaluate particulate concentrations.

PID monitoring

The Work Zone will be monitored continuously for VOCs during intrusive Site activities. Should this monitoring indicate sustained VOC levels in the breathing zone that exceed 5 ppm above background for a 15-minute average, workers will upgrade to Level C respiratory protection. Actions, such as working upwind of motors and fuel areas (if possible) will be implemented to reduce potential interference and exposure to fuel vapors. If the measured VOC concentration is greater than or equal to 50 ppm above background for a 15-minute average, the workers will leave that work area.

Particulate monitoring

The Work Zone will be monitored continuously for airborne particulates. Should this monitoring indicate sustained particulate concentrations above 100 ug/m^3 for a 15-minute average, particulate control measures will be initiated.

Table 6-1 *Vapor and Particulate Monitoring Requirements*

Total VOC Concentration (ppm)	Method	Monitoring Zone	Monitoring Requirements	PPE
<5 for 15-minute average	PID	Work Zone	Continuously in Work Zone during intrusive activities.	Level D
>5 for 15-minute average	PID	Work Zone	Continuously in Work Zone during intrusive activities.	Level C respiratory protection
>50 for 15-minute average	PID	Work Zone	Vacate area	Vacate area.
Particulate Concentration (ug/m^3)	**Method**	**Monitoring Zone**	**Monitoring Requirements**	**PPE**
<100 for 15-minute average	Dust Meter	Work Zone	Continuously in Work Zone during intrusive activities.	Level D
>100 for 15-minute average	Dust Meter	Work Zone	Continuously in Work Zone during intrusive activities	Level D, implement dust suppression measures
>150 for 15-minute average	Dust Meter	Work Zone	Continuously in Work Zone during intrusive activities	Stop work, employ dust control methods and resume work in Level C respiratory protection with continued monitoring

6.4. Community Air Monitoring Plan

Community air monitoring will be performed in accordance with the Site Specific Community Air Monitoring Plan (CAMP) provided as Appendix B of the CAP. The Site Specific CAMP was prepared in accordance with New York State Department of Health (NYSDOH) generic CAMP presented in Appendix 1A of DER-10. Protocols presented in the Site specific CAMP will be followed during field work associated with implementation of the CAP.

7. Site Control

7.1. Site Security

Site security will be monitored and controlled by the Site Supervisor. His or her duties will include limiting access to the work area to authorized personnel, overseeing project equipment and materials, and overseeing work activities. The procedures specified below will be followed to control access to each work Site to prevent persons who may be unaware of Site conditions from exposure to hazards. Work area control procedures may be modified as required by Site conditions.

7.2. Site Control

Work zones will be required during Site activities identified in this HASP. The following two categories of work zones will be established at each sampling point: an Exclusion Zone and a Buffer Zone. The remainder of the Site will be the Support Zone.

7.2.1. Exclusion Zone (Work Zone)

The Exclusion Zone (Work Zone) is where remedial activities are conducted (e.g., drilling, sampling and/or the excavation area). The SSHC will identify this zone. It must be at least 30 ft in diameter and centered on the work activities.

7.2.2. Buffer Zone

The Buffer Zone contains personnel and equipment decontamination stations and staging areas. The Buffer Zone will be located upwind of the work activities. It will only be large enough to contain equipment and personnel necessary to keep potentially contaminated media and materials in the immediate work area.

7.2.3. Support Zone

The remainder of the area is defined as the Support Zone. The Support Zone contains support facilities, extra equipment, transport vehicles, and additional personnel and equipment necessary to manage and perform work activities.

7.3. Site Access Procedures

Access during field activities will be limited to those personnel required. Such personnel are anticipated to include, but will not necessarily be limited to, O'Brien & Gere employees or subcontractors and those representatives as designated by the City of Rochester, NYSDEC or local agencies. Site access will be monitored by the SSHC, who will maintain a log-in sheet. The log will include O'Brien & Gere and other personnel on the Site, their arrival and departure times and their destination on the Site. The site access log sheet is presented in Appendix C of the CAP.

7.4. Site Communications

A cellular telephone will be used during activities to facilitate communications for emergency response and other purposes and to serve as the primary off Site communication network.

7.5. Confined Space Entry

A confined space is defined as a space that is large enough to enter, has limited or restricted means for egress, and is not designed for continuous employee occupancy. OSHA defines "limited means of egress" as entry through hatches, ladders, and similar methods. Entry by doors, door-sized openings, stairs, ramps with acceptable pitch, and similar methods are not "limited". Confined spaces include tanks, underground vaults, manholes, and excavations more than 4 feet deep. Entry into permit-required confined spaces requires special training, rescue procedures, and an entry permit.

Confined spaces can be modified so that they are no longer confined. Non-Permit Confined Space(s) include confined space(s) where all serious hazards have been "eliminated". "Eliminate" refers to the removal of serious hazards using Lockout/Tagout procedures and engineering controls (e.g., sloping, shoring of excavation sidewalls). If confined spaces can be modified so that the serious hazards can be eliminated or workers can enter through a doorsized opening, enter via industrial stairs, or enter via a ramp, then the space no longer has a restricted means of entry and is therefore no longer a confined space covered by OSHA's Permit-Required Confined Space Entry regulation.

No entry of permit required confined space is expected during the project however excavations may exceed 4 feet in depth and therefore may meet the criteria of a non-permit required confined space. Entry into any excavation at the Site is not anticipated at this time. If entry into an excavation is required this HASP must be modified to reflect the confined space entry procedures presented in the O'Brien & Gere Corporate Health and Safety Manual.

8. Decontamination

8.1. Personnel Decontamination Procedures

Personnel decontamination will be performed to prevent the migration of contaminants outside the Buffer Zone and to prevent exposure of Site workers and the public to COPCs. Decontamination involves scrubbing with a soap and water solution followed by rinses with potable water. Decontamination will take place in a dedicated decontamination area (e.g., decontamination pad or decontamination line). Dirt, oil, grease, or other foreign materials that are visible will be removed from surfaces. Scrubbing with a brush may be required to remove materials that adhere to the surfaces. Splash protection garments will be washed with soap and potable water before removal. Non-disposable garments will be air dried before storage. Waste waters from personnel decontamination will be disposed of with the waste waters from equipment decontamination. Respirators will be sanitized as well as decontaminated each day before re-use. The manufacturer's instructions will be followed to sanitize respirator masks.

It is anticipated that the majority of Site activities will only require OSHA Level D PPE. The decontamination sequence provided below includes all steps that will be necessary if an upgrade to OSHA LEVEL C PPE is required. The SSHC will be responsible for supervising the proper use and decontamination of PPE. The SSHC will also establish and monitor the decontamination line and determine which decontamination steps are required.

Station 1: Equipment Drop

Provide an area covered with a plastic drop cloth. Deposit equipment used in the Exclusion Zone including tools, sampling devices and containers, monitoring instruments, radios, and clipboards on the plastic drop cloth. During hot weather a cool down station with chairs, fans, and replenishing beverages may be set up in this area.

Station 2: Outer Garment, Boots, and Gloves Wash and Rinse

Establish a wash station for gloves, boots, and the protective suit (when worn). Scrub outer boots, outer gloves, and protective suit with detergent and water. Rinse with potable water.

Station 3a: Outer Boot and Glove Removal

Provide seating for use during the removal and collection of outer boots. Remove outer boots. Deposit them in a container with a plastic liner. If the boots are to be reused after cleaning, place them in a secure location near the work Site. Provide a location for removal, collection, and disposal of outer gloves. Remove the outer gloves. Deposit them in a container for disposal.

Station 3b: Filter or Cartridge Exchange

This station will be established only if respirators are worn. The worker's respirator cartridges and filters can be exchanged, new outer gloves and outer boots donned, and joints taped at this station. From here the worker can return to work duties in the Exclusion Zone.

Station 4: Outer Garment Removal

This station will only be provided if a protective outer garment is worn. Provide a bench to sit on during the removal of the protective garment. If the garment is disposable, deposit it in a container with a plastic liner; otherwise, hang it up to air dry.

Station 5: Respirator Removal

This station will be established only if respirators are worn. Remove the respirator. Avoid touching the face with gloved fingers. Deposit the respirator on a plastic sheet.

Station 6: Inner Glove Removal

Remove and dispose of inner gloves. Deposit them in a container with a plastic liner. If the gloves are to be reused, place them in a secure location near the work Site, preferably in a plastic container.

Station 7: Field Wash

Provide a place for a field wash. Wash hands and face thoroughly. Shower if body contamination is suspected.

8.2. Emergency Decontamination Procedures

This section has been included in the event of an emergency. The extent of emergency decontamination depends on the severity of the injury or illness and the nature of the contamination. Minimum decontamination will consist of detergent washing, rinsing and removal of contaminated outer clothing and equipment. If time does not permit the completion of all of these actions, it is acceptable to remove the contaminated clothing without washing it. If the situation is such that the contaminated clothing cannot be removed, the person should be given required first aid treatment, and then wrapped in plastic or a blanket prior to transport to medical care. If heat stress is a factor in the victim's illness/injury, outer clothing will be removed from the victim immediately.

8.3. Monitoring Equipment Decontamination Procedures

Equipment used for health monitoring purposes will be cleaned of visible contamination and debris before initial use on Site, between uses, and after final use. Monitoring equipment that contacts contaminated media will be decontaminated after each use by brushing or wiping with a cloth dampened with water and a low phosphate detergent followed by an equipment wipe down with a towel dampened with clean water. Electronically sensitive equipment should be cleaned in accordance with the manufacturer's recommendations. After decontamination, monitoring equipment will be stored separately from personal protective equipment. Decontaminated or clean equipment not in use will be covered with plastic or bagged and stored in a designated storage area in the support zone.

8.4. Decontamination Supplies

The following supplies will be available on Site for the decontamination of personnel and equipment:

- Plastic drop cloths
- Plastic bags or DOT-approved fiberboard drums to collect non-reusable protective clothing
- Plastic wash tubs
- Soft bristled long-handle brushes
- DOT-approved drums or appropriate other containers, to collect wash and rinse water
- Hand spray units for decontamination
- Soap, water, alcohol wipes, and towels to wash hands, faces, and respirators, and
- Washable tables and benches or chairs.

8.5. Collection and Disposition of Contaminated Materials

Field decontamination wastes are to be collected, drummed, and disposed of in accordance with the procedures in the CAP. Investigation derived waste will be managed as described in the CAP.

8.6. Refuse Disposal

Site refuse will be contained in appropriate areas or facilities. Trash from the project will be properly disposed.

9. Emergency Response

9.1. Notification of Site Emergencies

In an emergency, Site personnel will signal distress either by yelling or with three blasts from a horn (vehicle horn, air horn and so forth). The SSHC, Site Supervisor, or the Project Manager will immediately be notified of the nature and extent of the emergency.

Table 9-2, located on the following page, contains emergency telephone numbers. This table will be kept with the on-Site personnel and updated as needed by the SSHC. A cell phone will be used to notify off-Site personnel of emergencies. The operating condition of this telephone will be determined daily before initiation of activities.

Directions to Highland Hospital from the Site are provided in the table below:

Table 9-1. *Directions to Highland Hospital*

Directions	***Approx. Distance***
Heading East on Gregory Street	0.1 miles
Turn right onto Poplar St	0.3 miles
Turn left onto Manor Pkwy	0.2 miles
Turn right onto South Ave	0.2 miles
End at Highland Hospital: 1000 South Ave (585) 473-2200	
Total mileage (approximate)	0.7 miles

The route to the hospital is provided on Figure 1. Should someone be transported to a hospital or doctor, a copy of this HASP should accompany him or her.

Table 9-2. *Emergency Response Contact List*

Agency	*Contact/Function*	*Phone Number*
Rochester Police Dept.	Report Incidents	911
NYS Police Dept.	Report Incidents	911 or 1-800-342-4357
Monroe County Sheriff's Dept.	Report Incidents	911
City of Rochester Fire Dept.	Report Fire	911
Highland Hospital 1000 South Avenue Rochester, NY	Main Information	585-473-2200
USEPA Emergency Response Team		212-340-6656
CHEMTREC	Chemical Emergencies	1-800-424-9300
NYSDEC Albany, NY	Emergency	1-800-342-9296
Emergency NYSDEC Project Contact	TBD	1-585-226-2466
Oil Spill		1-800-457-7362
Poison Control Center		1-800-336-6997
Chemical Emergency Advice		1-800-424-9300
National Spill Response Center		1-800-424-8802

9.2. Responsibilities

The SSHC is responsible for responding to, or coordinating the response of off Site personnel to, emergencies. In the event of an emergency, the SSHC will direct notification and response, and will assist the Site Supervisor in arranging follow-up actions. Upon notification of an exposure incident, the SSHC will call the hospital, fire, and police emergency response personnel for recommended medical diagnosis, treatment if necessary, and transportation to the hospital.

Before the start of field activities at the Site, the SSHC will:

- Confirm that the following safety equipment is available: eyewash station, first aid supplies, and a fire extinguisher
- Have a working knowledge of the O'Brien & Gere safety equipment
- Confirm the most direct route to Highland Hospital (Table 9-1, Figure 1) is prominently posted with the emergency telephone numbers (Table 9-2), and
- Confirm that employees who will respond to emergencies have been appropriately trained.

Before work may resume following an emergency, used emergency equipment must be recharged, refilled, or replaced and government agencies must be notified as required.

The Project Manager, assisted by the SSHC and the Site Supervisor, must investigate the incident as soon as possible. The Project Manager will determine whether and to what extent exposure actually occurred, the cause of exposure, and the means to prevent similar incidents. The resulting report must be signed and dated by the Project Manager, the SSHC, and the Site Supervisor.

9.3. Accidents and Injuries

In the event of an accident or injury, workers will immediately implement emergency isolation measures to assist those who have been injured or exposed and to protect others from hazards. Upon notification of an exposure incident, the SSHC will contact emergency response personnel who can provide medical diagnosis and treatment. If necessary, immediate medical care will be provided by personnel trained in first aid procedures. Other on Site medical or first aid response to an injury or illness will be provided only by personnel competent in such matters. In addition, the O'Brien & Gere Corporate Associate for Safety and Health will be notified within 24-hours of an accident involving O'Brien & Gere personnel and/or its subcontractors.

9.4. Safe Refuge

Before commencing Site activities the SSHC will identify the location that will serve as the place of refuge for O'Brien & Gere workers in case of an emergency evacuation. During an emergency evacuation, personnel in the Exclusion Zone should evacuate the work area both for their own safety and to prevent hampering rescue efforts. Following an evacuation, the SSHC will account for Site personnel.

9.5. Fire Fighting Procedures

A fire extinguisher meeting the requirements of 29 CFR Part 1910 Subpart L, as a minimum, will be available in the Support Zone during on Site activities. This is intended to control small fires. When a fire cannot be controlled with the extinguisher, the Exclusion Zone will be evacuated, and the fire department will be contacted immediately. The SSHC or the Site Supervisor will determine when to contact the fire department.

9.6. Emergency Equipment

The following equipment, selected based on potential Site hazards, will be maintained in the Support Zone for safety and emergency response purposes:

- Fire extinguisher
- First aid kit, and
- Eye wash bottles.

9.7. Emergency Site Communications

Hand and verbal signals will be used at the Site. Cell phones will be available during Site activities for emergency response communications.

9.8. Security and Control

Work Zone security and control during emergencies, accidents, and incidents will be monitored by the SSHC or the Site Supervisor. The duties of the SSHC or the Site Supervisor include limiting access to the Work Zones to authorized personnel and overseeing emergency response activities.

10. Special Precautions and Procedures

The Site activities described in the CAP may expose personnel to both chemical and physical hazards. The hazards associated with specific Site activities are discussed in Section 2. The potential for exposure to hazardous situations will be significantly reduced through the use of air monitoring, PPE, hazard awareness training, and administrative and engineering controls. Other general hazards that may be present on a hazardous waste work Site are discussed below.

10.1. Heat Stress

The timing and location of this project may be such that heat stress could pose a threat to the health and safety of Site personnel. The SSHC will implement work and rest regimens so that O'Brien & Gere personnel do not suffer adverse effects from heat. These regimens will be developed by the SSHC following the guidelines in the 1997 edition of the ACGIH *Threshold Limit Values for Physical Agents in the Work Environment*. Special clothing and an appropriate diet and fluid intake will be recommended to O'Brien & Gere personnel involved in the activities specified in Section 2 to further reduce this hazard. In addition, ice and fluids will be provided as appropriate in the Support Zone.

10.2. Cold Injury

The project may require work during seasonal periods when cold injury could pose a threat to the health and safety of Site personnel. Factors that influence the development of a cold related injury include ambient temperatures, wind velocity and wet clothing and skin. The SSHC will implement work and rest regimens so that O'Brien & Gere personnel do not suffer adverse effects from cold. These regimens will be developed by the SSHC following the guidelines in the 1997 edition of the ACGIH *Threshold Limit Values for Physical Agents in the Work Environment*. Special clothing and an appropriate diet and fluid intake will be recommended to O'Brien & Gere personnel involved in the activities specified in Section 2 to further reduce this hazard.

10.3. Heavy Machinery/Equipment

O'Brien & Gere employees performing Site activities may use or work near operating heavy equipment and machinery. Respiratory protection and protective eyewear may be worn during portions of work activities. Since this protective equipment reduces peripheral vision of the wearer, O'Brien & Gere personnel should exercise extreme caution in the vicinity of operating equipment and machinery to avoid physical injury to themselves or others.

10.4. Additional Safety Practices

The following are important safety precautions that will be enforced during the completion of the activities listed in Section 2:

Contact with potentially contaminated surfaces should be avoided whenever possible. Workers should minimize walking through puddles, mud, or other discolored surfaces; kneeling on ground; and leaning, sitting, or placing equipment on drums, containers, vehicles, or the ground

Medicine and alcohol can mask the effects of exposure to certain compounds. Consumption of prescribed drugs must be at the direction of a physician

- O'Brien & Gere personnel and equipment in the work areas will be minimized consistent with effective Site operations

- Unsafe or inoperable equipment left unattended will be identified by a "DANGER, DO NOT OPERATE" tag

- Activities in the Exclusion Zone will be conducted using the "Buddy System." The Buddy is another worker fully dressed in the appropriate personal protective equipment who can perform the following activities:

    1. Provide partner with assistance
    2. Observe partner for sign of chemical or heat exposure
    3. Periodically check the integrity of partner's PPE, and
    4. Notify others if emergency help is needed.

- The HASP will be reviewed frequently for its applicability to the current and upcoming operations and activities.

10.5. Daily Log Contents

The Project Manager and the SSHC will establish a system appropriate to the Site investigation areas that will record, at a minimum, the following information:

- The O'Brien & Gere personnel and other personnel conducting the Site activities, their arrival and departure times, and their destination at the investigation areas

- Incidents and unusual activities that occur on the Site such as, but not limited to, accidents, breaches of security, injuries, equipment failures and weather related problems

- Changes to the CAP and the HASP

- Daily Information such as:

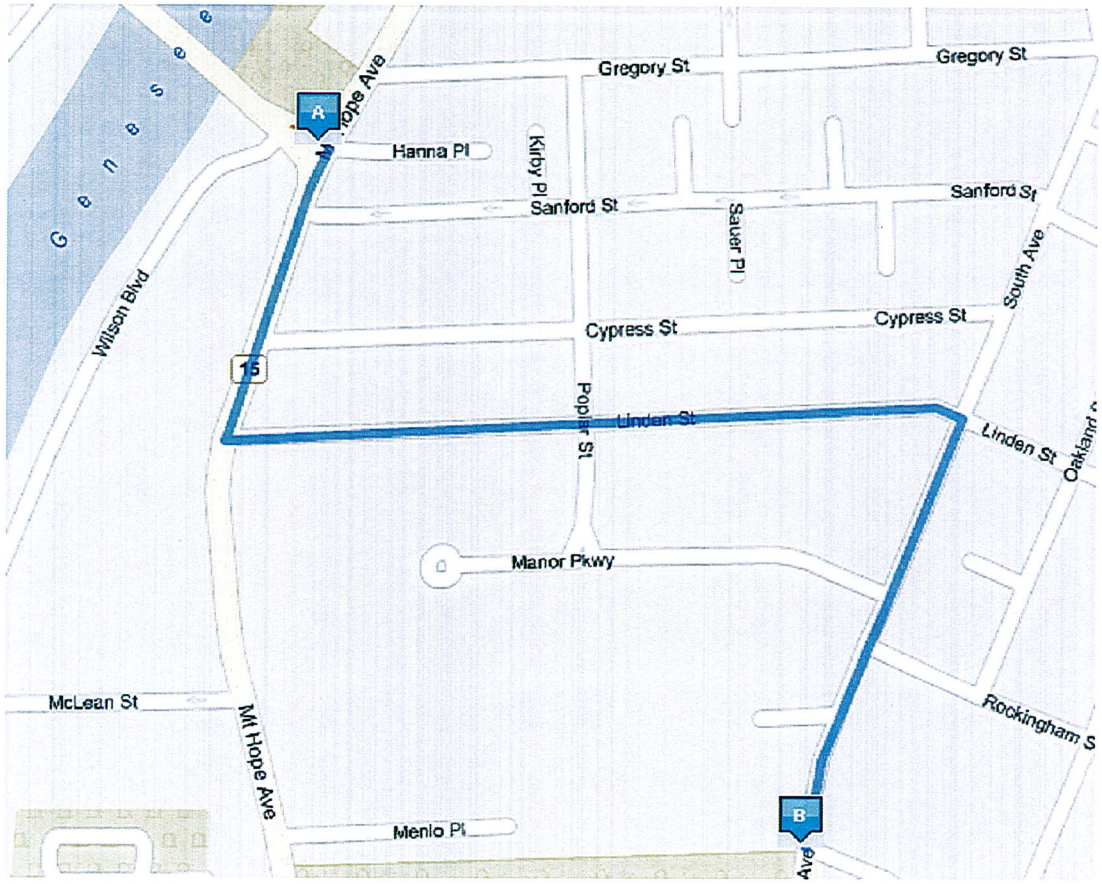
    1. Work accomplished and the current Site status, and
    2. Air monitoring results.

It is anticipated that this information will be recorded in the field book designated for the Site and/or the appropriate daily field forms/logs presented in Appendix C of the CAP.

FIGURE 1

Route to Highland Hospital

FILE NO. 77862.43868
FEBRUARY 2, 2009



CITY OF ROCHESTER
MOUNT HOPE AVENUE
425 and 435 MT HOPE AVE & 562 FORD ST

ROUTE TO HIGHLAND HOSPITAL

FIGURE NO. 1

O'BRIEN&GERE

EXHIBIT 1

Material Safety Data Sheets

Material Safety Data Sheet
Benzene

ACC# 02610

Section 1 - Chemical Product and Company Identification

MSDS Name: Benzene
Catalog Numbers: AC167660000, AC167660010, AC167660025, AC167660250, AC167665000, AC168650250, AC295330000, AC295330010, AC295330025, AC295330250, AC296880000, AC296880010, AC296880025, AC296880250, AC610230010, AC610231000, AC611001000, B243-4, B245-4, B245-500, B411-1, B411-4, B412-1, S79920ACS
Synonyms: Benzol; Cyclohexatriene; Phenyl hydride.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
71-43-2	Benzene	> 99	200-753-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear colorless liquid. Flash Point: -11 deg C.
Danger! Extremely flammable liquid and vapor. Vapor may cause flash fire. Harmful if swallowed, inhaled, or absorbed through the skin. Causes eye, skin, and respiratory tract irritation. Contains benzene. Benzene can cause cancer. Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause blood abnormalities. May cause central nervous system effects.
Target Organs: Blood, central nervous system, respiratory system, eyes, bone marrow, immune system, skin.

Potential Health Effects

Eye: Causes eye irritation.
Skin: Causes skin irritation. Harmful if absorbed through the skin. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis.
Ingestion: May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. May cause effects similar to those for inhalation exposure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Causes respiratory tract irritation. May cause drowsiness, unconsciousness, and central nervous system depression. Exposure may lead to irreversible bone marrow injury. Exposure may lead to aplastic anemia. Potential symptoms of overexposure by inhalation are dizziness, headache, vomiting, visual disturbances, staggering gait, hilarity, fatigue, and other symptoms of CNS depression.
Chronic: May cause bone marrow abnormalities with damage to blood forming tissues. May cause anemia and other blood cell abnormalities. Chronic exposure to benzene has been associated with an increased incidence of leukemia and multiple myeloma (tumor composed of cells of the type normally found in the bone marrow). Immunodepressive effects have been reported. This substance has caused adverse

reproductive and fetal effects in laboratory animals.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Extremely flammable liquid and vapor. Vapor may cause flash fire. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. This liquid floats on water and may travel to a source of ignition and spread fire. May accumulate static electricity.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: -11 deg C (12.20 deg F)
Autoignition Temperature: 498 deg C (928.40 deg F)
Explosion Limits, Lower:1.3 vol %
Upper: 7.1 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Remove all sources of ignition. Provide ventilation. Approach spill from upwind. Use water spray to cool and disperse vapors, protect personnel, and dilute spills to form nonflammable mixtures.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Take precautionary measures against static discharges. Keep container tightly closed. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Avoid breathing vapor.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. See 29CFR 1910.1028 for the regulatory requirements for the control of employee exposure to benzene.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Benzene	0.5 ppm TWA; 2.5 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous r oute	0.1 ppm TWA 500 ppm IDLH	1 ppm TWA; 10 ppm TWA (applies to industry segments exempt from the benzene stan dard at 29 CFR 1910.1028); 25 ppm Ceiling (applies to industry segments exempt from the 1 ppm TWA and 5 ppm STEL of th e benzene standard); 0.5 ppm Action Level; 1 ppm TWA; 5 ppm STEL (Cancer hazard, Flammable - see 29 C FR 1910.1028)

OSHA Vacated PELs: Benzene: 10 ppm TWA (unless specified in 1910.1028)
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear colorless
Odor: sweetish odor - aromatic odor
pH: Not applicable.
Vapor Pressure: 75 mm Hg @ 20 deg C
Vapor Density: 2.8 (air=1)
Evaporation Rate: Not available.
Viscosity: 0.647mPa @ 20 deg C
Boiling Point: 80.1 deg C
Freezing/Melting Point:5.5 deg C
Decomposition Temperature: Not available.
Solubility: 0.180 g/100 ml @ 25°C
Specific Gravity/Density:0.8765 @ 20°C
Molecular Formula:C6H6
Molecular Weight:78.11

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Ignition sources, excess heat, confined spaces.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 71-43-2: CY1400000
LD50/LC50:
CAS# 71-43-2:

Dermal, guinea pig: LD50 = >9400 uL/kg;
Draize test, rabbit, eye: 88 mg Moderate;
Draize test, rabbit, eye: 2 mg/24H Severe;
Draize test, rabbit, skin: 20 mg/24H Moderate;
Inhalation, mouse: LC50 = 9980 ppm;
Inhalation, mouse: LC50 = 24 mL/kg/2H;
Inhalation, rat: LC50 = 10000 ppm/7H;
Inhalation, rat: LC50 = 34 mL/kg/2H;
Inhalation, rat: LC50 = 6.5 mL/kg/4H;
Oral, mouse: LD50 = 4700 mg/kg;
Oral, rat: LD50 = 930 mg/kg;
Oral, rat: LD50 = 1 mL/kg;
Oral, rat: LD50 = 1800 Benzene is considered very toxic; probable human oral lethal dose would be 50-500 mg/kg. Human inhalation of approximately 20,000 ppm (2% in air) was fatal in 5-10 minutes.While percutaneous absorption of liquid benzene through intact human skin can be limited (e.g., 0.05% of the applied dose), the absorbed dose via direct dermal contact combined with that received from body surface exposure to benzene in workplace air is such that a substantial fraction (20-40%) of the total exposure is due to skin absorption.

Carcinogenicity:
CAS# 71-43-2:

- **ACGIH:** A1 - Confirmed Human Carcinogen
- **California:** carcinogen, initial date 2/27/87
- **NTP:** Known carcinogen
- **IARC:** Group 1 carcinogen

Epidemiology: IARC has concluded that epidemiological studies have established the relationship between benzene exposure and the development of acute myelogenous leukemia, and that there is sufficient evidence that benzene is carcinogenic to humans.
Teratogenicity: Inhalation, rat: TCLO = 50 ppm/24H (female 7-14 day(s) after conception) Effects on Embryo or Fetus - extra-embryonic structures (e.g., placenta, umbilical cord) and Effects on Embryo or Fetus - fetotoxicity (except death, e.g., stunted fetus).; Inhalation,mouse: TCLo = 5 ppm (female 6-15 day (s) after conception) Effects on Embryo or Fetus - cytological changes (including somatic cell genetic material) and Specific Developmental Abnormalities - blood and lymphatic systems (including spleen and marrow).
Reproductive Effects: Inhalation, rat: TCLO = 670 mg/m3/24H (female 15 day(s) pre-mating and female 1-22 day(s) after conception) female fertility index (e.g. # females pregnant per # sperm positive females; # females pregnant per # females mated).; Oral, mouse: TDLo = 12 gm/kg (female 6-15 day(s) after conception) Fertility - post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants).
Mutagenicity: DNA Inhibition: Human, Leukocyte = 2200 umol/L.; DNA Inhibition: Human, HeLa cell = 2200 umol/L.; Mutation Test Systems - not otherwise specified: Human, Lymphocyte = 5 umol/L.; Cytogenetic Analysis: Inhalation, Human = 125 ppm/1Y.; Cytogenetic Analysis: Human, Leukocyte = 1 mmol/L/72H.; Cytogenetic Analysis: Human, Lymphocyte = 1 mg/L.
Neurotoxicity: See actual entry in RTECS for complete information.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Mosquito Fish: TLm = 395 mg/L; 24 Hr; UnspecifiedFish: Goldfish: LC50 =46 mg/L; 24 Hr; Modified ASTM D 1345Fish: Fathead Minnow: LC50 = 15.1 mg/L; 96 Hr; Flow-through at 25°C (pH 7.9-8.0)Fish: Rainbow trout: LC50 = 5.3 mg/L; 96 Hr; Flow-through at 25°C (pH 7.9-8.0)Fish: Bluegill/Sunfish: LD50 = 20 mg/L; 24-48 Hr; Unspecified If benzene is released to soil, it will be subject to rapid volatilization near the surface and that which does not evaporate will be highly to very highly mobile in the soil and may leach to groundwater. If benzene is released to water, it will be subject to rapid volatilization. It will not be expected to significantly adsorb to sediment, bioconcentrate in aquatic organisms or hydrolyze. It may be subject to biodegradation.
Environmental: If benzene is released to the atmosphere, it will exist predominantly in the vapor phase. Gas-phase benzene will not be subject to direct photolysis but it will react with photochemically produced hydroxyl radicals with a half-life of 13.4 days. The reaction time in polluted atmospheres which contain nitrogen oxides or sulfur dioxide is accelerated with the half-life being reported as 4-6 hours. Benzene is fairly soluble in water and is removed from the atmosphere in rain.
Physical: Products of photooxidation include phenol, nitrophenols, nitrobenzene, formic acid, and peroxyacetyl nitrate.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 71-43-2: waste number U019 (Ignitable waste, Toxic waste).

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	BENZENE	BENZENE
Hazard Class:	3	3
UN Number:	UN1114	UN1114
Packing Group:	II	II
Additional Info:		FLASHPOINT -11 C

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 71-43-2 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 71-43-2: 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogeni
SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 71-43-2: immediate, delayed, fire.

Section 313

This material contains Benzene (CAS# 71-43-2, > 99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 71-43-2 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 71-43-2 is listed as a Hazardous Substance under the CWA. CAS# 71-43-2 is listed as a Priority Pollutant under the Clean Water Act. CAS# 71-43-2 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 71-43-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Benzene, a chemical known to the state of California to cause cancer.
WARNING: This product contains Benzene, a chemical known to the state of California to cause male reproductive toxicity.
California No Significant Risk Level: CAS# 71-43-2: 6.4 æg/day NSRL (oral); 13 æg/day NSRL (inhalation)

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T F

Risk Phrases:

R 11 Highly flammable.
R 36/38 Irritating to eyes and skin.
R 45 May cause cancer.
R 46 May cause heritable genetic damage.
R 48/23/24/25 Toxic : danger of serious damage to health by prolonged exposure through inhalation, contact with skin and if swallowed.
R 65 Harmful: may cause lung damage if swallowed.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.

WGK (Water Danger/Protection)

CAS# 71-43-2: 3

Canada - DSL/NDSL

CAS# 71-43-2 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D2A, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 71-43-2 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/11/1999
Revision #8 Date: 9/11/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
Ethylbenzene

ACC# 00596

Section 1 - Chemical Product and Company Identification

MSDS Name: Ethylbenzene
Catalog Numbers: AC118080000, AC118080025, AC118080250, AC118080251, AC118085000, 11808-0010, O2751-1
Synonyms: Ethylbenzol; Phenylethane.
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
100-41-4	Ethylbenzene	>99	202-849-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 15 deg C.
Warning! Flammable liquid and vapor. Causes eye, skin, and respiratory tract irritation. May be harmful if inhaled. Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause central nervous system depression.
Target Organs: Central nervous system.

Potential Health Effects

Eye: Causes severe eye irritation. Causes redness and pain.
Skin: Causes skin irritation. Prolonged and/or repeated contact may cause irritation and/or dermatitis. May be absorbed through the skin. Causes redness and pain.
Ingestion: May cause irritation of the digestive tract. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. Vapors may cause dizziness or suffocation.
Chronic: Chronic inhalation may cause effects similar to those of acute inhalation.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower

eyelids. Get medical aid immediately.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. This liquid floats on water and may travel to a source of ignition and spread fire. May accumulate static electricity.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: 15 deg C (59.00 deg F)
Autoignition Temperature: 432 deg C (809.60 deg F)
Explosion Limits, Lower:1.2%
Upper: 6.8%
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Provide ventilation. Control runoff and isolate discharged material for proper disposal. Use water spray to cool and disperse vapors and protect personnel.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Avoid breathing vapor or mist.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Ethylbenzene	100 ppm TWA; 125 ppm STEL	100 ppm TWA; 435 mg/m3 TWA 800 ppm IDLH	100 ppm TWA; 435 mg/m3 TWA

OSHA Vacated PELs: Ethylbenzene: 100 ppm TWA; 435 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: aromatic odor
pH: Not available.
Vapor Pressure: 9.6 mm Hg @ 25 deg C
Vapor Density: 3.7 (air=1)
Evaporation Rate:<1 (butyl acetate=1)
Viscosity: 0.63 mPa s 20 C
Boiling Point: 136 deg C
Freezing/Melting Point:-95 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:0.86
Molecular Formula:C8H10
Molecular Weight:106.17

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Ignition sources, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 100-41-4: DA0700000
LD50/LC50:
CAS# 100-41-4:
Draize test, rabbit, eye: 500 mg Severe;
Inhalation, mouse: LC50 = 35500 mg/m3/2H;
Inhalation, rat: LC50 = 55000 mg/m3/2H;
Oral, rat: LD50 = 3500 mg/kg;
Oral, rat: LD50 = 3500 mg/kg;
Skin, rabbit: LD50 = 17800 uL/kg;
.
Inhalation rat LC50: 17.2 mg/l/4H from BASF.
Carcinogenicity:
CAS# 100-41-4:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans

- **California:** carcinogen, initial date 6/11/04
- **NTP:** Not listed.
- **IARC:** Group 2B carcinogen

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: Mutation in mammalian somatic cells(Rodent,mouse) Lymphocyte = 80 mg/L.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 14.0 mg/L; 96 Hr.; Static BioassayFish: Fathead Minnow: LC50 = 12.1 mg/L; 96 Hr.; Flow-through BioassayFish: Bluegill/Sunfish: LC50 = 150.0 mg/L; 96 Hr.; Static Bioassay, pH 6.5-7.9, 21-23 degrees CWater flea EC50 = 2.1 mg/L; 48 Hr.; Static BioassayWater flea EC50 = 75.0 mg/L; 48 Hr.; Static Bioassay Shrimp (mysidoposis bahia), LC50=87.6 mg/L/96hr. Sheepshead minnow LC50=275 mg/L/96hr. Fathead minnow LC50=42.3 mg/L/96hr in hard water &48.5 mg/L/96hr in softwater.
Environmental: Experimental data on the bioconcentration of ethylbenzene include a log BCF of 1.9 in goldfish and the log BCF of 0.67 for clams exposed to the water-soluble fraction of crude oil. Using its octanol/water partition coefficient (log Kow= 3.15) and using a recommended regression equation, one can calculate a log BCF in fish of 2.16 indicating that ethylbenzene should not significantly bioconcentrate in aquatic organisms. Ethylbenzene has a moderate adsorption for soil. The measured Koc for silt loam was 164
Physical: The predominant photochemical reaction of ethylbenzene in the atmosphere is with hydroxyl radicals; the tropospheric half-life for this reaction is 5.5 and 24 hr in the summer and winter, actively. Degradation is somewhat faster under photochemical smog situations. Photooxidation products which have been identified include ethylphenol, benzaldehyde, acetophenone and m- and p-ethylnitrobenzene. Ethylbenzene is resistant to hydrolysis. Ethylbenzene does not significantly absorb light above 290 nm in methanol solution.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	ETHYLBENZENE	ETHYLBENZENE
Hazard Class:	3	3
UN Number:	UN1175	UN1175
Packing Group:	II	II
Additional Info:		FLASHPOINT 15 C

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 100-41-4 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 100-41-4: Effective 6/19/87, Sunset 6/19/97
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 100-41-4: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 100-41-4: immediate, delayed, fire.
Section 313
This material contains Ethylbenzene (CAS# 100-41-4, >99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 100-41-4 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 100-41-4 is listed as a Hazardous Substance under the CWA. CAS# 100-41-4 is listed as a Priority Pollutant under the Clean Water Act. CAS# 100-41-4 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 100-41-4 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Ethylbenzene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
XN F
Risk Phrases:
R 11 Highly flammable.
R 20 Harmful by inhalation.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 24/25 Avoid contact with skin and eyes.
S 29 Do not empty into drains.

WGK (Water Danger/Protection)
CAS# 100-41-4: 1
Canada - DSL/NDSL

CAS# 100-41-4 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D2B, D2A.

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

Canadian Ingredient Disclosure List

CAS# 100-41-4 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 4/28/1999
Revision #6 Date: 11/29/2007

Material Safety Data Sheet
Toluene

ACC# 23590

Section 1 - Chemical Product and Company Identification

MSDS Name: Toluene
Catalog Numbers: AC167900000, AC167900025, AC176850000, AC176850025, AC176850050, AC176850051, AC176850250, AC176855000, AC177160000, AC177160025, AC177160050, AC177160100, AC177160250, AC268370000, AC268370010, AC326980000, AC326980010, AC326981000, AC326982500, AC332070000, AC332070010, AC332070025, AC364410000, AC364410010, AC364410025, AC364411000, AC364415000, AC379140010, AC379140025, AC386760000, AC386760050, AC421160000, AC421160010, AC421160040, AC421170000, AC424550000, AC424550250, AC610590190, AC610590500, AC610591150, AC610592000, AC610790190, AC610790500, AC610791150, AC610792000, 16790-0010, 17685-0010, 17716-0010, 26837-0025, 42117-0040, 42117-5000, 42455-0010, 42455-5000, 61011-0040, 61046-0010, 61046-1000, 61095-1000, BP2625100, S80229HPLC, T288-1, T288RS-19, T290-1, T290-1LC, T290-4, T290N-219, T290RS-19, T290RS-200, T290RS-28, T290SK-1, T290SK-4, T290SS-115, T290SS-200, T290SS-28, T290SS-50, T291-4, T291-4LC, T291RS-200, T291SK-4, T291SK4, T291SS19, T313-4, T313SK-4, T323-20, T323-4, T324-1, T324-20, T324-200, T324-200LC, T324-20LC, T324-4, T324-500, T324CU1300, T324FB-115, T324FB-19, T324FB-200, T324FB-50, T324J-500, T324POP-200, T324POPB-200, T324RB-115, T324RB-19, T324RB-200, T324RS-115, T324RS-19, T324RS-200, T324RS-28, T324RS-50, T324S-4, T324SK-4, T324SS-115, T324SS-200, T324SS-28, T324SS-50, T326F-1GAL, T326P-4, T326S-20, T326S20LC, T330-4
Synonyms: Methylbenzene; Methylbenzol; Phenylmethane; Toluol.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
108-88-3	Toluene	>99	203-625-9

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless liquid. Flash Point: 4 deg C.
Warning! Flammable liquid and vapor. Causes eye, skin, and respiratory tract irritation. Breathing vapors may cause drowsiness and dizziness. May be absorbed through intact skin. Aspiration hazard if swallowed. Can enter lungs and cause damage. Possible risk of harm to the unborn child. May cause central nervous system depression. May cause liver and kidney damage.
Target Organs: Kidneys, central nervous system, liver, respiratory system, eyes, skin.

Potential Health Effects

Eye: Causes eye irritation. Vapors may cause eye irritation.
Skin: Causes skin irritation. May be absorbed through the skin. Repeated or prolonged exposure may cause drying and cracking of the skin. Not expected to cause an allergic skin reaction.
Ingestion: May cause effects similar to those for inhalation exposure. Aspiration of material into the lungs

may cause chemical pneumonitis, which may be fatal. May cause central nervous system depression.
Inhalation: Causes respiratory tract irritation. Inhalation of high concentrations (>200 ppm) of toluene are clearly associated with CNS encephalopathy, headache, depression, lassitude (weakness, exhaustion), impaired coordination, transient memory loss, and impaired reaction time.
Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis. Repeated exposure in combination with constant, loud noise can produce hearing loss and dizziness. Chronic hydrocarbon abuse (for example, sniffing glue or light hydrocarbons such as contained in this material) has been associated with irregular heart rhythms and potential cardiac arrest. Toluene abuse has been linked with kidney disease, as evidenced by blood, protein, & pus in the urine, accompanied by elevated serum creatinine, decreased urinary output, & metabolic & renal tubular acidosis. Although kidney toxicity has not been common in cases of occupational toluene exposure, there has been at least one report of renal toxicity following a 40-year occupational toluene exposure. Toluene does not cause the severe injury to the bone marrow that is characteristic of benzene poisoning. Intentional abuse of toluene vapors has been linked to damage of the brain, liver, kidney and to death. Repeated inhalation exposure of toluene to animals causes histological changes in the brain, degeneration of the heart tissue, and possible immune

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Causes cardiac sensitization to endogenous catelcholamines which may lead to cardiac arrhythmias. Do NOT use adrenergic agents such as epinephrine or pseudoepinephrine.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Use water spray to keep fire-exposed containers cool. Water may be ineffective. Material is lighter than water and a fire may be spread by the use of water. Flammable liquid and vapor. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. This liquid floats on water and may travel to a source of ignition and spread fire. May accumulate static electricity.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or appropriate foam. Solid streams of water may be ineffective and spread material.
Flash Point: 4 deg C (39.20 deg F)
Autoignition Temperature: 480 deg C (896.00 deg F)
Explosion Limits, Lower:1.1 vol%
Upper: 7.1 vol%
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Provide ventilation. Use only non-sparking tools and equipment. Control runoff and isolate discharged material for proper disposal. Use water spray to cool and disperse vapors and protect personnel.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Avoid breathing vapor or mist.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Separate from oxidizing materials.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Ventilation fans and other electrical service must be non-sparking and have an explosion-proof design.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Toluene	20 ppm TWA	100 ppm TWA; 375 mg/m3 TWA 500 ppm IDLH	200 ppm TWA; 300 ppm Ceiling

OSHA Vacated PELs: Toluene: 100 ppm TWA; 375 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless
Odor: sweetish odor - pleasant odor - benzene-like
pH: Not applicable.
Vapor Pressure: 28.4 mm Hg @ 25 deg C
Vapor Density: 3.1 (Air=1)
Evaporation Rate:2.4 (Butyl acetate=1)
Viscosity: 0.59 cps @ 20 deg C
Boiling Point: 110.6 deg C
Freezing/Melting Point:-95 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:0.86 (Water=1)
Molecular Formula:C6H5CH3
Molecular Weight:92.14

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Ignition sources, excess heat, confined spaces.
Incompatibilities with Other Materials: Strong oxidizing agents, nitric acid, sulfuric acid.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 108-88-3: XS5250000
LD50/LC50:
CAS# 108-88-3:
Draize test, rabbit, eye: 870 ug Mild;
Draize test, rabbit, eye: 2 mg/24H Severe;
Draize test, rabbit, skin: 435 mg Mild;
Draize test, rabbit, skin: 500 mg Moderate;
Draize test, rabbit, skin: 20 mg/24H Moderate;
Inhalation, mouse: LC50 = 400 ppm/24H;
Inhalation, mouse: LC50 = 30000 mg/m3/2H;
Inhalation, mouse: LC50 = 19900 mg/m3/7H;
Inhalation, mouse: LC50 = 10000 mg/m3;
Inhalation, rat: LC50 = 49 gm/m3/4H;
Oral, rat: LD50 = 636 mg/kg;
Skin, rabbit: LD50 = 14100
Carcinogenicity:
CAS# 108-88-3: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: In an epidemiologic study of toluene and pregnancy, occupational exposures to toluene were said to be associated with an increased incidence of renal, urinary, gastrointestinal, and cardiac anomalies.Fetotoxicity (reduced fetal weight), behavioural effects (effects on learning and memory) and hearing loss (in males) were observed in the offspring of rats exposed by inhalation to toluene, in the absence of maternal toxicity.
Reproductive Effects: Many reports of reproductive effects of toluene abuse or heavy occupational exposure are confounded by mixed solvent exposure or fetal alcohol syndrome. Women exposed to toluene in lab work had a 4.7-fold increased risk of spontaneous abortions.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Bluegill LC50=17 mg/L/24H Shrimp LC50=4.3 ppm/96HFathead minnow LC50=36.2 mg/L/96HSunfish (fresh water) TLm=1180 mg/L/96H
Environmental: From soil, substance evaporates and is microbially biodegraded. In water, substance volatilizes and biodegrades.
Physical: Photochemically produced hydroxyl radicals degrade substance.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.

RCRA U-Series:
CAS# 108-88-3: waste number U220.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	TOLUENE	TOLUENE
Hazard Class:	3	3
UN Number:	UN1294	UN1294
Packing Group:	II	II
Additional Info:		FLASHPOINT 4 C

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 108-88-3 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 108-88-3: Effective 10/4/82, Sunset 10/4/92
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 108-88-3: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 108-88-3: immediate, fire.
Section 313
This material contains Toluene (CAS# 108-88-3, >99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 108-88-3 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 108-88-3 is listed as a Hazardous Substance under the CWA. CAS# 108-88-3 is listed as a Priority Pollutant under the Clean Water Act. CAS# 108-88-3 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 108-88-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
WARNING: This product contains Toluene, a chemical known to the state of California to cause developmental reproductive toxicity.
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:

XN F

Risk Phrases:

R 11 Highly flammable.
R 38 Irritating to skin.
R 48/20 Harmful : danger of serious damage to health by prolonged exposure through inhalation.
R 63 Possible risk of harm to the unborn child.
R 65 Harmful: may cause lung damage if swallowed.
R 67 Vapours may cause drowsiness and dizziness.

Safety Phrases:

S 36/37 Wear suitable protective clothing and gloves.
S 46 If swallowed, seek medical advice immediately and show this con tainer or label.
S 62 If swallowed, do not induce vomiting: seek medical advice immed iately and show this container or label.

WGK (Water Danger/Protection)

CAS# 108-88-3: 2

Canada - DSL/NDSL

CAS# 108-88-3 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D2A, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 108-88-3 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/01/1999
Revision #10 Date: 2/13/2008

MATERIAL SAFETY DATA SHEET

Date-Issued: 08/08/2000
MSDS Ref. No: 211120
Date-Revised: 02/26/2001
Revision No: 2

Xylene

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Xylene
PRODUCT DESCRIPTION: Xylene
PRODUCT CODE: 211120
PRODUCT FORMULATION NAME: Xylene
CHEMICAL FAMILY: Aromatic Hydrocarbon Solvent
GENERIC NAME: Xylol, Dimethyl Benzene

MANUFACTURER

Americhem Sales Corporation
340 North Street
Mason, MI 48854
Contact: Americhem Sales Corporation
Product Stewardship: 517-676-9363
Transportation: 517-676-9363

24 HR. EMERGENCY TELEPHONE NUMBERS

CHEMTREC (U.S.): (800) 424-9300
Canutec (613) 996-6666
Emergency Phone: 800-424-9300

2. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	Wt.%	CAS#	EINECS#
Xylenes (o-,m-,p- isomers)	75 - 90	1330-20-7	
Ethyl Benzene	10 - 25	100-41-4	

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

PHYSICAL APPEARANCE: Clear, Colorless liquid.

IMMEDIATE CONCERNS: CAUTION! May cause eye and skin irritation.

POTENTIAL HEALTH EFFECTS

EYES: May cause moderate burning, tearing, redness and swelling.

SKIN: Moderate irritation and discomfort. Defatting of skin and redness are possible. Toxic systemic effects from absorbtion are expected to be minor.

INGESTION: Gastrointestinal tract irritation and/or discomfort is possible.

INHALATION: Dizziness, impaired coordination, headaches and loss of consciousness. Severe respiratory tract irritation. Toxic systemic effects are possible.

MEDICAL CONDITIONS AGGRAVATED: Disorders of the skin, respiratory and central nervous system.

ROUTES OF ENTRY: Absorption, Inhalation

TARGET ORGAN STATEMENT: Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage (sometimes referred to as Solvent or Painters' Syndrome). Intentional misuse by deliberately concentrating and inhaling this material may be harmful or fatal.

CANCER STATEMENT: This material and components above 0.1% are not listed as carcinogens by IARC, NTP or OSHA.

4. FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for 15 minutes. If irritation persists, seek medical attention.

SKIN: Wash exposed area with mild soap and water. Get medical attention if irritation develops or persists.

INGESTION: Do not Induce Vomiting. Get immediate medical attention.

INHALATION: Remove victim from area of exposure. If unconscious, give oxygen. Give artificial respiration if not breathing. Get immediate medical attention.

NOTES TO PHYSICIAN: Exposure to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse) may be associated with cardiac arrhythmias. Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to this material. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias.

5. FIRE FIGHTING MEASURES

FLASHPOINT AND METHOD: (81°F)ASTM D56

FLAMMABLE LIMITS: 1.0 to 7.0

AUTOIGNITION TEMPERATURE: (810°F) to (984°F)

EXTINGUISHING MEDIA: Use dry chemical, foam, or carbon dioxide.

EXPLOSION HAZARDS: Vapor accumulations may flash and/or explode if ignited. Keep ignition sources, open flames, ect., away from thse fumes.

FIRE FIGHTING PROCEDURES: Proper respiratory equipment to protect against the hazardous effects of combustion products is recommended. Water in a straight hose stream may cause fire to spread and should be used as a cooling medium only.

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6. ACCIDENTAL RELEASE MEASURES

SMALL SPILL:

Extinguish possible sources of ignition. Evacuate all unprotected personnel and ventilate area. Only personnel equipped with proper respiratory, skin/eye protection should enter spill area. Dike area to contain spill and clean up by absorbing on an inert absorbant or other means. Don't flush into sewers or natural waterways.

LARGE SPILL:

Contain material as described above and call the local fire or police department for immediate emergency assistance.

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7. HANDLING AND STORAGE

HANDLING:

Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel or container to another. This material can accumulate static charge by flow or agitation. Vapors can be ignited by static discharge. Use explosion proof equipment as directed by local fire codes.

STORAGE:

Store unopened containers under cool, dry and ventilated conditions. Keep away from heat, sparks and flame.

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8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE GUIDELINES:

OSHA HAZARDOUS COMPONENTS (29 CFR 1910.1200)

		EXPOSURE LIMITS					
		OSHA PEL		ACGIH TLV		Supplier OEL	
		ppm	mg/m³	ppm	mg/m³	ppm	mg/m³
Xylenes (o-,m-,p- isomers)	TWA	100		100			
	STEL			150			

Ethyl Benzene	**TWA**	100
	STEL	150

ENGINEERING CONTROLS: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure guidelines, additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Wear safety glasses with side shields or goggles when handling this material.

SKIN: To prevent any contact, wear impervious protective clothing such as neoprene or butyl rubber gloves, apron, boots or whole bodysuit, as appropriate.

RESPIRATORY: Use NIOSH/MSHA approved respirators when vapors or mist concentrations exceed permissible exposure limits.

PROTECTIVE CLOTHING: Chemical resistant boots, apron, etc. as necessary to prevent contamination of clothing and skin contact.

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9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: Liquid

ODOR: Light Aromatic

APPEARANCE: Clear

COLOR: Colorless

pH: Not Applicable

PERCENT VOLATILE: 100

VAPOR PRESSURE: 7 mmHg at 20°C

VAPOR DENSITY: 3.7 (Air=1)

BOILING POINT: (276°F) to (284°F)

FREEZING POINT: Not Determined

MELTING POINT: Not Determined

SOLUBILITY IN WATER: Negligible

EVAPORATION RATE: 0.6 (n-Butyl Acetate=1)

SPECIFIC GRAVITY: 0.87 (water=1) at (60°F)

MOLECULAR FORMULA: C8H10

MOLECULAR WEIGHT: 106

10. STABILITY AND REACTIVITY

STABLE: YES

HAZARDOUS POLYMERIZATION: NO

CONDITIONS TO AVOID: Exposure to excessive heat, open flames and sparks. Avoid conditions that favor the formation of excessive mists and/or fumes.

STABILITY: Stable

POLYMERIZATION: Will not occur

HAZARDOUS DECOMPOSITION PRODUCTS: Oxides of Carbon when burned.

INCOMPATIBLE MATERIALS: Strong oxidizing agents.

11. TOXICOLOGICAL INFORMATION

TARGET ORGANS: A six week inhalation study with xylene produced hearing loss in rats.

REPRODUCTIVE EFFECTS: Both mixed xylenes and the individual isomers produced limited evidence of fetal toxicity in laboratory animals. Inhalation and oral administration of xylene resulted in decreased fetal weight, increased incidences of delayed bone development, skeletal variations and missed abortions.

12. ECOLOGICAL INFORMATION

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Conditions of use may cause this material to become a hazardous waste as defined by state or federal law. Use approved treatment, transporters and disposal sites.

FOR LARGE SPILLS: Extinguish possible sources of ignition. Evacuate all unprotected personnel and ventilate area. Only personnel equipped with proper respiratory, skin/eye protection should enter spill area. Dike area to contain spill and clean up by absorbing on an inert absorbent or other means. Don't flush into sewers or natural waterways.

14. TRANSPORT INFORMATION

DOT (DEPARTMENT OF TRANSPORTATION)

PROPER SHIPPING NAME: Xylene

PRIMARY HAZARD CLASS/DIVISION: 3

UN/NA NUMBER: UN1307

PACKING GROUP: III

LABEL: Flammable Liquid

15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

311/312 HAZARD CATEGORIES:

FIRE: YES **PRESSURE GENERATING:** NO **REACTIVITY:** NO **ACUTE:** YES **CHRONIC:** YES

313 REPORTABLE INGREDIENTS: Xylene (CAS No. 1330-20-7) - 75 to 90%
Ethyl benzene (CAS No. 100-41-4) - 10 to 25%

CERCLA (COMPREHENSIVE RESPONSE, COMPENSATION, AND LIABILITY ACT)

CERCLA REGULATORY: Xylene (CAS No. 1330-20-7) - 75 to 90%
Ethyl benzene (CAS No. 100-41-4) - 10 to 25%

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA REGULATORY: This material or its components are listed in the TSCA inventory.

PROPOSITION 65 STATEMENT: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirments of California Proposition 65 (CA Health & Safety Code Section 25249.5):

ComponentEffect
BenzeneCancer
TolueneDevelopmental Toxicant

16. OTHER INFORMATION

REVISION SUMMARY

Revision #: 2

This MSDS replaces the February 21, 2001 MSDS. Any changes in information are as follows:
In Section 14
DOT UN/NA Number

NFPA CODES

HEALTH: 2 **FIRE:** 3 **REACTIVITY:** 0

HMIS CODES

HEALTH: *2 **FIRE:** 3 **REACTIVITY:** 0 **PROTECTION:** X

MANUFACTURER DISCLAIMER: The information in this MSDS was obtained from sources which we believe are reliable. However, the above information is provided without warranty, expressed or implied, regarding its correctness. The conditions or methods if handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibilty and expressly dislcaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the procuct.

ATTACHMENT A

Pre-work Job Safety Analysis

O'BRIEN & GERE

PRE-WORK JSA for Environmental Investigations

Revised: November 20, 2008

This JSA template is most suitable for site surveys, sampling, test trenching, drilling/boring, water studies, wildlife studies, etc.

JSA Title:	425,435 Mount Hope Ave. and 562 Ford Street.	**Client Name:**	City of Rochester
Project Name:	South Mount Hope Ave. Brownfield Cleanup	**Client Project Manager:**	Joseph Biondolillo
Project Number:	11862/43868	**OBG Project Manager**	Kevin Ignaszak
Project Location:	Rochester, NY		
Project Phone No.:	585-263-2820 (office)	**Prepared By:**	Jeremy Wolf
Project Fax No.:		**Revision Date:**	22 January 2009
Scope of Work covered by this JSA (identify subcontractors covered by this JSA)	Site remedial activities including excavation and disposal of petroleum contaminated soils, installation and sampling of test pits, soil borings and ground water monitoring wells, installation of oxygen injection points for an oxygen injection remedial system.		
Key Hazards (Focus on Highly Hazardous Tasks)	Excavation and trenching, drilling, movement of machinery and heavy equipment (e.g., excavator, bulldozer, dump trucks) around Site, chemical hazards (petroleum contaminated soil and ground water).		
Minimum Safety Equipment	*(additional safety equipment may be required for specific hazards identified in the following sections)* ☒ Hard Hat ☒ Safety Glasses ☒ Safety Shoes ☐ Cut-Resistant Gloves ☐ Ear Protection ☒ Other (specify): High visibility reflective vest or shirt when equipment/machinery operating on Site. • Modified Level D – See Section 4 of Site Specific HASP		

Pre-Work Documentation & Certifications	**Documentation and Certifications**	**To Be Submitted or Provided By…….**
	☐ Drug Testing (☐ alcohol testing is also required)	
	☒ Project Safety Plan or Job Safety Analysis (JSA)	Copy must be maintained at Site and available for review by all Site workers.
	☒ Client/Facility Contractor Safety Orientation	Provided by OBG SSHC to all Site workers
	☒ Project/O'Brien & Gere Safety Orientation	Provided by OBG SSHC to all Site workers
	☒ Other (describe below): • Verification of Hazwoper Medical Surveillance • OSHA 40-hr Hazwoper with current 8-hr Refresher	Submitted by all Site workers (including subcontractors). Documents must be kept on file at Site.

Individuals Must Sign The Last Page After Reviewing This JSA.

HAZARD		**HAZARD CONTROLS (check all that apply and comment as required)**
ELEVATED WORK		
☐ NA	FALLS > **6'** or within **15'** of a ROOF OR MEZZANINE EDGE where the fall is >6'	☐ Existing Guardrails ☐ Hole Covers Marked "HOLE" ☐ Fall Restraint ☒ Temporary Guardrails ☐ Manlifts used for elevated work ☐ _____ ☒ Warning Line 15' from Edge ☐ Fall Arrest w/ harness/lanyard (identify tie-off points) **Fall Protection Comments (describe equipment used):** Chain link fence will be installed around the perimeter of the Site to prevent unauthorized entry and access to the excavation. Warning line, temporary guardrails and/or temporary fence will be placed proximal to the excavation on an as needed basis to prevent Site workers from falling in excavation.
☒ NA	LADDERS / STAIRS ☐ Extension Ladders ☐ Step Ladders ☐ Fixed Ladders ☐ Stairs	☒ Employees training in safe ladder use at toolbox safety meeting ☒ Extension ladders are properly footed, secured at top, and setup at proper angle ☐ Stepladders are set on level ground or properly shimmed with spreaders locked. ☐ Stairs have proper rise over run and stairs >4 steps or 4' have guardrails. **LADDERS/STAIRS COMMENTS:**
EXCAVATIONS / TRENCHING (includes test trenches)		
☐ NA	☐ Max Depth ≥ 20' ☒ Max Depth ≥ 5' ☒ Max Depth <5' with potential cave-in hazard ☐ Potential permit-required	☐ Excavation Competent Person Name:_____ Company _____ ☐ Sloping & shoring for excavations ≥20' are approved by a professional engineer ☒ Sloping & shoring for excavations ≥5' when persons are exposed to cave-in. (specify below) ☒ Sloping & shoring for shallow (<5') excavations with cave-in hazard (specify below)

	HAZARD	HAZARD CONTROLS (check all that apply and comment as required)
	confined space at depth ≥ 4' ☒ Underground utilities ☒ Structures/foundations ☒ Falls into excavations ☐ Other:	☒ O'Brien & Gere *Daily Excavation Checklist* to be completed by the Competent Person. ☒ Excavations ≥ 4' are classified as a non-permit confined space ☐ Excavations ≥ 4' are classified as Alternate Entry or Permit-Required (see confined space) ☒ Underground utilities have been identified and marked. ☒ Local "dig safe" organization has been notified for utility locations in public areas or rights of way. Number: _____ Date: _____ ☒ Hand digging within 3' of utility locations. ☐ Soft-dig/vacuum dig within ____' of utility locations. ☒ Excavations are protected by perimeter fencing (not barricade tape): (☒ rigid fence - chain link or wood ☒ safety fence 6' from edge.) **EXCAVATION COMMENTS:** Chain link fence will be installed around the perimeter of the Site to prevent unauthorized entry and access to the excavation. Warning line, temporary guardrails and/or temporary fence will be placed proximal to the excavation on an as needed basis to prevent Site workers from falling in excavation. Entry into excavation(s) is not anticipated.
CONFINED SPACES		
☒ NA	☐ No Serious Hazards ☐ Toxic Atmosphere ☐ carbon monoxide ☐ hydrogen sulfide ☐ ☐ Flammable Atmosphere ☐ Low Oxygen ☐ Combustible dust ☐ Drowning - high water level or potential for sudden changes in flow or level ☐ Other Serious Hazard:	☐ Confined space is altered so that it is no longer a confined space. (describe below) ☐ Confined space is downgraded to a non-permit confined space. (identify which spaces below) ☐ Alternate Entry is used. (Identify which space qualify for confined space entry below) ☐ Full permit-required confined space entry is used due to presence of serious hazards. ☐ Rescue team has been notified (☐ Paid FD ☐ Volunteer FD ☐ Plant Rescue) Rescue Team:_____ Phone Number: _____ ☐ All entrants and attendants for Alternate Entry and Permit-Required Entry have confined space entry training. **CONFINED SPACE COMMENTS:**
OVERHEAD POWERLINES		
☐ NA	OVERHEAD POWER LINES _____ KV _____ ft above ground _____ KV _____ ft above ground	☐ Request to de-energize lines will be submitted for work within 20' of power lines. Request sent to: _____ Date: _____ ☐ No one will be permitted to work <10' to power lines without lines being de-energized. ☒ Project persons are informed of 20' safety zone around energized power lines. ☐ Project persons are informed of additional restrictions required when working ≤20' but >10': ☐ Dedicated spotter for all elevated work or operation of equipment that can contact lines ☐ Barricades setup at 20' from base of power lines to establish a "restricted work area." ☐ "Power Line Safety Permit' required to work within 20' of power lines. ☐ Power lines are shielded and/or marked with high visibility material **POWER LINE COMMENTS:**
DRILLING / BORING - All self-propelled rigs including trailer-mounted drilling/boring equipment.		
☐ NA	Struck By, Run-Over, Caught In Between (pinch points), Roll Over, Hot Work (open flame) Fluid Leaks ☒ Drilling/Boring Rig: specify type(s) below: Geoprobe _____ _____	☒ **Qualified persons** operate all drilling/boring equipment. Qualifications were determined by: ☒ Work Experience Summary on company letterhead or email with company email address. ☐ Other (describe): _____ ☒ Equipment will be **inspected** upon mobilization by: Operator. NOTE - Inspections will include (but not be limited to) the following: leaks, defective safety equipment, and loose/unsecured parts that could fall during operation) ☐ Operators will be reminded of **seatbelt** use by: _____ ☒ **High visibility vests** are required for: When operating proximal to road or when other heavy equipment is moving operating on Site ☒ **Cut-resistant gloves** are required when handling cable, rods, and other sharp or "splintery" materials ☒ **Chemical-resistant gloves and clothing** are required while handling grout, cement, chemicals, or contaminated materials including soil or groundwater. (Refer to "Environmental Hazards" section for more information.) ☒ Operators and helpers will maintain a **safe distance** to moving parts. All those working near moving or rotating parts will secure loose hair, clothing, and equipment. All those working near the rods/casings are instructed to not put themselves in a position where they could get hurt if the rods/casings should turn or drop.

HAZARD		HAZARD CONTROLS (check all that apply and comment as required)
		☒ Drill rods, casings, and other equipment will be **stored neatly** when not in use and secured to prevent them from falling on, or rolling into, site personnel. ☐ The area will be cleared of **rope, cords, weed-block fabric**, or similar material that could become wrapped around the auger, entangle someone and then pull them into the auger. ☐ **Fall protection** will be worn whenever (if) the drilling/boring mast must be climbed above 6'. (Tie-off Points are specified: ☐ in "Comments" below ☐ in the "Fall Protection" section) ☒ Masts located within 20' of an **overhead power line** will only be lowered or raised with a dedicated spotter. (Refer to the "Overhead Powerlines" section of this JSA for additional safety precautions) ☒ Drill rigs will only be **moved with masts lowered**. ☐ Masts will be erected with **outriggers fully extended** when equipped with outriggers. ☐ Outriggers will be placed on a **firm, stable surface** or will be cribbed to prevent sinking of outriggers and collapse of the drilling/boring rig. ☐ Damage to **underground utilities** will be prevented by cribbing outriggers to spread the load or relocated outriggers so they are not placed on utilities. ☒ Procedures for responding to **natural gas emissions** (explosive vapors) are: ☐ Outlined in "Comments" below. ☐ Outlined in an attached procedure. ☐ Procedures for drilling/boring from a **barge** or otherwise working over water are: ☐ Outlined in "Comments" below. ☐ in the "Working Over Water" section. ☐ Drilling/boring equipment will be **de-energized and locked-out** prior to maintenance. ☐ Site personnel working in the area surrounding the drilling/boring rig have will be informed where the **emergency shutoff** in the event of an emergency. Specify the location of the shutoff in the "Comments" section below. ☒ **Spill equipment** is available for fuel and hydraulic fluid leaks. Location; Maintained on Site in drillers service truck **DRILLING/BORING COMMENTS:** If a subsurface facility is contacted (e.g., electric or gas) notify appropriate emergency responders (if needed), utility company and project manager. Vacate area and equipment as needed for high hazard utilities (e.g., natural gas)
HEAVY EQUIPMENT (other than drilling/boring rigs)		
☐ NA	Struck By, Run-Over, Caught In Between (pinch points), Roll Over, Fluid Leaks ☒ Excavator ☒ Dump Truck ☐ mini Skid Steer (bobcat) ☐ mini Excavator ☐ Gator/Off-Road Vehicle ☐ Other:_____ ☐ Other:_____ ☐ Manlift - specify type(s):	☒ **Qualified persons** operate all heavy equipment. Qualifications were determined by: ☒ Work Experience Summary on company letterhead or email w/ company email address. ☐ Other (describe): _____ ☒ **Equipment will be inspected** upon mobilization by: Operator. (NOTE - All leaks or defective safety equipment must be repaired before use.) ☒ Operators are required to wear **seatbelts** for all equipment provided with seatbelts. ☒ **High visibility vests** are required for: When operating proximal to road or when other heavy equipment is moving operating on Site ☒ Operators will review manufacturer's safety guidelines for all **equipment operated on slopes** including Gators© and similar ATVs/4x4's. (In the "Comments" section below, specify the maximum slope for each piece of equipment that will be operated on slopes. This may be completed upon mobilization.) ☒ Dump trucks, 4x4's, or other haul vehicles will not be loaded beyond manufacturer **capacities or weight limits** established by state and local authorities for transportation. ☐ **Counterweight swing radius** will be barricaded. ☒ Operators and helpers will maintain a **safe distance to moving parts**. All those working near moving or rotating parts will secure loose hair, clothing, and equipment. ☐ Fall protection will be worn by all those in **manlifts** (scissor lifts are excepted: ☐ Yes ☐ NO) ☒ **Spill equipment** is available for fuel and hydraulic fluid leaks. Location; _____ **HEAVY EQUIPMENT COMMENTS:** O'Brien & Gere personnel will stay away from heavy equipment to the extent possible and maintain verbal and/or visual contact with the operator prior to approaching the equipment.
POWER TOOLS, HAND TOOLS & AUGERS, EXTENSION CORDS, & ELECTROFISHING (FISH SHOCKING) EQUIPMENT		
☐ NA	eye injury, hand/arm cuts, electrical shock, strains, foot injuries, dust ☒ Misc Handtools (shovels, hammers, trowels, etc.) ☒ Chainsaws (Clearing & Grubbing) ☒ Sharp hand-tools (knives, cutters, scissors) ☐ Electrofishing (Fish	☒ All tools and electrical cords in-use will be **inspected daily** by: ☒ Users ☐ Site Supervisor/Safety Coordinator ☐ Other: _____ ☒ Only the right tools will be used in a manner for which they were designed. ☒ **GFCIs** will be used on all extension cords and 120v power tools. ☒ All **extension cords** are in good condition with no cuts through outer insulation, ground plugs are present, and no "vinyl tape" repairs. (Only 12 gauge extension cords may be repaired.) ☐ **Face shield** and safety glasses used (required for chain saws and chemical handling) ☐ **Kevlar chaps and jacket** (required for all chainsaw work) ☒ **Cut-resistant gloves** are worn whenever cutting tools are used.

HAZARD		HAZARD CONTROLS (check all that apply and comment as required)
	Shocking) Equipment ☒ Hand Augers - Iwan or Spiral type ☐ Hand Sampler - Split Spoon or Thin Wall ☐ Hand Probe (GeoProbe) with ____ lb weight ☐ Manual Cathead Hoist with _____ lb weight ☐ Motorized Cathead Hoist with ____ lb weight ☐ Light-weight Motorized Auger drills (not truck-mounted) ☐ Manhole Lifting Devices **(specify in Comments)** ☐ Other (specify):	☐ **Safety cutters or scissors** are required for all cutting activities (no fixed-blade knives). ☒ **Hearing protection** required for which tools or areas: >85 dBA generally if you need to elevate your voice to communicate when working in elevated noise areas hearing protection should be worn ☒ All **hand augers and sampling probes** will be inspected and verified to be in good conditions with ALL parts required by the manufacturer. Inspections will be completed by: ☒ Users ☐ Site Supervisor/Safety Coordinator ☐ Other: _____ ☒ Persons using sampling probes equipped with **manual slide hammers** are physically capable of handling the weight without difficulty and keep hands clear of pinch-points. ☐ Persons using **manual and motorized cathead hoists** have been trained on how to operate them in accordance with manufacturer guidelines. **(Identify qualified persons by name in the "Comments" Section below.)** ☐ Electrofishing equipment will be **inspected** and verified to be in good conditions with ALL parts required by the manufacturer and exterior cords have no cuts through outer insulation and no "vinyl tape" repairs. Inspections will be completed by: ☐ Users ☐ Site Supervisor/Safety Coordinator ☐ Other: _____ ☐ Persons using **Electrofishing Equipment** have been **trained** on how to operate it in accordance with manufacturer guidelines. **(Identify qualified persons by name in the "Comments" Section below.)** ☐ Electrofishing will be discontinued if the **public** approaches within **100'** ☐ Electrofishing boats will be marked with "**Danger Electricity**" signs (or equivalent) that can be read at a distance of **150'**. ☐ All electrofishing team members wear **electrically-rated rubber gloves** that are inspected daily by users and replaced every 6 months. Use leather or other cut-resistant gloves to protect the rubber gloves. (Similar to NFPA 70E requirements.) ☐ All electrofishing team members wear **chest or hip waders** to insulate the wearer from electrical shock. ☐ **Net handles** for nets used during electrofishing will be nonconductive and long enough to keep hands out of the water. ☐ The positive electrode (anode) on portable electroshockers is equipped with a **manual switch** that stops the current when released and is **not "bypassed'** with a hold-down mechanism (i.e., tape) ☐ At least **two (2) persons** on each Electrofishing boat or location are trained in **CPR**. ☐ All personnel involved in electrofishing know the location of the **emergency shutoff switch**. ☐ **Backpack electrofishing equipment** is equipped with a **tilt switch** that stops the current if the operator falls. **POWER TOOLS, HAND TOOLS & AUGERS, EXTENSION CORDS, & ELECTROFISHING COMMENTS:** OBG personnel will not operate chainsaws however subcontractors should be reminded of safe operating practices
WORKING OVER/NEAR WATER OR ON ICE		
☒ NA	drowning, hypothermia (winter months), spills to surface waterways, fall through ice ☐ Barge-mounted drilling/boring rigs ☐ Sampling from a boat ☐ Boat required for site access ☐ Work on an ice covered body of water ☐ Other:	☐ 100% Fall Protection while working over water or when otherwise exposed to a drowning hazard. **(Describe how fall protection will be implemented, Tie-off points, and the equipment that will be used.** ☐ in "Comments" below ☐ in the "Fall Protection" section) ☐ A "**safety observer**" will remain on shore with the ability to contact emergency response personnel and communicate with those on boats/barges. ☐ USG-approved **flotation vests** will be used. ☐ **Ring-buoy** with 90' of rope and placed within 100' of site personnel. ☐ **Rescue skiff** will be staged such that one person can immediately launch the skiff. ☐ At least **one person will be available to launch** and operate the rescue skiff. NOTE - "Safety Observer" may launch rescue skiff after making emergency response notification(s). ☐ Ice Safety - **Core samples** will be taken every 100' on lakes or 50' on rivers to evaluate the thickness and quality of ice (i.e., *clear/blue ice* = best quality, *white/opaque ice* = moderate quality/use caution, *gray/slushy ice* = poor quality/unsafe). ☐ Ice Safety - Conservative **load estimates** are established for static and/or moving loads as appropriate for the type of work being conducted. Load estimates are explained: ☐ in "Comments" below ☐ in an attached document ☐ Spill Control - **Floating booms** will be used around barges, shore-based heavy equipment, or other locations where hydraulic fluid may leak from equipment into surface water. ☐ Spill Control - **Silt curtains** will be suspended below floating booms. ☐ Boats and Barges will not be operated above their **weight capacity**.

HAZARD		HAZARD CONTROLS (check all that apply and comment as required)
		☐ Boats and barges operated (or potentially operated) in **bad weather** will be operated below their weight capacity by _____% (suggest at least 25%). ☐ Boat and barge emergency calls - **Weather resistant radios** that broadcast on Coast Guard frequencies (Channel 16 VHF/FM or 2182 MHZ) will be available for emergency calls. ☐ Boat or barge-based operations will be discontinued when NOAA issues a **small craft advisory** or when sustained **wind speeds of 20 mph** are observed and create dangerous wave or boat/barge handling conditions. ☐ **NOAA Weather Radio Receiver** will be used to monitor weather conditions that may affect boat or barge-based activities. **WORKING OVER WATER COMMENTS:**
MANUAL MATERIAL HANDLING / MATERIAL STORAGE / HOUSEKEEPING		
☐ NA	back or shoulder strain, struck by falling objects, trips and falls, incompatible materials (fire or explosion) ☒ hvy manual lifting (>50 lbs) ☐ chemical storage ☒ compressed gas storage ☐ Tall storage greater than 2 pallets stacked. ☐ Material & equipment laydown areas ☒ Trash & debris removal ☐ Temporary cords & hoses placed across walkways ☐ ☐ ☐	☐ Mechanical lifting equipment used to reduce manual material handling: (☐ Forklift/Lull ☐ Heavy Equipment ☐ Dolly ☐_____) ☒ Manual lifting more than 75 lbs by a single person will be avoided. ☒ Good manual lifting techniques will be reviewed with the following trades/persons prior to site work: OBG SSHC _____ ☐ "Hay Hook" style manhole removal tools will NOT be used to remove manhole covers. ☐ "Hay Hook" style manhole removal tools will be used AND the justification why an alternate, lower-stress removal tool is not available is in the "Comments" section below. ☐ Incompatible chemicals will be separated by 20' or a concrete block wall. ☐ Secondary containment will be provided for the following chemicals: _____ _____ ☐ Safety equipment will be located near chemical storage. ☐ Spill Kit ☐ Emergency Shower ☐ Eyewash ☐ Drench Hose ☐ Splash PPE ☐ Flammable gases and oxygen will be separated by 20'. ☒ All compressed gas cylinders will be transported vertically and secured upright. ☐ Equipment and materials will be stacked in laydown areas with aisles as necessary for safe access. All un-used equipment & materials will be returned to laydown areas daily. Designated laydown areas:_____ ☐ Materials will not be stacked greater than 2 pallets high without being secured. ☒ Trash and debris will be removed daily and placed in designated containers. Specify debris segregation and location of disposal containers below. ☐ Hoses & Cords will be run out of walkways (e.g., within 6" of walls or 7.5' overhead) whenever possible or will be clearly marked by cones or barricades. ☒ All chemical containers will be labeled per Hazard Communication requirements. **MATERIAL HANDLING & HOUSEKEEPING COMMENTS:**
ROADWAY, RAILROAD, & SIDEWALK OBSTRUCTION		
☐ NA	☒ Vehicle accidents ☒ Pedestrians struck by vehicles or heavy equipment ☐ Pedestrians falls ☐ Pedestrian struck-by falling objects ☐ Railroad accidents	☒ DOT signal devices will be used to re-route vehicles around excavations or busy site entrances/exits that affect road traffic. ☐ Roadway Flaggers will be used and have DOT Flagger Training ☒ Pedestrian traffic will be safely routed around or over excavations. ☐ Pedestrian traffic will be safely routed around or under overhead work. ☐ Railroad owner notified for permission to work on the railroad right-of-way. ☐ Railroad flagger is required for work in the right-of-way. ☐ Equipment, materials, and personnel may not be closer than 15' to the nearest railroad rail if the railroad flagger or the flagger's signal is not visible. ☐ Derailer(s)/bumper(s) will be installed on railroad tracks to isolate the work area. **ROADWAY, RAILROAD, & SIDEWALK COMMENTS:**
BIOLOGICAL HAZARDS		
☐ NA	Infection, Lyme Disease, West Nile Virus, Eastern Equine Encephalitis (EEE), Severe Rash, Allergic Reaction, Venom effects ☒ Ticks ☒ Mosquitoes (EEE, WNV,	☐ Use **DEET** (25%-98%) repellent on skin for protection against mosquitoes, ticks, and similar insects. Use higher concentrations for heavily infested areas. ☐ Use **Permethrin** repellent on clothing in areas heavily infested with ticks, chiggers, etc. ☐ All site personnel will be instructed on how to **identify poison ivy, sumac, and oak**. (O'Brien & Gere Field Identification Guide or equiv. has been posted? ☐ YES ☐ NO) ☐ Poison ivy **barrier creams** (e.g., Ivy Block) will be used on exposed skin prior to the workday. ☐ Poison ivy **neutralizing wipes or rubbing alcohol** will be used on hands and exposed skin following work activities or incidents where contact with poison ivy/oak/sumac is suspected.

HAZARD		HAZARD CONTROLS (check all that apply and comment as required)
	etc) ☐ Venomous Snakes ☐ Venomous Spiders ☒ Poison Ivy, Oak, or Sumac ☒ Bees & Wasps ☐ Fire Ants ☐ Other (identify below):	☒ **Protective coveralls** (such as Tyvek) will be used to prevent contact with ticks or poison ivy. ☐ All site personnel will be instructed on how to **identify venomous snakes** indigenous to the area. List venomous snakes of concern in the "Comments" section below. (O'Brien & Gere Field Identification Guide or equiv. has been posted? ☐ YES ☐ NO) ☐ All field personnel with a potential to **encounter venomous snakes** will wear: ☐ Snake Chaps AND/OR ☐ High Leather Safety Boots (NOT ankle-high boots/shoes) ☐ All site personnel will be instructed on how to identify **venomous spiders** indigenous to the area. List venomous spiders of concern in the "Comments" section below. (O'Brien & Gere Field Identification Guide or equiv. has been posted? ☐ YES ☐ NO) ☒ Site personnel with known **allergies** to bee/wasp stings, fire ant bites, or other insect bites carry an "EpiPen" or equivalent medication prescribed for treating allergic reaction. **BIOLOGICAL HAZARDS COMMENTS:**
ENVIRONMENTAL & CHEMICAL HAZARDS / HAZARDOUS WASTE SITE WORK		
☐ NA	Exposure to hazardous vapors or dust, contact with contaminated materials, fire, explosion. Contaminants of Concern and hazardous chemicals include: ☒ volatile organic compounds (describe: Petroleum Compounds) ☒ semivolatile organic cmpds (describe: Petroleum Compounds) ☐ metal dusts (describe:) ☐ PCBs ☐ Caustic (NaOH) ☐ Acid (H2SO4, HCL) ☐ ☐ (many other hazardous waste and chemical hazards are covered elsewhere in this JSA)	☒ Site workers with a potential for contact with contaminated materials and work in Level C PPE will have OSHA 40-hour training, current 8-hour refresher, and medical exam. ☐ Site workers with minimal contact with contaminated materials and no work in Level C PPE will have OSHA 40-hour OR 24-hour training, current 8-hour refresher, and medical exam. ☐ Foremen or Supervisors overseeing field crews will have 8-hour OSHA Supervisor training. ☐ No intrusive work activities or areas are anticipated with current scope of work. ☒ Intrusive work activities include: _Installation of test pits, excavation of petroleum impacted soil, installation of soil borings, monitoring wells and oxygen injection points, collection of soil and groundwater samples. ☒ The perimeter of intrusive work areas are identified by: See HASP Section 7 ☐ Decontamination of personnel or equipment is not anticipated with the current scope of work. ☒ Decontamination of personnel and small tools will be conducted as follows: _SEE HASP Section 8 ☒ Decontamination of heavy equipment will be conducted as follows: See CAP document ☒ Heavy equipment leaving the site will be inspected by: Designated person TBD (most likely designated individual who signs manifests for each truck ☐ Work area monitoring is not anticipated with the current scope of work. ☒ Work area air monitoring will be conducted per attached air monitoring plan & action levels. ☒ **Work Area Air Monitoring** as follows for: ☐ Dust, ☐ VOCs, ☒ Other: See Section 6 of HASP (**NOTE** - Insert additional or revise existing response actions as appropriate)

Action Levels	Description & Response Actions
	1. Level C PPE - Tyvek, boot covers, nitrile gloves, half or full face w/ respirator with _____ cartridges changed (☐ daily, ☐ _____) OR 2. Reduce contaminant concentrations below action level(s).
	1. Level B PPE - Same as above except with a supplied air respirator OR 2. Reduce contaminant(s) below Level B action level(s).
	1. STOP work

☐ Community Air Monitoring is not anticipated with the current scope of work.
☒ Community Air Monitoring is required per the attached air monitoring plan & action levels.
☒ **Community Area Air Monitoring** as follows for: ☐ Dust, ☐ VOCs, ☒ Other: See Attachment A of HASP

(**NOTE** - Insert additional or revise existing response actions as appropriate)

Action Levels	Description & Response Actions
	1. If dust or odors are observed leaving the site perimeter, then dust/odor controls must be implemented. 2. If dust/odor controls fail to prevent dust/odor emissions from leaving the site, then **STOP** work and notify the client contact.
	1. Use dust/odor suppression techniques outlined in the "Comments" section. 2. Evaluate additional techniques or controls if necessary. 3. Notify the client contact.
	1. STOP work

HAZARD		HAZARD CONTROLS (check all that apply and comment as required)
		ENVIRONMENTAL & CHEMICAL HAZARD COMMENTS:

Post Emergency Response Information On-Site or Retain Near Work Area

EMERGENCY RESPONSE			
(911 Service is Available ☒ Yes ☐ No **Cell Phone Required** ☒ Yes ☐ No) **Alternate Emergency Number (if not "911"):**			
Site Address:	425, 435 Mt. Hope Avenue, 562 Ford Street, Rochester, NY		
Muster Point in case of site evacuation:	To be determined prior to initiating Site work		
Emergency Medical Treatment - Hospital Name: Hospital Address:	Rochester Highland Hospital 1000 South Ave. Rochester, NY	**Number:**	585-473-2200
Non-Emergency Med. Treatment - Clinic Name: Occupational Clinic Address:		**Number:**	
Fire Department Name	City of Rochester Fire Dept.	**Number:**	911
Spill Response:	Contact OBG Project Manager to report and manage spill	**Number:**	585-263-2820
Client Representative Name::	Joseph Biondolillo Jane Forbes	**Office Number:** **Office Number:**	585-428-6649 585-428-7892
O'Brien & Gere **Project Manager** Name:	Kevin Ignaszak	**Office Number:** **Cell Number:**	585-263-2820 x14
O'Brien & Gere **Corporate H&S** Name:	Jeff Parsons	**Office Number:** **Cell Number:**	315-437-6100
O'Brien & Gere **SSHC** Name:	Tony Dinardo	**Office Number:** **Cell Number:**	585-263-2820 x19
Contact Name:		**Office Number:** **Cell Number:**	

EMERGENCY RESPONSE COMMENTS:

1. Upon occurrence of any injury, fire, explosion, major spill (beyond incidental), property damage >$1,000, or near-miss that could have resulted in a fatality or disabling injury, **IMMEDIATELY NOTIFY** the O'Brien & Gere Project Manager, O'Brien & Gere Manager of Corporate H&S, and the Client Representative.
2. Complete an *Incident Report* within **24 hours** and submit to the O'Brien & Gere Manager of Corporate H&S for review.
3. First Aid and CPR supplies are located within SSHC vehicle Spill Supplies are located within subcontractors vehicle's.
4. Emergency numbers and Hospital Route Map are posted _____.

Individuals who are performing work covered by this JSA have received a **project-specific safety orientation** that includes a review of the safety requirements outlined in this JSA. The undersigned individuals acknowledge that they have read this JSA and/or reviewed this JSA with the Project Supervisor, Superintendent, or Foreman and agree to comply with safety requirements outlined herein. The undersigned individuals understand that these safety requirements are not "all-inclusive" and that they will be expected to follow any additional safe work practices applicable or customary to their specific scope of work or trade.

Print Name	Signature	Company	Date

ATTACHMENT B

Excavation –
Section 2.1.5 of O'Brien &Gere
Corporate Health and Safety Manual

2.15 EXCAVATION

1. Purpose

This program is designed to assist employees in the safe work practices involved with soil excavation. Excavations are defined to include trenches and openings in the earth's surface.

2. Scope

- Specific Responsibilities;
- Procedures:
  - Utilities;
  - Exit and Entry;
  - Falling Materials;
  - Warning Lines/Systems;
  - Confined Spaces;
  - Water Accumulation;
  - General Sloping & Shoring Requirements
  - Sloping and Benching;
  - Shield Systems;
  - Shoring Systems
  - Adjacent Structures;;
  - Daily Inspection; and
  - Soil Testing.
- Additional Information:
  - Sloping Angles by Soil Type; and
  - Timber and Aluminum Hydraulic Shoring Requirements

3. Specific Responsibilities

3.1 Project Manager

To ensure that all excavations are properly safeguarded prior to employee entry; To ensure that all affected employees understand and are knowledgeable in safe entry and work procedures; and To ensure employees involved in excavation are properly trained in the safe work practices associated with all excavation operations.

3.2 Site Supervisor/Foreman/Team Leader

To train or provide training to all employees who are unfamiliar with safe excavation practices; To ensure all affected employees under their supervision are knowledgeable in excavation safety; and To ensure all excavations greater than four (4) feet deep are characterized for confined space potential. To ensure that an Excavation Competent Person is on site whenever workers must enter excavations 5' or more deep or are otherwise exposed to excavation collapse hazards.

3.3 Excavation Competent Person

The Excavation Competent Person is responsible to characterize soils, select sloping and shoring methods, and inspect excavations daily, and implement other requirements of this procedure. Excavation competent persons must complete the *Soil Analysis Checklist* if a soil class other than "Type C" is selected and complete a *Daily Excavation Checklist* each day that workers are exposed to excavation/cave-in hazards. Excavation competent persons must have National Underground Utility Contractors Association (NUCA) training or equivalent that thoroughly covers requirements in 29CFR1926 Subpart P.

3.4 Employee/Subcontractor/Visitor

Understand and abide by all applicable training; Comply with all signage; Advise appropriate personnel of deficiencies in the program and/or hazards on-site; and Follow all Health and Safety rules at the facility and meet all the Health and Safety requirements of their contracts. To NOT enter excavations without verifying that excavations have had the daily inspection required by OSHA.

4. Procedures

4.1 Utilities

A. Prior to opening an excavation, the estimated location of utility installations (i.e., sewer, telephone, fuel, electric, waterlines, etc.) shall be established.

B. Contact affected utility companies for utility locations. If location is uncertain or a response cannot be received within 24 hours (unless a longer period is required by state or local law), work may proceed provided the appropriate precautions are taken (i.e., use of detection equipment, etc.).

C. When excavations approach the estimated location of utility, the exact location of the installation shall be determined by safe and acceptable means (i.e., use of hand shovels).

Note: Often utilities are flagged 12 - 24 inches above the actual installation.

4.2 Exit and Entry

A. A ladder, stairway, ramp or other safe means of egress will be located in excavations four (4) feet or more in depth at least 25 feet from each employee in the excavation.

B. Ramps:

- Equipment ramps will be designed by a competent person qualified in structural design;
- Structural members must be the same thickness and connected together when two (2) or more are in-line;
- Personnel ramps should be cleaned or provided with a surface treatment to prevent slipping;
- Cleats will be attached in a manner to prevent tripping; and
- Ramps/Walkways Crossing over excavations deeper than six (6) feet require guarding. Refer to *Fall Protection* of this manual).

4.3 Falling Materials

A. No employee will be permitted underneath loads handled by lifting or digging equipment.

Note: Employees will be required to stand away from any vehicle being loaded or unloaded to avoid being struck by an spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped to provide adequate protection for the operator during loading and unloading operations.

B. Employees will be protected from excavated materials or equipment that could pose a hazard by falling or rolling into excavations. Protection will be provided by placing and keeping such materials or equipment at least two (2) feet from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

C. Adequate protection will be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection will consist of:

- Scaling to remove loose material;
- Installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or
- Other means that provide equivalent protection.

D. All persons working on the upper surface must stay six (6) feet from the excavations edge to the maximum extent possible and where feasible. Contact CHS for guidance.

4.4 Warning Line/System

When mobile equipment is used/operated near open excavations, a warning system (i.e. barricading, stop logs, hand or mechanical signals) shall be utilized.

4.5 Confined Space

A. Excavations over four (4) feet in depth may be considered a confined space. Generally if the excavation is sufficiently sloped to provide <u>easy</u> personnel access (no use of a ladder, stairs, etc.) then it is not classified as a confined space.

B. If the excavation is considered a confined space, enter via confined space entry procedures outlined in *Confined Space Entry* of this manual.

4.6 Water Accumulation

A. Employees will not work in excavation with water accumulation unless sufficient precautions have been taken. These include, but are not limited to: use of support shields, pumping of water, and protection from cave-ins.

B. If water accumulation is controlled by mechanical means, a competent person will monitor the effectiveness and operation of the equipment. If equipment failure occurs, personnel will leave the excavation until proper safe precautions have been taken.

C. If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means will be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require a documented inspection by a competent person.

4.7 General Sloping & Shoring Requirements

A. Each employee in an excavation will be protected from cave-ins by an adequate protective system designed in accordance with this procedure and 29CFR1926.652 except when:
- Excavations are made entirely in stable rock; or
- Excavations are less than five (5) feet in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

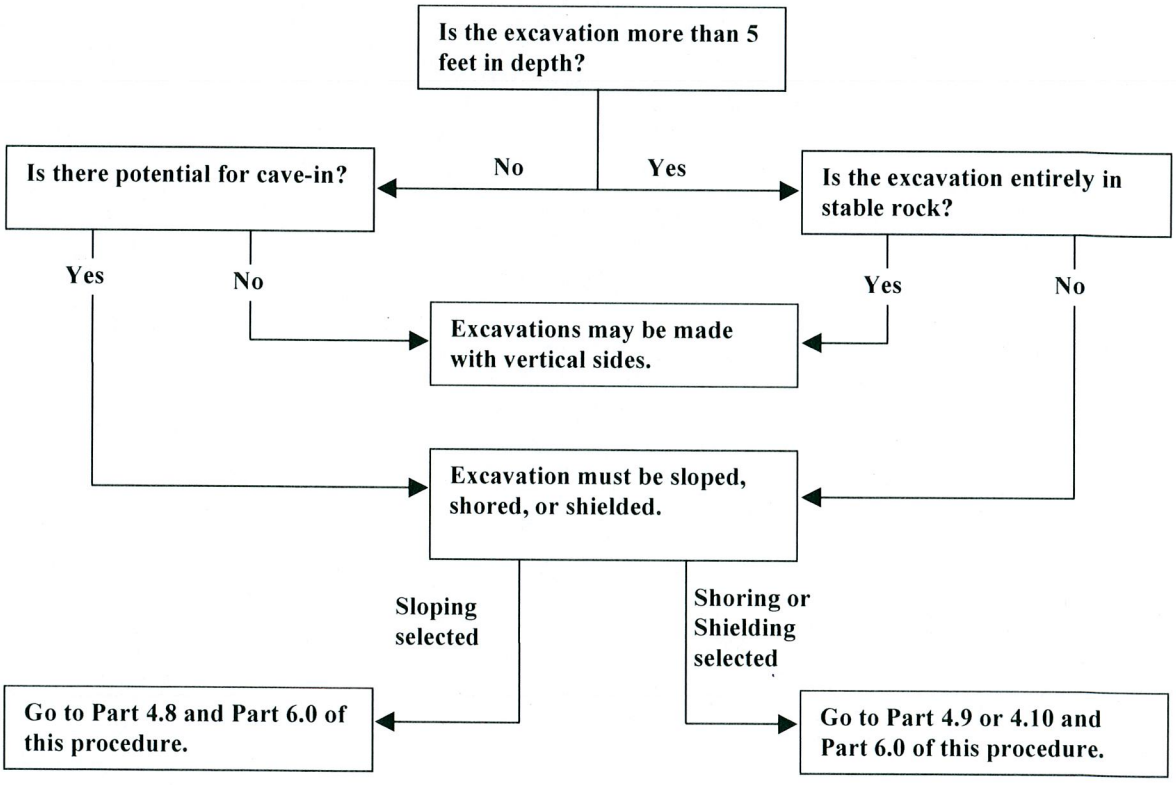
B. Excavations will be sloped at an angle not steeper than 1½ horizontal to 1 vertical (34° measured from the horizontal), unless other sloping or shoring options are used.

C. If a PE is used to design sloping, benching, shielding, or shoring excavation systems, then the designs must remain in the job trailer for the duration of the job; and

D. All designs must remain in the job trailer for the duration of the project.

E. Refer to the following figure for guidance in selecting sloping or shoring options.

Selection of Protection System



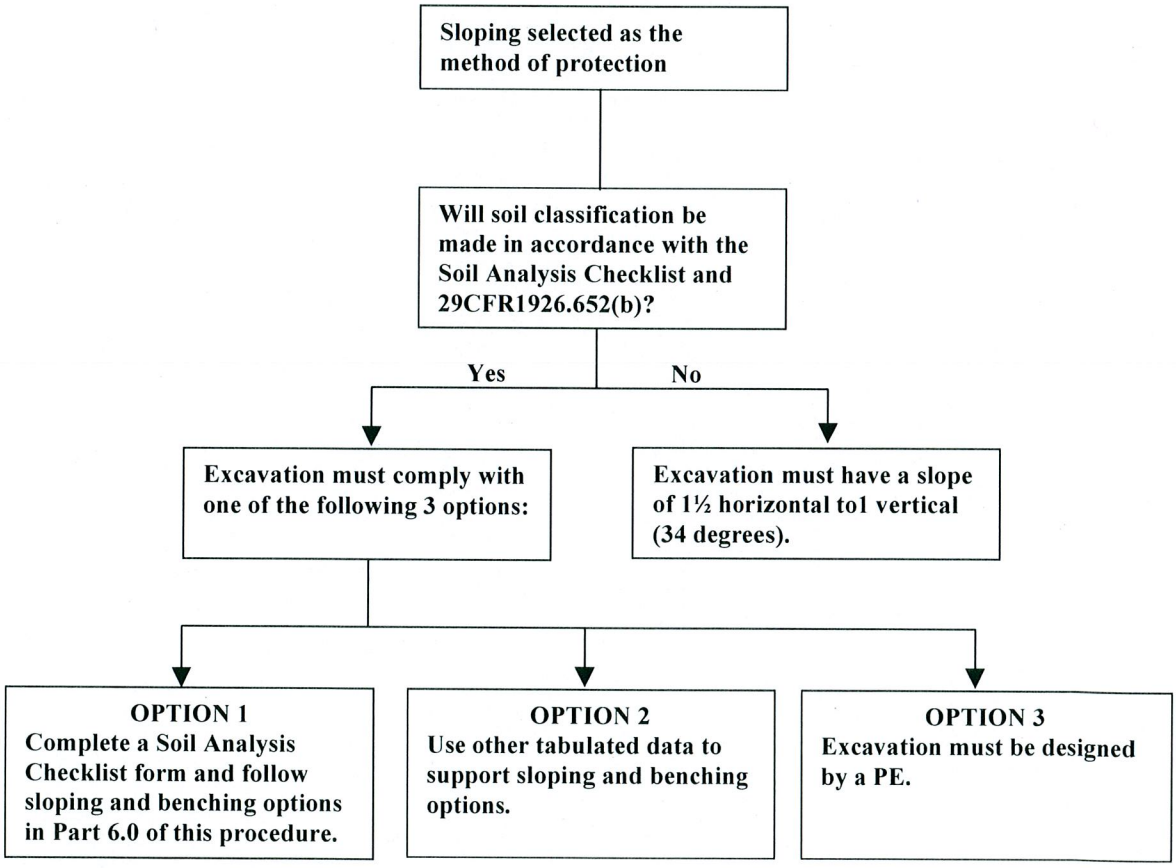
4.8 Sloping and Benching

A. Sloping and shoring requires that the soil is classified by its type, either A, B, or C. The *Soil Analysis Checklist* is available to document and provide guidance in soil analysis activities. Sloping and shoring options in accordance with the following figure and refer to Table 1 and Figures 6.1 to 6.16 in Part 6.0 of this procedure for specific information on sloping and benching angles according to soil type.

B. Deviations from sloping and benching requirements set forth in 29CFR1926 Subpart P, Appendices A and B must be approved by a PE.

C. Refer to the following figure for selection of sloping and benching options.

Selection of Sloping Options

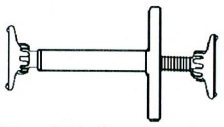


4.9 Shield Systems

A. Shield systems (e.g., trench boxes) will have the capacity to resist failure against all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

B. Shield systems will not be subjected to loads exceeding those which the system was designed to withstand;

C. Shields will be installed in a manner to restrict lateral or other hazardous movement of the shield in the event the excavation or trench caves in.

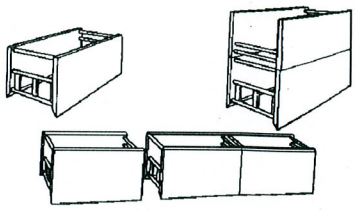


Trench Jacks
(Screw Jacks)

D. Employees will be protected from the hazard of cave-ins when entering or exiting the areas protected by shields;

E. Employees will not be allowed between (in) shields when shields are being installed, removed, or moved vertically;

F. Shields must extend to at least two (2) feet from the bottom of the excavation;



Trench Shields

G. Shields must extend 18 inches above shored excavations; and

H. Always follow manufacturers recommendations. Deviations from manufacturers recommendations must be requested in writing to the manufacturer and documented in the job trailer for the duration of the project.

I. Refer to the adjacent figure for examples of typical trench shield or trench boxes.

4.10 Shoring Systems

A. Shoring systems (e.g., trench boxes) will have the capacity to resist failure against all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

B. Shoring systems will not be subjected to loads exceeding those which the system was designed to withstand

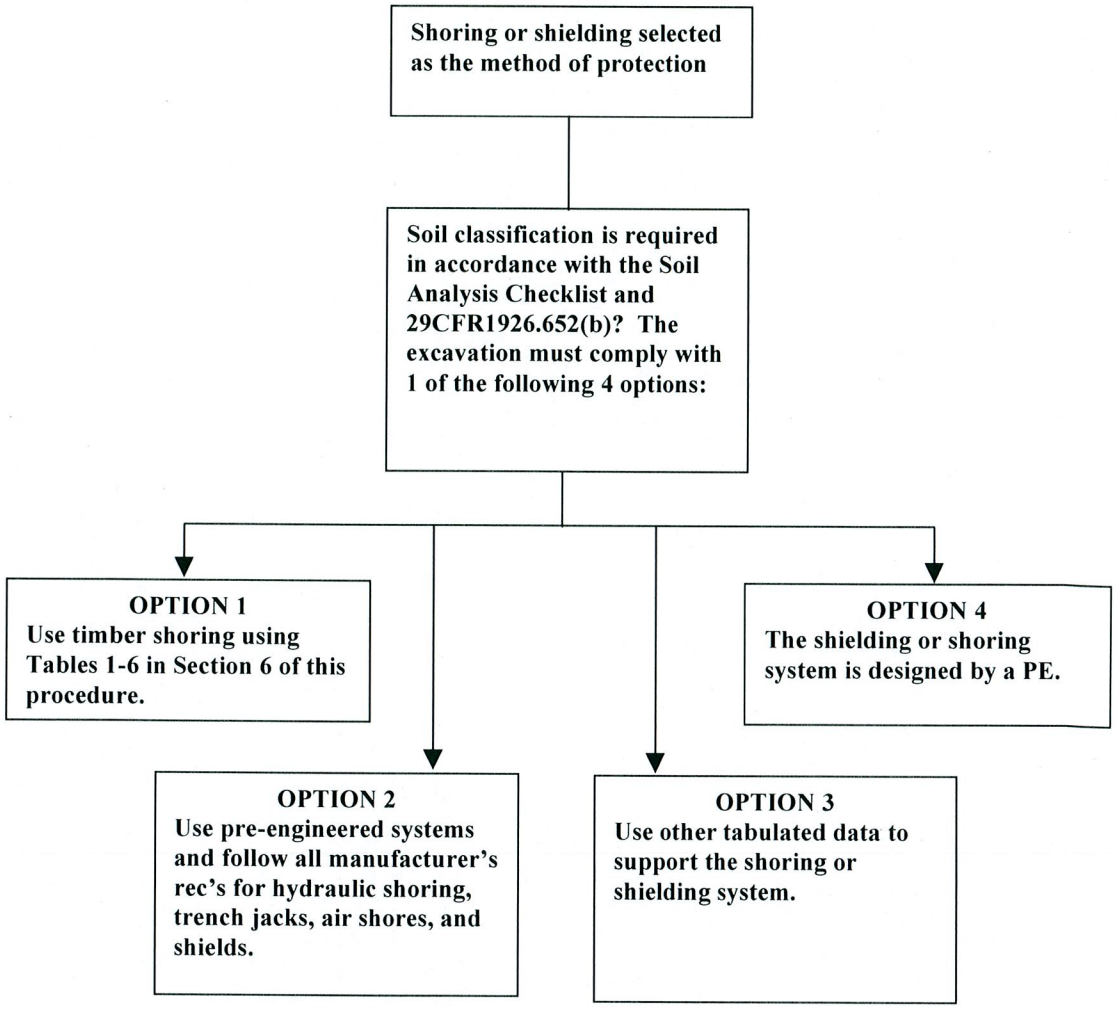
C. Shoring systems other than those listed in 29CFR1926 Subpart P must be approved by a PE. Information on common timber and aluminum hydraulic shoring systems from 29CFR1926 Subpart P is included in Tables 2-10 in Part 6 of this procedure.

D. Materials and Equipment:

- Materials and equipment used for protective systems will be free from damage or defects that might impair their proper function; and
- When material or equipment that are used for protective systems is damaged, a competent person will examine the material or equipment and evaluate its suitability for continued use. If a competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment will be removed from service, and will be evaluated and approved by a registered professional engineer before being returned to service.

Note: The equipment should be effectively tagged "Do Not Use - Defective".

Selection of Shoring or Shielding Options



E. Installation and Removal of Support:

- Members of support systems will be securely connected together to prevent sliding, falling, kickouts, or other predictable failure;
- Support systems will be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system;
- Individual members of support systems will not be subjected to loads exceeding those which those members were designed to withstand;
- Before temporary removal of individual members begins, additional precautions will be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system;
- Removal will begin at, and progress from, the bottom of the excavation. Members will be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation; and
- Backfilling will progress together with the removal of support systems from excavations.

F. Refer to the following figure for selection guidance on shoring and shielding options.

4.11 Adjacent Structures

A. Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operation, support systems such as shoring, bracing, or underpinning will be provided to ensure the stability of such structures for the protection of employees;

B. Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees will not be permitted except when:

- A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or
- The excavation is in stable rock; or
- A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees; and
- Sidewalks, pavements, and appurtenant structure will not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

4.12 Daily Inspections

A. Daily inspections of excavations, the adjacent areas, and protective systems will be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection will be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections will also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure is anticipated.

B. Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees will be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

C. Each inspection must be fully documented and meet or exceed the content referenced in the O'Brien & Gere ***Daily Excavation Checklist***. Refer to Section 4, forms.

4.13 Soil Analysis

Soil analysis documentation and procedures are outlined in the soil analysis checklist. Refer to Section 4, Forms.

A. Soil Qualities must be assessed by a person trained to identify soil types and excavation hazards. Soil qualities are grain, site, saturation cohesiveness and unconfined compressive strength. OSHA identifies soil types as follows:

- Soil Type A - Most stable soil: clay, silty clay, clay loam, and hardpan (resists penetration);
- Soil Type B - Medium stability soil: silt, sandy loam, medium clay and unstable dry rock;

- Soil Type C - Least stable soil: gravel, loamy sand, soft clay, submerged soil or dense, heavy unstable rock; and
- Stable Rock – Natural solid material matter that can be excavated with vertical sides and remain intact while exposed.

B. Grain sizes (gravel, sand, silt and clay) vary in stability. The larger the grain, the less stable the soil. Particles larger than a pin head are considered gravel. The naked eye cannot see particles of clay or silt.

C. Saturation refers to the amount of water between the particles of soil. When water fills all voids in the soil, the soil is considered saturated. Saturated soils may be more likely to cave-in.

D. Cohesion/stability refers to how well the particles hold together therefore predicting how well the excavation will hold together.

E. Unconfined compressive strength refers to how the particles react under pressure, and is measured in pounds per square foot.

F. Visual Testing Clues:

- Look at soil particle size and type. You'll see a mixture of different types;
- Does soil clump when dug? It could be clay or silt;
- Cracks in walls and spalling can mean soil types B or C;
- Layered systems with adjacent hazardous areas - buildings, roads and vibrating machinery - may require a professional engineer for classification; and
- Standing water or water seeping through trench walls automatically means soil type C.

G. Manual soil tests are required before a protective system is selected. A sample taken from soil dug out into a spoil pile is tested as soon as possible to preserve its natural moisture. Soil can be tested either on-site or off-site. Manual tests include:

- Sedimentation: Test determines how much silt and clay are in sandy soil. Saturated sandy soil is placed in a straight-sided jar with about five inches of water. After the sample is thoroughly mixed and allowed to settle, the percentage of sand is visible. Using this data the soil is classified: for example, a sample with 80 percent sand will be classified Type C;
- Wet shaking test is another way to determine the amount of sand versus clay and silt in a soil sample. In your hand, shake a saturated sample to gauge soil permeability based on the following facts: Shaken clay resists water movement through it. Water flows freely through sand and less freely through silt;
- Thread test determines cohesion. A representative soil sample is rolled between the palms of the hands to 1/8" diameter and several inches in length. The rolled piece is placed on a flat surface, then picked up. If a sample holds together for two (2) inches, it's considered cohesive; and
- Ribbon test determines cohesion and is used as a backup for the Thread Test. A representative soil sample is rolled out (using the palms of your hands) to ¾" in diameter, and several inches in length. The sample is then squeezed between thumb and forefinger into a flat unbroken ribbon 1/8" to ¼" thick, which is allowed to fall freely over the fingers. If

the ribbon does not break off before several inches are squeezed out, the soil is considered cohesive.

5. Documentation

A. Each daily excavation inspection must be documented and retained on-site for the duration of the job project.

B. Soil analysis documentation must be retained on-site for the project duration.

C. Each excavation design (i.e., shoring, benching, shielding, etc.) must be kept on-site for the duration of the project.

6. Additional Information

6.1 Slope Angles by Soil Type

Table 1
Maximum Allowable Slopes

Soil or Rock Type	Maximum allowable slope (H:V) * for excavations less than 20 feet deep ***
Stable Rock	Vertical (90°)
Type A **	¾:1 (53°)
Type B	1:1 (45°)
Type C	1½:1 (34°)

NOTES:

* Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

** A short-term maximum allowable slope of ½H:1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67m) in depth shall be ¾H:1V (53°).

*** Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

EXCAVATION SAFETY – TYPE A SOIL
Simple Slope – General

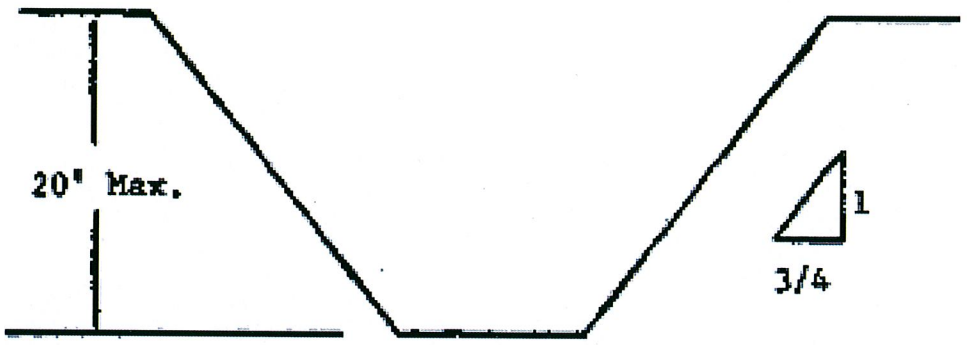


Figure 6.1 – All simple slope excavations in Type A soil that are 20 feet or less in depth shall have a maximum allowable slope of ¾:1.

EXCAVATION SAFETY – TYPE A SOIL
Simple Slope – Short Term

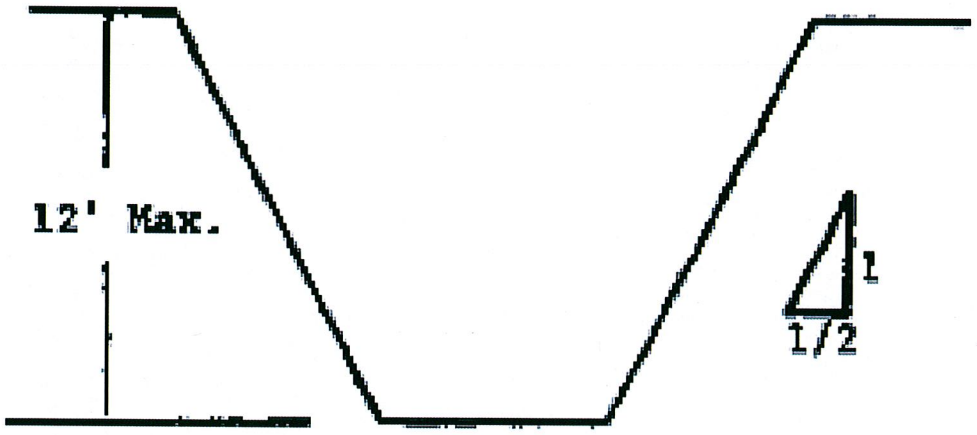
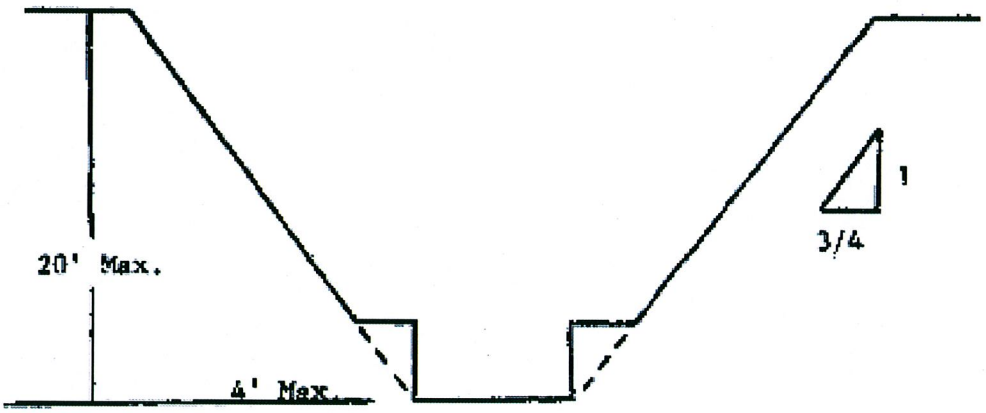


Figure 6.2 – (Exception) Simple slope excavations in Type A soil which are open 24 hours or less (short-term) and which are 12 feet or less in depth shall have a maximum allowable slope of ½:1.

EXCAVATION SAFETY – TYPE A SOIL

Simple Bench



Multiple Bench

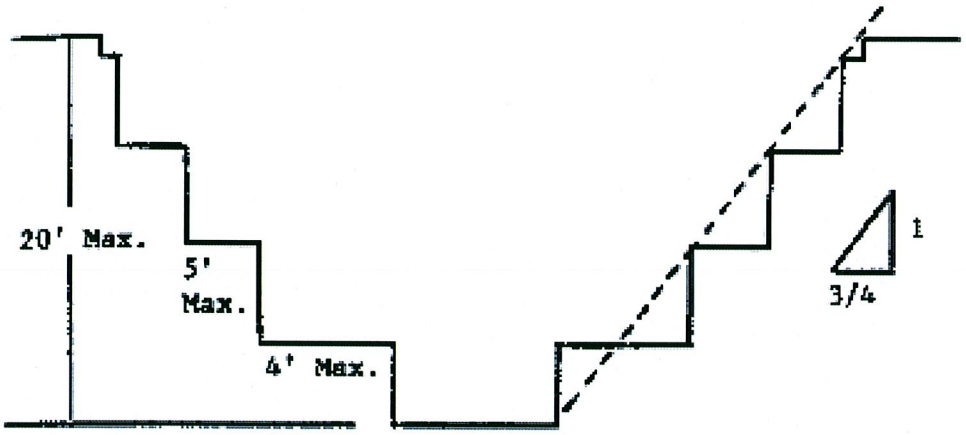


Figure 6.3 – All benched excavations in Type A soil that are 20 feet or less in depth shall have a maximum allowable slope of ¾:1 and maximum bench dimensions as shown above.

EXCAVATION SAFETY – TYPE A SOIL
Unsupported Vertically Sided Lower Portion – Maximum 8 Feet In Depth

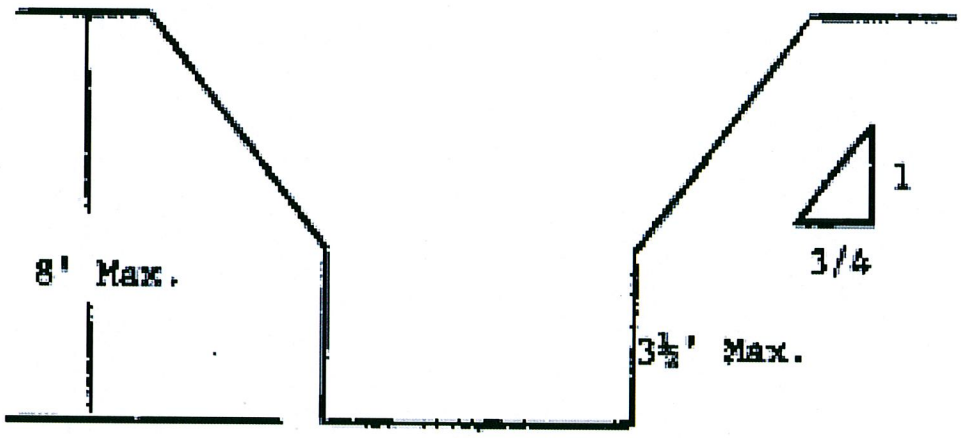


Figure 6.4 – All excavations in Type A soil that are 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of 3.5 feet.

EXCAVATION SAFETY – TYPE A SOIL
Unsupported Vertically Sided Lower Portion – Maximum 12 Feet In Depth

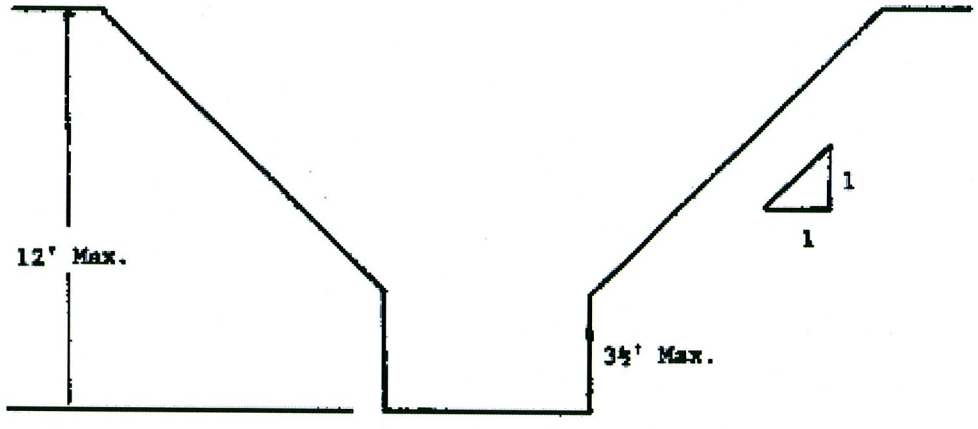


Figure 6.5 – All excavations in Type A soil that are more than 8 feet but not more than 12 feet in depth with unsupported vertically sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of 3.5 feet.

EXCAVATION SAFETY – TYPE A SOIL
Supported or Shielded Vertically Sided Lower Portion

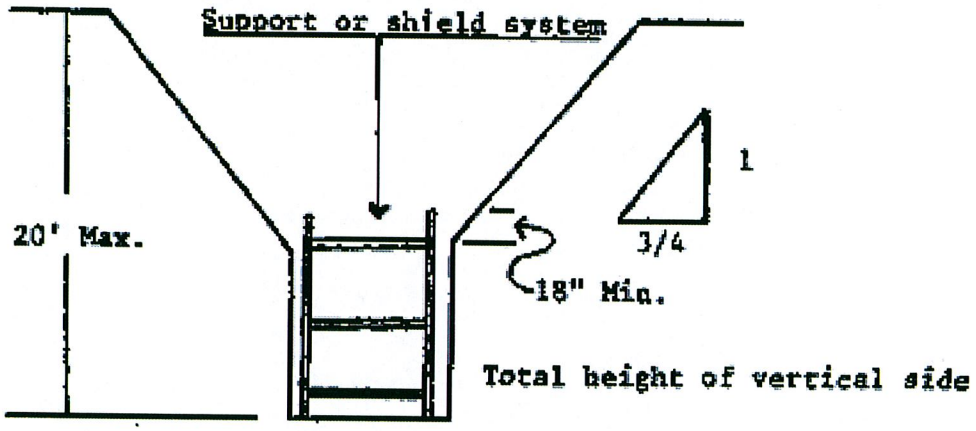


Figure 6.6 – All excavations in Type A soil that are 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of ¾:1. The support or shield system must extend 18 inches above the top of the vertical side.

EXCAVATION SAFETY – TYPE B SOIL
Simple Slope

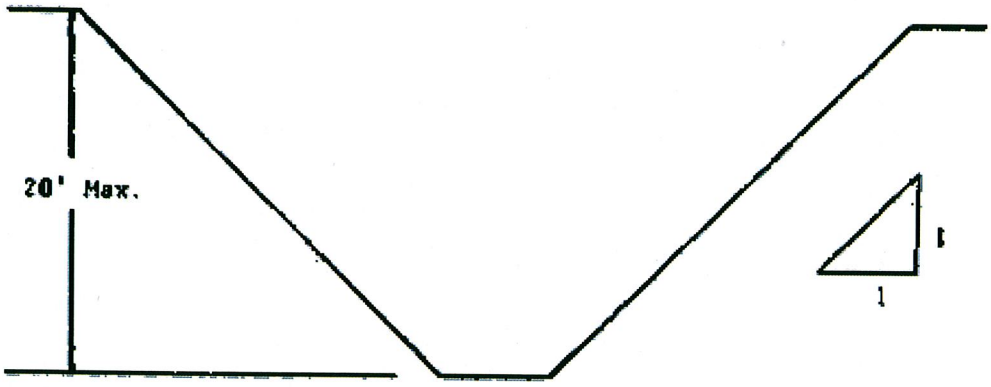
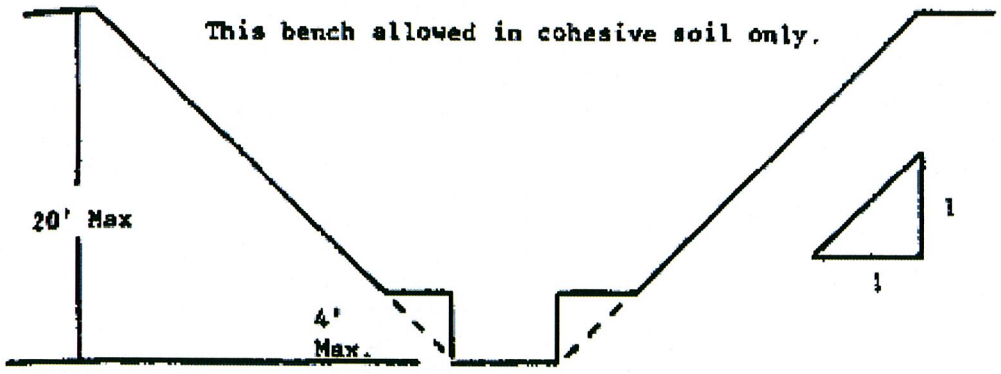


Figure 6.7 – All simple slope excavations in Type B soil that are 20 feet or less in depth shall have a maximum allowable slope of 1:1.

EXCAVATION SAFETY – TYPE B SOIL

Single Bench



Multiple Bench

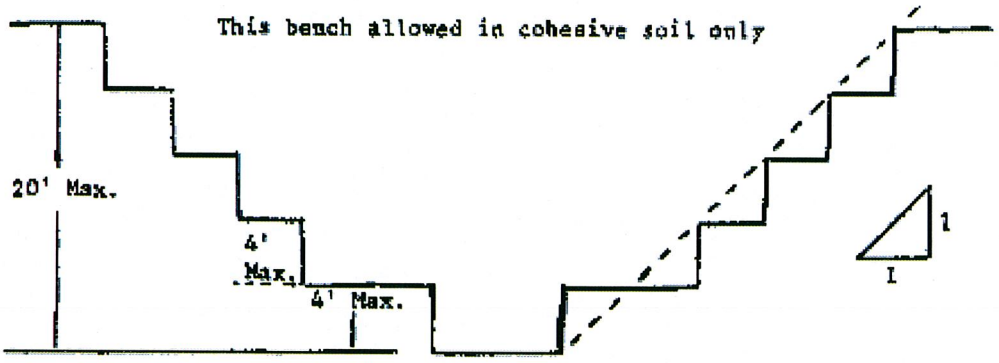


Figure 6.8 – All benched excavations in Type B soil that are 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as shown above.

EXCAVATION SAFETY – TYPE B SOIL
Supported or Shielded Vertically Sided Lower Portion

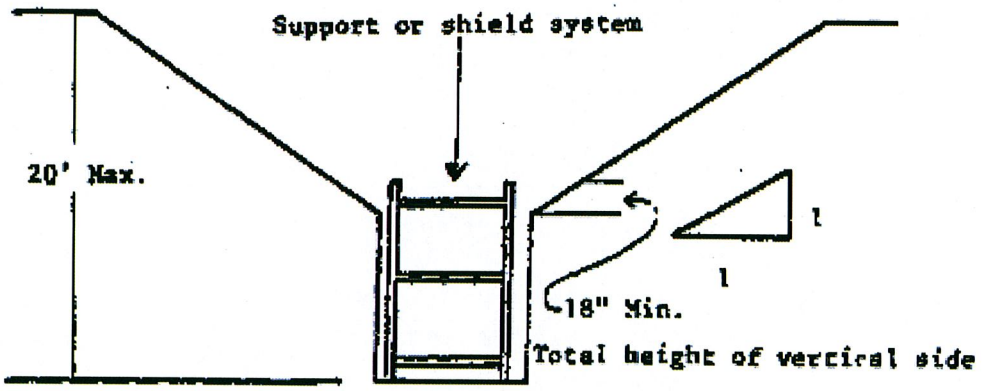


Figure 6.9 – All excavations in Type B soil that are 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of 1:1. The support or shield system must extend 18 inches above the top of the vertical side.

EXCAVATION SAFETY – TYPE C SOIL
Simple Slope

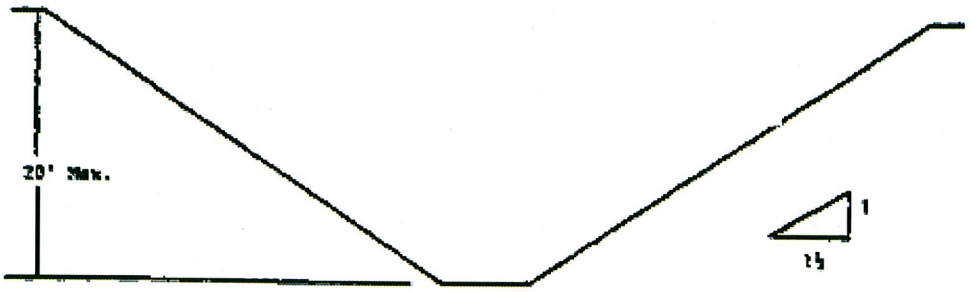


Figure 6.10 – All simple slope excavations in Type C soil that are 20 feet or less in depth shall have a maximum allowable slope of 1½:1. Benching techniques are not effective in Type C soil.

EXCAVATION SAFETY – TYPE C SOIL
Supported or Shielded Vertically Sided Lower Portion

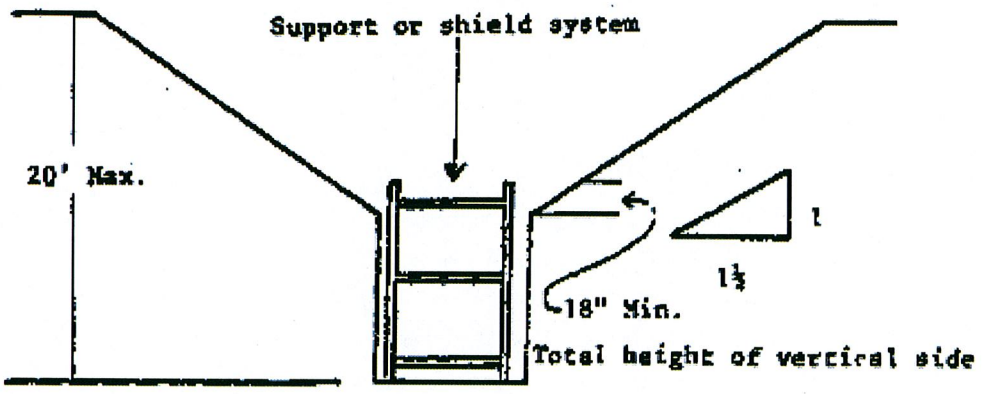


Figure 6.11 – All excavations in Type C soil that are 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of 1½:1. The support or shield system must extend 18 inches above the top of the vertical side.

EXCAVATION SAFETY – LAYERED SOILS
B over A

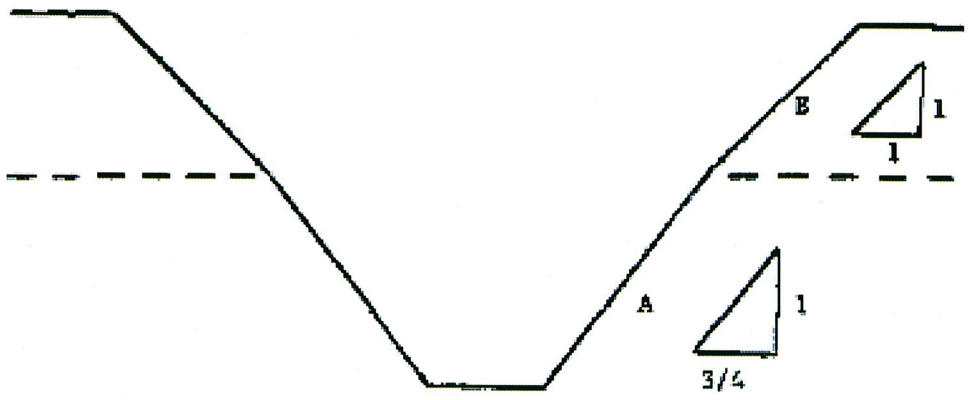


Figure 6.12 – All excavations 20 feet or less in depth in B over A layered soils have a maximum allowable slope for each layer as shown above.

EXCAVATION SAFETY – LAYERED SOILS
C over A

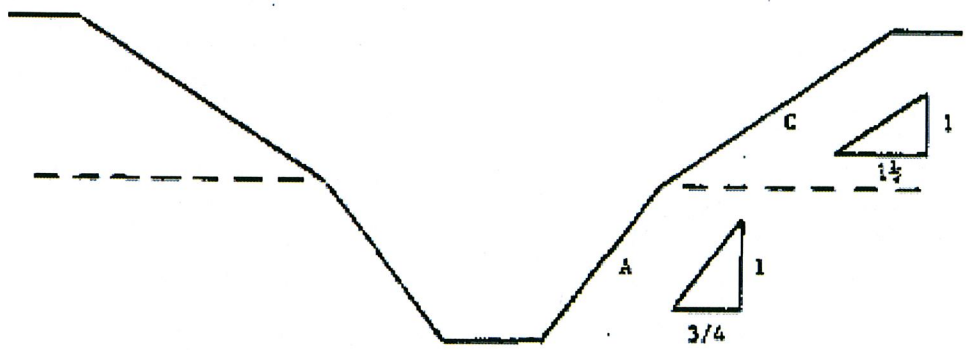


Figure 6.12 – All excavations 20 feet or less in depth in C over A layered soils have a maximum allowable slope for each layer as shown above.

EXCAVATION SAFETY – LAYERED SOILS
C over B

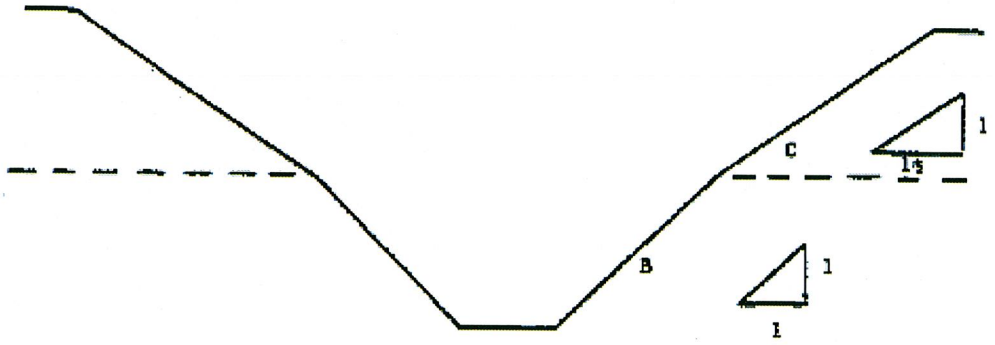


Figure 6.13 – All excavations 20 feet or less in depth in C over B layered soils have a maximum allowable slope for each layer as shown above.

EXCAVATION SAFETY – LAYERED SOILS
A over B

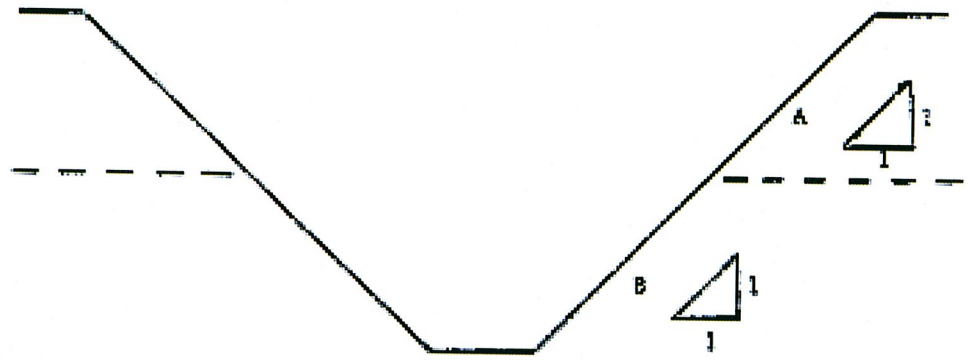


Figure 6.14 – All excavations 20 feet or less in depth in A over B layered soils have a maximum allowable slope for each layer as shown above.

EXCAVATION SAFETY – LAYERED SOILS
A over C

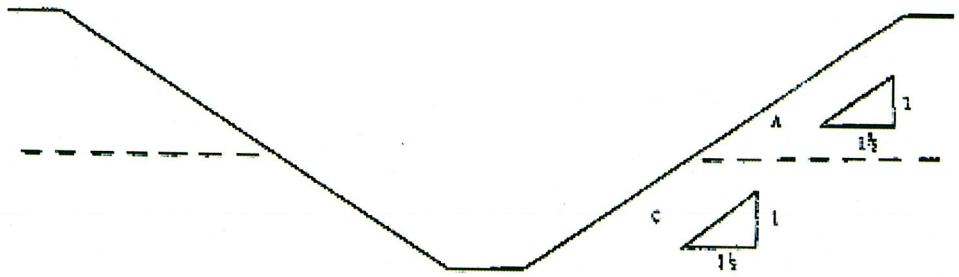


Figure 6.15 – All excavations 20 feet or less in depth in A over C layered soils have a maximum allowable slope for each layer as shown above.

EXCAVATION SAFETY – LAYERED SOILS
B over C

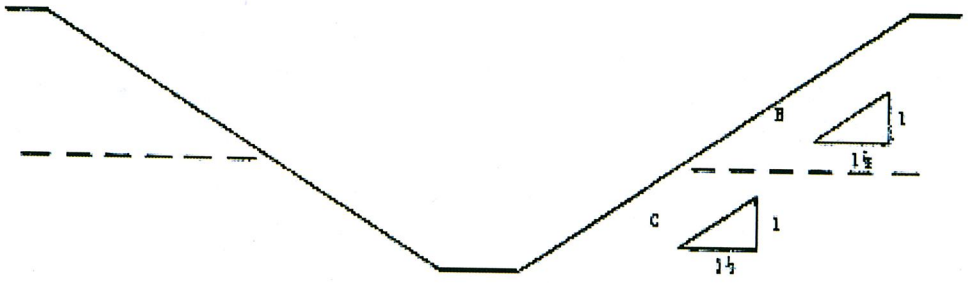


Figure 6.16 – All excavations 20 feet or less in depth in B over C layered soils have a maximum allowable slope for each layer as shown above.

6.2 Timber & Aluminum Hydraulic Shoring Requirements

TABLE 2
Timber Trench Shoring -- Minimum Timber Requirements*
Soil Type A $P_a = 25 \times H + 72$ psf (2 ft. Surcharge)

Size (Actual) and Spacing of Members**													
Depth of Trench (feet)	Cross Braces						Wales			Uprights				
	Horizontal Spacing (feet)	Width of Trench (feet)					Vert. Spacing (feet)	Size (inches)	Vert. Spacing (feet)	Maximum Allowable Horizontal Spacing (feet)				
		Up to 4	Up to 6	Up to 9	Up to 12	Up to 15				Close	4	5	6	8
5 to 10	Up to 6	4 x 4	4 x 4	4 x 6	4 x 6	6 x 6	4	Not req'd	---				2 x 6	
	Up to 8	4 x 4	4 x 4	4 x 6	6 x 6	6 x 6	4	Not req'd	---					2 x 8
	Up to 10	4 x 6	4 x 6	4 x 6	6 x 6	6 x 6	4	8 x 8	4			2 x 6		
	Up to 12	4 x 6	4 x 6	6 x 6	6 x 6	6 x 6	4	8 x 8	4				2 x 6	
10 to 15	Up to 6	4 x 4	4 x 4	4 x 6	6 x 6	6 x 6	4	Not req'd	---				3 x 8	
	Up to 8	4 x 6	4 x 6	6 x 6	6 x 6	6 x 6	4	8 x 8	4		2 x 6			
	Up to 10	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	4	8 x 10	4			2 x 6		
	Up to 12	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	4	10 x 10	4				3 x 8	
15 to 20	Up to 6	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	4	6 x 8	4	3 x 6				
	Up to 8	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	4	8 x 8	4	3 x 6				
	Up to 10	8 x 8	8 x 8	8 x 8	8 x 8	8 x 10	4	8 x 10	4	3 x 6				
	Up to 12	8 x 8	8 x 8	8 x 8	8 x 8	8 x 10	4	10 x 10	4	3 x 6				
Over 20	See Note 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.
** Manufactured members of equivalent strength may be substituted for wood.

TABLE 3
Timber Trench Shoring -- Minimum Timber Requirements*
Soil Type B $P_a = 45 \times H + 72$ psf (2 ft. Surcharge)

Size (Actual) and Spacing of Members**											
Depth of Trench (feet)	Cross Braces						Wales			Uprights		
	Horizontal Spacing (feet)	Width of Trench (feet)					Vert. Spacing (feet)	Size (inches)	Vert. Spacing (feet)	Maximum Allowable Horizontal Spacing (feet)		
		Up to 4	Up to 6	Up to 9	Up to 12	Up to 15				Close	2	3
5 to 10	Up to 6	4 x 6	4 x 6	6 x 6	6 x 6	6 x 6	5	6 x 8	5			2 x 6
	Up to 8	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	5	Not req'd	5			2 x 6
	Up to 10	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	5	8 x 8	5			2 x 6
	See Note 1											
10 to 15	Up to 6	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	5	Not req'd	5		2 x 6	
	Up to 8	6 x 8	6 x 8	6 x 8	8 x 8	8 x 8	5	Not req'd	5		2 x 6	
	Up to 10	8 x 8	8 x 8	8 x 8	8 x 8	8 x 10	5	Not req'd	5		2 x 6	
	See Note 1											
15 to 20	Up to 6	6 x 8	6 x 8	6 x 8	8 x 8	8 x 8	5	Not req'd	5	3 x 6		
	Up to 8	8 x 8	8 x 8	8 x 8	8 x 8	8 x 10	5	Not req'd	5	3 x 6		
	Up to 10	8 x 10	8 x 10	8 x 10	8 x 10	8 x 10	5	Not req'd	5	3 x 6		
	See Note 1											
Over 20	**See Note 1**											

* Mixed oak or equivalent with a bending strength not less than 850 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE 4
Timber Trench Shoring -- Minimum Timber Requirements*
Soil Type C $P_a = 45 \times H + 72$ psf (2 ft. Surcharge)

Size (Actual) and Spacing of Members**										
Depth of Trench (feet)	Cross Braces						Wales			Uprights
	Horizontal Spacing (feet)	Width of Trench (feet)					Vert. Spacing (feet)	Size (inches)	Vert. Spacing (feet)	Maximum Allowable Horizontal Spacing (feet)
		Up to 4	Up to 6	Up to 9	Up to 12	Up to 15				Close
5 to 10	Up to 6	6 x 8	4 x 6	6 x 6	6 x 6	6 x 6	5	6 x 8	5	2 x 6
	Up to 8	8 x 8	6 x 6	6 x 6	6 x 8	6 x 8	5	Not req'd	5	2 x 6
	Up to 10	8 x 10	8 x 10	8 x 10	8 x 10	10 x 10	5	12 x 12	5	2 x 6
	See Note 1									
10 to 15	Up to 6	8 x 8	8 x 8	8 x 8	8 x 8	8 x 10	5	10 x 12	5	2 x 6
	Up to 8	8 x 10	8 x 10	8 x 10	8 x 10	10 x 10	5	12 x 12	5	2 x 6
	See Note 1									
	See Note 1									
15 to 20	Up to 6	8 x 10	8 x 10	8 x 10	8 x 10	10 x 10	5	12 x 12	5	3 x 6
	See Note 1									
	See Note 1									
	See Note 1									
Over 20	**See Note 1**									

* Mixed oak or equivalent with a bending strength not less than 850 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE 5
Timber Trench Shoring -- Minimum Timber Requirements*
Soil Type A $P_a = 25 \times H + 72$ psf (2 ft. Surcharge)

Size (Actual) and Spacing of Members**													
Depth of Trench (feet)	Cross Braces						Wales			Uprights				
	Horizontal Spacing (feet)	Width of Trench (feet)					Vert. Spacing (feet)	Size (inches)	Vert. Spacing (feet)	Maximum Allowable Horizontal Spacing (feet)				
		Up to 4	Up to 6	Up to 9	Up to 12	Up to 15				Close	4	5	6	8
5 to 10	Up to 6	4 x 4	4 x 4	4 x 4	4 x 4	4 x 6	4	Not req'd	Not req'd				4 x 6	
	Up to 8	4 x 4	4 x 4	4 x 4	4 x 6	4 x 6	4	Not req'd	Not req'd					4 x 8
	Up to 10	4 x 6	4 x 6	4 x 6	6 x 6	6 x 6	4	8 x 8	4			4 x 6		
	Up to 12	4 x 6	4 x 6	4 x 6	6 x 6	6 x 6	4	8 x 8	4				4 x 6	
10 to 15	Up to 6	4 x 4	4 x 4	4 x 4	6 x 6	6 x 6	4	Not req'd	Not req'd				4 x 10	
	Up to 8	4 x 6	6 x 6	4 x 6	6 x 6	6 x 6	4	6 x 8	4		4 x 6			
	Up to 10	6 x 6	6 x 6	6 x 6	6 x 6	6 x 6	4	8 x 8	4			4 x 8		
	Up to 12	6 x 6	6 x 6	6 x 6	6 x 6	6 x 6	4	8 x 10	4		4 x 6		4 x 10	
15 to 20	Up to 6	6 x 6	6 x 6	6 x 6	6 x 6	6 x 6	4	6 x 8	4	3 x 6				
	Up to 8	6 x 6	6 x 6	6 x 6	6 x 6	6 x 6	4	8 x 8	4	3 x 6	4 x 12			
	Up to 10	6 x 6	6 x 6	6 x 6	6 x 6	6 x 8	4	8 x 10	4	3 x 6				
	Up to 12	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	4	8 x 12	4	3 x 6	4 x 12			
Over 20	See Note 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE 6
Timber Trench Shoring -- Minimum Timber Requirements*
Soil Type B $P_a = 45 \times H + 72$ psf (2 ft. Surcharge)

Size (Actual) and Spacing of Members**													
Depth of Trench (feet)	Cross Braces						Wales			Uprights			
	Horizontal Spacing (feet)	Width of Trench (feet)					Vert. Spacing (feet)	Size (inches)	Vert. Spacing (feet)	Maximum Allowable Horizontal Spacing (feet)			
		Up to 4	Up to 6	Up to 9	Up to 12	Up to 15				Close	4	5	6	8
5 to 10	Up to 6	4 x 6	4 x 6	4 x 6	6 x 6	6 x 6	5	6 x 8	5			3 x 12		4 x 12
	Up to 8	4 x 6	4 x 6	6 x 6	6 x 6	6 x 6	5	8 x 8	5			4 x 8	4 x 8	
	Up to 10	4 x 6	4 x 6	6 x 6	6 x 6	6 x 8	5	8 x 10	5			4 x 8		
	See Note 1													
10 to 15	Up to 6	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	5	8 x 8	5	3 x 6	4 x 10			
	Up to 8	6 x 8	6 x 8	6 x 8	8 x 8	8 x 8	5	10 x 10	5	3 x 6	4 x 10			
	Up to 10	6 x 8	6 x 8	8 x 8	8 x 8	8 x 8	5	10 x 12	5	3 x 6	4 x 10			
	See Note 1													
15 to 20	Up to 6	6 x 8	6 x 8	6 x 8	6 x 8	8 x 8	5	8 x 10	5	4 x 6				
	Up to 8	6 x 8	6 x 8	6 x 8	8 x 8	8 x 8	5	10 x 12	5	4 x 6				
	Up to 10	8 x 8	8 x 8	8 x 8	8 x 8	8 x 8	5	12 x 12	5	4 x 6				
	See Note 1													
Over 20	**See Note 1**													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE 7
Timber Trench Shoring -- Minimum Timber Requirements*
Soil Type C $P_a = 80 \times H + 72$ psf (2 ft. Surcharge)

Size (Actual) and Spacing of Members**										
Depth of Trench (feet)	Cross Braces						Wales			Uprights
	Horizontal Spacing (feet)	Width of Trench (feet)					Vert. Spacing (feet)	Size (inches)	Vert. Spacing (feet)	Maximum Allowable Horizontal Spacing (feet)
		Up to 4	Up to 6	Up to 9	Up to 12	Up to 15				Close
5 to 10	Up to 8	6 x 6	6 x 6	6 x 6	6 x 6	8 x 8	5	8 x 8	5	3 x 6
	Up to 8	6 x 6	6 x 6	6 x 6	8 x 8	8 x 8	5	10 x 10	5	3 x 6
	Up to 8	6 x 6	6 x 6	8 x 8	8 x 8	8 x 8	5	10 x 12	5	3 x 6
	See Note 1									
10 to 15	Up to 6	6 x 8	6 x 8	6 x 8	8 x 8	8 x 8	5	10 x 10	5	4 x 6
	Up to 8	8 x 8	8 x 8	8 x 8	8 x 8	8 x 8	5	12 x 12	5	4 x 6
	See Note 1									
	See Note 1									
15 to 20	Up to 8	8 x 8	8 x 8	8 x 8	8 x 10	8 x 10	5	10 x 12	5	4 x 6
	See Note 1									
	See Note 1									
	See Note 1									
Over 20	**See Note 1**									

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE 8
Aluminum Hydraulic Shoring
Vertical Shores For Soil Type B

Depth of Trench (feet)	Hydraulic Cylinders				
	Spacing (feet)		Width of Trench (feet)		
	Maximum Horizontal	Maximum Vertical	Up to 8	Over 8 Up to 12	Over 12 Up to 15
Over 5, Up to 10	8	4	2 Inch Diameter	2 Inch Diameter (See Note 2)	3 Inch Diameter
Over 10, Up to 15	6.5				
Over 15, Up to 20	5.5				
Over 20	See Note 1				

Footnotes to tables and general notes on hydraulic shoring are found in Appendix D, Item (g).

Note 1: See Appendix D, Item (g)(1).
Note 2: See Appendix D, Item (g)(2).

TABLE 9
Aluminum Hydraulic Shoring
Vertical Shores For Soil Type A

Depth of Trench (feet)	Hydraulic Cylinders				
	Spacing (feet)		Width of Trench (feet)		
	Maximum Horizontal	Maximum Vertical	Up to 8	Over 8 Up to 12	Over 12 Up to 15
Over 5, Up to 10	8	4	2 Inch Diameter	2 Inch Diameter (See Note 2)	3 Inch Diameter
Over 10, Up to 15	8				
Over 15, Up to 20	7				
Over 20	See Note 1				

Footnotes to tables and general notes on hydraulic shoring are found in Appendix D, Item (g).

Note 1: See Appendix D, Item (g)(1).
Note 2: See Appendix D, Item (g)(2).

TABLE 10
Aluminum Hydraulic Shoring
Waler Systems for Soil Type B

Depth of Trench (feet)	Hydraulic Cylinders								Timber Uprights		
	Wales		Width of Trench (feet)						Max. Horizontal Spacing (On Center)		
			Up to 8		Over 8, Up to 12		Over 12, Up to 15				
	Vertical Spacing (feet)	Section Modules (Inches^3)	Horizontal Spacing	Cylinder Diameter	Horizontal Spacing	Cylinder Diameter	Horizontal Spacing	Cylinder Diameter	Solid Sheet	2 Feet	3 Feet
Over 5, Up to 10	4	3.5	8.0	2 Inches	8.0	2 Inches (see Note 2)	8.0	3 Inches	---	---	3 x 12
		7.0	9.0	2 Inches	9.0	2 Inches (see Note 2)	9.0	3 Inches			
		14.0	12.0	3 Inches	12.0	3 Inches	12.0	3 Inches			
Over 10, Up to 15	4	3.5	6.0	2 Inches	6.0	2 Inches (see Note 2)	6.0	3 Inches	---	3 x 12	---
		7.0	8.0	3 Inches	8.0	3 Inches	8.0	3 Inches			
		14.0	10.0	3 Inches	10.0	3 Inches	10.0	3 Inches			
Over 15, Up to 20	4	3.5	5.5	3 Inches	5.5	2 Inches (see Note 2)	5.5	3 Inches	3 x 12	---	---
		7.0	6.0	3 Inches	6.0	3 Inches	6.0	3 Inches			
		14.0	9.0	3 Inches	9.0	3 Inches	9.0	3 Inches			
Over 20	**See Note 1**										

Footnotes to tables and general notes on hydraulic shoring are found in Appendix D, Item (g).

Note 1: See Appendix D, Item (g)(1).
Note 2: See Appendix D, Item (g)(2).

* Consult product manufacturer and/or qualified engineer for Section Modules of available wales.

TABLE 11
Aluminum Hydraulic Shoring
Waler Systems for Soil Type C

Depth of Trench (feet)	Hydraulic Cylinders								Timber Uprights		
	Wales		Width of Trench (feet)						Max. Horizontal Spacing (On Center)		
			Up to 8		Over 8, Up to 12		Over 12, Up to 15				
	Vertical Spacing (feet)	Section Modules (Inches^3)	Horizontal Spacing	Cylinder Diameter	Horizontal Spacing	Cylinder Diameter	Horizontal Spacing	Cylinder Diameter	Solid Sheet	2 Feet	3 Feet
Over 10, Up to 15	4	3.5	4.0	2 Inches	4.0	2 Inches (see Note 2)	4.0	3 Inches	3 x 12	---	---
		7.0	5.5	3 Inches	5.5	3 Inches	5.5	3 Inches			
		14.0	8.0	3 Inches	8.0	3 Inches	8.0	3 Inches			
Over 15, Up to 20	4	3.5	3.5	2 Inches	3.5	2 Inches (see Note 2)	3.5	3 Inches	3 x 12	---	---
		7.0	5.0	3 Inches	5.0	3 Inches	5.0	3 Inches			
		14.0	6.0	3 Inches	6.0	3 Inches	6.0	3 Inches			
Over 20	**See Note 1**										

Footnotes to tables and general notes on hydraulic shoring are found in Appendix D, Item (g).

Note 1: See Appendix D, Item (g)(1).
Note 2: See Appendix D, Item (g)(2).

* Consult product manufacturer and/or qualified engineer for Section Modules of available wales.

FIGURE NO. 1

VERTICAL ALUMINUM
HYDRAULIC SHORING
(SPOT BRACING)

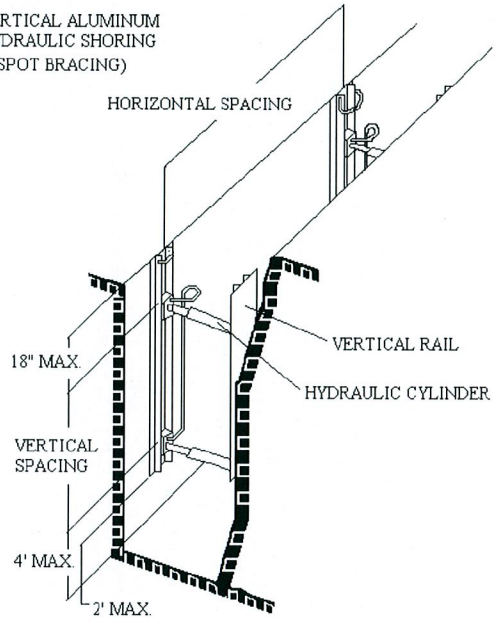


FIGURE NO. 2

VERTICAL ALUMINUM
HYDRAULIC SHORING
(WITH PLYWOOD)

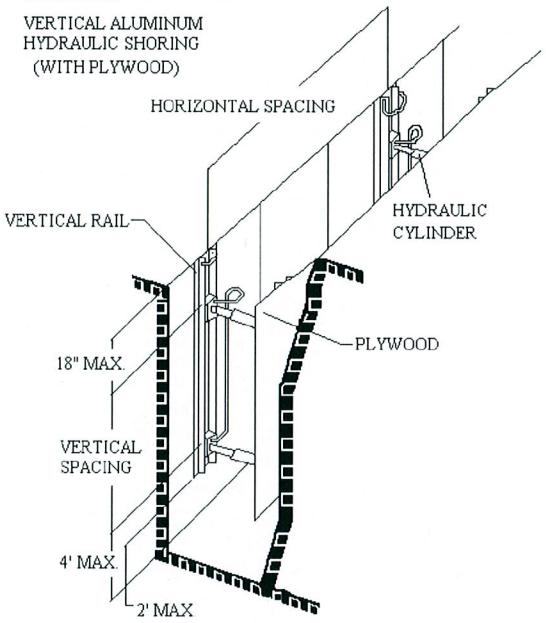


FIGURE NO. 3

VERTICAL ALUMINUM
HYDRAULIC SHORING
(STACKED)

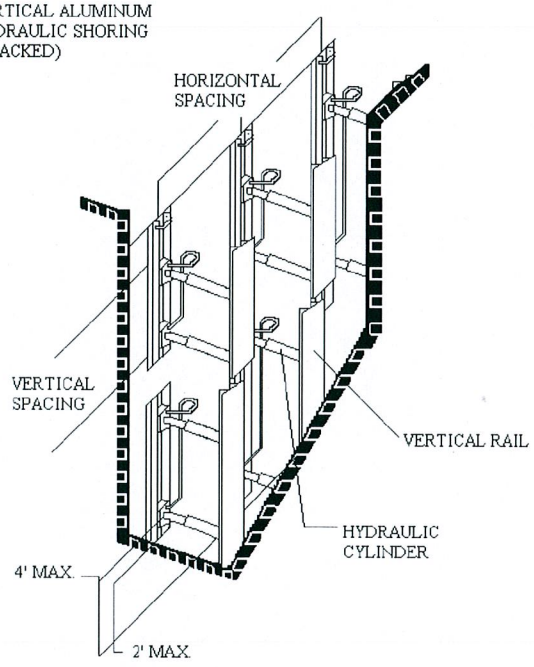
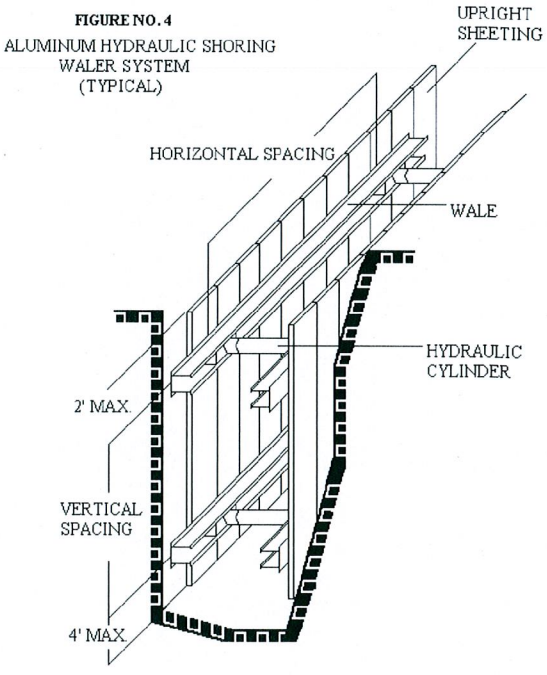


FIGURE NO. 4

ALUMINUM HYDRAULIC SHORING
WALER SYSTEM
(TYPICAL)



Appendix C

Community Air Monitoring Plan (CAMP)

Community Air Monitoring Plan (CAMP)

Brownfield Site Cleanup
425 & 435 Mt Hope Ave
and 562 Ford St
Rochester, New York
NYSDEC Spill No. 0070378

O'Brien & Gere Project Number: 11862/43868

City Agreement Number: 032176

City of Rochester
Department of Environmental Services
Division of Environmental Quality
30 Church Street
Rochester, New York 14604

February 2, 2009

O'BRIEN & GERE

TABLE OF CONTENTS

List of Exhibits

1.0 Introduction

This Community Air Monitoring Plan (CAMP) has been prepared by O'Brien & Gere on behalf of the City of Rochester Division of Environmental Quality (City). This CAMP addresses potential volatile organic compound (VOC) and particulate air quality issues which may arise during planned remedial activities at the 425 and 435 Mt Hope Ave and 562 Ford Street Brownfield Site located in the City of Rochester, Monroe County, New York (the "Site). This CAMP and the monitoring, response and action levels presented herein are adapted from the New York State Department of Health (NYSDOH) *Generic Community Air Monitoring Plan* presented in the New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation *DRAFT DER-10 Technical Guidance for Site Investigation and Remediation, December 2002.* (DER-10). The generic NYSDOH CAMP is presented for reference here as Exhibit A.

The remedial activities planned during the project include the stripping and stockpiling of topsoil, excavation and off Site disposal of petroleum-impacted soil/fill, installation of an oxygen injection remedial system, ground water monitoring well decommissioning and installation, and soil and ground water sampling.

Based on previous studies completed at the Site and the Site's history (i.e., former automobile repair and gasoline dispensing station), the primary chemicals of concern at the Site are petroleum constituents. Disturbance of soils and/or ground water could result in volatilization of organic compounds and fugitive dust releases to the ambient air that may create possible nuisance or health threats to the surrounding neighborhood.

This CAMP details real-time monitoring activities to be carried out during the project, to minimize the potential for neighborhood exposure to airborne hazards resulting from fugitive emissions.

Air monitoring and response actions for VOCs and particulates are included in this CAMP. Air monitoring described herein is not intended to establish action levels to protect Site workers, rather its intent is to provide a measure of protection for the surrounding community. Additional VOC and particulate monitoring will be conducted within the Work Zone during specific field activities to protect the health and welfare of Site workers. This monitoring will be conducted in accordance with the Site specific Health and Safety Plan (HASP) prepared by O'Brien & Gere.

2.0 Methodology

The remediation activities at the Site will consist primarily of the stripping and stockpiling of topsoil, excavation and off Site disposal of petroleum-impacted soil/fill, installation of an oxygen injection remedial system, ground water monitoring well decommissioning and installation, and soil and ground water sampling. The following programs will be implemented to monitor and, if necessary, control the potential migration of fugitive VOCs and particulates at the Site.

Continuous real time monitoring will be required for all ground intrusive activities. Ground intrusive activities are anticipated to include:

- Stripping and stockpiling of topsoil,
- excavation and loading of petroleum impacted soils, and
- drilling or installation of test pits, soil borings or ground water 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 ground water samples from existing wells. Periodic monitoring during sampling may reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location.

2.1 Perimeter Monitoring

For each day of intrusive field work, a wind sock or flag will be used to monitor wind direction in the area of the Work Zone. Based upon the daily wind direction, two temporary monitoring points will be established at the perimeter of the Work Zone, one upwind and one downwind of the Work Zone.

2.1.1. VOC Monitoring

VOC monitoring will be done with a photoionization detector (PID-MiniRAE Model 2000 or its equivalent) fitted with a 10.6 eV lamp. Prior to the commencement of field work each day, background measurements of VOC concentrations will be logged at the upwind and downwind locations. Thereafter, readings will be recorded at approximate 15-minute intervals. These readings will be used to observe the difference between upwind and downwind VOC levels. If at any time, the downwind VOC levels exceed upwind levels (adjusted for engine exhaust) by 5 ppm (sustained), the work will be temporarily halted. The Contractor will then be required to implement the means necessary to control VOCs, similar to those discussed in Section 2.3.

2.1.2. Particulate Monitoring

Particulate monitoring will be done with a real time particulate meter (PDR 1000 or its equivalent) capable of monitoring particulate matter less than 10 microns in size (PM-10). Prior to the commencement of field work each day, background measurements of particulate levels will be logged at the upwind and downwind locations. The equipment will be set up to log particulate concentrations continuosly while intrusive field work is being conducted. Readings and visual observations will be recorded on the appropriate field log at approximate 15-minute intervals. The appopriate field log is presented in Appendix C of the CAP. If the downwind PM-10 particulate level is 100 micrograms per

cubic meter (mcg/m^3) greater than background (upwind perimeter) for a 15-minute average period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed.

Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

2.2 Work Zone Monitoring

In addition to perimeter monitoring, monitoring for VOCs, particulates and explosive gases will be carried out continuously within the Work Zone to monitor personal exposures and to compare work area readings with downwind and upwind readings. The first readings of the day will be obtained prior to the commencement of work to obtain daily background readings. Readings will be logged along with the perimeter measurements. Specific monitoring procedures to be used in the Work Zone can be found in the HASP prepared for this Site.

2.3 Minor Vapor Emissions Response Plan

If the ambient air concentration of total organic vapors exceeds 5 ppm (sustained) above the background at the perimeter of the work area, activities will be halted and monitoring continued.

If the total organic vapor level decreases below 5 ppm above background, work activities can resume, with emphasis given to observing spikes in levels. If the total organic vapor levels are greater than 5 ppm over background but less that 25 ppm over background at the perimeter of the work area, activities can resume provided the organic level 200 ft. downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over the background. (The locations of structures in the subject neighborhood may not allow the 200 ft. buffer zone to be used).

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to evaluate if the vapor emission levels exceed those specified in Section 2.4, Major Vapor Emission Response Plan.

2.4 Major Vapor Emission Response Plan

If total organic vapor levels greater than 5 ppm over background are identified 200 ft. downwind from the work area or half the distance to the nearest residential or commercial structure, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, total organic vapor levels greater than 5 ppm above background persist 200 ft. downwind or half the distance to the nearest residential or commercial structure, then the air quality must be monitored within 20 ft. of the perimeter of the nearest residential or commercial structure (20-foot zone).

If efforts to abate the emission source area are unsuccessful and if the organic vapor levels continue to persist at or near 5 ppm above background for more than 30 minutes in the 20-foot zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect.

The Major Vapor Emission Response Plan shall also be immediately placed into effect if organic vapor levels are greater than 10 ppm above background at the 20-foot zone.

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in the HASP will be contacted.
2. The local police authorities will immediately be contacted by the Safety Officer and advised of the situation. Evacuation or neighborhood notification plans can be discussed at that time.
3. Air monitoring will be conducted at 30-minute intervals within the 20-foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site Safety Officer.

3.0 Record Keeping and Quality Control

For the duration of the field activities, a monitoring log book will be kept to record calibration, operational notes and monitoring readings. All readings must be recorded and available for State review. Instantaneous readings, if any, used for decision purposes should also be recorded. O'Brien & Gere will incorporate the results of the Community Air Monitoring Program into the required reports.

Instrumentation will be calibrated and/or operationally checked, either daily or at intervals recommended by the manufacturer. Only approved calibration gases will be used. All operators will have been trained in the proper use, maintenance, limitation, and interpretation of results of the monitoring equipment.

EXHIBIT A

NYSDOH Generic Community Air Monitoring Plan

APPENDIX 1A

New York State Department of Health
Generic Community Air Monitoring Plan

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

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

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

Community Air Monitoring Plan

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

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

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

VOC Monitoring, Response Levels, and Actions

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

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

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

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