



Transmittal

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Attachment:

Copies	Doc Date	Pages	Description
1	January 5, 2015	234	Document titled "Corrective Action Plan, Petroleum-Impacted Soil, 937 Genesee Street, Rochester, NY, NYSDC Spill No. 1206397

Mike – Attached is the referenced document for your review and comment. If you have questions contact me at any time.

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Design with community in mind

**Corrective Action Plan
Petroleum-Impacted Soil
937 Genesee Street
Rochester, NY
NYSDEC Spill No.
1206397**



Prepared for:

New York State Department of
Environmental Conservation
Division of Environmental
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January 2016

Executive Summary

This Corrective Action Plan (CAP) provides the details of proposed environmental remediation of petroleum-impacted soil and groundwater at the City of Rochester (City)-owned property located at 937-941 Genesee Street (referred to herein as "the Site"). Previous investigations at the Site have identified soil and groundwater impacted with petroleum-related contamination at levels in excess of applicable regulatory cleanup standards. The remediation is being performed as part of the City's Brownfield Cleanup Grant from the United States Environmental Protection Agency (EPA), and the work is being jointly funded by the EPA and the City.

The Site has been assigned Spill File No. 1206397 by the New York State Department of Environmental Conservation (NYSDEC) based on the presence of the petroleum impacts found. The City has entered into a Stipulation Agreement with the NYSDEC for cleanup at the Site. NYSDEC will provide review and approval of this Work Plan and oversight of the project.

The goal of the project is to remediate subsurface petroleum impacts sufficiently to facilitate closure of the NYSDEC Spill File for the Site, and to facilitate future sale and development of the property. This CAP provides details on a proposed cleanup program that will include:

- A Citizen Participation/Public Outreach Program;
- Demolition of remaining building remnants;
- Impacted soil excavation;
- Offsite landfill disposal of excavated soils;
- Source area groundwater management/treatment;
- *In situ* bioremediation of remaining impacts in groundwater;
- Followup groundwater monitoring;
- Excavation backfill, Site restoration and related activities; and
- Documentation and reporting.

In addition, an Environmental Management Plan and other institutional controls will be developed and assigned to the property, related to minor soil and/or groundwater impacts that may remain after completion of the remedial program.

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1.0 INTRODUCTION

On behalf the City of Rochester (the City), Stantec Consulting Services Inc. (Stantec) has prepared this Corrective Action Plan (CAP) to perform environmental remediation of petroleum-impacted soil at the property located at 937-941 Genesee Street (referred to herein as "the Site"). The location of the Site is shown on the attached Site Location Map (Figure 1).

The environmental remediation project is being performed as part of the City of Rochester's (City's) Brownfield Cleanup Grant (Agreement No. BF-96290614-0) from the United States Environmental Protection Agency (EPA). The work is being jointly funded by the EPA and the City. Activities eligible for EPA Cleanup Grant funding generally include remedial planning and work plan development, remedial measures and cleanup activities, restoration, performance monitoring, reports, documentation, and community involvement.

The remedial activities are subject to the conditions in the EPA Brownfield Assessment Cooperative Agreement Administrative Conditions. In addition, the Site has been assigned Spill File No. 1206397 by the New York State Department of Environmental Conservation (NYSDEC) based on the presence of the petroleum impacts found. The City has entered into a Stipulation with the NYSDEC for cleanup at the Site.

The goal of the project is to remediate subsurface petroleum impacts sufficiently to facilitate closure of the NYSDEC Spill File for the Site, and to facilitate future sale and development of the property. This CAP provides details on a proposed cleanup program including demolition of remaining building remnants, impacted soil excavation and offsite disposal, groundwater management, excavation backfill, Site restoration and related activities.

2.0 SITE BACKGROUND AND PREVIOUS INVESTIGATIONS

The Site, which is owned by the City (Monroe County Tax ID No. 135.34-2-36) is located in a densely-developed area of mixed commercial and residential usage. The Site is a rectangular and generally level parcel approximately 0.25 acres in size.

As part of a larger area investigation of several parcels of property, a Phase I Environmental Site Assessment (ESA) was performed in 2002 for the Site by Stantec. The ESA revealed the following historical information:

- The 941 Genesee Street parcel was an auto repair garage during the time frame from approximately 1917 through 1942. Permit records indicated a 550-gallon gasoline tank and pump from 1938 through 1941; these were listed as being removed in 1943.
- 941 Genesee Street was also the site of a dry cleaner from 1947 through 2003, and dry cleaning site use appeared to continue until the 2009 demolition of the building on the Site by the City. Sanborn™ fire insurance rating maps from 1950 and 1971 showed a dry cleaning building with a pressing section, a cleaning section, and a boiler room. A City permit was maintained for a 250-gallon solvent tank at the Site from 1947 through 1961.

Stantec completed Phase II Investigations for the City in 2003 on the adjoining property to the north, 923-927 Genesee Street (see Figure 2). Those investigations identified low-level impacts in shallow fill soils containing apparent ash and cinder materials, but impact to groundwater or deeper soils along the common property boundary was not identified, suggesting that contaminants had not migrated off-site toward the north.

The Site had been tax delinquent for many years and eventually a fire damaged the building located on the 941 parcel. The City performed emergency demolition of the building in 2009. City staff involved with the demolition of the building observed a 55-gallon drum that was buried in the floor at the rear (western end) of the building that was filled with stone and had no sealed bottom. This feature was suspected to have been a dry well. The demolition included filling in the basement located beneath the front (east end) of the structure with imported fill soils to match existing grade. The building's floor slab and much of the wall footings were left in place.

The City obtained legal access to the Site in March 2011. Stantec then performed Phase II ESA (2011) and Supplemental Phase II ESA (2012) investigations on behalf of the City to evaluate soil and groundwater conditions on the Site and further evaluate the potential for off-site impacts. The following is a combined summary of the primary findings of these investigations:

- 19 test borings were performed and 10 groundwater monitoring wells were installed (nine overburden wells and one bedrock well).
- An approximate three-foot diameter manhole was identified in the western portion of the foundation slab (see location, Figure 2). The manhole was found to have a solid bottom and did not appear to have an outlet; however sampling of the contents of the manhole identified impacts above NYSDEC's Unrestricted Use Soil Cleanup Objectives (UUSCOs). Soil and groundwater sampling locations nearest the manhole and the former suspected drywell revealed the most significant impacts on the Site. This western area was identified as Remedial Area of Concern (RAOC) 1.

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- A second area of impact was identified on the eastern side of the Site centered on boring/well B-14/MW-14. The contamination in this area may have resulted from releases associated with the sewer that serviced the Site, the former gasoline tank and pump, or the former 250-gallon solvent tank. This eastern area was identified as RAOC 2.
- The impacts identified in RAOCs 1 and 2 primarily involve petroleum constituents typical of diesel fuel, kerosene, lubricating oil, and/or mineral spirits or Stoddard solvent (a known dry-cleaning agent). No chlorinated VOCs were identified at the Site.
- Overburden groundwater depths have ranged from approximately 8 to 10 feet below ground surface. The hydraulic gradient of the water table is relatively low, and flow was generally toward the east-northeast. The investigations completed have not indicated that contamination is migrating offsite.
- A shallow, variable layer of fill soil containing apparent ash and cinder materials is present on the Site. This shallow fill material was identified in the Phase II ESA reports as RAOC 3. Analysis of this material indicates that SVOC and metal concentrations, although above NYSDEC's UUSCOs or Restricted Residential SCOs (RRSCOs) for Brownfield sites, were consistent with concentrations typically observed in urban fill.

As a result of the findings of these investigations and the City's desire to return the Site to productive use, a Brownfields Cleanup Grant was awarded by the USEPA to the City for the remediation of soil and groundwater impacts at the Site. Details of the proposed remedial program are provided below.

3.0 PUBLIC PARTICIPATION

A public participation program will be implemented by the City for the proposed remediation, to provide the public with project-specific information regarding the benefits and potential community impacts resulting from the corrective actions. This program will include:

- Preparation and distribution of a written Citizen Participation Plan (CPP) (also known as a Citizen Involvement Plan) to be provided to project stakeholders including area residents, community groups and businesses (see copy, Appendix A);
- Preparation and distribution of one or more newsletters to provide surrounding community members and stakeholders with information about project activities;
- Providing project updates through the City's Project Web Site:
<http://www.cityofrochester.gov/937Genesee>.
- Distributing hard copies of reports and other project documents to the project's official document repository (Rochester Public Library, Main Branch).
- Addressing or responding to public comments; and
- Holding public meetings if appropriate to present and discuss the proposed project with adjacent property owners, community groups, and other stakeholders.

4.0 CORRECTIVE ACTION PLAN

This section provides a detailed description of the corrective actions to be taken at the Site. The remedial program will include the development and submittal of documents, public outreach activities and implementation of the proposed actions to complete the work in accordance with City, NYSDEC and USEPA requirements.

4.1 REMEDIAL OBJECTIVES

The primary objectives of this remediation project are as follows:

- Implement corrective actions to address petroleum-impacted soil and groundwater in two primary remedial areas of concern, RAOC 1 and RAOC 2. The urban fill identified previously as RAOC 3 will be allowed to remain onsite and will be addressed as part of an Environmental Management Plan (EMP) that will provide guidance for management of such material if disturbed by future Site activities;
- Excavate source-area soils and other media that are impacted with petroleum-related contaminants in excess of applicable SCO's and/or soils which exhibit nuisance characteristics, and transport and dispose these materials offsite;
- Remove (if encountered), treat, and discharge to the combined sewer impacted groundwater from the excavations;
- Perform *in-situ* bioremediation of groundwater by adding Oxygen Releasing Compound (ORC-A™) to the excavation prior to backfilling to further reduce contaminant concentrations to acceptable levels; and
- Obtain NYSDEC spill file closure and a "No Further Action" letter.

Other related objectives and tasks include:

- Removal of shallow, accessible, subsurface utilities and sub-slab structures associated with Site drainage and sewer systems;
- Partial demolition of remaining floor slabs and foundation remnants;
- Recycling of waste asphalt and concrete;
- Removal of some existing monitoring wells as needed for excavation work, and installation of new monitoring wells as needed for followup monitoring;
- Followup groundwater monitoring (minimum of four quarters, with additional as needed based on the first year results);
- Development of a Remedial Construction/Closure Report and an Environmental Management Plan; and
- Input of project data into USEPA's Assessment, Cleanup and Redevelopment Exchange System (ACRES) database.

4.2 RELATED PLANS

Supporting documents have been prepared to accompany this CAP, as listed below. These are contained in the referenced appendices:

- Health and Safety Plan (Appendix B) - A project-specific Health and Safety Plan (HASP) has been prepared in accordance with OSHA regulations. The remedial contractor will prepare a HASP for its own employees. All personnel involved directly in Site work, monitoring or sampling will have the proper OSHA HAZWOPER training commensurate with their project duties.
- Community Air Monitoring Program (Appendix C) - A Community Air Monitoring Plan (CAMP) has been prepared in accordance with the NYSDEC CAMP guidance and template.
- Quality Assurance Project Plan (Appendix D) - A Quality Assurance Project Plan (QAPP) has been prepared in general accordance with USEPA guidance.

4.3 PROPOSED REMEDIAL ACTIVITIES

This section provides a detailed description of each of the proposed remedial activities to be performed as part of the corrective action for the Site. The work will be performed by TREC Environmental Inc. of Spencerport, New York (Contractor) under the observation of Stantec and the City. Laboratory analyses will be performed by Eurofins Spectrum Analytical Inc. (Laboratory).

4.3.1 Planning, Mobilization and Security

Applicable clearances and permits will be obtained by the Contractor prior to mobilizing equipment to the Site. These include:

- Underground utility clearance obtained through DigSafelyNY;
- A hydrant use permit from the City of Rochester Bureau of Water to obtain potable water for decontamination and dust control; and
- A demolition permit from the City of Rochester to complete the remaining building slab and footing demolition/removal.

The Site currently contains several wooden bollards along the eastern edge of the property. Some of these bollards will be temporarily removed to facilitate access for equipment and vehicles. During the remedial work Site security will include installation of temporary construction fencing around the perimeter of the Site. This includes fencing placed across the eastern Site entrance which will be secured at the end of each working day. Fencing will also be installed around the perimeter of any open excavations at the end of each working day.

It is possible that, at times, one or more parking spaces on Genesee Street may need to be temporarily blocked off to facilitate safe truck entry and exit.

4.3.2 Impacted Soil Pre-characterization

The Site has limited space for stockpiling non-impacted and impacted materials during excavation. To facilitate direct loading into trucks of excavated material, the impacted soils will be pre-characterized, a waste profile will be developed and advanced disposal approval will be obtained from the disposal facility.

Prior to implementing excavation-related activities, samples of impacted soil will be obtained from each RAO for laboratory analysis. The samples will be obtained by advancing a soil boring in each RAO to obtain representative samples. Underground utility clearance will be obtained through DigSafelyNY prior to performing the drilling.

Further details on disposal of the impacted soils are provided in Section 4.3.6 below.

4.3.3 Demolition and Removal of Asphalt and Structure Remnants

Asphalt Paving: Existing asphalt pavement located within the limits of RAO 1 and RAO 2 will be stripped and removed. Based on the RAO footprints and the assumed area of disturbance for excavation, including benching, an estimated 1,100 sq ft of asphalt will be removed.

Based on observations during prior investigations, it is assumed that the asphalt is not impacted and can be transported to a local recycling facility.

Concrete Floor Slabs: The City demolished the previously-existing Site building in 2009; however the foundation footings and floor slabs were not removed at the time. The basement that existed beneath the eastern portion of the building was backfilled to existing grade with fill soils.

Two separate but adjacent floor slabs exist at slightly different elevations (see Figure 2). The slabs are assumed to contain reinforcement steel. Based on observations of thickness made during the Phase II ESA explorations and a combined total area of 3,200 sq ft of existing slabs, a total of approximately 65 cu yd of concrete are anticipated to be generated by at-grade slab demolition.

The manhole located near well MW-3 will be removed as part of the demolition activity. The manhole and its sediment contents (sampled and tested during the Phase II ESA) will be managed and disposed as impacted materials.

Test boring B-15 was drilled to a depth of 14.9 ft below ground surface (bgs) within the easternmost portion of the former building where the basement formerly existed. The boring encountered apparent bedrock fragments at or just above the refusal depth, indicating refusal was due to encountering the top of bedrock. No concrete slab was encountered. Accordingly, it is assumed that an intact slab is not present and therefore does not need to be removed in this part of the former structure.

Foundation Walls and Footings: Specific construction details of the former building foundation walls or footings are not known. Surface observations indicate that concrete block walls likely exist around the entire perimeter of the former building and also between

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each of the three individual building sections. For estimating purposes, we have assumed the walls of the eastern section (former full basement) extend to approximately 8 ft bgs, and the remaining footer walls extend to approximately 4 ft bgs. This equates to approximately 100 linear ft (LF) of full-depth walls, and 240 LF of shallow-depth walls. The nature of any footings that exist below the concrete walls is unknown.

The southern foundation walls are variably within approximately 4 to 8 ft of the adjacent building (943-945 Genesee Street) along much of the parcel boundary, and in the eastern portion, the basement walls of the former Site building are immediately proximal to the adjacent building's basement wall. Complete removal of the Site foundation walls along the southern boundary will be dependent on conditions encountered and the potential for damage to the adjacent structure due to Site foundation removal. This determination will be made in the field based on an assessment by a structural engineer at the time of excavation. In addition, it is proposed that pre- and post-demolition assessments of the condition of the adjacent structure be made by a structural engineer, assuming permission can be obtained from the property owner for access to the 943-945 parcel for inspection.

Although the former building foundation walls on the Site's western edge also abut the adjacent residential properties, there are no structures in close proximity to the property line on those parcels. One exception to this is a utility pole located at the southeastern corner of the property; complete removal of foundation walls there may not be possible due to potential for disturbance of the pole. If conditions are encountered in the field that contradict this assumption (such as excavation sidewall caving) modifications to that approach may be necessary.

It is assumed that removed concrete in areas outside RAOC 1 will be non-impacted and can be transported offsite for recycling. We understand that it is possible that where foundation walls intersect or abut impacted soil horizons in either of the RAOCs, contaminated concrete or block may be present. If apparently-contaminated concrete or block is encountered, it will be segregated from non-impacted material and managed and disposed of with similarly-contaminated soil or debris.

4.3.4 RAOC Excavation and Backfill Plan

RAOCs 1 and 2 will be excavated in general accordance with the recommendations of the ABCA. Figure 2 depicts the estimated limits of excavation for both RAOCs. Actual dimensions of the excavations may vary from that shown based on conditions encountered.

Stormwater Measures: Prior to excavation, measures will be taken to prevent stormwater runoff from transporting sediment beyond the Site property limits. This will consist of silt fence installed along portions of the property boundary where storm water can be expected to run off. This is primarily along the northern boundary and portions of the southern boundary of the Site.

Excavation: As discussed above, the asphalt and/or concrete located at the surface within each RAOC will be removed and recycled offsite prior to commencing excavation work. Portions of the foundation walls located within the RAOC excavation footprints may be

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removed in advance, or they may be removed concurrently with soil excavations in those areas.

Shallow, non-impacted soil and fill material in each RAOC will be removed and stockpiled for potential reuse as backfill (pending laboratory analyses to demonstrate acceptability).

The limits of the RAOC excavations will be established using visual observations and olfactory indications and PID screening. It is anticipated that gray bleaching, black staining and petroleum odors will be indicative of the presence of contamination; however, given the variation of petroleum types that have been identified on-site, in the absence of any of these a PID reading exceeding 10 ppm will also be used initially as a screening criterion for segregating impacted versus non-impacted soils. The PID screening level may be adjusted as necessary and appropriate, with City and NYSDEC concurrence.

Excavation benching will be performed around the perimeter of the RAOCs to establish stable sidewalls within the confines of the Site boundaries. The potential benching configuration is indicated on Figure 1 and is subject to change based on field conditions. It should be noted that the proposed bench configuration is not designed to conform to OSHA excavation guidelines, since personnel will not be entering the excavations once their dimensions exceed those required for safe entry and egress, or after contaminated material is encountered. If significant caving occurs, additional benching will be performed as needed to stabilize sidewalls.

The actual vertical and lateral dimensions of the excavations will depend on the conditions encountered in the field. The table below summarizes estimated excavation dimensions, and volumes for impacted soil and overlying non-impacted materials, based on laboratory results, field PID screening and observations such as staining and odors, as summarized in the Phase II ESA reports:

Area	Estimated Lateral Dimensions and Top and Bottom Depth of Contaminated Material	Estimated volume of Impacted Material for Removal (cy)	Estimated volume of Non-Impacted Soil for Removal (cy)
RAOC 1	<u>North section</u> 25 ft x 25 ft, 4-14 ft. deep <u>South section</u> 15 ft x 25 ft, 3-12 ft deep	357	203
RAOC 2	<u>North section</u> 12.5 ft x 15 ft, 3-13 ft deep <u>South section</u> 12.5 ft x 15 ft, 6-13 ft deep	118	142

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If significant nuisance odors are present during excavation and soil handling, Biosolve® or a similar vapor suppressant will be utilized in the excavation and on stockpiled material as needed.

Non-impacted soils will be segregated and stockpiled onsite (in the approximate area shown on Figure 1) for future use as excavation backfill. This material will be placed on and covered with polyethylene sheeting. The sheeting will be secured to prevent disturbance or erosion by wind and water.

The final approximate geometry of the excavations will be documented with GPS equipment with sub-meter accuracy for incorporation into GIS-based Site mapping.

Confirmatory sampling: Samples will be collected for laboratory analysis from excavation sidewalls and bottoms to confirm that sufficient removal of impacted soil has been achieved. Sample locations and frequency will be determined based on sidewall lengths and excavation areas, at a rate of one sample per 30 linear ft of sidewall and one bottom sample for every 900 sq ft of bottom area. Confirmation samples from RAOC 1 and RAOC 2 will be analyzed for the analyte classes listed below.

- Total Petroleum Hydrocarbons (TPH), USEPA Method 8015D;
- Part 375 and NYSDEC CP-51 List volatile organic compounds (VOCs) plus Tentatively Identified Compounds (TICs), USEPA Method 8260C; and
- PART 375 and NYSDEC CP-51 List Semivolatile Organic Compounds (SVOCs) plus TICs, USEPA Method 8270D.

Reporting of results for final confirmation samples will be performed using ASP Category B deliverables. A data usability summary report (DUSR) will be generated by a data validator independent of the Laboratory for each data report.

Confirmation sample results will be compared to NYSDEC's SCOs for Restricted Residential usage and Protection of Groundwater, as contained in 6 NYCRR Part 375, and supplemental SCOs contained in NYSDEC's CP-51 Soil Cleanup Guidance document, prior to backfilling the excavation. In the event that the results of a confirmation sample do not meet SCOs, NYSDEC and the City will be consulted regarding potentially extending excavation limits; however this may not be possible depending on proximity to property lines, adjacent structures, sidewalks, etc.

4.3.5 Groundwater and Stormwater Management:

Excavation in both RAOCs is anticipated to extend below the water table, based on the historic observed water levels in onsite wells (approximately 8-10 ft bgs). Accordingly, it will be necessary to manage and contain groundwater and potentially rainwater accumulating in the excavation, due to the potential for contaminant presence. The Contractor will be equipped with the necessary pumps, hoses, drums and a storage tank to pump and contain water. If the work is performed during freezing weather, the Contractor will have the necessary heating equipment for the storage tank to prevent freezing of the water.

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Based on previous groundwater sampling results it is anticipated that the contaminant concentrations will be low enough (to be demonstrated through sampling and analysis) to allow discharge of the water to the combined sewer under a Short-Term Discharge Permit from the Monroe County Department of Environmental Services (MCDES). It is also assumed that no separate-phase product will be present, and that pre-treatment will not be required for the water.

A sample of the containerized water will be obtained and analyzed on a rapid turnaround basis (estimated 48 hours) to facilitate tank discharge and demobilization while the Contractor is still onsite. The results will be submitted to MCDES for approval and Stantec will coordinate with MCDES relative to its preferred discharge point.

4.3.6 Excavation Backfill

Onsite soils will be used as backfill in the excavation(s) first before utilizing imported soils. We have assumed that approximately 345 cy of material will be generated for potential reuse onsite. The remaining fill will be obtained from a stockpile of clean granular soil currently located at the City's Colfax yard.

Backfill will be placed in 1 to 2-ft. lifts and compacted. In the deeper reaches of the excavations it will not be possible to place personnel and compaction equipment due to safety concerns, and therefore the excavator bucket will be used for compaction of the deeper backfill. Once the excavation depth has been reduced sufficiently, backfill compaction will be accomplished in lifts with a vibratory roller.

A minimum of 2 in. of topsoil from a commercial source will be placed at the surface of RAOC 2 level with the existing grade, seeded and covered with straw mulch by hand.

4.3.7 Waste Recycling and Disposal

Waste streams are anticipated to include:

- Concrete
- Asphalt
- Petroleum-impacted soil
- Manhole contents
- Wastewater

As indicated above, it is assumed removed asphalt and concrete will be acceptable for recycling. Based on previous analytical results and the small volume of this material, the manhole and its contents will be added to the impacted soil waste stream for offsite disposal.

It is anticipated that impacted soils will be acceptable for disposal at Waste Management's (WM) Mill Seat Landfill located on Brew Road in Bergen, New York. Previous correspondence with WM has indicated the material will be acceptable provided toxicity characteristic leaching procedure (TCLP) analysis for lead will show acceptable levels.

The wastewater will be temporarily containerized and then tested and disposed under a permit with MCDES as described in Section 4.3.5 above.

4.3.8 Monitoring Well Decommissioning and Replacement

The Site currently has nine overburden wells and one bedrock well. Three overburden wells are located outside the anticipated limits of excavation: MW-7, MW-12 and MW-13. MW-7 and MW-13 are located within the limits of the existing floor slab, which will be demolished; accordingly, these wells will be removed prior to demolition. Well MW-12, although not currently proposed to be included in the future groundwater monitoring program, may eventually be useful in demonstrating clean groundwater conditions for Site spill file closure, and thus will not be decommissioned.

Bedrock well MW-19D is located within the proposed RAOC 2 excavation footprint and therefore will require removal. Since no impacts were observed in this well, it will be decommissioned in advance and not replaced. It will be decommissioned by removing the PVC well casing and screen, washing out the open rock hole and tremie-grouting the well to the surface. The steel outer casing will then be cut off at least 5 ft below grade and abandoned.

The following list summarizes the remaining six overburden wells that fall within anticipated excavation limits, and the observed contaminant presence (above or below NYSDEC groundwater standards):

<u>RAOC 1</u>	<u>Contaminant Presence</u>
MW-3	Above standards
MW-6	Above "
MW-9	Below "
MW-11	Below "
 <u>RAOC 2</u>	 <u>Contaminant Presence</u>
MW-14	Above standards
MW-18	Below "

Each of these wells will be removed during the excavation activities; however, only those wells that have shown significant impact will be replaced: MW-3/MW-6 in RAOC 1, and MW-14 in RAOC 2. The replacement wells will be installed after backfilling is complete using a Geoprobe® rig. Each overburden well will consist of 1-in diameter PVC casing and approximately 10-ft of well screen. New flush-mounted surface completions will be installed for each new well. All new and existing well casings will be surveyed for accurate elevations. The wells will be developed upon completion.

4.3.9 In-situ Groundwater Treatment and Monitoring

Although source-area groundwater will be removed and disposed as part of the excavation activities, residual groundwater contamination may remain after backfill is performed. In accordance with the ABCA recommendations, in-situ remediation will be performed to facilitate further reduction of contaminant levels in groundwater. To accomplish this, Oxygen Releasing Compound-Advanced™ (ORC-A™; manufactured by Regenesys) will be

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added to the excavation prior to backfill. The ORC-A™ will be placed in dry form and spread evenly in each excavation below the water table depth before backfill soils are placed.

Based on the contaminant levels observed during the Phase II ESAs, the area of impacts, and recommendations from Regenesis, approximately 275 lbs and 225 lbs will be placed in RAOC 1 and RAOC 2, respectively. Groundwater sampling will be performed subsequent to the ORC-A™ application and replacement well installations. At this time it is anticipated that a groundwater monitoring program consisting of four rounds of quarterly sampling will be performed. The first round of sampling will be performed approximately three months after excavation and backfill are complete.

Three wells will be sampled: the two replacement wells installed in RAOC 1 (MW-3 and MW-6) and the one replacement well installed in RAOC 2 (MW-14). The sampling will be performed using bailers or low-flow methodology to facilitate accurate measurement of the field parameters dissolved oxygen (DO) and oxidation-reduction potential (ORP). Samples will be submitted to an ELAP-certified laboratory for the following analyses:

- Part 375 and CP-51 List VOCs plus TICs, USEPA Method 8260C;
- Part 375 and CP-51 List SVOCs plus TICs, USEPA Method 8270D; and
- TPH, USEPA Method 8015D.

The data and findings will be included in the Remedial Construction/Closure Report (see Section 4.4 below). A DUSR will only be generated for the final round of groundwater sampling.

4.4 DOCUMENTATION AND REPORTING

This section provides a summary of reporting to be performed after Corrective Actions are performed. The reporting will provide documentation of remediation performed, residual contamination presence, institutional controls and other aspects of the project.

4.4.1 Remedial Construction/Closure Report

A Remedial Construction/Closure Report (RCCR) will be developed that will summarize the remedial program details, including the first quarterly round of followup groundwater sampling performed.

The remedial activities will be documented in a Remedial Construction/Closure Report (RCCR). A draft RCCR will be submitted to NYSDEC and NYSDOH for review within 90 days of the completion of remedial activities. The primary elements of the report will include:

- A description of remedial activities, including excavation, groundwater management, soil disposal, backfill and Site restoration;
- Waste disposal documentation;
- Data usability summary reports (DUSRs) for final soil confirmation samples and samples of imported soils;

**CORRECTIVE ACTION PLAN
PETROLEUM-IMPACTED SOIL
937 GENESEE STREET
ROCHESTER, NY**

- GIS-based drawings showing the final limits of excavation, sample locations, well locations, areas of remaining contamination (if present) etc;
- Photographs; and
- New York State Professional Engineer Certification.

4.4.2 Environmental Management Plan

After the remedial actions have been completed, relatively minor amounts of low-level residual contamination may remain in soil and groundwater beneath the Site. Accordingly, Institutional Controls will be implemented for the Site. These will consist of:

- The property will be flagged in the City's Building Information System (BIS) database relative to potential residual environmental impacts.
- In conjunction with the BIS flag, a written Environmental Management Plan (EMP) document will be developed that will provide guidance for future Site activities that may result in subsurface disturbance, such as drilling, excavation, Site grading, etc. The EMP will be developed in general accordance with applicable portions of NYSDEC's Site Management Plan development guidance, and will provide:
 - A summary of the environmental investigations performed;
 - A description of Site conditions at the time of completion of the remedial actions, including areas and concentrations of known residual soil impacts;
 - Site plan(s) showing remediation-related features, monitoring wells, etc.;
 - A summary of groundwater flow conditions, contaminant levels and the ongoing groundwater monitoring program requirements;
 - The appropriate precautions and procedures to be followed in the event that impacted soil or groundwater are encountered during Site development activities, including field screening, and soil/groundwater testing, handling and disposal; and
 - Engineering controls. This is anticipated to include a generic description of a vapor intrusion mitigation (sub-slab depressurization) system.

4.4.3 USEPA ACRES Database

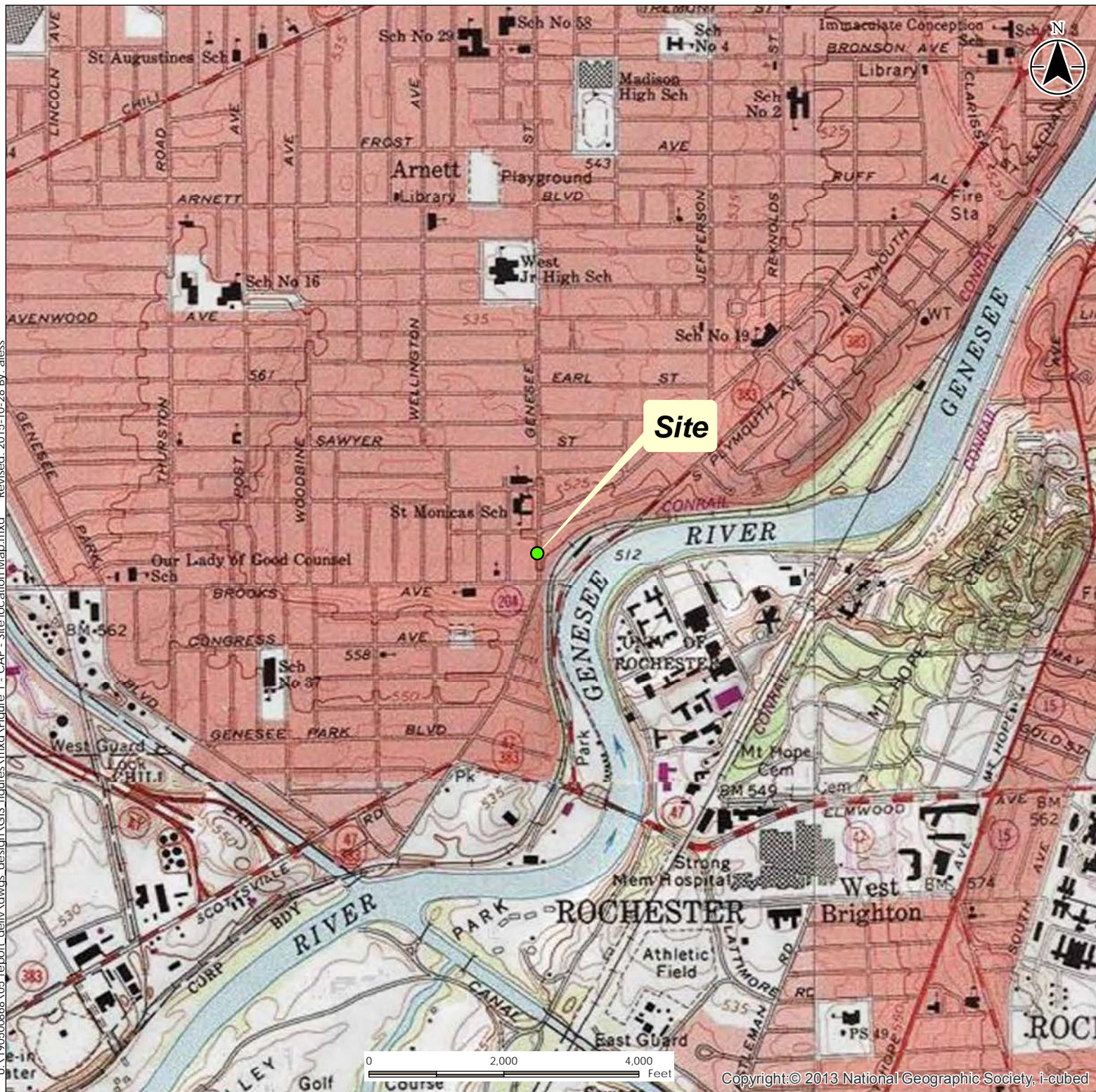
An account for the Site will be created on the USEPA online ACRES database. Applicable project/Site information will be entered and periodically updated as appropriate during the course of the project up until the time the EMP is completed.

5.0 SCHEDULE

The attached Figure 3 provides the anticipated schedule for each major element of the project.

FIGURES

U:\190500868\05 report deliv\dwgs design\GIS figures\mxd\Figure 1 - CAP - Site location Map.mxd Revised: 2015-10-28 By: aless



Project Location: 937-941 Genesee Street
Rochester, NY
Prepared by APL on 2015-10-26
Technical Review by BM on 2015-10-26
Independent Review by MPS on 2015-10-26
190500868

Client/Project
City of Rochester
Corrective Action Plan
937-941 Genesee Street

Figure No.

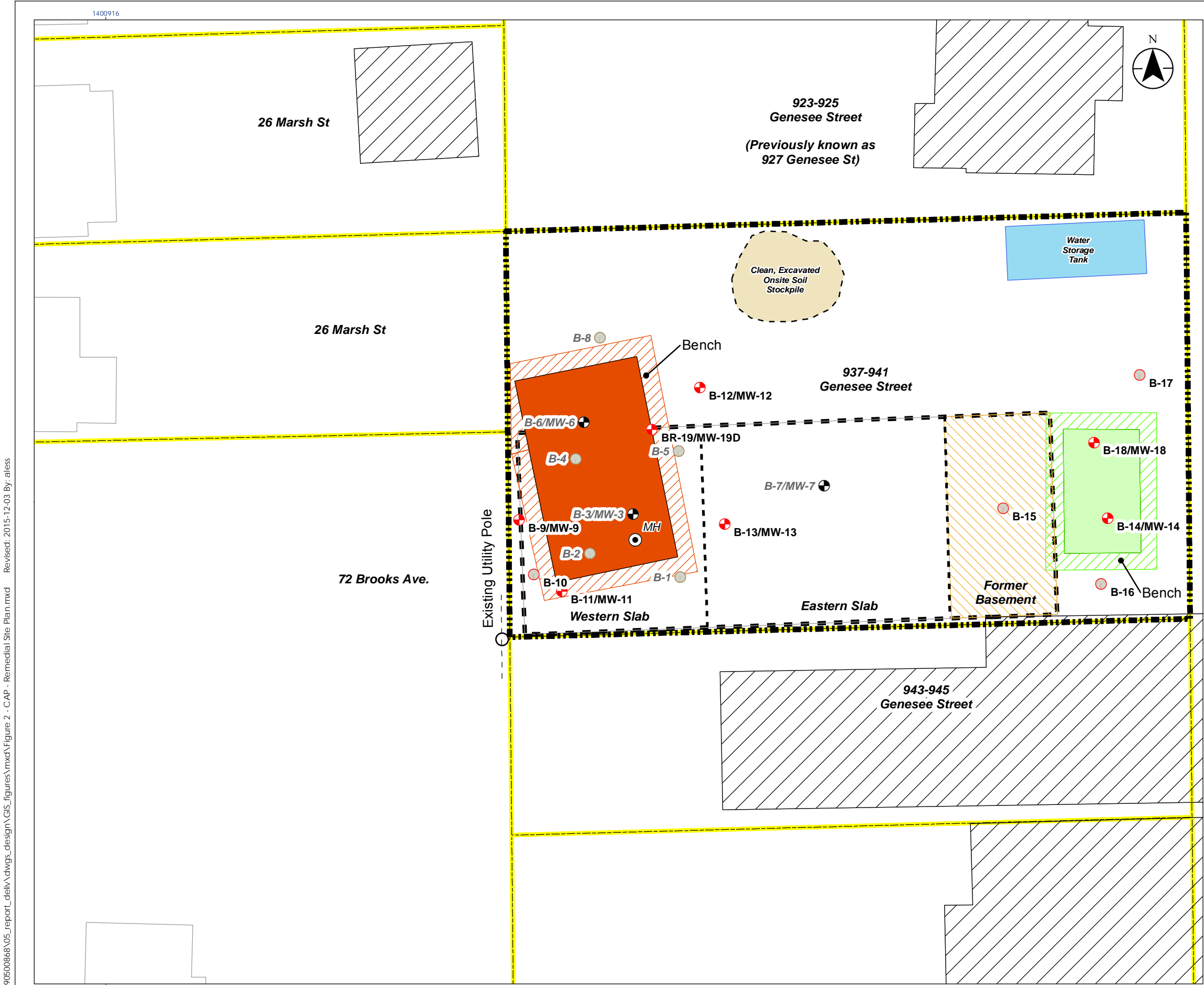
1

Title

Site Location Map

- Notes
1. Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
 2. Source: USGS Map Rochester West Quad

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format.
The recipient accepts full responsibility for verifying the accuracy and completeness of the data.
The recipient releases Stantec, its officers, employees, consultants and agents,
from any and all claims arising in any way from the content or provision of the data.

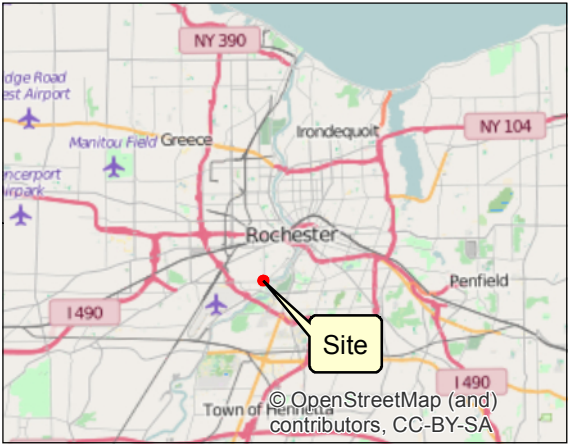
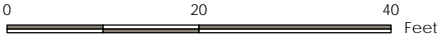


Legend

- Former Building Footprint
- Site Boundary
- Former Basement
- Parcel Boundary
- Existing Buildings

Notes

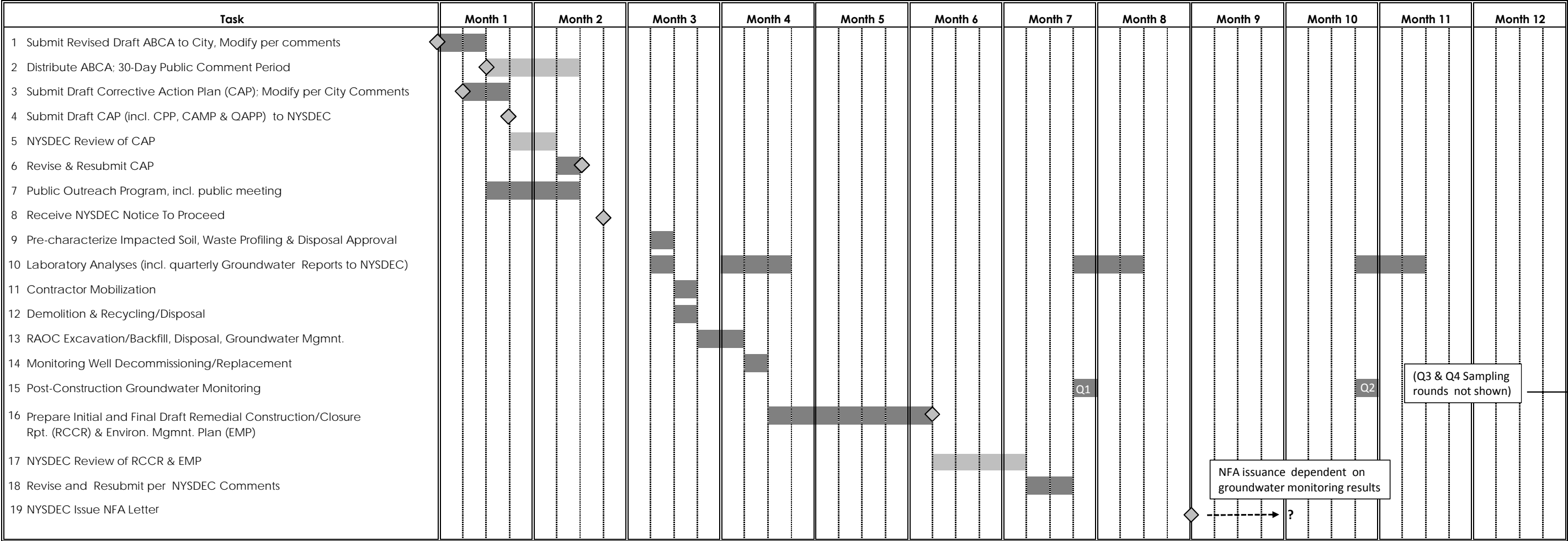
- Coordinate System:
NAD 1983 StatePlane New York West FIPS 3103 Feet
- RAOC = Remedial Area of Concern.
- Locations of remedial features approximate only and subject to change.



Project Location: 937-941 Genesee Street, Rochester, NY
Prepared by: APL on 2015-10-26
Technical Review by: BM on 2015-10-26
Independent Review by: MPS on 2015-10-26
190500868

Client/Project: City of Rochester
Corrective Action Plan
937-941 Genesee Street

Figure No.: 2
Title: Remedial Site Plan



Note: Dates and durations estimated only and subject to revision.



Corrective Action Plan
Petroleum Impacted Soil
937 Genesee Street, Rochester, NY

Estimated Project Schedule

Figure 3

Appendix A

Citizen Participation Plan/ Citizen Involvement Plan

CITIZEN PARTICIPATION PLAN

for Proposed Environmental Cleanup

937 – 941 Genesee Street

**Rochester, NY
City of Rochester
Monroe County, New York
NYSDEC Spill #126397**

January 2016

Prepared By:

**City of Rochester
Department of Environmental Services
Division of Environmental Quality
30 Church Street
Rochester, New York 14614-1278**

PREFACE

This Citizen Participation Plan has been developed for the proposed environmental remediation of petroleum-impacted soil and groundwater at the City of Rochester (City)-owned property located at 937-941 Genesee Street (referred to herein as “the Site”). This work will be completed with funding from the United States Environmental Protection Agency’s (USEPA) Brownfield Cleanup Program. The New York State Department of Environmental Conservation’s (NYSDEC) Spills Program will provide technical oversight of the cleanup project.

Brownfields are abandoned, idled, or under-used properties where expansion or redevelopment is complicated by real or perceived environmental contamination. They typically are former industrial or commercial properties where operations may have resulted in environmental contamination. They often pose not only environmental, but legal and financial burdens on communities. Left vacant, contaminated sites can diminish the property value of surrounding sites and potentially threaten the economic viability of adjoining properties.

Under the Brownfield Cleanup Program, the USEPA provides grants to municipalities to reimburse up to 80 percent of eligible costs for site investigation and remediation activities. The City of Rochester was awarded \$200,000 in funding from the United States Environmental Protection Agency’s (USEPA) Brownfield Program to complete an Environmental Cleanup project at the Site. The Site consists of one parcel of vacant land covering approximately 0.25 acres. The Site was occupied by a former auto repair facility from 1912 to 1941, and by a former dry cleaner and Laundromat from 1946 until 2009 when the building was demolished after a fire. The City obtained the property through tax foreclosure in October 2012. Recent private investments in the Brooks Landing area make the Site a candidate for future redevelopment after completion of the cleanup project.

The City has completed both Phase I and Phase II Environmental Site Assessments at the Site which have identified several Recognized Environmental Conditions (RECs), including the presence of Volatile Organic Compound (VOC) impacts to on-Site soil and groundwater which appear to be associated with the former on-Site auto repair and dry cleaning facilities. The environmental cleanup will consist of completing the remaining building demolition, and initiating a targeted soil removal excavation program to remove petroleum-contaminated soil from two areas at the Site. All contaminated media will be transported off-site to a permitted landfill for disposal. If nuisance odors are present during the excavations, a vapor suppressant will be utilized. Oxygen Releasing Compounds will be added to the excavation prior to backfilling to assist with the natural biodegradation of residual petroleum, and all excavations will be backfilled to grade. A groundwater monitoring well network will be installed and post-cleanup groundwater monitoring will be conducted to evaluate the effectiveness of the cleanup. Institutional Controls will consist of an Environmental Management Plan and flagging the Site in the City’s Building Information Permit system. A final report will be prepared and submitted to the NYSDEC summarizing the cleanup project.

The Site is located in the Brooks Landing Urban Renewal District, and as such future uses of the Site will likely be multi-family development, mixed use development (a combination of multi-family and commercial development), or commercial development.

SECTION 1: INTRODUCTION

The City of Rochester, in cooperation with the USEPA and the NYSDEC, are committed to informing and involving the public during the process to develop the Site Corrective Action Plan (CAP) for the Site. The Site is located at 937-941 Genesee Street in the City of Rochester, New York (Tax ID No. 135.34-2-36). The Site consists of one (1) parcel owned by the City of Rochester with an area of approximately 0.25 acres. The location of the Site is shown on the attached Site Location Map (Figure 1). Previous environmental studies revealed that former uses of the Site include auto repair from approximately 1912 through 1941 and a former dry cleaner and laundromat from approximately 1946 through 2009 when the building was demolished after a fire. The City obtained the property through tax foreclosure in October 2012. Recent private investments in the Brooks Landing area make the Site a candidate for future redevelopment after completion of the cleanup project.

This Citizen Participation Plan (CPP) has been prepared by the City of Rochester's Department of Environmental Services, Division of Environmental Quality specifically for this Site. Definitions of some common terms used during the cleanup process may be found in Appendix 1.

The CPP seeks to assure an open process for the interested and possibly affected public. This includes public officials at all levels, citizen interest groups, commercial interests, individuals in the area of the Site, and the media. These parties can be a part of the decision-making process for this Site, and need to be informed about on-site activities. It also identifies locations where these parties can obtain additional information about the remedial program for this Site. Specific opportunities for public and community input into the decision-making process are indicated.

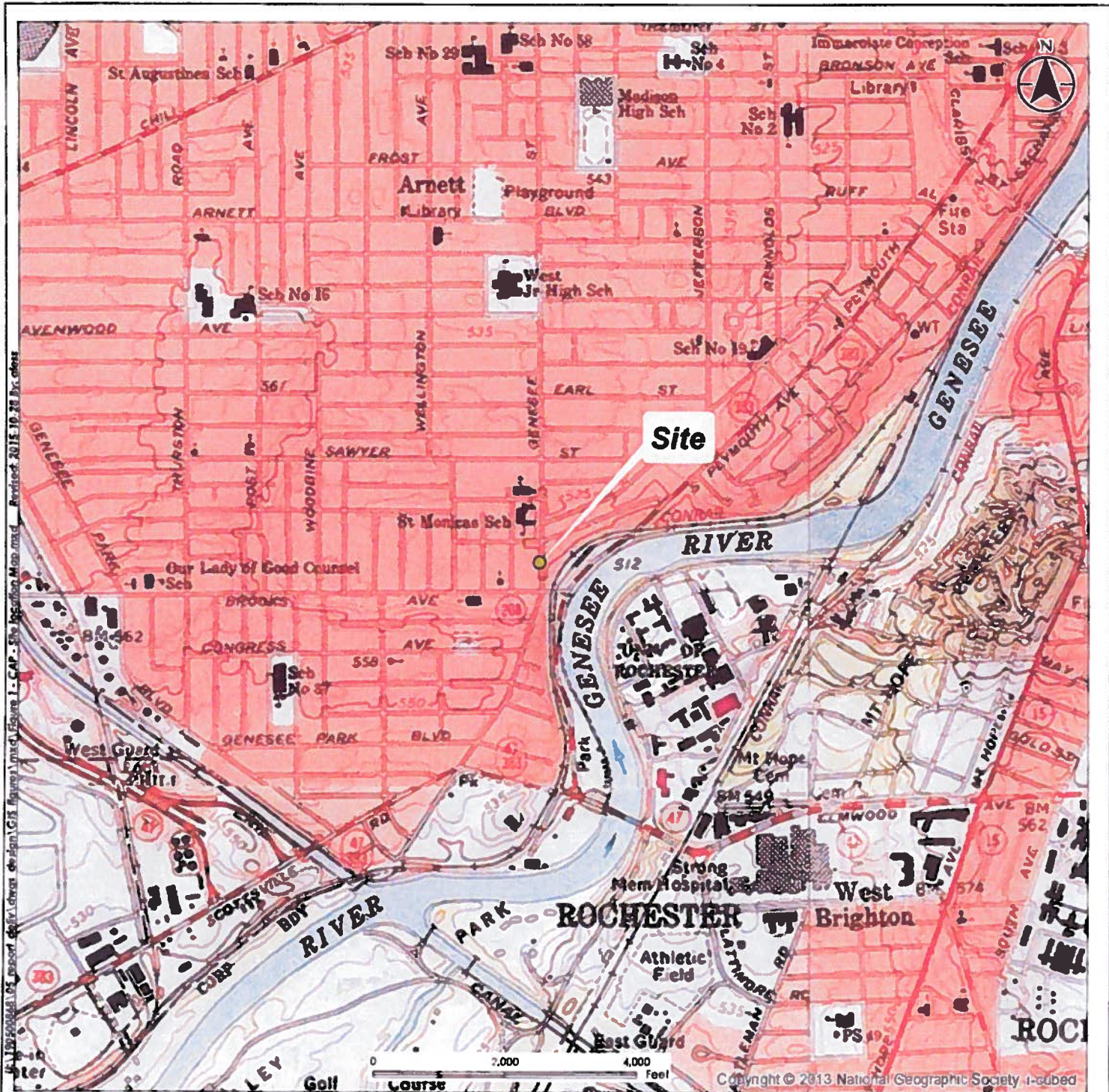
The CPP is a working document. It can be enhanced to accommodate major changes in either public attitude, or in the nature and scope of technical activities at the Site. The activities listed below are not intended to be all-inclusive, but an outline of possible activities which may be conducted in coordination with the site investigation and remedial process.

This CPP includes the following information:

- A description of the Site history, indicating possible types of contamination, any past studies, and any previous remedial measures that may have occurred at the Site;
- A description of the proposed Corrective Action activities to be conducted at the Site;
- Listing of contacts representing the affected and interested public agencies associated with this project;
- Identification of a local repository for information and reports generated during the course of completing the investigation activities; and
- Description of planned citizen participation activities.

SECTION 2: SITE LOCATION

The Site is located at 937-941 Genesee Street in the City of Rochester, New York (Tax ID No. 135.34-2-36). The site consists of one (1) parcel owned by the City of Rochester with an area of approximately 0.25 acres. The location of the Site is shown on the attached Site Location Map (Figure 1).



Notes

1. Coordinate System, WGS 1984 Web Mercator Auxiliary Sphere
2. Source: USGS Map Rochester West Quad



Project Location: 937-941 Genesee Street, Rochester, NY
 Prepared by: A.P. on 2015-10-21
 Technical Review by: B.A. on 2015-10-26
 Independent Review by: M.P. on 2015-09-26
 100500888

Client/Project: City of Rochester
 Corrective Action Plan
 937 941 Genesee Street

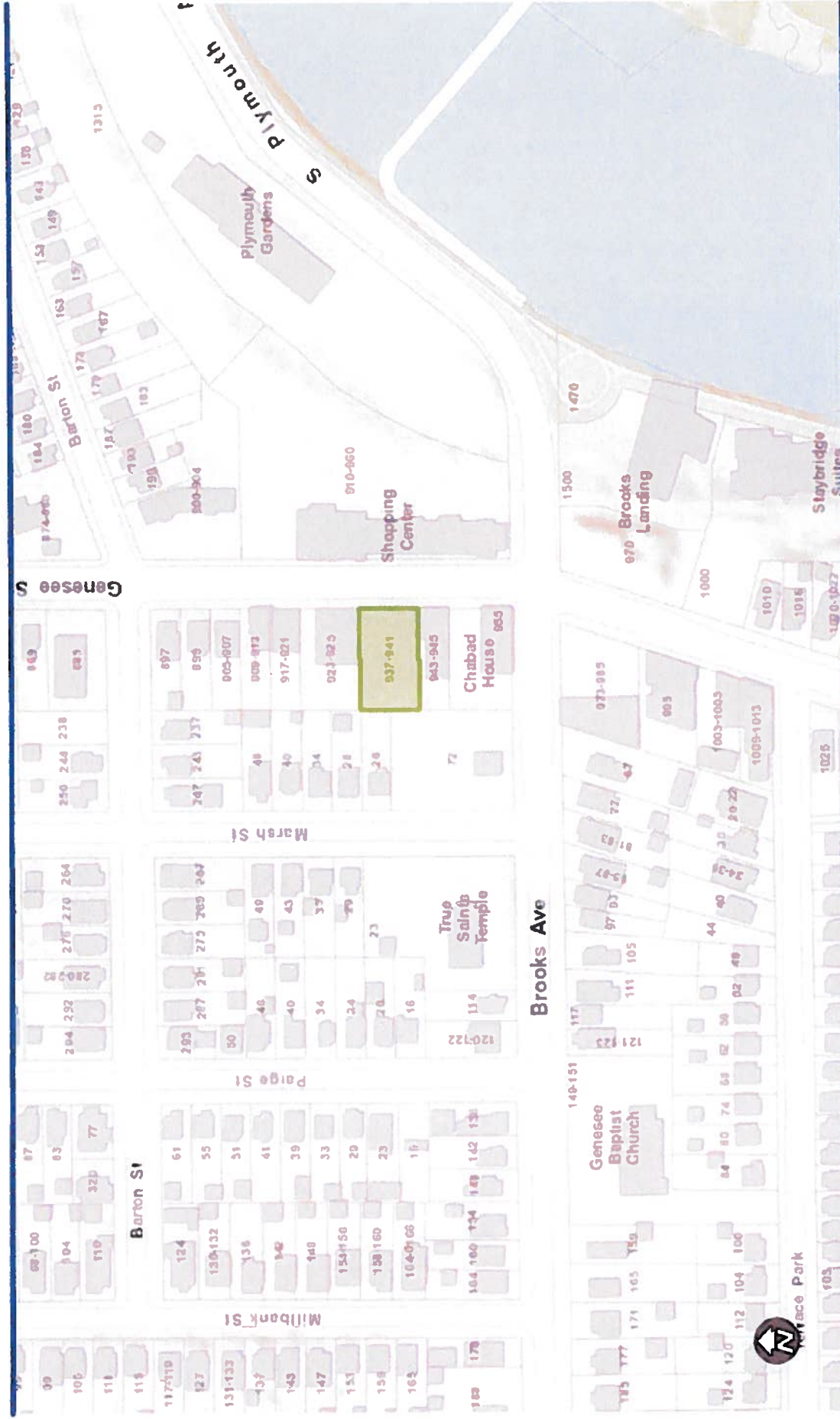
Figure No.

1

Title

Site Location Map

937-941 GENESEE ST



December 28, 2015

This map is intended for general reference only.
The City of Rochester makes no representation
as to the accuracy or fitness of the data presented.



City of Rochester, NY
Lovely A. Warren, Mayor

City of Rochester, NY

SECTION 3: SITE HISTORY

The Site has been developed for commercial uses since the early 1900's. The site was formerly improved with a commercial building that was demolished in 2009. The building was used as a dry cleaner and laundromat from approximately 1947 until approximately 2009 when it was demolished. A previous building on the Site was used as an auto repair garage from approximately 1917 through 1942. Permit records indicate a gasoline tank and pump were present at the Site from 1938 through 1941. The City of Rochester took ownership of the property in 2012 via foreclosure. The Site has remained unimproved since demolition.

The City has completed both Phase I and Phase II Environmental Site Assessments at the Site which have identified several Recognized Environmental Conditions (RECs), including the presence of Volatile Organic Compound (VOC) impacts to on-Site soil and groundwater which appear to be associated with the former on-Site auto repair and dry cleaning facilities. Listed below are electronic copies of the previous environmental reports completed at the Site:

- Phase I Environmental Site Assessment , STANTEC, September 2012
- Phase II Environmental Site Assessment , STANTEC, July 2011
- Phase II Supplemental Environmental Site Assessment , STANTEC, October 2012

SECTION 4: PLANNED FUTURE USE OF THE SITE

Detailed development plans for the Site have not been prepared yet. The proposed redevelopment of the site will be integrated into the ongoing Brooks Landing Redevelopment project, providing the opportunity for needed mixed use commercial/residential development to service the surrounding neighborhood and businesses. Post-cleanup, the Site will be subject to appropriate environmental engineering controls (e.g., placement of a clean soil cover, installation of a sub-slab depressurization system in future buildings, etc.). An Environmental Management Plan (EMP) will be developed for the Site that should be implemented when work at the Site has the potential to disturb soil/fill and/or groundwater at areas of known contamination. An Activities and Use Limitation permit restriction will also be entered into the City's Building Information System (BIS) institutional control system which initiates an environmental review of all new permit applications for the Site.

SECTION 5: RECOMMENDED REMEDIAL ALTERNATIVE

The Corrective Action Plan dated December, 2015, specifies the scope and details of the proposed environmental cleanup at the Site, and also contains a revised version of the Analysis of Brownfield Cleanup Alternatives (ABCA). The ABCA evaluated three (3) different remedial alternatives for the cleanup of the Site. Based on the remediation criteria evaluated, the following remedial alternative has been selected for the cleanup of the Site:

- Complete remaining building slab and foundation demolition and initiate a Community Air Monitoring Plan (CAMP);

- Complete a targeted soil removal excavation program to remove petroleum-contaminated soil from two areas at the Site, and transport the impacted soil to a permitted landfill for disposal;
- If nuisance odors are present during excavation a vapor suppressant will be utilized;
- Dewater the subsurface excavations to remove contaminants present in groundwater if entering the excavations;
- Adding Oxygen Releasing Compound–Advanced™ (ORC-A™; manufactured by Regenesis) to the excavation prior to backfilling to assist with the natural biodegradation of residual petroleum VOCs and Semi-Volatile Organic Compounds (SVOCs).
- Backfill the excavations to grade and install a groundwater monitoring well network.
- Perform groundwater monitoring, sampling, and analysis for VOCs, SVOCs, and Total Petroleum Hydrocarbons (TPH) to evaluate post-soil source removal Site conditions;
- Conduct post-cleanup groundwater monitoring to evaluate the effectiveness of the cleanup.
- Implement Institutional Controls for the Site consisting of flagging the Site in the City's Building Information System (BIS) database and developing a written Environmental Management Plan (EMP) document that will provide guidance for future Site activities.

Hard copies of the draft Corrective Action Plan (work plan) and ABCA are available for public review and comment can be found at the official document repository (Rundell Memorial Library, 115 South Avenue, Rochester, NY). Electronic copies of these documents are also available for public review and comment, and can be opened or downloaded at www.cityofrochester.gov/937Genesee . The names of the documents are as follows:

- Analysis of Brownfields Cleanup Alternatives, STANTEC, November 2015
- Corrective Action Plan (Work Plan) STANTEC, December 2015

A 30-day public comment period for the draft Corrective Action Plan work plan and the draft ABCA will begin on January 4, 2016 and end February 3, 2016. If you have questions or comments regarding the draft Corrective Action Plan (work plan) or the draft ABCA, please contact the City's project manager: Joseph Biondolillo, Sr. Environmental Specialist, Division of Environmental Quality at (585) 428-6649, or email him at biondj@cityofrochester.gov

5.1 Project Schedule

After receiving and addressing public comments, the City will finalize the ABCA and the Corrective Action Plan (Work Plan) and submit the plans to NYSDEC Region 8 for review and approval. After addressing any NYSDEC comments, the City will obtain work plan approval from the NYSDEC. Once work plan approval has been obtained, the City will coordinate with Stantec and other stakeholders regarding the schedule to initiate the cleanup of the Site, anticipated to begin sometime in spring 2016.

SECTION 6: CITIZEN PARTICIPATION ACTIVITIES

It is the expressed intent of the City of Rochester to provide information to the public in a timely, complete, and accurate manner. To this end, the City of Rochester has compiled a list of individuals to whom the public can address specific requests for information. The contacts are both local and state public officials and are knowledgeable of the proposed project activities. Table 1 provides the contact information for Public Agency representatives for this project.

Table 1 – Public Agency Contacts

City of Rochester Contacts		
Joseph Biondolillo Project Manager	DIV OF ENVIRONMENTAL QUALITY CITY OF ROCHESTER CITY HALL RM 300B ROCHESTER NY 14614	585-428-6649
NYS Department of Environmental Conservation		
Michael Zamiarski NYSDEC Project Manager (Technical Assistance)	NYSDEC REGION 8 OFFICE 6274 EAST AVON-LIMA ROAD AVON, NY 14414-9519	585-226-5438

A local document repository has been established at the Rundell Memorial Library, 115 South Avenue, Rochester, NY. Additional repositories have been established at the NYSDEC Region 8 offices at 6274 East Avon-Lima Road. Copies of documents relevant to the project are also available on-line, at the City's web-site at www.cityofrochester.gov/937Genesee.

A Fact Sheet or Newsletter detailing the availability of the ABCA Report, Citizens Participation Plan and the draft Corrective Action Plan will be sent out to the local residents and other interested parties. Additional activities such as project status presentations at neighborhood association or public meetings and/or distribution of additional Fact Sheets will be added as appropriate.

6.1 Mailing List

A mailing list including local and State elected officials and owners of properties located within the immediate vicinity of the site is included as Table 2. (Property owners' addresses are not provided to the public, but are maintained confidentially by the City and the NYSDEC Project Manager). The City of Rochester will produce and distribute Fact Sheets or newsletters providing residents with timely information on project status, including notifications of upcoming activities on-site (e.g., fieldwork) or off-site (e.g., public availability sessions). Included in all Fact Sheets or newsletters will be the list of individuals to be contacted by the public for additional information (see Table 1). In addition to property owners, Fact Sheets or newsletters will be mailed to the elected officials/ representatives, and neighbors/other interested parties as listed in Tables 2 and 3.

Table 2: Elected Officials/Representatives and Environmental Groups

Elected Officials / Public Agency Representatives		
THE HONORABLE KIRSTEN GILLIBRAND UNITED STATES SENATE 100 STATE ST ROOM 3280 ROCHESTER NY 14614	THE HONORABLE CHARLES SCHUMER UNITED STATES SENATE FEDERAL BLDG 100 STATE ST ROCHESTER NY 14614	THE HONORABLE LOUISE M SLAUGHTER US HOUSE OF REPRESENTATIVES 3110 FEDERAL BLDG 100 STATE ST ROCHESTER NY 14614
DAVID GANTT NYS ASSEMBLY 74 UNIVERSITY AVE ROCHESTER NY 14605	THE HONORABLE MICHAEL RANZENHOFER NYS SENATE 8203 MAIN ST. SUITE 4 WILLIAMSVILLE NY 14221	MAYOR LOVELY A WARREN CITY HALL 30 CHURCH STREET ROCHESTER NY 14614
CHERYL DINOLFO MONROE COUNTY EXECUTIVE COUNTY OFFICE BLDG RM 110 39 W MAIN ST ROCHESTER NY 14614-1476	ROCHESTER FIRE CHIEF JOHN SCHREIBER ROCHESTER FIRE & RESCUE DEPT 185 EXCHANGE BLVD - SUITE 665 ROCHESTER NY 14614-2277	OFFICE OF THE POLICE CHIEF CIVIC CENTER PLAZA 185 EXCHANGE BLVD ROCHESTER NY 14614
MONROE COUNTY SHERIFF PATRICK O'FLYNN MONROE COUNTY PUBLIC SAFETY BLDG CIVIC CTR PLAZA 130 S PLYMOUTH AVE ROCHESTER NY 14614	LORETTA SCOTT CITY COUNCIL OFFICE CITY HALL 30 CHURCH STREET ROOM 301 ROCHESTER NY 14614-1265	HAZEL WASHINGTON CITY CLERK - CITY HALL 30 CHURCH STREET ROOM 301 ROCHESTER NY 14614-1265
MICHAEL PATTERSON CITY COUNCIL OFFICE CITY HALL 30 CHURCH STREET ROOM 301 ROCHESTER NY 14614-1265	ADAM MCFADDEN CITY COUNCIL OFFICE CITY HALL 30 CHURCH STREET ROOM 301 ROCHESTER NY 14614-1265	MOLLY CLIFFORD CITY COUNCIL OFFICE CITY HALL 30 CHURCH STREET ROOM 301 ROCHESTER NY 14614-1265
CAROLEE CONKLIN CITY COUNCIL OFFICE CITY HALL 30 CHURCH STREET ROOM 301 ROCHESTER NY 14614-1265	MATT HAAG CITY COUNCIL OFFICE CITY HALL 30 CHURCH STREET ROOM 301 ROCHESTER NY 14614-1265	DANA MILLER CITY COUNCIL OFFICE CITY HALL 30 CHURCH STREET ROOM 301 ROCHESTER NY 14614-1265
JACKLYN ORTIZ CITY COUNCIL OFFICE CITY HALL 30 CHURCH STREET ROOM 301 ROCHESTER NY 14614-1265	ELAINE SPAULL CITY COUNCIL OFFICE CITY HALL 30 CHURCH STREET ROOM 301 ROCHESTER NY 14614-1265	LINDA VERA CITIZEN PARTICIPATION SPECIALIST NYSDEC REGION 8 OFFICE 6274 EAST AVON-LIMA ROAD AVON, NY 14414-9519

APPENDIX 1

Glossary and Acronyms

GLOSSARY

This glossary defines terms associated with New York's citizen participation program, and important elements of the Brownfield program. Words in **bold** in the definitions are defined elsewhere in the glossary.

Administrative Record Part of a site's **Record of Decision** which lists and defines documents used in the development of NYSDEC's decision about selection of a remedial action.

Availability Session A scheduled gathering of program staff and members of the public in a casual setting, without a formal presentation or agenda but usually focusing on a specific aspect of a site's remedial process.

Citizen Participation A program of planning and activities to encourage communication among people affected by or interested in Brownfield sites and the government agencies responsible for investigating and remediating them.

Citizen Participation Plan A document which must be developed at a site's **Site Investigation** stage. A CP Plan describes the citizen participation activities that will be conducted during a site's remedial process.

Citizen Participation Specialist A staff member from an NYSDEC central office or regional office who has specialized training and experience to assist a **project manager** and other staff to plan, conduct and evaluate a site-specific citizen participation program.

Comment Period A time period for the public to review and comment about various documents and DER actions. For example, a 45-day comment period is provided when DER issues a **Proposed Remedial Action Plan (PRAP)**.

Contact List Names, addresses and/or telephone numbers of individuals, groups, organizations, government officials and media affected by or interested in a particular Brownfield site. The size of a contact list and the categories included are influenced by population density, degree of interest in a site, the stage of the remedial process and other factors. It is an important tool needed to conduct outreach activities.

Division of Environmental Remediation A major program unit within the New York State Department of Environmental Conservation created to manage the hazardous waste site remedial program, the Brownfield program, and the Voluntary Cleanup program. Staff include: engineers, geologists, chemists, attorneys, citizen participation specialists, environmental program specialists and support staff.

Document Repository A file of documents pertaining to a site's remedial and citizen participation programs which is made available for public review. The file generally is maintained in a public building near the Brownfield site to provide access at times and a location convenient to the public.

Fact Sheet A written discussion about part or all of a site's remedial process, prepared and provided by DER to the public. A fact sheet may focus on: a particular element of the site's remedial program; opportunities for public involvement; availability of a report or other information, or announcement of a **public meeting** or **comment period**. A fact sheet may be mailed to all or part of a site's **contact list**, distributed at meetings, placed in a **document repository** and/or sent on an "as requested" basis.

Interim Remedial Measure (IRM) A discrete action which can be conducted at a site relatively quickly to reduce the risk to people's health and the environment from a well-defined contamination problem. An IRM can involve removing contaminated soil and drums, providing alternative water supplies or securing a site to prevent access.

New York State Department of Health Agency within the executive branch of New York State government which: performs health-related inspections at suspected contaminated sites; conducts health assessments to determine potential risk from environmental exposure; reviews Exposure Assessments prepared during the **Site Investigation/Remedial Alternatives Report**; conducts health-related community outreach around sites; and reviews remedial actions to assure that public health concerns are adequately addressed.

Operable Unit A discrete part of an entire site that produces a release, threat of release, or pathway of exposure. An Operable Unit can receive specific investigation, and a particular remedy may be proposed. A **Record of Decision** is prepared for each Operable Unit.

Operation and Maintenance A period in which remedial action may be conducted following construction at a site (for example, operation of a "pump and treat" system), or which is performed after a remedial action to assure its continued effectiveness and protection of people's health and the environment. Activities can include site inspections, well monitoring and other sampling.

Project Manager An NYSDEC staff member within the **Division of Environmental Remediation** (usually an engineer, geologist or hydro geologist) responsible for the day-to-

day administration of remedial activities at, and ultimate disposition of, an Environmental Restoration site. The Project Manager works with legal, health, **citizen participation** and other staff to accomplish site-related goals and objectives.

Proposed Remedial Action Plan (PRAP) An analysis by DER of each alternative considered for the remediation of an Environmental Restoration site and a rationale for selection of the alternative it recommends. The PRAP is created based on information developed during the **Site Investigation/Remedial Alternatives Report**. The PRAP is reviewed by the public and other state agencies.

Public Meeting A scheduled gathering of **Division of Environmental Remediation** staff with the affected/interested public to give and receive information, ask questions and discuss concerns about a site's remedial program. Staff from other NYSDEC divisions, legal and health staff, and staff from consultants and a responsible party often also attend. A public meeting, unlike an **availability session**, generally features a formal presentation and a detailed agenda.

Record of Decision (ROD) A document which provides definitive record of the cleanup alternative that will be used to remediate an Environmental Restoration site. The ROD is based on information and analyses developed during the **Site Investigation/Remedial Alternatives Report** and public comment.

Remedial Construction The physical development, assembly and implementation of the remedial alternative selected to remediate a site. Construction follows the **Remedial Design** stage of a site's remedial program.

Remedial Design The process following finalization of a **Record of Decision** in which plans and specifications are developed for the **Remedial Construction** of the alternative selected to remediate a site.

Site Investigation/Remedial Alternatives Report (SI/RAR) The SI fully defines and characterizes the type and extent of contamination at the site. The RAR, which may be conducted during or after the SI, uses information developed during the SI to develop alternative remedial actions to eliminate or reduce the threat of contamination to public health and the environment.

Responsiveness Summary A written summary of major oral and written comments received by DER during a **comment period** about key elements of a site's remedial program, such as a **Proposed Remedial Action Plan**, and DER's response to those comments.

APPENDIX 2

MAILING LIST

**ADJACENT PROPERTIES ARE INCLUDED IN MAILINGS BUT
HAVE BEEN EXCLUDED FROM THE LISTING IN THIS
DOCUMENT AS CONFIDENTIAL INFORMATION**

Appendix B
Health and Safety Plan

Appendix A

**Health and Safety Plan
Petroleum-Impacted Soil Corrective Action
937 Genesee Street
Rochester, NY
NYSDEC Spill No. 126397**

Prepared for:

New York State Department of
Environmental Conservation
Division of Environmental Remediation
6274 East Avon-Lima Road
Avon, NY 14414-9519

Prepared by:

Stantec Consulting Services Inc.
61 Commercial Street Suite 100
Rochester, New York 14614-1009

On behalf of:

City of Rochester Division of
Environmental Quality
30 Church Street, Room 300B
Rochester, NY 14614



December 2015



Emergency Contact List

Ambulance: 911
Hospital: Strong Memorial Hospital, Rochester, NY:
585-275-2100
Fire Department: 911
Police: 911
Poison Control Center: 585-222-1222
RG&E Utility Emergency: 911 or (800) 743-1702

Project Contacts:

Project Title	Name	Telephone Number	General Responsibilities
COR Project Manager	Joe Biondolillo	Office: Cell:	Oversight of all project work
Stantec Project Manager	Mike Storonsky	Office: 585-413-5266 Cell: 585-298-2386	Direction of all Stantec project activities
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1.0 INTRODUCTION

This Health and Safety Plan (HASP) describes personal safety protection standards and procedures to be followed by Stantec staff during Corrective Action activities at 937 Genesee Street, Rochester, New York (Figure 1). The field activities are described in detail in the Corrective Action Plan (CAP) to which this HASP is appended.

This HASP establishes mandatory safety procedures and personal protection standards pursuant to the Occupational Safety and Health Administration (OSHA) regulations 29 Code of Federal Regulations (CFR) 1910.120. The HASP applies to all Stantec personnel conducting any Site work, as defined in 29 CFR 1910.120(a). All personnel involved in the mentioned activities must familiarize themselves with this HASP, comply with its requirements and have completed the required health and safety training and medical surveillance program participation pursuant to 29 CFR 1910.120 prior to beginning any work onsite.

THIS HASP IS FOR THE EXPRESS USE OF STANTEC EMPLOYEES. ALL OTHER CONTRACTORS TO BE WORKING IN THE EXCLUSION AREAS ARE REQUIRED BY LAW TO DEVELOP THEIR OWN HASP, AS WELL AS TO MEET ALL PERTINENT ASPECTS OF OSHA REGULATIONS. STANTEC RESERVES THE RIGHT TO STOP ANY SITE WORK WHICH IS DEEMED TO POSE A HEALTH AND SAFETY THREAT TO ITS STAFF.

1.1 BACKGROUND

The Corrective Action Plan (CAP) is being submitted to the NYSDEC on behalf of the City of Rochester for activities at the 937 Genesee Street property located in the City of Rochester, Monroe County, New York (the "Site"). The objectives of the proposed project include the following:

- Implement corrective actions to address petroleum-impacted soil and groundwater in two primary remedial areas of concern, RAOC 1 and RAOC 2. The urban fill identified previously as RAOC 3 will be allowed to remain onsite and will be the focus of an Environmental Management Plan (EMP) that will provide guidance for management of such material if disturbed by future Site activities;
- Excavate source-area soils and other media that are impacted with petroleum-related contaminants in excess of applicable SCOs and/or soils which exhibit nuisance characteristics, and transport and dispose these materials offsite;
- Remove (if encountered), treat, and discharge to the combined sewer impacted groundwater from the excavations;
- Perform *in-situ* bioremediation of groundwater by adding Oxygen Releasing Compound (ORC-A™) to the excavation prior to backfilling to further reduce contaminant concentrations to acceptable levels; and
- Obtain NYSDEC spill file closure and a "No Further Action" letter.

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Other related objectives and tasks include:

- Removal of shallow, accessible, subsurface utilities and sub-slab structures associated with Site drainage and sewer systems;
- Partial demolition of remaining floor slabs and foundation remnants;
- Recycling of waste asphalt and concrete;
- Removal of some existing monitoring wells as needed for excavation work, and installation of new monitoring wells as needed for followup monitoring;
- Followup groundwater monitoring (minimum of four quarters, with additional as needed based on the first year results);
- Development of a Remedial Construction/Closure Report and an Environmental Management Plan; and
- Input of project data into USEPA's Assessment, Cleanup and Redevelopment Exchange System (ACRES) database.

The Site is a rectangular and generally level parcel approximately 0.25 acres in size, owned by the City (Monroe County Tax ID No. 135.34-2-36) and located in a densely-developed area of mixed commercial and residential usage.

Previous investigations by Stantec have identified petroleum impacts in soil at the Site. No chlorinated VOCs were identified at the Site. As more analytical data is generated during and/or following the remedial activities, this HASP should be updated to reflect any new information regarding Site contaminants of concern (COCs).

1.2 SITE-SPECIFIC CHEMICALS OF CONCERN

The primary contaminants of concern (COCs) include petroleum constituents typical of diesel fuel, kerosene, lubricating oil, and/or mineral spirits or Stoddard solvent (a known dry-cleaning agent). Other potential COCs include PCBs from potential waste oil and heavy metals from possible urban fill soils that may have been placed on the Site.

The air monitoring action levels will be based on one-half of the current Threshold Limit Value (TLV) or Permissible Exposure Limit (PEL) for benzene with a margin of safety built into the action levels to account for the non-specificity of the field monitoring instruments. Exposure limits for less hazardous compounds will be satisfied by meeting the more stringent exposure limits for benzene. Table 1 summarizes health and safety data for the volatile compounds of primary concern.

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**Table 1
Health and Safety Data for Contaminants of Concern**

Compound	PEL/ TWA	Physical Description	Odor Threshold in Air	Route of Exposure	Symptoms	Target Organs
Benzene	10 ppm	Colorless to light yellow liquid with a characteristic sweet aromatic odor	8.65 ppm	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]	Eyes, skin, respiratory system, blood, central nervous system, bone marrow
Butylbenzene, n-	NA	Colorless liquid	NA	Skin/eye contact, inhalation, ingestion	Irritation to skin and/or eyes, respiratory tract, digestive tract; nausea, vomiting, diarrhea; dizziness; suffocation	Liver, nervous system
Ethylbenzene	100 ppm	Colorless liquid with an aromatic odor.	2.3 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation to eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eyes, skin, respiratory system, central nervous system
Isopropylbenzene	50 ppm	Clear, colorless liquid, sharp penetrating aromatic odor	NA	Inhalation, ingestion, skin and/or eye contact	Irritation to eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eyes, skin, respiratory system, central nervous system
Naphthalene	10 ppm	White crystalline or colorless to brown solid with a distinct aromatic odor	0.003 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage	Eyes, skin, blood, liver, kidneys, central nervous system

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Compound	PEL/ TWA	Physical Description	Odor Threshold in Air	Route of Exposure	Symptoms	Target Organs
Propylbenzene, n-	NA	Colorless or light yellow liquid	NA	Inhalation, ingestion, skin/eye contact	Irritate or burn skin and eyes; respiratory tract irritation, suffocation, aspiration hazard if swallowed	Lungs, eyes, kidney
Toluene	100 ppm	Colorless liquid with a sweet, pungent, benzene-like odor	0.16 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation to eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys
Trimethylbenzene, 1,2,4- (1,2,4-TMB)	25 ppm	Clear, colorless liquid with a distinctive, aromatic odor	2.4 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation to eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system, blood
Trimethylbenzene, 1,3,5- (1,3,5-TMB)	25 ppm	Clear, colorless liquid with a distinctive, aromatic odor	2.4 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation to eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system, blood
Xylenes	100 ppm	Colorless liquid with a sweet aromatic odor	0.851 ppm, 0.324 ppm, 0.49 ppm	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

Notes:

NA - not available

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PEL - permissible exposure limits
TWA - time weighted average, 8-hour workday
mg/m³ - milligrams per cubic meter
ppm - parts per million

2.0 STANTEC PERSONNEL ORGANIZATION

The following Stantec personnel will be involved in health and safety operations at the 937 Genesee Street site.

2.1 PROJECT MANAGER

The Project Manager is responsible for ensuring that all Stantec procedures and methods are carried out, and that all Stantec personnel abide by the provisions of this Health and Safety Plan.

2.2 SITE SAFETY OFFICER

The Site Safety Officer (SSO) and will report directly to the Project Manager and will be responsible for the implementation of this HASP as well as daily calibration of Stantec's safety monitoring instruments. The SSO will keep a log book of all calibration data and instrument readings for the Site.

2.3 HEALTH AND SAFETY COORDINATOR

The Health and Safety Coordinator will be responsible for overall coordination of health and safety issues on the project.

2.4 DAILY MEETINGS

All Stantec personnel and contractors working within the exclusion zone will be required to read this document and sign off on the daily safety meeting form presented in HASP Appendix B.

3.0 MEDICAL SURVEILLANCE REQUIREMENTS

3.1 INTRODUCTION

Hazardous waste site workers may be subjected to elevated levels of physical and chemical stress. Their daily tasks may expose them to toxic chemicals, physical hazards, biologic hazards, or radiation. They may develop heat stress while wearing protective equipment or working under temperature extremes, or face life-threatening emergencies such as explosions and fires. Therefore, a medical program is essential to: assess and monitor worker's health and fitness both prior to employment and during the course of the work; provide emergency and other treatment as needed; and keep accurate records for future reference. In addition, OSHA requires a medical evaluation for employees that may be required to work on hazardous waste sites and/or wear a respirator (29 CFR Part 1910.120 and 1910.134), and certain OSHA standards include specific medical surveillance requirements (e.g., 29 CFR Part 1926.62, Part 1910.95 and Parts 1910.1001 through 1910.1045).

3.2 MEDICAL EXAMINATIONS

All Stantec personnel working in areas of the Site where Site-related contaminants may be present shall have been examined by a licensed physician as prescribed in 29 CFR Part 1910.120, and determined to be medically fit to perform their duties for work conditions which require respirators. Employees will be provided with medical examinations as outlined below:

- Pre-job physical examination
- Annually thereafter if contract duration exceeds 1 year;
- Termination of employment;
- Upon reassignment in accordance with CFR 29 Part 1910.120(e)(3)(i)(C);
- If the employee develops signs or symptoms of illness related to workplace exposures;
- If the physician determines examinations need to be conducted more often than once a year; and
- When an employee develops a lost time injury or illness during the contract period.

Examinations will be performed by, or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine, and will be provided without cost to the employee, without loss of pay and at a reasonable time and place. Medical surveillance protocols and examination and test results shall be reviewed by the Occupational Physician.

4.0 ONSITE HAZARDS

4.1 CHEMICAL HAZARDS

The primary potential chemical hazards onsite are expected to be exposure to the VOCs detailed in Table 1. Safety data sheets for the anticipated chemicals are presented in Appendix A.

The COCs are volatile; therefore, any activity at the Site which causes physical disturbance of the soil can potentially allow the release of contaminants into the air. For volatiles, this can include release of organic vapors into the air. Such an occurrence may be recognized by noticeable chemical odors. Field personnel should be aware of the odor threshold for these chemicals and their relation to the action levels and Permissible Exposure Limits.

Symptoms of overexposure to primary COCs are detailed in Table 1. To prevent exposure to these chemicals, dermal contact will be minimized by using disposable surgical gloves (such as nitrile gloves) with work gloves (as appropriate) when handling soil, groundwater equipment or samples. Breathing zone levels of total VOCs will be monitored in real time using a portable photoionization detector (PID). If ambient levels exceed action levels, all Site activities will be performed using Level C PPE until ambient concentrations dissipate. Where levels exceed 50 ppm, work will cease and the project manager will be notified immediately.

In addition, depending on seasonal conditions, disturbance of the Site soils may cause the particulate contaminants to become airborne as dust. Therefore, if visible particulate dust is noted, dust-suppression methods will be used where appropriate. Particulate monitoring will be performed using Dust Track instruments in accordance with the Community Air Monitoring Plan (CAMP). A copy of the CAMP is included in the CAP.

Finally, aeration of the groundwater may cause volatilization of chemicals into the air, particularly VOCs. Table 2 below summarizes first aid instructions for exposure pathways for the COCs.

Table 2
Exposure Pathways and First Aid Response for Contaminants of Concern

Substance	Exposure Pathways	First-Aid Instructions
VOCs listed in Table 1	Eye	Irrigate immediately
	Dermal	Soap wash promptly; or Soap wash immediately (benzene, xylenes); or Soap wash (ethylbenzene, 1,3,5-TMB, 1,2,4-TMB, n-propylbenzene, naphthalene); or Water wash immediately (n-butylbenzene, isopropylbenzene, toluene) For thermal burns (naphthalene), cool affected areas by drenching or immersing in water
	Inhalation	Respiratory support; or Fresh air (n-butylbenzene, n-propylbenzene, isopropylbenzene, toluene, xylenes) Note – do not use mouth-to-mouth if victim inhaled toluene
	Ingestion	Medical attention immediately If victim is conscious and alert, give two to four cups milk/water (ethylbenzene) Rinse mouth (toluene) Note – never give anything by mouth to an unconscious person

4.2 PHYSICAL HAZARDS

Hazards typically encountered at sites with drilling and excavation activities will be a concern at this site. These hazards include slippery ground surfaces, soil stockpiles, uneven ground and holes, and operation of heavy machinery and equipment. Field team members will wear the basic safety apparel such as steel-toed shoes, hard hat and safety glasses during all appropriate activities.

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During active drilling activities, Stantec personnel will not approach the borehole. Field personnel working around the rig will be shown the location and operation of kill switches, which are to be tested daily.

Multi-purpose fire extinguishers, functional and within annual inspection period, will be staged and readily accessible for use.

The use of electrical equipment in any established exclusion zones will be limited to areas verified as containing non-explosive atmospheres (<10% LEL) prior to operation, unless the equipment has been previously demonstrated or designed to be FM or UL rated as intrinsically safe. Care will be taken to avoid an ignition source while working in the presence of vapors.

The driller shall make all necessary contacts with utilities and/or underground utility locator hotlines prior to drilling, and shall meet OSHA requirements for distances between the drilling rig and overhead utilities. No drilling work will be carried out where the drill rig chassis has not been stabilized and the rig is not to be moved between locations with its boom in a vertical position.

4.2.1 Test Borings

The drilling of test borings presents hazards related to exposure to chemicals and working around heavy equipment. As with any soil disturbance, monitoring for VOCs with a photoionization detector will be performed continuously during drilling activities. Work will be stopped and the area vacated if sustained PID readings are observed at concentrations in excess of the Action Levels specified in Section 6.

4.2.2 Remedial Excavation

The remedial excavation presents hazards related to open excavations, working around heavy equipment and exposure to chemicals.

The potential exists for falling into the excavation due to a slip or trip and also due to potential caving of the excavation sidewalls. During the excavation, field personnel will generally perform observation from the end of the excavation opposite the excavation equipment and will avoid standing along the long sidewalls of the excavation. If it is necessary to make observations from a point along the sidewall of the excavation adjacent to the excavation equipment, they will maintain adequate distance between themselves and the excavation walls, and be mindful of signs that caving may be likely. These could include raveling of sidewall material into the excavation, or the development of cracks in the ground surface.

If it becomes necessary to leave an excavation open overnight, construction fencing will be placed around the entire perimeter of the site.

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In the event of excessive petroleum vapor emanating from the excavation, vapor suppression methods will be employed, including the use of a liquid spray surfactant such as Biosolve™ or equivalent.

As with any soil disturbance, monitoring for VOCs with a photoionization detector will be performed continuously during test pit excavation and logging activities. Work will be stopped and the area vacated if sustained PID readings are observed at concentrations in excess of the Action Levels specified in Section 6.

4.2.3 Noise

The use of heavy machinery/equipment and operation may result in noise exposures, which require hearing protection. Exposure to noise can result in temporary hearing losses, interference with speech communication, interference with complicated tasks or permanent hearing loss due to repeated exposure to noise.

During the investigative activities, Stantec field team members will use hearing protection when sound levels are in excess of 90 dB TWA.

4.2.4 Heat and Cold Stress Exposure

Heat is a potential threat to the health and safety of Site personnel. The Site Safety Officer under the direction of the Project Manager will determine the schedule of work and rest. These schedules will be employed as necessary so that personnel do not suffer adverse effects from heat. Table 3 summarizes exposure symptoms and first aid instructions for heat stress. Non-caffeinated, thirst replenishment liquids will be available onsite.

Cold stress is also a potential threat to the health and safety of Site personnel. Symptoms of cold stress include the following: shivering, blanching of the extremities, numbness or burning sensations, blue, purple or gray discoloration of hands and feet, frostbite, hypothermia, and loss of consciousness. Cold stress can be prevented by acclimatizing one's self to the cold, increasing fluid intake, avoiding caffeine and alcohol, maintaining proper salt and electrolyte intake, eating a well-balanced diet, wearing proper clothing, building heated enclosures to work in, and taking regular breaks to warm up. If any of the above symptoms are encountered the person should be removed from the cold area. Depending on the severity of the cold stress, 911 should be contacted and first aid administered. No fluids should be given to an unconscious person.

**Table 3
Exposure Symptoms and First Aid for Heat Exposure**

Hazard	Exposure Symptoms	First-Aid Instructions
Heat Stress	Fatigue, sweating, irritability	Rest; take fluids
	Dizziness, disorientation, perspiration ceases, loss of consciousness	Remove from hot area, activate 911, administer first aid, no fluids to be administered to unconscious victim.

4.2.5 Roadway Hazards

Field activities may take place near active roadways. Where such work zones are established, personnel shall assure that protective measures including signage, cones, and shielding through use of vehicles parked at workmen perimeter, are in place. All contractors shall be responsible for meeting signage requirements of DOT. Fluorescent safety vests shall be worn by all personnel during activities in or adjacent to roadways and driveways.

4.2.6 Electrical Work

Site work involving electrical installation or energized equipment must be performed by a qualified electrician. All electrical work will be performed in accordance with the OSHA electrical safety requirements found in 29 CFR 1926.400 through 1926.449. Workers are not permitted to work near electrical power circuits unless the worker is protected against electric shock by de-energizing and grounding the circuit or by guarding or barricading the circuit and providing proper personal protective equipment. All electrical installations must comply with NEC regulations. All electrical wiring and equipment used must be listed by a nationally recognized testing laboratory.

All electrical circuits and equipment must be grounded in accordance with the NEC regulations. The path to ground from circuits, equipment, and enclosures will be permanent and continuous. Ground fault circuit interrupters (GFCIs) are required on all 120-volt, single phase, 15- and 20-amp outlets in work areas that are not part of the permanent wiring of the building or structure. A GFCI is required when using an extension cord. GFCIs must be tested regularly with a GFCI tester.

Heavy-duty extension cords will be used; flat-type extension cords are not allowed. All extension cords must be the three-wire type, and designed for hard/extra hard usage. Electrical wire or cords passing through work areas must be protected from water and damage. Worn, frayed, or damaged cords and cables will not be used. Walkways and work spaces will be kept clear of cords and cables to prevent a tripping hazard. Extension cords and cables may not be secured

with staples, hung from nails, or otherwise temporarily secured. Cords or cables passing through holes in covers, outlet boxes, etc., will be protected by bushings or fittings.

All lamps used in temporary lighting will be protected from accidental contact and breakage. Metal shell and paper-lined lamp holders are not permitted. Fixtures, lamp holders, lamps, receptacles, etc. are not permitted to have live parts. Workers must not have wet hands while plugging/unplugging energized equipment. Plugs and receptacles will be kept out of water (unless they are approved for submersion).

4.2.7 Lock-Out/Tag-Out

Before a worker sets up, services, or repairs a system where unexpected energizing (or release of stored energy) could occur and cause injury or electrocution, the circuits energizing the parts must be locked-out and tagged. Only authorized personnel will perform lock-out/tag-out procedures. All workers affected by the lock-out/tag-out will be notified prior to, and upon completion of, the lock-out/tag-out procedure.

Lock-out/tag-out devices must be capable of withstanding the environment to which they are exposed. Locks will be attached in such a way as to prevent other personnel from operating the equipment, circuit, or control, or from removing the lock unless they resort to excessive force. Tags will identify the worker who attached the device, and contain information, which warns against the hazardous condition that will result from the system's unauthorized start-up. Tags must be legible and understood by all affected workers and incidental personnel. The procedures for attaching and removing lock-out/tag-out devices include the steps outlined in the following table.

STEP	LOCK-OUT/TAG-OUT PROCEDURES
1	Disconnect the circuits and/or equipment to be worked on from all electrical energy sources.
2	Ensure that the system is completely isolated so that it cannot be operated at that shut-off point or at any other location.
3	Release stored electrical energy.
4	Block or relieve stored non-electrical energy.
5	Place a lock on each shut-off or disconnect point necessary to isolate all potential energy sources. Place the lock in such a manner that it will maintain the shut-off/disconnect in the off position.
6	Place a tag on each shut-off or disconnect point. The tag must contain a statement prohibiting the unauthorized re-start or re-connect of the energy source and the removal of the tag, and the identity of the individual performing the tag and lock-out.

7	Workers who will be working on the system must place their own lock and tag on <u>each</u> lock-out point.
8	A qualified person must verify the system cannot be re-started or re-connected, and de-energization of the system has been accomplished.

Once the service or repairs have been made on the system:	
1	A qualified person will conduct an inspection of the work area, to verify that all tools, jumpers, shorts, grounds, etc., have been removed so that the system can then be safely re-energized.
2	All workers stand clear of the system.
3	Each lock and tag will be removed by the worker who attached it. If the worker has left the site, then the lock and tag may be removed by a qualified person under the following circumstances:
	a. The qualified person ensures the worker who placed the lock and tag has left the site; and
	b. The qualified person ensures the worker is aware the lock and tag has been removed before the worker resumes work on-site.

If maintenance work is required, the electrical supply to the equipment must be disconnected. Turning off the MAIN breaker using the disconnect switch will disconnect all power to the system. Once the disconnect switch has been turned off, the switch will be locked-out using the steps outlined below.

4.2.8 Ladders

One-third of worker deaths in construction result from falls. Many falls occur because ladders are not placed or used safely. Ladder use will comply with OSHA 1926.1053 through 1926.1060, including the following safety requirements.

STEP	PROPER LADDER USE PROCEDURE
1	Choose the right ladder for the task--the proper type and size, with a sufficient rating for the task.
2	Check the condition of the ladder before climbing. Do not use a ladder with broken, loose, or cracked rails or rungs. Do not use a ladder with oil, grease, or dirt on its rungs. The ladder should have safety feet.
3	Place the ladder on firm footing, with a four-to-one pitch.

STEP	PROPER LADDER USE PROCEDURE
4	Support the ladder by: <ul style="list-style-type: none"> • Tying it off; • Using ladder outrigger stabilizers; or • Have another worker hold the ladder at the bottom. • If another worker holds the ladder, they must: <ul style="list-style-type: none"> • Wear a hard hat; • Hold the ladder with both hands; • Brace the ladder with their feet; and • Not look up.
5	Keep the areas around the top and bottom of the ladder clear.
6	Extend the top of the ladder at least 36 inches (3 feet) above the landing.
7	Climb the ladder carefully - facing it - and use both hands. Use a tool belt and hand-line to carry material to the top or bottom of the ladder. Wear shoes in good repair with clean soles.
8	Inspect the ladder every day, prior to use, for the following problems: <ul style="list-style-type: none"> • Rail or rung damage • Broken feet • Rope or pulley damage • Rung lock defects or damage • Excessive dirt, oil, or grease • If the ladder fails inspection, it must be removed from service and tagged with a "Do Not Use" sign.

4.2.9 Hand and Power Tools

All hand and power tools will be maintained in a safe condition and in good repair. Hand and power tools will be used in accordance with 29 CFR 1926, Subpart I (1926.300 through 1926.307). Neither Stantec nor its subcontractors will issue unsafe tools, and workers are not permitted to bring unsafe tools on-site. All tools will be used, inspected, and maintained in accordance with the manufacturer's instructions. Throwing tools or dropping tools to lower levels is prohibited. Hand and power tools will be inspected, tested, and determined to be in safe operating condition prior to each use. Periodic safety inspections of all tools will be conducted to assure that the tools are in good condition, all guards are in place, and the tools are being properly maintained. Any tool that fails an inspection will be immediately removed from service and tagged with a "Do Not Use" sign.

Workers using hand and power tools, who are exposed to falling, flying, abrasive, or splashing hazards will be required to wear personal protective equipment (PPE). Eye protection must

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always be worn when working on-site. Additional eye and face protection, such as safety goggles or face shields, may also be required when working with specific hand and power tools. Workers, when on-site, will wear hard hats. Additional hearing protection may be required when working with certain power tools. Workers using tools, which may subject their hands to an injury, such as cuts, abrasions, punctures, or burns, will wear protective gloves. Loose or frayed clothing, dangling jewelry, or loose long hair will not be worn when working with power tools.

Electric power-operated tools will be double insulated or grounded, and equipped with an on/off switch. Guards must be provided to protect the operator and other nearby workers from hazards such as in-going nip points, rotating parts, flying chips, and sparks. All reciprocating, rotating and moving parts of tools will be guarded if contact is possible. Removing machine guards is prohibited.

Abrasive wheels will only be used on equipment provided with safety guards. Safety guards must be strong enough to withstand the effect of a bursting wheel. Abrasive wheels will not be operated in excess of their rated speed. Work or tool rests will not be adjusted while the wheel is in motion. All abrasive wheels will be closely inspected and ring tested before each use, and any cracked or damaged wheels will be removed immediately and destroyed.

Circular saws must be equipped with guards that completely enclose the cutting edges and have anti-kickback devices. All planer and joiner blades must be fully guarded. The use of cracked, bent, or otherwise defective parts is prohibited. Chain saws must have an automatic chain brake or kickback device. The worker operating the chain saw will hold it with both hands during cutting operations. A chain saw must never be used to cut above the operator's shoulder height. Chain saws will not be re-fueled while running or hot. Power saws will not be left unattended.

Only qualified workers will operate pneumatic tools, powder-actuated tools, and abrasive blasting tools.

4.2.10 Manual Lifting

Back injuries are among the leading occupational injuries reported by industrial workers. Back injuries such as pulls and disc impairments can be reduced by using proper manual lifting techniques. Leg muscles are stronger than back muscles, so workers should lift with their legs and not with their back. Proper manual lifting techniques include the following steps:

STEP	PROPER MANUAL LIFTING PROCEDURE
1	Plan the lift before lifting the load. Take into consideration the weight, size, and shape of the load.
2	Preview the intended path of travel and the destination to ensure there are no tripping hazards along the path.
3	Wear heavy-duty work gloves to protect hands and fingers from rough edges, sharp corners, and metal straps. Also, keep hands away from potential pinch points between the load and other objects.
4	Get the load close to your ankles, and spread your feet apart. Keep your back straight and do not bend your back too far; instead bend at your knees.
5	Feel the weight; test it.
6	Lift the load smoothly, and let your legs do the lifting. If you must pivot, do not swing just the load; instead, move your feet and body with the load.

If the load is too heavy, then do not lift it alone. Lifting is always easier when performed with another person. Assistance should always be used when it is available.

4.2.11 Weather-Related Hazards

Weather-related hazards include the potential for heat or cold stress, electrical storms, treacherous weather-related working conditions, or limited visibility. These hazards correlate with the season in which Site activities occur. Outside work will be suspended during electrical storms. In the event of other adverse weather conditions, the Site Safety Officer will determine if work can continue without endangering the health and safety of site personnel.

5.0 SITE WORK ZONES

The following work zones will be delineated by Stantec during the investigation activities.

5.1 CONTROL ZONES

Control boundaries will be established within the areas of Site activities. Examples of boundary zones include the exclusion and decontamination zone. All boundaries will be dynamic, and will be determined by the planned activities for the day. The Stantec representative will record the names of any visitors to the Site.

5.2 EXCLUSION ZONE

The controlled portion of the Site will be delineated to identify the exclusion zone, wherein a higher level of personal protective equipment may be required for entry during intrusive activities. The limits of the exclusion zone will be designated at each work location appropriately. A decontamination zone will be located immediately outside the entrance to the exclusion zone. All personnel leaving the exclusion zone will be required to adhere to proper decontamination procedures.

During drilling, a "super exclusion" zone will be established around the borehole which will not be entered by Stantec personnel at any time during any active drilling, slambor, cathead, silica sand dumping, or other related activities. The drilling contractor will be directed to stop such activity when Stantec site team members have a need to enter this zone.

5.3 DECONTAMINATION ZONE

The decontamination zone will be located immediately outside the entrance to the exclusion zone on its apparent upwind side, if feasible, and will be delineated with caution tape and traffic cones as needed. This zone will contain the necessary decontamination materials for personnel decontamination. Decontamination procedures are outlined in Section 8.0 of this plan.

6.0 SITE MONITORING AND ACTION LEVELS

6.1 SITE MONITORING

Field activities associated with drilling, excavation, and soil and groundwater sampling may create potentially hazardous conditions due to the migration of contaminants into the breathing zone. These substances may be in the form of mists, vapors, dusts, or fumes that can enter the body through ingestion, inhalation, absorption, and direct dermal contact. Monitoring for VOCs will be performed as needed to ensure appropriate personal protective measures are employed during site activities.

The following describes the conditions that will be monitored for during the investigation activities. All background and Site readings will be logged, and all instrument calibrations, etc., will be logged.

Organic Vapor Concentrations – During drilling, organic vapors will be monitored continuously in the breathing zone in the work area with a portable photoionization detector (PID), such as a miniRAE Model 3000 with a 10.2 eV lamp. The instrument will be calibrated daily or as per the manufacturer's recommendations. PID readings will be used as the criteria for upgrading or downgrading protective equipment and for implementing additional precautions or procedures.

Split spoons or other soil sampling devices will be monitored using the PID at the time they are opened, with appropriate PPE to be used where soils exhibit measurable volatile organic compound levels.

Particulates - Should subsurface conditions result in visible particulate dust during the course of intrusive activities (as indicated by CAMP monitoring equipment), the Contractor will be instructed to implement dust suppression measures.

6.2 ACTION LEVELS

During the course of any activity, as long as PID readings in the breathing zone are less than 5 ppm above background, Level D protection will be considered adequate. Level C protection will be required when VOC concentrations in ambient air in the work zone are sustained above 5 ppm total VOCs above background but remain below 50 ppm total VOCs.

If concentrations in the work zone exceed 50 ppm for a period of 5 minutes or longer, work will immediately be terminated by the Site Safety Officer. Options to allow continued drilling would then be discussed amongst all parties. Supplied-air respiratory protection is generally required for drilling to resume under these conditions. If Level B protection is not used, work may resume

**Health and Safety Plan
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937 Genesee Street
Rochester, NY**

in Level C once monitoring concentrations have decreased below 50 ppm and conditions outlined in the CAMP are met.

If the monitoring of fugitive particulate levels within the work area exceeds 0.15 mg/m^3 above background, then the drilling Contractor will be directed to implement fugitive dust control measures which may include use of engineering controls such as water spray at the borehole.

7.0 PERSONAL PROTECTIVE EQUIPMENT

Based on an evaluation of the hazards at the Site, personal protective equipment (PPE) will be required for all personnel and visitors entering the drilling exclusion zone(s). It is anticipated that all Stantec oversight work will be performed in Level D. All contractors will be responsible for selection and implementation of PPE for their personnel.

7.1 PROTECTIVE CLOTHING/RESPIRATORY PROTECTION

Protective equipment for each level of protection is as follows:

If PID readings are above 50 ppm, requiring an upgrade to Level B, Site work will be halted pending review of conditions and options by Stantec and other involved parties.

When PID readings range between 5 and 50 ppm, upgrade to Level C:

Level C

- Full face, air purifying respirator with organic/HEPA cartridge;
- Disposable chemical resistant one-piece suit (Tyvek or Saranex, as appropriate);
- Inner and outer chemical resistant gloves;
- Hard hat;
- Steel-toed boots; and
- Disposable booties.

When PID readings range between background and 5 ppm use Level D:

Level D

- Safety glasses;
- Steel-toed boots;
- Protective cotton, latex or leather gloves depending on Site duties;
- Hard hat; and
- Tyvek coverall (optional).

8.0 DECONTAMINATION

8.1 PERSONAL DECONTAMINATION

For complete decontamination, all personnel will observe the following procedures upon leaving the exclusion zone:

1. Remove disposable outer boots and outer gloves and place in disposal drum.
2. If using a respirator, remove respirator, dispose of cartridges if necessary, and set aside for later cleaning.
3. Remove disposable chemical resistant suits and dispose of articles in drum.
4. Remove and dispose of inner gloves.

Decontamination solutions shall be supplied at the decontamination zone. The wash solution will consist of water and detergent such as Alconox or trisodium phosphate (TSP), and the rinse solution will consist of clean water.

Contaminated wash solutions shall be collected in drums for disposal. All other disposable health and safety equipment will be decontaminated and disposed of as non-hazardous waste.

8.2 EQUIPMENT DECONTAMINATION

If equipment is used during field activities, it will be properly washed or steam-cleaned prior to exiting the decontamination zone. Pre- or post-use rinsing using solvents will be done wearing appropriate PPE.

When feasible, monitoring instruments will be either wrapped in plastic or carried by personnel not involved in handling contaminated materials, to reduce the need for decontamination. All instruments will be wet-wiped prior to removal from the work zone.

9.0 EMERGENCY PROCEDURES

The Site Safety Officer will coordinate emergency procedures and will be responsible for initiating emergency response activities. Emergency communications at the Site will be conducted verbally and by means of an air or vehicle horn. All personnel will be informed of the location of the cellular telephone and horn. Three blasts on the air or vehicle horn will be used to signal distress.

9.1 LIST OF EMERGENCY CONTACTS

Ambulance: 911
Hospital: **Strong Memorial Hospital: (585) 275-2100**
Fire Department: 911
Police: 911
Poison Control Center: 1-800-222-1222
Utility Emergency: 911

9.2 DIRECTIONS TO HOSPITAL

A map presenting directions to the hospital is provided in Figure 2. The route shall be reviewed at the initial site safety meeting onsite.

9.3 ACCIDENT INVESTIGATION AND REPORTING

All accidents requiring first aid, which occur incidental to activities onsite, will be investigated. The investigation format will be as follows:

- interviews with witnesses;
- pictures, if applicable; and
- necessary actions to alleviate the problem.

In the event that an accident or some other incident such as an explosion or exposure to toxic chemicals occurs during the course of the project, the Project Health and Safety Officer will be telephoned as soon as possible and receive a written notification within 24 hours. The report will include the following items:

- Name of injured;
- Name and title of person(s) reporting;
- Date and time of accident/incident;
- Location of accident/incident, building number, facility name;
- Brief summary of accident/incident giving pertinent details including type of operation ongoing at the time of the accident/incident;

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- Cause of accident/incident;
- Casualties (fatalities, disabling injuries), hospitalizations;
- Details of any existing chemical hazard or contamination;
- Estimated property damage, if applicable;
- Nature of damage; effect on contract schedule;
- Action taken to insure safety and security; and
- Other damage or injuries sustained (public or private).

Where reportable injuries, hospitalizations or fatalities occur amongst Stantec personnel, the necessary document required by OSHA will be submitted within timeframes allowed by law.

The accident report form is illustrated in Table 4.

TABLE 4
ACCIDENT REPORT

Project Corrective Action Plan Date of Occurrence _____

Location 937 Genesee Street

Type of Occurrence: (check all that Apply)

- | | |
|--|---|
| <input type="checkbox"/> Disabling Injury | <input type="checkbox"/> Other Injury |
| <input type="checkbox"/> Property Damage | <input type="checkbox"/> Equip. Failure |
| <input type="checkbox"/> Chemical Exposure | <input type="checkbox"/> Fire |
| <input type="checkbox"/> Explosion | <input type="checkbox"/> Vehicle Accident |
| <input type="checkbox"/> Other (explain) _____ | |

Witnesses to Accident/Injury:

_____	_____
_____	_____
_____	_____

Injuries:

Name of Injured _____

What was being done at the time of the accident/injury?

What corrective actions will be taken to prevent recurrence? _____

SIGNATURES

Health and Safety Officer _____ Date _____

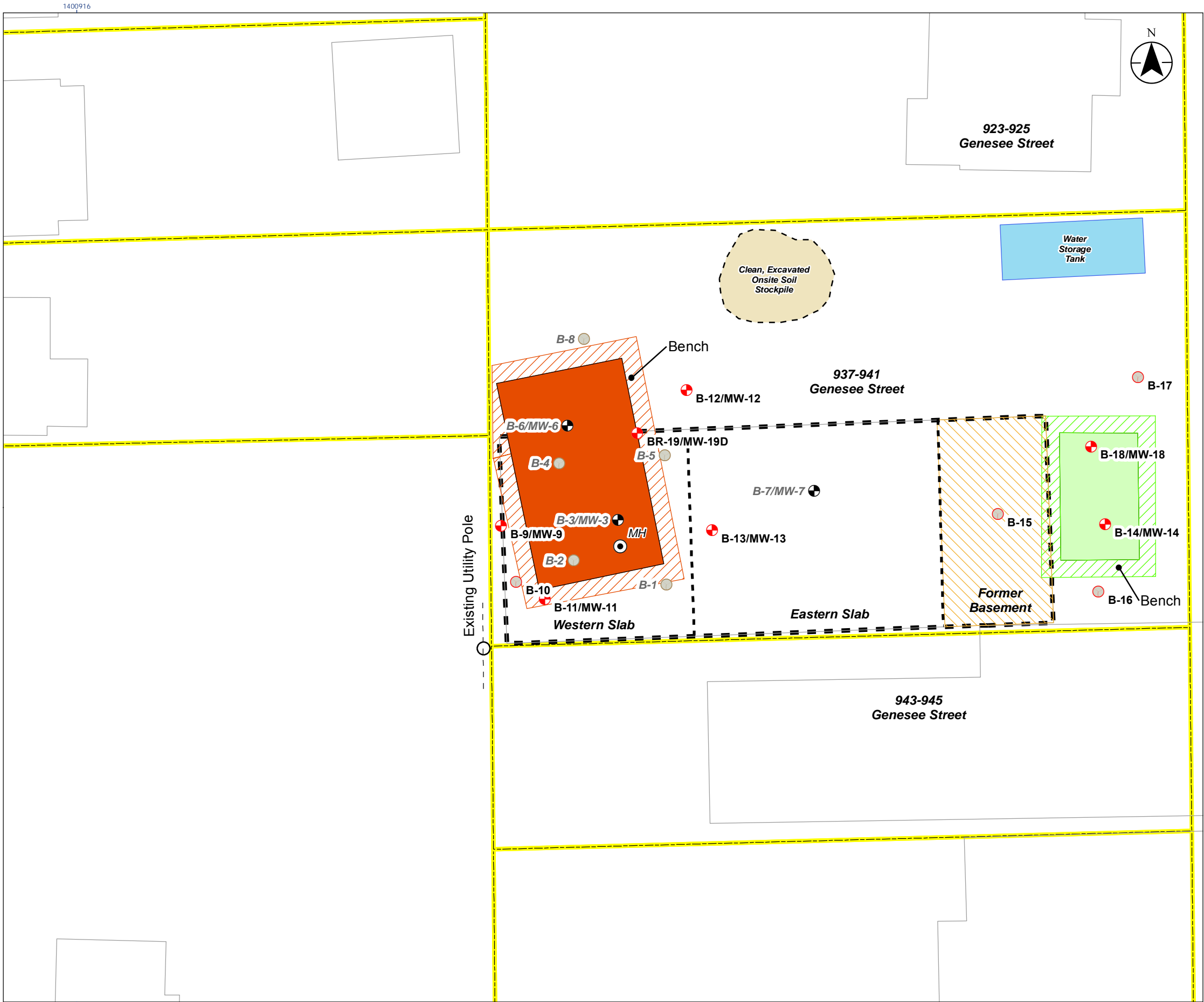
Project Manager _____ Date _____

Reviewer _____ Date _____

Comments by reviewer _____

FIGURES

U:\190500868\05_report_deliv\dwgs_design\GIS_figures\mxd\Figure 2 - CAP - Remedial Site Plan.mxd Revised: 2015-10-28 By: aless

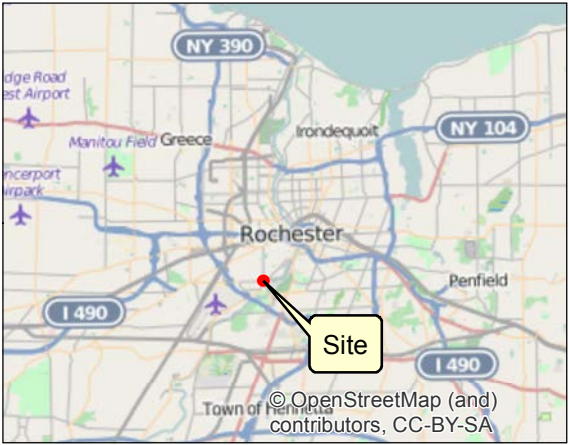
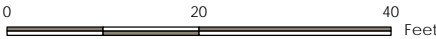


Legend

- Former Building Footprint
- Former Basement
- Parcel Boundary

Notes

- Coordinate System:
NAD 1983 StatePlane New York West FIPS 3103 Feet
- RAOC = Remedial Area of Concern.
- Locations of remedial features approximate only and subject to change.



Project Location: 937-941 Genesee Street, Rochester, NY
Prepared by: APL on 2015-11-5
Technical Review by: BM on 2015-11-5
Independent Review by: MPS on 2015-11-5
190500868

Client/Project
City of Rochester
Health and Safety Plan
937-941 Genesee Street

Figure No.

1

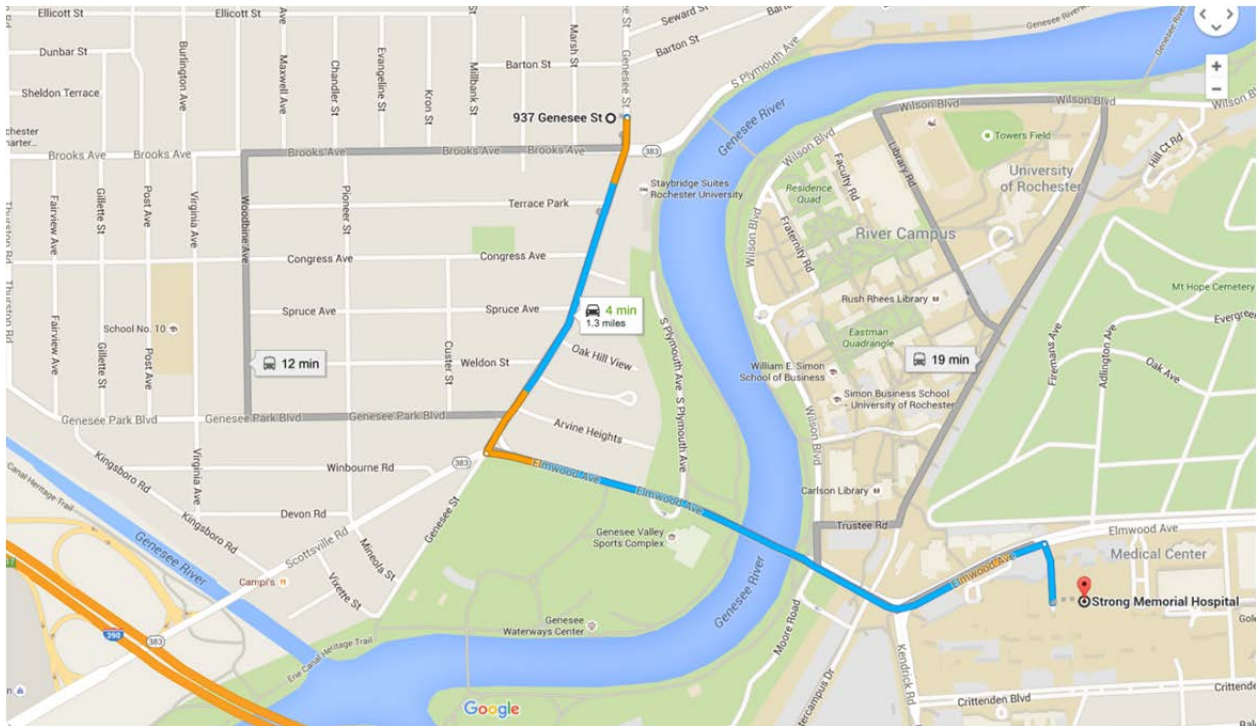
Title

Remedial Site Plan and Site Location

Corrective Action Plan – 937 Genesee Street Petroleum Impacted Soil

FIGURE 2

Directions and Map from the Site to Strong Memorial Hospital, Rochester, NY



937 Genesee St

Rochester, NY 14611, USA

- ↑ 1. Head south on Genesee St toward S Plymouth Ave 0.4 mi
- ↩ 2. Use the left 2 lanes to turn left onto Elmwood Ave 0.7 mi
- ➡ 3. Turn right onto Middle Drive 387 ft
 - 📍 Destination will be on the left

Strong Memorial Hospital

Rochester, NY 14642, USA

HEALTH & SAFETY PLAN

APPENDIX A

SAFETY DATA SHEETS



SAFETY DATA SHEET

Revision Date 10-Feb-2015

Revision Number 1

1. Identification

Product Name 1,2,4-Trimethylbenzene

Cat No. : AC140090000; AC140090010; AC140090025; AC140090100;
AC140090250

Synonyms Pseudocumene

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company	Entity / Business Name	Emergency Telephone Number
Fisher Scientific	Acros Organics	For information US call: 001-800-ACROS-01
One Reagent Lane	One Reagent Lane	/ Europe call: +32 14 57 52 11
Fair Lawn, NJ 07410	Fair Lawn, NJ 07410	Emergency Number US :001-201-796-7100 /
Tel: (201) 796-7100		Europe : +32 14 57 52 99
		CHEMTREC Tel. No. US :001-800-424-9300 /
		Europe :001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 3
Acute Inhalation Toxicity - Vapors	Category 4
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word

Warning

Hazard Statements

Flammable liquid and vapor
Causes skin irritation
Causes serious eye irritation
Harmful if inhaled
May cause respiratory irritation

**Precautionary Statements****Prevention**

Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell

Skin

If skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse

Eyes

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention

Fire

In case of fire: Use CO₂, dry chemical, or foam for extinction

Storage

Store in a well-ventilated place. Keep container tightly closed
Store locked up

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

None identified

3. Composition / information on ingredients

Component	CAS-No	Weight %
Benzene, 1,2,4-trimethyl-	95-63-6	98

4. First-aid measures

Eye Contact

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
Obtain medical attention.

Skin Contact

Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Obtain medical attention.

Inhalation

Remove from exposure, lie down. Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Obtain medical attention.

Ingestion

Do not induce vomiting. Clean mouth with water. Get medical attention.

Most important symptoms/effects	Breathing difficulties. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray. Carbon dioxide (CO ₂). Dry chemical. Use water spray to cool unopened containers. chemical foam.
Unsuitable Extinguishing Media	No information available
Flash Point	48 °C / 118.4 °F
Method -	No information available
Autoignition Temperature	500 °C / 932 °F
Explosion Limits	
Upper	6.4%
Lower	0.9%
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Flammable. Vapors may travel to source of ignition and flash back. Containers may explode when heated.

Hazardous Combustion Products

Carbon monoxide (CO) Carbon dioxide (CO₂)

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health
2

Flammability
2

Instability
0

Physical hazards
N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions	See Section 12 for additional ecological information.
Methods for Containment and Clean Up	Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Provide adequate ventilation. Do not let this chemical enter the environment.

7. Handling and storage

Handling	Avoid contact with skin and eyes. Do not breathe dust. Do not breathe vapors or spray mist. Take precautionary measures against static discharges. Do not ingest. Use only in area provided with appropriate exhaust ventilation. Use explosion-proof equipment. Use only non-sparking tools.
Storage	Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Benzene, 1,2,4-trimethyl-			TWA: 25 ppm TWA: 125 mg/m ³

Legend

NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection 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.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-44 °C / -47.2 °F
Boiling Point/Range	168 °C / 334.4 °F @ 760 mmHg
Flash Point	48 °C / 118.4 °F
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	6.4%
Lower	0.9%
Vapor Pressure	7 mmHg @ 44.4 °C
Vapor Density	4.15 (Air = 1.0)
Relative Density	0.880
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	500 °C / 932 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C ₉ H ₁₂
Molecular Weight	120.19

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Keep away from open flames, hot surfaces and sources of ignition. Incompatible products.
Incompatible Materials	Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO₂)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Benzene, 1,2,4-trimethyl-	3280 mg/kg (Rat)	3160 mg/kg (Rabbit)	18 g/m ³ (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Benzene, 1,2,4-trimethyl-	95-63-6	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects, both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Benzene, 1,2,4-trimethyl-	Not listed	7.19 - 8.28 mg/L LC50 96 h	Not listed	6.14 mg/L EC50 = 48 h

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility

Component	log Pow
Benzene, 1,2,4-trimethyl-	3.63

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN1993
Hazard Class 3
Packing Group III

TDG

UN-No UN1993
Hazard Class 3
Packing Group III

IATA

UN-No 1993
Proper Shipping Name FLAMMABLE LIQUID, N.O.S.*
Hazard Class 3
Packing Group III

IMDG/IMO

UN-No 1993
Proper Shipping Name Flammable liquid, n.o.s.
Hazard Class 3
Packing Group III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Benzene, 1,2,4-trimethyl-	X	X	-	202-436-9	-		X	X	X	X	X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Benzene, 1,2,4-trimethyl-	95-63-6	98	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard Yes
Chronic Health Hazard No
Fire Hazard Yes
Sudden Release of Pressure Hazard No

Reactive Hazard

No

Clean Water Act Not applicable**Clean Air Act** Not applicable**OSHA** Occupational Safety and Health Administration
Not applicable**CERCLA**
Not applicable**California Proposition 65** This product does not contain any Proposition 65 chemicals**State Right-to-Know**

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Benzene, 1,2,4-trimethyl-	X	X	X	X	-

U.S. Department of TransportationReportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N**U.S. Department of Homeland Security**

This product does not contain any DHS chemicals.

Other International Regulations**Mexico - Grade** No information available**Canada**

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

WHMIS Hazard Class B3 Combustible liquid
D1B Toxic materials
D2B Toxic materials**16. Other information****Prepared By** Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com**Revision Date** 10-Feb-2015**Print Date** 10-Feb-2015**Revision Summary** This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)**Disclaimer**

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage,

transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Version 3.8
Revision Date 11/04/2015
Print Date 11/16/2015

1. PRODUCT AND COMPANY IDENTIFICATION**1.1 Product identifiers**

Product name : 1,3,5-Trimethylbenzene

Product Number : 442236
Brand : Supelco
Index-No. : 601-025-00-5

CAS-No. : 108-67-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION**2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Flammable liquids (Category 3), H226
Skin irritation (Category 2), H315
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Acute aquatic toxicity (Category 2), H401
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Warning

Hazard statement(s)

H226 Flammable liquid and vapour.
H315 Causes skin irritation.
H335 May cause respiratory irritation.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.

P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : Mesitylene
1,3,5-Trimethylbenzene

Formula : C₉H₁₂
Molecular weight : 120.19 g/mol
CAS-No. : 108-67-8
EC-No. : 203-604-4
Index-No. : 601-025-00-5

Hazardous components

Component	Classification	Concentration
Mesitylene		
	Flam. Liq. 3; Skin Irrit. 2; STOT SE 3; Aquatic Acute 2; Aquatic Chronic 2; H226, H315, H335, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

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

If inhaled

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

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES**5.1 Extinguishing media****Suitable extinguishing media**

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

5.2 Special hazards arising from the substance or mixture

Carbon oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES**6.1 Personal precautions, protective equipment and emergency procedures**

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE**7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

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

Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION**8.1 Control parameters**

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Mesitylene	108-67-8	TWA	25.000000 ppm 125.000000 mg/m3	USA. NIOSH Recommended Exposure Limits

8.2 Exposure controls

Appropriate engineering controls

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

Personal protective equipment

Eye/face protection

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

Skin protection

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

Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Impervious clothing, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

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

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

- | | |
|--------------------|---|
| a) Appearance | Form: liquid, clear
Colour: colourless |
| b) Odour | No data available |
| c) Odour Threshold | No data available |
| d) pH | No data available |

e) Melting point/freezing point	Melting point/range: -45 °C (-49 °F) - lit.
f) Initial boiling point and boiling range	163 - 166 °C (325 - 331 °F) - lit.
g) Flash point	53.0 °C (127.4 °F) - closed cup
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	Lower explosion limit: 0.88 %(V)
k) Vapour pressure	18.7 hPa (14.0 mmHg) at 55.0 °C (131.0 °F) 3.3 hPa (2.5 mmHg) at 25.0 °C (77.0 °F)
l) Vapour density	No data available
m) Relative density	0.864 g/cm ³ at 25 °C (77 °F)
n) Water solubility	No data available
o) Partition coefficient: n-octanol/water	No data available
p) Auto-ignition temperature	550.0 °C (1,022.0 °F)
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

Heat, flames and sparks.

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - Mouse - 7,000 mg/kg

LD50 Oral - Rat - 5,000 mg/kg

LC50 Inhalation - Rat - 4 h - 24,000 mg/m3

Dermal: No data available

No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

Eyes - Rabbit

Result: Mild eye irritation - 24 h

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

No data available

No data available

Specific target organ toxicity - single exposure

May cause respiratory irritation.

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: OX6825000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish LC50 - Carassius auratus (goldfish) - 12.52 mg/l - 96.0 h

Toxicity to daphnia and other aquatic invertebrates Immobilization EC50 - Daphnia magna (Water flea) - 6 mg/l - 48 h

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 2325 Class: 3 Packing group: III
Proper shipping name: 1,3,5-Trimethylbenzene
Reportable Quantity (RQ):
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG

UN number: 2325 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: 1,3,5-TRIMETHYLBENZENE
Marine pollutant:yes

IATA

UN number: 2325 Class: 3 Packing group: III
Proper shipping name: 1,3,5-Trimethylbenzene

15. REGULATORY INFORMATION

SARA 302 Components

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

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Mesitylene	108-67-8	1994-04-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Mesitylene	108-67-8	1994-04-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Mesitylene	108-67-8	1994-04-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H315	Causes skin irritation.
H335	May cause respiratory irritation.
H401	Toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.
Skin Irrit.	Skin irritation

HMIS Rating

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

NFPA Rating

Health hazard:	2
Fire Hazard:	2
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.8

Revision Date: 11/04/2015

Print Date: 11/16/2015

**Benzene**

Version 1.8

Revision Date 2014-06-30

SECTION 1: Identification of the substance/mixture and of the company/undertaking**Product information**

Trade name : Benzene
Material : 1098293, 1059192, 1059060, 1037212, 1037213, 1037103,
1029170, 1037104, 1015526, 1016960

Company : Chevron Phillips Chemical Company LP
10001 Six Pines Drive
The Woodlands, TX 77380

Emergency telephone:**Health:**

866.442.9628 (North America)

1.832.813.4984 (International)

Transport:

North America: CHEMTREC 800.424.9300 or 703.527.3887

Asia: +800 CHEMCALL (+800 2436 2255)

EUROPE: BIG +32.14.584545 (phone) or +32.14583516 (telefax)

South America SOS-Cotec Inside Brazil: 0800.111.767 Outside Brazil: +55.19.3467.1600

Responsible Department : Product Safety and Toxicology Group
E-mail address : MSDS@CPChem.com
Website : www.CPChem.com

SECTION 2: Hazards identification**Classification of the substance or mixture**

This product has been classified in accordance with the hazard communication standard 29 CFR 1910.1200; the SDS and labels contain all the information as required by the standard.

Emergency Overview**Danger****Physical state:** Liquid **Color:** Clear, Colorless **Odor:** sweet, distinct

OSHA Hazards : Flammable Liquid, Aspiration hazard, Carcinogen, Moderate skin irritant, Moderate eye irritant, Mutagen, Target Organ Effects

Classification

: Flammable liquids , Category 2
Skin irritation , Category 2
Eye irritation , Category 2A
Germ cell mutagenicity , Category 1B

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Carcinogenicity , Category 1A
 Specific target organ systemic toxicity - repeated exposure ,
 Category 1 , Blood
 Aspiration hazard , Category 1

Labeling

Symbol(s)

:



Signal Word

:

Danger

Hazard Statements

: H225: Highly flammable liquid and vapor.
 H304: May be fatal if swallowed and enters airways.
 H315: Causes skin irritation.
 H319: Causes serious eye irritation.
 H340: May cause genetic defects.
 H350: May cause cancer.
 H372: Causes damage to organs (Blood) through prolonged or repeated exposure.

Precautionary Statements

:

Prevention:

P201 Obtain special instructions before use.
 P202 Do not handle until all safety precautions have been read and understood.
 P210 Keep away from heat/sparks/open flames/hot surfaces.
 - No smoking.
 P233 Keep container tightly closed.
 P240 Ground/bond container and receiving equipment.
 P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
 P242 Use only non-sparking tools.
 P243 Take precautionary measures against static discharge.
 P260 Do not breathe dust/fume/gas/mist/vapor/spray.
 P264 Wash skin thoroughly after handling.
 P270 Do not eat, drink or smoke when using this product.
 P280 Wear protective gloves/ eye protection/ face protection.
 P281 Use personal protective equipment as required.

Response:

P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
 P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
 P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 P308 + P313 IF exposed or concerned: Get medical advice/ attention.
 P331 Do NOT induce vomiting.
 P332 + P313 If skin irritation occurs: Get medical advice/ attention.
 P337 + P313 If eye irritation persists: Get medical advice/ attention.
 P362 Take off contaminated clothing and wash before reuse.
 P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

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Storage:

P403 + P235 Store in a well-ventilated place. Keep cool.

P405 Store locked up.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Carcinogenicity:**IARC**

Group 1: Carcinogenic to humans

Benzene 71-43-2

NTP

Known to be human carcinogen

Benzene 71-43-2

ACGIH

Confirmed human carcinogen

Benzene 71-43-2

SECTION 3: Composition/information on ingredients

Synonyms : Benzol
Cyclohexatriene
Phenyl Hydride
Phene

Molecular formula : C₆H₆

Component	CAS-No.	Weight %
Benzene	71-43-2	100

SECTION 4: First aid measures

General advice : Move out of dangerous area. Show this material safety data sheet to the doctor in attendance. Material may produce a serious, potentially fatal pneumonia if swallowed or vomited.

If inhaled : If unconscious place in recovery position and seek medical advice. If symptoms persist, call a physician.

In case of skin contact : If skin irritation persists, call a physician. If on skin, rinse well with water. If on clothes, remove clothes.

In case of eye contact : Immediately flush eye(s) with plenty of water. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.

If swallowed : Keep respiratory tract clear. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

Benzene

Version 1.8

Revision Date 2014-06-30

SECTION 5: Firefighting measures

Flash point	: -11 °C (12 °F) Method: Tag closed cup
Autoignition temperature	: 498 °C (928 °F)
Suitable extinguishing media	: Alcohol-resistant foam. Carbon dioxide (CO2). Dry chemical.
Unsuitable extinguishing media	: High volume water jet.
Specific hazards during fire fighting	: Do not allow run-off from fire fighting to enter drains or water courses.
Special protective equipment for fire-fighters	: Wear self contained breathing apparatus for fire fighting if necessary.
Further information	: Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. For safety reasons in case of fire, cans should be stored separately in closed containments. Use a water spray to cool fully closed containers.
Fire and explosion protection	: Do not spray on an open flame or any other incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.
Hazardous decomposition products	: No data available.

SECTION 6: Accidental release measures

Personal precautions	: Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.
Environmental precautions	: Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods for cleaning up	: Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

SECTION 7: Handling and storage**Handling**

Benzene

Version 1.8

Revision Date 2014-06-30

Advice on safe handling : Avoid formation of aerosol. Do not breathe vapors/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Provide sufficient air exchange and/or exhaust in work rooms. Container may be opened only under exhaust ventilation hood. Open drum carefully as content may be under pressure. Dispose of rinse water in accordance with local and national regulations.

Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary, but may not by themselves be sufficient. Review all operations, which have the potential to generating and accumulation of electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106 "Flammable and Combustible Liquids"; National Fire Protection Association (NFPA 77), "Recommended Practice on Static Electricity"; and/or the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising Out of Static, Lightning, and stray Currents".

Avoid formation of aerosol. Do not breathe vapors/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Take precautionary measures against static discharges. Provide sufficient air exchange and/or exhaust in work rooms. Container may be opened only under exhaust ventilation hood. Open drum carefully as content may be under pressure. Dispose of rinse water in accordance with local and national regulations.

Advice on protection against fire and explosion : Do not spray on an open flame or any other incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.

Storage

Requirements for storage areas and containers : No smoking. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

SECTION 8: Exposure controls/personal protection**Ingredients with workplace control parameters****US**

Ingredients	Basis	Value	Control parameters	Note
Benzene	ACGIH	TWA	0.5 ppm,	BEI, A1, Skin,
	ACGIH	STEL	2.5 ppm,	BEI, A1, Skin,
	OSHA Z-1-A	TWA	1 ppm,	

MSDS Number: 100000068511

5/14

Benzene

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	OSHA Z-1-A	CEIL	5 ppm,	
	OSHA Z-2	Peak	50 ppm,	(a),
	OSHA 29 CFR 1910.1028(c)	TWA	1 ppm,	
	OSHA 29 CFR 1910.1028(c)	STEL	5 ppm,	
	OSHA CARC	PEL	1 ppm,	
	OSHA CARC	STEL	5 ppm,	

(a) This standard applies to the industry segments exempt from the 1 ppm 8-hour TWA and 5 ppm STEL of the benzene standard at 1910.1028.

A1 Confirmed human carcinogen

BEI Substances for which there is a Biological Exposure Index or Indices (see BEI® section)

Skin Danger of cutaneous absorption

Immediately Dangerous to Life or Health Concentrations (IDLH)

Substance name	CAS-No.	Control parameters	Update
Benzene	71-43-2	Immediately Dangerous to Life or Health Concentration Value 500 parts per million	1995-03-01

Engineering measures

Adequate ventilation to control airborne concentrations below the exposure guidelines/limits. Consider the potential hazards of this material (see Section 2), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

Personal protective equipment

- Respiratory protection : Wear a supplied-air NIOSH approved respirator unless ventilation or other engineering controls are adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure. Wear a NIOSH approved respirator that provides protection when working with this material if exposure to harmful levels of airborne material may occur, such as: Air-Purifying Respirator for Organic Vapors. Use a positive pressure, air-supplying respirator if there is potential for uncontrolled release, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.
- Hand protection : The suitability for a specific workplace should be discussed with the producers of the protective gloves. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
- Eye protection : Eye wash bottle with pure water. Tightly fitting safety goggles.
- Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. Wear as appropriate: Flame retardant antistatic protective clothing. Workers should wear antistatic footwear.
- Hygiene measures : When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

Benzene

Version 1.8

Revision Date 2014-06-30

SECTION 9: Physical and chemical properties**Information on basic physical and chemical properties****Appearance**

Physical state : Liquid
Color : Clear, Colorless
Odor : sweet, distinct

Safety data

Flash point : -11 °C (12 °F)
Method: Tag closed cup
Lower explosion limit : 1.2 %(V)
Upper explosion limit : 7.8 %(V)

Oxidizing properties : no
Autoignition temperature : 498 °C (928 °F)
Molecular formula : C₆H₆
Molecular weight : 78.12 g/mol
pH : Not applicable
pour point : No data available
Boiling point/boiling range : 80 °C (176 °F)
Vapor pressure : 75.00 MMHG
at 20 °C (68 °F)
Relative density : 0.88, 25 °C(77 °F)
Water solubility : 1.88 g/l
at 23.5 °C (74.3 °F)
Partition coefficient: n-
octanol/water : log Pow: 2.13
Relative vapor density : 2.77
(Air = 1.0)
Evaporation rate : 2.8
Percent volatile : > 99 %

Other information

Conductivity : < 50 pSm
at 20 °C

Benzene

Version 1.8

Revision Date 2014-06-30

SECTION 10: Stability and reactivity

Reactivity : No decomposition if stored and applied as directed.

Chemical stability : This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
No decomposition if stored and applied as directed.

Possibility of hazardous reactions

Conditions to avoid : Heat, flames and sparks.

Materials to avoid : May react with oxygen and strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

Other data : No decomposition if stored and applied as directed.

SECTION 11: Toxicological information**Acute oral toxicity**

Benzene : LD50: > 2,000 mg/kg
Species: rat
Sex: female

Acute inhalation toxicity

Benzene : LC50: 44.5 mg/l
Exposure time: 4 h
Species: rat
Sex: Not Specified
Test atmosphere: vapor

Acute dermal toxicity

Benzene : LD50: > 8,260 mg/kg
Species: rabbit

Benzene

Skin irritation : May cause skin irritation in susceptible persons.

Benzene

Eye irritation : May cause irreversible eye damage.

Sensitization

Benzene : Did not cause sensitization on laboratory animals.

Repeated dose toxicity

Benzene : Species: rat, female
Sex: female

Benzene

Version 1.8

Revision Date 2014-06-30

Application Route: oral gavage
 Dose: 0, 25, 50, 100 mg/kg
 Exposure time: 103 wk
 Number of exposures: 5 d/wk
 NOEL: < 25 mg/kg
 Lowest observable effect level: 25 mg/kg

Species: rat, male
 Sex: male
 Application Route: oral gavage
 Dose: 0, 50, 100, 200 mg/kg
 Exposure time: 103 wk
 Number of exposures: 5 d/wk
 NOEL: < 50 mg/kg
 Lowest observable effect level: 50 mg/kg

Species: mouse
 Application Route: oral gavage
 Dose: 0, 25, 50, 100 mg/kg
 Exposure time: 103 wk
 NOEL: < 25 mg/kg

Carcinogenicity

Benzene

: Species: rat
 Sex: female
 Dose: 0, 25, 50, 250 mg/kg
 Exposure time: 103 wks
 Number of exposures: daily, 5 days/week
 Test substance: yes
 Remarks: zymbal gland carcinomas, squamous cell papillomas

Species: rat
 Sex: male
 Dose: 0, 50, 100, 200 mg/kg
 Exposure time: 103 wks
 Number of exposures: daily, 5 days/week
 Test substance: yes
 Remarks: zymbal gland carcinomas, squamous cell papillomas

Species: mouse
 Sex: male and female
 Dose: 25, 50, 100 mg/kg
 Exposure time: 103 wks
 Number of exposures: daily, 5 days/week
 Test substance: yes
 Remarks: Clear evidence of multiple organ carcinogenicity.

Benzene**Aspiration toxicity**

: May be fatal if swallowed and enters airways.
 Substances known to cause human aspiration toxicity hazards or to be regarded as if they cause human aspiration toxicity hazard.

CMR effects

Benzene

: Carcinogenicity: Human carcinogen.

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Mutagenicity: In vivo tests showed mutagenic effects
Teratogenicity: Did not show teratogenic effects in animal experiments.
Reproductive toxicity: Animal testing did not show any effects on fertility.

Benzene**Further information**

: Chronic Health Hazard.
Solvents may degrease the skin.

SECTION 12: Ecological information**Toxicity to fish**

Benzene : LC50: 5.3 mg/l
Exposure time: 96 h
Species: Oncorhynchus mykiss (rainbow trout)
flow-through test Test substance: yes
Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates

Benzene : EC50: 10 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)
static test Test substance: yes
Method: OECD Test Guideline 202

Toxicity to algae

Benzene : ErC50: 100 mg/l
Exposure time: 72 h
Species: Pseudokirchneriella subcapitata (green algae)
Test substance: yes
Method: OECD Test Guideline 201

Elimination information (persistence and degradability)

Biodegradability : This material is expected to be readily biodegradable.

Ecotoxicology Assessment**Acute aquatic toxicity**

Benzene : Toxic to aquatic life.

Chronic aquatic toxicity

Benzene : Harmful to aquatic life with long lasting effects.

Results of PBT assessment

Benzene : This substance is not considered to be persistent, bioaccumulating nor toxic (PBT)., This substance is not considered to be very persistent nor very bioaccumulating

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(vPvB).

Additional ecological
information

: Toxic to aquatic life.

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal., Toxic to aquatic life.

SECTION 13: Disposal considerations

The information in this SDS pertains only to the product as shipped.

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

Product

: The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.

Contaminated packaging

: Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum.

SECTION 14: Transport information

The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition).

Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping description for the material. Flashpoints for the material may vary slightly between the MSDS and the bill of lading.

US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)

UN1114, BENZENE, 3, II, RQ (BENZENE)

IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)

UN1114, BENZENE, 3, II, (-11 °C)

IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)

UN1114, BENZENE, 3, II

ADR (AGREEMENT ON DANGEROUS GOODS BY ROAD (EUROPE))

UN1114, BENZENE, 3, II, (D/E)

RID (REGULATIONS CONCERNING THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS (EUROPE))

UN1114, BENZENE, 3, II

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**ADN (EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE
OF DANGEROUS GOODS BY INLAND WATERWAYS)**

UN1114, BENZENE, 3, II

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Other information	: Benzene and mixtures having 10% Benzene or more, S.T. 3, Cat.Y
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SECTION 15: Regulatory information**National legislation**

CERCLA Reportable
Quantity : 10 lbs
Benzene

SARA 302 Reportable
Quantity : This material does not contain any components with a SARA
302 RQ.

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

SARA 304 Reportable
Quantity : This material does not contain any components with a section
304 EHS RQ.

SARA 313 Ingredients : The following components are subject to reporting levels
established by SARA Title III, Section 313:
: Benzene - 71-43-2

Clean Air Act

Ozone-Depletion
Potential : This product neither contains, nor was manufactured with a Class I or
Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR
82, Subpt. A, App.A + B).

The following chemical(s) are listed as HAP under the U.S. Clean Air Act, Section 12 (40 CFR 61):
: Benzene - 71-43-2

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for
Accidental Release Prevention (40 CFR 68.130, Subpart F).

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The following chemical(s) are listed under the U.S. Clean Air Act Section 111 SOCMII Intermediate or Final VOC's (40 CFR 60.489):

: Benzene - 71-43-2

US State Regulations

Pennsylvania Right To Know

: Benzene - 71-43-2

New Jersey Right To Know

: Benzene - 71-43-2

California Prop. 65
Ingredients

: WARNING! This product contains a chemical known in the State of California to cause cancer.

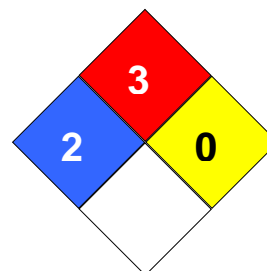
WARNING: This product contains a chemical known in the State of California to cause birth defects or other reproductive harm.

Notification status

Europe REACH	:	On the inventory, or in compliance with the inventory
United States of America TSCA	:	On the inventory, or in compliance with the inventory
Canada DSL	:	On the inventory, or in compliance with the inventory
Australia AICS	:	On the inventory, or in compliance with the inventory
New Zealand NZIoC	:	On the inventory, or in compliance with the inventory
Japan ENCS	:	On the inventory, or in compliance with the inventory
Korea KECI	:	On the inventory, or in compliance with the inventory
Philippines PICCS	:	On the inventory, or in compliance with the inventory
China IECSC	:	On the inventory, or in compliance with the inventory

SECTION 16: Other information**NFPA Classification**

: Health Hazard: 2
Fire Hazard: 3
Reactivity Hazard: 0



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Further information

Legacy SDS Number : CPC00091

Significant changes since the last version are highlighted in the margin. This version replaces all previous versions.

The information in this SDS pertains only to the product as shipped.

The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.


Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50	Lethal Concentration 50%		

Safety Data Sheets (SDS)

SECTION 1-IDENTIFICATION

Product name: Ethylbenzene
Other names: —
Proper shipping name: Ethylbenzene
Recommended use of the chemical and restrictions on use: The main use of ethylbenzene is to manufacture styrene, a compound used to make plastics. Ethylbenzene is also found in gasoline, paints, inks, insecticides, carpet glues and tobacco products.
Manufacturer/Supplier Name: Taiwan SM Corp., Kaohsiung plant Address: NO.7, Industrial 1st Rd, Lin-Yuan Kaohsiung County 83203, Taiwan, R.O.C. Phone No.: 886-7-6414511
Emergency phone No./Fax No.: 886-7-6414511 Ext. 221 (on duty), 886-7-6414517 (off duty)/886-7-6423828

SECTION 2-HAZARDS IDENTIFICATION

GHS Classification:	Flammable Liquid Category 2 Acute Toxicity (Inhalation) Category 4 Skin Corrosion/Irritation Category 3 Serious Eye Damage/Eye Irritation Category 2 Carcinogenicity Category 2 Reproductive Toxicity Category 2 Specific Target Organ Toxicity Repeated Exposure Category 2 Aspiration Hazard Category 1
GHS Label elements:	
Hazard symbols	
Signal word	Danger
Hazard statements	Flammable liquid and vapor Harmful if inhaled Causes skin irritation Causes serious eye irritation Suspected of causing cancer May damage the unborn child May be harmful to organs by prolonged and repeated exposure May be fatal if swallowed and enters airways
Precautionary statements	Use only in well ventilated area. Control of exposure by mechanical ventilation in an unventilated or confined space Avoid breathing vapors and contact with skin and eyes. Wear breathing apparatus/protective gloves/face protection. Store in well-ventilated place. Disposal must be in accordance with applicable federal, state, or local regulations.
Other hazards: —	

SECTION 3-COMPOSITION/INFORMATION ON INGREDIENTS

CAS No.	Chemical Name	wt% by weight	EINECS No.
00100-41-4	Ethylbenzene	99.0 min.	202-849-4
Synonyms	Phenylethane 、 EB 、 Ethylbenzol		

SECTION 4-FIRST AID MEASURES

Description of necessary first aid measures

Eye:

1. Flush eye with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids.
2. Get medical aid immediately.

Skin:

1. Washing affected area thoroughly with soap and water for at least 20 minutes.
2. Call a Physician if irritation develops or persists.
3. Removing contaminated clothing, shoes, and leathery wearings, cleaning procedure is available before reused or waste treatment.

Ingestion:

1. If victim is conscious and alert, give 2~4 cupfuls of milk/water to dilute the substance in stomach.
2. Never give anything by mouth to an unconscious person.
3. Don't induce vomiting unless directed to do so by medical person.
4. Then seek for medical attention.

Inhalation:

1. Remove from further exposure and flush thoroughly with air.
2. If not breathing, give artificial respiration. If breathing is difficult, give Oxygen.
3. If respiratory irritation, seek immediate medical assistance and call a physician.

Most important symptoms/effects, acute and delayed

Headaches, dizziness, fatigue, eye, nose and throat irritation. Target organs: Eyes, upper respiratory system, skin, CNS, lung, liver, kidney, skin (dermatitis), eye (conjunctivitis and other eye injuries), upper respiratory system disorders, and central nervous system disorders.

Indication of immediate medical attention and special treatment needed, if necessary

For acute or short term repeated exposures to Ethylbenzene:

Inhalation:

1. Severe exposures should have cardiac monitoring to detect arrhythmia.
2. If bronchospasm and wheezing occur, consider treatment with inhaled sympathomimetic agents.
3. If pulmonary edema (noncardiogenic) occurs, then maintain ventilation and oxygenation with close arterial blood gas monitoring. Early use of PEEP and mechanical ventilation may be needed to maintain pO₂ greater than 50 mmHG with FIO₂ less than 60%.

Ingestion:

1. Induction of emesis is not recommended.
2. Cautious gastric lavage followed by administration of activated charcoal may be of benefit if the patient is seen soon after the exposure.

SECTION 5-FIRE FIGHTING MEASURES

Extinguishing media

Foam · CO₂ · Dry chemical powder · Water spray or fog – Large fires only.

Specific hazards arising from the chemical

1. Liquid and vapor are flammable.
2. Moderate fire hazard when exposed to heat or flame.
3. Vapor forms an explosive mixture with air.
4. Moderate explosion hazard when exposed to heat or flame.
5. Vapor may travel a considerable distance to source of ignition.
6. Heating may cause expansion or decomposition leading to violent rupture of containers.
7. On combustion, may emit toxic fumes of carbon monoxide (CO).

Special protective equipment and precautions for fire-fighters

1. Must wear MSHA/NOISH approved positive self-contained breathing apparatus (SCBA) and protective clothing.
2. Withdrawing and isolation the possible dangerous sources, fire fighting at safe distance and suitable protection area. Keep toxic vapors and decompositions away from inhalation, when standing at upper-wind area as well.
3. Stop leakage before fire extinguishing, otherwise it may explode again because of vapors above leakage. However, it's not well extinguishment at nondangerous circumstance, preferring to burning up.
4. Water spray may not work effectively in terms of lower flash point. Better fire fighting performed by experienced people.
5. In huge fire at larger area, automatic water spray system should be recommended. If extinguishing is not available, evacuating people back as soon as possible.
6. Out off the space immediately, if vessel collapsed or pressure relief valve went pop.

SECTION 6-ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedure

1. Personal protective equipment (specified in Section 8)
Eyes : Chemical safety goggles are recommended, and a face shield is added when needed.
Skin : Wear appropriate protective gloves to avoid skin contact.
Clothing : When direct contact is likely, Use rubberized clothings, apron and boots.
Respiratory : When limits are exceeded, wear a respirator approved by NIOSH/MSHA for protection against organic dust, mists and vapors.
2. Remove all sources of ignition. No smoking, naked lights or ignition sources. Ventilate area of leak or spill.
3. Keep unnecessary and unprotected personnel from entering. Evacuate personnel from the danger area. Consult with an expert about the emergency procedures.

Environmental precautions

1. Prevent spillage from entering drains, surface, and groundwater.
2. Contain and recover liquid when possible. Use non-sparking tools and equipment.
3. Collect liquid in an appropriate container or absorb with an inert material (e.g. vermiculite, dry sand, earth), and place in a chemical waste container.
4. Report the accidental spill/release to Local/State government.

Methods and materials for containment and cleaning up

Minor spill:

1. Remove all ignition sources.
2. Clean up all spills immediately.
3. Avoid breathing vapors and contact with skin and eyes.
4. Control personal contact by using protective equipment.
5. Contain and absorb small quantities with vermiculite or other absorbent material.
6. Wipe up.
7. Collect residues in a flammable waste container.

Major spill

1. Clear area of personnel and move upwind.
2. Alert emergency responders and tell them location and nature of hazard.
3. May be violently or explosively reactive.
4. Wear breathing apparatus plus protective gloves.
5. Prevent spillage from entering drains or water course.
6. No smoking, naked lights or ignition sources. Increase ventilation.
7. Stop leak if safe to do so.
8. Water spray or fog may be used to disperse/absorb vapor.
9. Contain spill with sand, earth or vermiculite.
10. Use only spark-free shovels and explosion proof equipment.
11. Collect recoverable product into labeled containers for recycling..
12. Absorb remaining product with sand, earth or vermiculite.
13. Collect solid residues and seal in labeled drums for disposal.
14. Wash area and prevent runoff into drains.
15. If contamination of drains or waterways occurs, advise emergency services.

SECTION 7-HANDLING AND STORAGE

Precautions for safe handling

1. Wash thoroughly after handling.
2. Use only in well ventilated area.
3. Ground and bond containers when transferring.
4. Use spark-free tools and explosion proof equipment.
5. Empty containers retain product residue (liquid/vapor), and can be dangerous.
6. Do not pressurize, cut, weld, braze, solder, drill, or expose empty containers to heat, sparks or open flames.

Conditions for safe storage, including any incompatibilities

1. Iron, galvanized iron, and steel are suitable metals for tanks.
2. Storage should be located away from any area subject to fire hazards. Storage tanks located in the open or underground minimize the danger of fire, vapor and health problems.
3. All openings in the system should terminate outdoors and be protected by flash screen.
4. Electrical installation should conform to the National Electrical Code.
5. Storage tanks should be electrically bonded and grounded to prevent dangerous accumulations of static electricity. (see NFPA pamphlet "Static Electricity")
6. Natural ventilation is all that is needed for outdoor storage installation.
7. For indoor storage : Good natural ventilation may be sufficient. The generally considered maximum allowable concentration is 100 ppm by volume in air for an eight-hour working exposure. If other than natural ventilation is required,

the ventilation equipment should be designed to handle the heavy ethylbenzene vapor. Since ethylbenzene vapor is heavier than air, a down draft mechanical exhaust is indicated in those operation in which general ventilation should be to ensure a substantial air flow away from the work area. All ventilating systems require periodic inspection.

SECTION 8-EXPOSURE CONTROLS, PERSONAL PROTECTION

Control parameters

OSHA- Final PELs : 100 ppm TWA.

ACGIH TLV-TEL : 100 ppm.

ACGIH TLV-STEL : 125 ppm.

Taiwan TWA : 100 ppm (skin).

Taiwan STEL : 125 ppm (skin).

Taiwan Ceiling : -----.

Taiwan BEI : 1 mg/l (before on duty).

Engineering control

1. Process should be located at least 17 meter (50 feet) away from open flames and all high temperature operations likely to cause ignition of the ethylbenzene vapor.
2. In venting ethylbenzene vapors, consideration should be given to possible halogenation of the vapors by low concentrations of free chlorine and bromine with the resultant formation of lacrimations.
3. Process should be designed so that the operator is not exposed to direct contact with ethylbenzene or the vapor. The technical problems of designing equipment, providing adequate ventilation and operating procedures which promise maximum security and economy, can best be handled by competent engineers.
4. It is essential for safety that equipment be used and maintained as recommended by the manufacturer.
5. Tanks used to store or process ethylbenzene should be closed vessels vented to a safe point of discharge in the outside atmosphere away from operating stations, roadways, and at least 17 meter (50 feet) from possible sources of ignitions. All sparks, flames, heated surface, or other sources of ignition should be kept away from all vents. It is advisable, to provide suction on vessels when inspection or observation openings are made, to minimize or eliminate escape of vapors.

Personal protective equipment

Personal respirators (NIOSH Approved):

If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator.

(Warning: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.)

Skin protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

SECTION 9-PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Transparent liquid	Upper/lower explosive limits : 1.0% ~ 6.7%
Odor: Aromatic odor	Vapor Pressure : 7.1 mmHg @ 20°C / 68°F
Odor threshold : 0.092 ~ 0.6 ppm	Vapor Density : 3.66 (air=1)
PH : Not available	Relative density : 0.864 (water=1)
Melting/Freezing Point : -94.9°C	Solubility : 0.015 @ 25°C in water
Initial boiling point/boiling range : 132.6°C	Partition coefficient : 3.15 (n-octanol/water)
Flash point : 21°C	Auto-ignition temperature : 432°C
Evaporation Rate : 0.84 (BuAc=1)	Decomposition temperature : Not available
Flammability (solid/gas) : Not available	Viscosity : Not available
Molecular Formula : C ₈ H ₁₀	Molecular Weight : 106.7

SECTION 10-STABILITY AND REACTIVITY

Reactivity

The product is stable. Vapor is explosive when exposed to heat or flame.

Chemical stability

Stable under normal temperatures and pressures.

Possibility of hazardous reaction

Has not been reported.

Condition to avoid Incompatible materials, ignition sources, excess heat.
Incompatible materials Oxidizing agents.
Hazardous decomposition products Carbon dioxide and carbon monoxide may form when heated to decomposition.

SECTION 11-TOXICOLOGICAL INFORMATION

Routes of exposure Eye, Skin, inhalation, Ingestion.
Symptoms (treatments as indicated in Section 4) <p>Eye: May cause irritation, redness, pain, and corneal damage.</p> <p>Skin: Causes irritation to skin. Symptoms include redness, itching, and pain. May produce blisters. May be absorbed through the skin.</p> <p>Ingestion: May cause irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. May cause central nervous system depression. Symptoms may include giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal.</p> <p>Inhalation: Inhalation of high concentrations of gas/vapor causes lung irritation with coughing and nausea, central nervous depression with headache and dizziness, slowing of reflexes, fatigue and inco-ordination. Central nervous system (CNS) depression may include general discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal. If exposure to highly concentrated solvent atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and possible death.</p> <p>Chronic exposure: There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. Chronic solvent inhalation exposures may result in nervous system impairment and liver and blood changes.</p> <p>Aggravation of pre-existing conditions: Persons with pre-existing skin disorders, eye problems, liver disease, central nervous system disorders, or impaired respiratory function may be more susceptible to the effects of the substance.</p>
Toxicity LD50: 3500 mg/kg (rat, oral) LC50: 4000 ppm/4h (rat, inhalation)
Irritation Skin (rabbit): 15 mg/24h Mild Eye (rabbit): 500 mg- SEVERE
Chronic effect Carcinogenicity: ACGIH : A3- Proven for animals. OSHA : Classified None. IARC : Group 2B carcinogen. <p>Epidemiology: Not available.</p> <p>Teratogenicity: Not available.</p> <p>Reproductive Effects: Not available.</p>

Neurotoxicity: Not available
Mutagenicity: Mutation in mammalian somatic cells (Rodent, mouse) Lymphocyte=80mg/L.




SECTION 12-ECOLOGICAL INFORMATION



Ecotoxicity LC ₅₀ (96 hr.) Fish: 32.0~97.1 mg/l EC ₅₀ (48 hr.) Water flea: Not available Biocentration factor (BCF): Not available
Persistence and degradability 1. In the atmosphere, it exists primarily in the vapor phase based on its vapor pressure. It photochemically degrades by reaction with hydroxyl radicals (half-life 0.5 to 2 days) and partially returns to the earth in rain. 2. Degradation occurs faster under smog conditions. Photooxidation products include ethylphenol, benzaldehyde, acetophenone and m- and p- ethylnitrobenzene. 3. In water, ethylbenzene's concentration decreases by evaporation and biodegradation. The rate of decrease is dependent on the season. Half-lives in water range from several days to 2 weeks. 4. Some ethylbenzene is absorbed by sediment, but bioconcentration in fish is not expected to be significant. Half-life (Air): 8.56~85.6 hr Half-life (Surface water): 72~240 hr Half-life (Ground water): 144~5472 hr Half-life (Soil): 7.2~240 hr
Bioaccumulative potential This material is not expected to significantly bioaccumulate.
Mobility in soil Ethylbenzene is adsorbed moderately by soil. It does not significantly hydrolyze in either water or soil.
Other adverse effects: —

SECTION 13-DISPOSAL CONSIDERATIONS

Residues and spilled material are hazardous waste due to ignitability. Disposal must be in accordance with applicable federal, state, or local regulations.
The container for this product can present explosion or fire hazards, even when emptied. To avoid risk of injury, do not cut, puncture, or weld on or near this container. Since the emptied containers retain product residue, follow label warnings even after container is emptied.

SECTION 14-TRANSPORTATION INFORMATION

US DOT	Shipping Name	ETHYLBENZENE	Hazard Labels	
	Hazard Class	3		
	UN Number	1175		
	Packing Group	II		
Sea(IMO/IMDG)	Shipping Name	ETHYLBENZENE	Hazard Labels	
	Hazard Class	3.2		
	UN Number	1175		
	Packing Group	II		
Air(ICA0/IATA)	Shipping Name	ETHYLBENZENE	Hazard Labels	
	Hazard Class	3		
	Subsidiary Class	1175		
	Packing Group	II		

EUROPEAN RID/ADR (ADR/RID)	Shipping Name	ETHYLBENZENE	Hazard Labels	
	Hazard Class	3		
	UN Number	1175		
Canadian TDG	Shipping Name	ETHYLBENZENE	Hazard Labels	
	Hazard Class	3		
	UN Number	1175		
	Packing Group	II		
	Subsidiary Class	9.2		

SECTION 15-REGULATORY INFORMATION

US FEDERAL	
TSCA	<p>CAS# 100-41-4 is listed on the TSCA inventory. Health & Safety Reporting List CAS# 100-41-4 : Effective Date : June 19, 1987 ; Sunset Date : June 19, 1997 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.</p>
SARA	<p>Section 302 (RQ) CAS# 100-41-4 : final RQ = 1000 pounds (454 kg) Section 302 (TPQ) None of the chemicals in this product have a TPQ. SARA Codes CAS# 100-41-4 : acute, chronic, flammable. Section 313 This material contains Ethylbenzene (CAS# 100-41-4, 99.0%) ,which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.</p>
Clean Air Act	<p>CAS# 100-41-4 is listed as a hazardous air pollutant (HAP) . This material does not contain any class 1 Ozone depleters. This material does not contain any class 2 Ozone depleters.</p>
Clean Water Act	<p>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.</p>
OSHA	<p>None of the chemicals in this product are considered highly hazardous by OSHA.</p>
STATE	
Ethylbenzene can be found on the following state right to know lists : California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.	
California No Significant Risk Level : None of the chemicals in this product are listed.	
European/International Regulations	
<p>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.</p>	
CANADA	<p>CAS# 100-41-4 is listed on Canada's DSL/NDSL list. This product has a WHMIS classification of B2, D2B.</p>

SECTION 16-OTHER INFORMATION**References and sources**

1. CHEMINFO Data Bank, CCINFO CD, 2005-3
2. HSDB Data Bank, TOMES PLUS CD, Vol.65,2005
3. RETECS Data Bank, TOMES PLUS CD, Vol.65, 2000
4. Hazardous Substance Data Bank, Environment Protection, Administration, Executive Yuan, ROC (Taiwan)
5. Chemwatch Data Bank, 2005-1
6. SDS, GHS in Taiwan, Council of Labor Affairs, Executive Yuan, ROC (Taiwan)

Version	Date	Remark
Version 1	06/01/1998	Original Version.
Version 2	04/20/2001	Updated 10 sections to 16 sections.
Version 3	08/01/2003	Updated "SECTION 9-PHYSICAL AND CHEMICAL PROPERTIES".
Version 4	01/01/2006	Updated "SECTION 14-TRANSPORTATION INFORMATION".
Version 5	08/21/2008	Updated each section by GHS SDS.
Version 6	08/01/2011	Checked each section by SHE
Prepared by	Safety & Environment Protection Section, Taiwan SM Corporation Kaohsiung Plant.	



SAFETY DATA SHEET

Creation Date 16-Apr-2012

Revision Date 10-Feb-2015

Revision Number 1

1. Identification

Product Name Cumene

Cat No. : AC329730000; AC329730025; AC329730050; AC329735000

Synonyms Isopropylbenzene

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01
/ **Europe** call: +32 14 57 52 11
Emergency Number **US**:001-201-796-7100 /
Europe: +32 14 57 52 99
CHEMTREC Tel. No.**US**:001-800-424-9300 /
Europe:001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 3
Acute oral toxicity	Category 4
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Carcinogenicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	
Aspiration Toxicity	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
Flammable liquid and vapor
Harmful if swallowed
Causes skin irritation
Causes eye irritation
Suspected of causing cancer
May cause respiratory irritation
May be fatal if swallowed and enters airways

**Precautionary Statements****Prevention**

Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Wear protective gloves/protective clothing/eye protection/face protection
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product

Response

Call a POISON CENTER or doctor/physician if you feel unwell

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

Skin

Take off contaminated clothing and wash before reuse

IF ON SKIN: Wash with plenty of soap and water

If skin irritation occurs: Get medical advice/attention

Eyes

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

If eye irritation persists: Get medical advice/attention

Ingestion

Rinse mouth

Do NOT induce vomiting

IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician

Fire

Fight fire with normal precautions from a reasonable distance

Evacuate area

Storage

Store locked up

Store in a well-ventilated place. Keep container tightly closed

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Toxic to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
Cumene	98-82-8	>95

4. First-aid measures

General Advice

If symptoms persist, call a physician.

Eye Contact

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
Obtain medical attention.

Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.
Inhalation	Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.
Ingestion	Do not induce vomiting. Obtain medical attention.
Most important symptoms/effects	Breathing difficulties. . Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.
Unsuitable Extinguishing Media	Do not use a solid water stream as it may scatter and spread fire
Flash Point	31 °C / 87 °F
Method -	No information available
Autoignition Temperature	424 °C / 795 °F
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Flammable. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Containers may explode when heated. Vapors may form explosive mixtures with air.

Hazardous Combustion Products

Carbon monoxide (CO) Carbon dioxide (CO₂)

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	2	0	N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.
Environmental Precautions	Should not be released into the environment. Do not flush into surface water or sanitary sewer system.
Methods for Containment and Clean Up	Keep in suitable, closed containers for disposal. Soak up with inert absorbent material. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Take precautionary measures against static discharges.

7. Handling and storage

Handling	Wear personal protective equipment. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Take precautionary measures against static discharges. Use explosion-proof equipment.
Storage	Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Cumene	TWA: 50 ppm	(Vacated) TWA: 50 ppm (Vacated) TWA: 245 mg/m ³ Skin TWA: 50 ppm TWA: 245 mg/m ³	IDLH: 900 ppm TWA: 50 ppm TWA: 245 mg/m ³
Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Cumene	TWA: 50 ppm TWA: 246 mg/m ³	TWA: 50 ppm TWA: 245 mg/m ³ STEL: 75 ppm STEL: 365 mg/m ³	TWA: 50 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures

Ensure that eyewash stations and safety showers are close to the workstation location.
Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment.

Personal Protective Equipment

Eye/face Protection

Tightly fitting safety goggles. Face-shield.

Skin and body protection

Long sleeved clothing.

Respiratory Protection

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.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	No information available
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-96 °C / -141 °F
Boiling Point/Range	152 - 154 °C / 306 - 309 °F
Flash Point	31 °C / 87 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	5.3 hPa @ 20 °C
Vapor Density	No information available
Relative Density	0.862
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	424 °C / 795 °F
Decomposition Temperature	No information available

Viscosity	0.79 mPa.s at 20 °C
Molecular Formula	C9 H12
Molecular Weight	120.19

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Excess heat. Incompatible products. Keep away from open flames, hot surfaces and sources of ignition.
Incompatible Materials	Strong oxidizing agents
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO ₂)
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Cumene	1400 mg/kg (Rat) 2700 mg/kg (Rat)	12300 µL/kg (Rabbit)	3577 ppm (Rat) 6 h 39000 mg/m ³ (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation	Irritating to eyes, respiratory system and skin
Sensitization	No information available
Carcinogenicity	The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Cumene	98-82-8	Group 2B	Not listed	Not listed	X	Not listed

IARC: (International Agency for Research on Cancer)

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

Mutagenic Effects	No information available
Reproductive Effects	No information available.
Developmental Effects	No information available.
Teratogenicity	No information available.
STOT - single exposure	Respiratory system
STOT - repeated exposure	None known
Aspiration hazard	Category 1

Symptoms / effects, both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting delayed

Endocrine Disruptor Information No information available

Other Adverse Effects See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Do not empty into drains. Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Cumene	2.6 mg/L EC50 = 72 h	5.1 mg/L LC50 96 h 2.7 mg/L LC50 96 h 4.8 mg/L LC50 96 h 6.04 - 6.61 mg/L LC50 96 h	EC50 = 0.89 mg/L 5 min EC50 = 1.10 mg/L 15 min EC50 = 1.48 mg/L 30 min EC50 = 172 mg/L 24 h	7.9 - 14.1 mg/L EC50 48 h 0.6 mg/L EC50 = 48 h

Persistence and Degradability May persist based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility.

Component	log Pow
Cumene	3.55

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Cumene - 98-82-8	U055	-

14. Transport information

DOT

UN-No UN1918
 Proper Shipping Name ISOPROPYLBENZENE
 Hazard Class 3
 Packing Group III

TDG

UN-No UN1918
 Proper Shipping Name ISOPROPYLBENZENE
 Hazard Class 3
 Packing Group III

IATA

UN-No 1918
 Proper Shipping Name ISOPROPYLBENZENE
 Hazard Class 3
 Packing Group III

IMDG/IMO

UN-No 1918
 Proper Shipping Name ISOPROPYLBENZENE
 Hazard Class 3
 Packing Group III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Cumene	X	X	-	202-704-5	-		X	X	X	X	X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Cumene	98-82-8	>95	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act Not applicable

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depleters	Class 2 Ozone Depleters
Cumene	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Cumene	5000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Cumene	98-82-8	Carcinogen	-	Carcinogen

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Cumene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security

This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Serious risk, Grade 3

Canada

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

WHMIS Hazard Class B2 Flammable liquid
D2B Toxic materials
D1B Toxic materials

**16. Other information**

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 16-Apr-2012

Revision Date 10-Feb-2015

Print Date 10-Feb-2015

Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS



Safety Data Sheet

Product Identifier: NAPHTHALENE

SDS ID: 00228306

Section 1 - IDENTIFICATION

Product Identifier: NAPHTHALENE

Synonyms

NAPHTHALENE CRUDE 78 DEGREE; NAPHTHALENE INTERMEDIATE 79 DEGREE; NAPHTHALENE REFINED 80 DEGREE

Chemical Family

polynuclear aromatic hydrocarbons

Recommended Use

process chemical

Restrictions on Use

None known.

Manufacturer Information

KOPPERS INC.
436 Seventh Avenue
Pittsburgh, PA 15219-1800
Mfg Contact: 412-227-2001 (SDS Requests: 866-852-5239)

CHEMTREC: 800-424-9300 (Outside USA: +1 703-527-3887)
Emergencies: (Medical in USA): 877-737-9047
Emergencies: (Medical Outside of USA): 651-632-9269
Email: naorgmsds@koppers.com

Section 2 - HAZARD(S) IDENTIFICATION

Classification in accordance with 29 CFR 1910.1200

Flammable Liquids, Category 4
Acute Toxicity (Oral), Category 4 (2% unknown)
Carcinogenicity, Category 2
Specific Target Organ Toxicity - Repeated Exposure, Category 1 (blood)
Hazardous to the Aquatic Environment - Acute Hazard, Category 1 (4 % unknown)
Hazardous to the Aquatic Environment - Chronic Hazard, Category 1 (2 % unknown)

GHS LABEL ELEMENTS

Symbol(s)



Signal Word

DANGER

Hazard Statement(s)

Combustible liquid
Harmful if swallowed
Suspected of causing cancer
Causes damage to blood through prolonged or repeated exposure.
Very toxic to aquatic life with long lasting effects

Safety Data Sheet

Product Identifier: NAPHTHALENE

SDS ID: 00228306

Precautionary Statement(s)

Prevention

Keep away from flames and hot surfaces. - No smoking. Do not breathe vapor or mist. Wear protective gloves/clothing and eye/face protection. Wash thoroughly after handling. Do not eat, drink, or smoke when using this product. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid release to the environment.

Response

In case of fire, use media appropriate for extinction. IF exposed or concerned: Get medical advice/attention. IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. Rinse mouth. Collect spillage.

Storage

Store in a well-ventilated place. Keep cool. Store locked up.

Disposal

Dispose in accordance with all applicable regulations.

Hazard(s) Not Otherwise Classified

May cause thermal burns from heated material.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

CAS	Component	Percent (weight)
91-20-3	NAPHTHALENE	95-100
95-15-8	BENZO(B)THIOPHENE	1-2
91-57-6	2-METHYLNAPHTHALENE	<1
1319-77-3	CRESOL	<1
92-52-4	DIPHENYL	<1
90-12-0	1-METHYLNAPHTHALENE	<1

Section 4 - FIRST-AID MEASURES

Description of Necessary Measures

Inhalation

If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin

Wash skin with soap and water or use a waterless handcleaner while removing contaminated clothing and shoes. For thermal burns, cool affected areas as quickly as possible by drenching or immersing in water. Get immediate medical attention.

Eyes

Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Then get immediate medical attention.

Ingestion

Not a likely route of exposure. If burns occur, treat as thermal burns. DO NOT induce vomiting. If a large amount is swallowed, get medical attention. Do not give anything by mouth to unconscious or convulsive person. If vomiting occurs, keep head lower than hips to help prevent aspiration. Rinse mouth.

Most Important Symptoms/Effects

Acute

harmful if swallowed

Delayed

blood damage, nasal cancer, lung tumors

Safety Data Sheet

Product Identifier: NAPHTHALENE

SDS ID: 00228306

Indication of Immediate Medical Attention and Special Treatment Needed, if Necessary

Treat symptomatically and supportively.

* * *Section 5 - FIRE-FIGHTING MEASURES* * *

Suitable Extinguishing Media

regular dry chemical, carbon dioxide, dry sand, earth, water spray, regular foam

Large fires: Use water spray, fog or regular foam.

Unsuitable Extinguishing Media

Do not use water jets.

Specific Hazards Arising from the Chemical

Moderate fire hazard. Vapor/air mixtures are explosive above flash point. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back.

Hazardous Combustion Products

Combustion Products: oxides of carbon

Fire Fighting Measures

Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Directly spraying water or foam onto hot burning product may cause frothing. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. Keep unnecessary people away, isolate hazard area and deny entry. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire.

Special Protective Equipment and Precautions for Firefighters

Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.

Sensitivity to Mechanical Impact

No

Sensitivity to Static Discharge

Yes (dust)

* * *Section 6 - ACCIDENTAL RELEASE MEASURES* * *

Personal Precautions, Protective Equipment and Emergency Procedures

Avoid inhalation or contact. Provide adequate ventilation. Wear personal protective clothing and equipment, see Section 8. Avoid release to the environment. Collect spillage.

Methods and Materials for Containment and Cleaning Up

Eliminate all ignition sources if safe to do so. Do not touch or walk through spilled material. Stop leak if possible without personal risk. **Small spills:** Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. **Large spills:** Dike for later disposal. Prevent entry into waterways, sewers, basements, or confined areas. In Canada, report releases to provincial authorities, municipal authorities, or both, as required. If this product is spilled or leaked into the environment, the CERCLA (40 CFR 302.4) reportable quantity is 100 pounds, and requires National Response Center notification.

* * *Section 7 - HANDLING AND STORAGE* * *

Precautions for Safe Handling

Keep away from flames and hot surfaces. - No smoking. Do not breathe vapor or mist. Avoid breathing vapors of heated materials. Avoid contact with eyes, skin and clothing. Use only in well ventilated areas. Wash exposed areas thoroughly with soap and water, or a waterless handcleaner, after skin contact and before eating, drinking, using tobacco products, or restrooms. Contaminated clothing should be removed and laundered before reuse. Wear protective gloves/clothing and eye/face protection. Do not eat, drink, or smoke when using this product. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood.

Safety Data Sheet

Product Identifier: NAPHTHALENE

SDS ID: 00228306

Conditions for Safe Storage, including any Incompatibilities

Store and handle in accordance with all current regulations and standards. Label all containers. Keep away from heat, sparks and flame. Store in a cool, dry place. Keep container in a well-ventilated place. Protect from physical damage. Store locked up. Keep separated from incompatible substances.

Incompatibilities: oxidizing materials

* * *Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION* * *

Component Exposure Limits

NAPHTHALENE (91-20-3)

OSHA (US): 10 ppm TWA; 50 mg/m³ TWA

ACGIH: 10 ppm TWA

Skin - potential significant contribution to overall exposure by the cutaneous route

Biological Limit Values

NAPHTHALENE (91-20-3)

ACGIH: Time: end of shift Parameter: 1-Naphthol with hydrolysis plus 2-Naphthol with hydrolysis
(nonquantitative, nonspecific)

Appropriate Engineering Controls

Ensure adequate ventilation. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

Individual Protection Measures, such as Personal Protective Equipment

Eyes/Face Protection

ANSI Z87.1-1989 approved safety glasses with side shields. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. For the molten form: A faceshield is recommended.

Skin Protection

Wear protective clothing to prevent contact. Contaminated clothing should be removed and laundered before reuse. In the molten form: Wear appropriate heat resistant clothing.

Glove Recommendations

Wear appropriate gloves. In the molten form: Wear appropriate heat resistant gloves.

Protective Materials

chemical resistant material, heat resistant material

Respiratory Protection

If the applicable TLVs and/or PELs are exceeded, use canister or cartridge respirators, which are MSHA/NIOSH-approved, with organic vapor cartridges and high-efficiency particulate filters.

Safety Data Sheet

Product Identifier: NAPHTHALENE

SDS ID: 00228306

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid	Appearance:	forms crystals during cooling
Physical Form:	liquid when loaded, solid at room temperature, changes from solid to liquid as temperature increases	Odor:	mothball odor
Odor Threshold:	0.003 ppm	pH:	Not available
Freezing / Melting Point:	77 - 80 °C	Boiling Point:	218 °C
Flash Point:	>80 °C	Decomposition Temperature:	Not available
Evaporation Rate:	<1 ether=1	Lower Explosive Limit:	0.9 % by volume
Upper Explosive Limit:	5.9 % by volume	Vapor Pressure:	0.187 mmHg @ 20 °C
Vapor Density:	4.42	Density:	1.162 g/cc @ 4 °C
Specific Gravity (water=1):	1.028 @ 4 °C	Water Solubility:	0.003 % by weight
Log Kow:	3.7 @ 25 °C	Autoignition Temp.:	526 °C
Viscosity:	Not available	Volatility:	Not available
Volatility by Volume:	>99 %	Flammability (solid, gas):	Not applicable

Other Property Information

No additional information is available.

Section 10 - STABILITY AND REACTIVITY

Reactivity

No reactivity hazard is expected.

Chemical Stability

Stable at normal temperatures and pressure.

Possibility of Hazardous Reactions

Will not polymerize.

Conditions to Avoid

Avoid heat, flames, sparks and other sources of ignition.

Incompatible Materials

oxidizing materials

Hazardous Decomposition

Combustion Products: oxides of carbon

Section 11 - TOXICOLOGICAL INFORMATION

Acute Toxicity (Component)

Component Analysis - LD50/LC50

The components of this material have been reviewed in various sources and the following selected endpoints are published:

NAPHTHALENE (91-20-3)

Dermal LD50 Rabbit 1120 mg/kg; Inhalation LC50 Rat >340 mg/m³ 1 h; Oral LD50 Rat 1110 mg/kg

Information on Likely Routes of Exposure

Inhalation

blood damage, nasal cancer, lung tumors

Ingestion

harmful if swallowed, blood damage

Skin Contact

thermal burns from heated material

Safety Data Sheet

Product Identifier: NAPHTHALENE

SDS ID: 00228306

Eye Contact

temporary irritation, thermal burns from heated material

Immediate Effects

harmful if swallowed

Delayed Effects

blood damage, nasal cancer, lung tumors

Medical Conditions Aggravated by Exposure

respiratory disorders, skin disorders, eye disorders, blood system disorders

Irritation/Corrosivity Data

The material was found to be non-irritating.

Respiratory Sensitization

No data available.

Dermal Sensitization

Not sensitizing.

Germ Cell Mutagenicity

Negative

Carcinogenicity (Product)

See applicable component information.

Component Carcinogenicity

NAPHTHALENE (91-20-3)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

NTP: Reasonably Anticipated To Be A Human Carcinogen (Possible Select Carcinogen)

IARC: Monograph 82 [2002] (Group 2B (possibly carcinogenic to humans))

Reproductive Toxicity

No data available for the mixture.

Specific Target Organ Toxicity - Single Exposure

No data available.

Specific Target Organ Toxicity - Repeated Exposure

blood

Aspiration Hazard

No data available.

Section 12 - ECOLOGICAL INFORMATION

Ecotoxicity

Very toxic to aquatic life with long lasting effects.

Component Analysis - Aquatic Toxicity

NAPHTHALENE (91-20-3)

Fish: 96 Hr LC50 Pimephales promelas: 5.74 - 6.44 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 1.6 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 0.91 - 2.82 mg/L [static]; 96 Hr LC50 Pimephales promelas: 1.99 mg/L [static]; 96 Hr LC50 Lepomis macrochirus: 31.0265 mg/L [static]

Invertebrate: 48 Hr LC50 Daphnia magna: 2.16 mg/L; 48 Hr EC50 Daphnia magna: 1.96 mg/L [Flow through]; 48 Hr EC50 Daphnia magna: 1.09 - 3.4 mg/L [Static]

Algal Toxicity

Naphthalene: 0.4 mg/L 72 hours EC50 Skeletonema costatum

Persistence and Degradability

Biodegradable.

Safety Data Sheet

Product Identifier: NAPHTHALENE

SDS ID: 00228306

Bioaccumulation Potential

This material is believed not to bioaccumulate due to low water solubility. BCF for fish is 168.

Mobility

The product has poor water-solubility.

Other Adverse Effects

No data available.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Methods

Dispose in accordance with all applicable regulations.

Component Waste Numbers

NAPHTHALENE (91-20-3)

RCRA: waste number U165

Disposal of Contaminated Packaging

Dispose in accordance with all applicable regulations.

Section 14 - TRANSPORT INFORMATION

US DOT Information

Shipping Name: Naphthalene, molten, RQ

UN/NA #: UN2304 **Hazard Class:** 4.1 **Packing Group:** III

Required Label(s): 4.1

This material contains reportable quantity (RQ) Hazardous Substances. Applicable shipping classification depends on temperature of product.

US DOT Reportable Quantities

NAPHTHALENE (91-20-3)

100 lbs RQ; 45.4 kg RQ

Component Marine Pollutants

This material does not contain any chemicals listed on the Hazardous Materials Table required by US DOT to be identified as a marine pollutant.

TDG Information

Shipping Name: Naphthalene, molten

UN #: UN2304 **Hazard Class:** 4.1 **Packing Group:** III

Required Label(s): 4.1

IATA Information

Air shipment is prohibited.

Marine Pollutant(s) based on 2.9.3 of the UN Model Regulations

NAPHTHALENE

Safety Data Sheet

Product Identifier: NAPHTHALENE

SDS ID: 00228306

Section 15 - REGULATORY INFORMATION

U.S. Federal Regulations

This material contains one or more of the following chemicals required to be identified under SARA Sections 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

NAPHTHALENE (91-20-3)

SARA 313: 0.1 % de minimis concentration

CERCLA: 100 lb final RQ; 45.4 kg final RQ

SARA 311/312 Hazardous Categories (40 CFR 370 Subparts B and C)

Acute Health: Yes **Chronic Health:** Yes **Fire:** Yes **Pressure:** No **Reactive:** No

U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS#	CA	MA	MN	NJ	PA
NAPHTHALENE	91-20-3	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

WHMIS Classification

B3, D2A.

WHMIS Ingredient Disclosure List

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

NAPHTHALENE (91-20-3)

1 %

Component Analysis - Inventory

Component	CAS	US	DSL	NDSL
NAPHTHALENE	91-20-3	Yes	Yes	No

U.S. Inventory (TSCA)

Listed on inventory.

Canada Inventory

Listed on DSL.

Section 16 - OTHER INFORMATION

NFPA Ratings: Health= 1 Fire= 2 Reactivity= 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Review date

1/22/2015

Summary of Changes

Updated: 1/22/2015

Multiple changes due to format (GHS) update.

Safety Data Sheet

Product Identifier: NAPHTHALENE

SDS ID: 00228306

Key / Legend





ACGIH - American Conference of Governmental Industrial Hygienists; ANSI - American National Standards Institute; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CPR - Controlled Products Regulations; DOT - Department of Transportation; DSL - Domestic Substances List; EPA - Environmental Protection Agency; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; Kow - Octanol/water partition coefficient; LC50 - Lethal Concentration, 50%; LD50 - Lethal Dose, 50%; LEL - Lower Explosive Limit; LMPE-CT - Maximum Permissible Short Time Exposure Limit (Mexico); LMPE-PPT - Maximum Permissible Time-Weighted Average Exposure Limit (Mexico); LOLI - List Of Lists™ - ChemADVISOR's Regulatory Database; NDSL - Non-Domestic Substances List; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; OSHA - Occupational Safety and Health Administration; PEL - Permissible Exposure Limit; RCRA - Resource Conservation and Recovery Act; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TLV - Threshold Limit Value; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States; WHMIS - Workplace Hazardous Materials Information System

Other Information

The information set forth in this Safety Data Sheet does not purport to be all-inclusive and should be used only as a guide. While the information and recommendations set forth herein are believed to be accurate, the company makes no warranty regarding such information and recommendations and disclaims all liability from reliance thereon.

End of Sheet 00228306

Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
	Combustible material; avoid heat and sources of ignition. The health risks of this compound have not been fully determined. Exposure may cause irritation of the skin, eyes, and respiratory system.	   

Section I. Chemical Product and Company Identification

Chemical Name	n-Butylbenzene		
Catalog Number	B0713	Supplier	TCI America 9211 N. Harbortgate St. Portland OR 1-800-423-8616
Synonym	1-Phenylbutane		
Chemical Formula	CH ₃ (CH ₂) ₃ C ₆ H ₅		
CAS Number	104-51-8	In case of Emergency Call	Chemtrec® (800) 424-9300 (U.S.) (703) 527-3887 (International)

Section II. Composition and Information on Ingredients

Chemical Name	CAS Number	Percent (%)	TLV/PEL	Toxicology Data
n-Butylbenzene	104-51-8	Min. 99.0 (GC)	Not available.	Rat LD ₅₀ (oral) 10 ml/kg

Section III. Hazards Identification

Acute Health Effects	No specific information is available in our data base regarding the toxic effects of this material for humans. However, exposure to any chemical should be kept to a minimum. Skin and eye contact may result in irritation. May be harmful if inhaled or ingested. Always follow safe industrial hygiene practices and wear proper protective equipment when handling this compound.
Chronic Health Effects	CARCINOGENIC EFFECTS : Not available. MUTAGENIC EFFECTS : Not available. TERATOGENIC EFFECTS : Not available. DEVELOPMENTAL TOXICITY Not available. There is no known effect from chronic exposure to this product. Repeated or prolonged exposure to this compound is not known to aggravate existing medical conditions.

Section IV. First Aid Measures

Eye Contact	Check for and remove any contact lenses. DO NOT use an eye ointment. Flush eyes with running water for a minimum of 15 minutes, occasionally lifting the upper and lower eyelids. Seek medical attention. Treat symptomatically and supportively.
Skin Contact	If the chemical gets spilled on a clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical touches the victim's exposed skin, such as the hands: Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. Seek medical attention. Treat symptomatically and supportively. Wash any contaminated clothing before reusing.
Inhalation	Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform artificial respiration. Seek medical attention. Treat symptomatically and supportively.
Ingestion	INDUCE VOMITING by sticking finger in throat. Lower the head so that the vomit will not reenter the mouth and throat. Loosen tight clothing such as a collar, tie, belt, or waistband. If the victim is not breathing, administer artificial respiration. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Seek immediate medical attention and, if possible, show the chemical label. Treat symptomatically and supportively.

Section V. Fire and Explosion Data

Flammability	Combustible.	Auto-Ignition	411°C (771.8°F)
Flash Points	59°C (138.2°F).	Flammable Limits	LOWER: 0.8% UPPER: 5.8%
Combustion Products	These products are toxic carbon oxides (CO, CO ₂).		
Fire Hazards	No specific information is available regarding the flammability of this compound in the presence of various materials.		
Explosion Hazards	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. No additional information is available regarding the risks of explosion.		

Continued on Next Page

Emergency phone number (800) 424-9300

Fire Fighting Media
and Instructions

SMALL FIRE: Use DRY chemicals, CO₂, water spray or foam.
LARGE FIRE: Use water spray, fog or foam. DO NOT use water jet.

Section VI. Accidental Release MeasuresSpill Cleanup
Instructions

Combustible material.
Keep away from heat and sources of ignition. Mechanical exhaust required. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. DO NOT get water inside container. DO NOT touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all sources of ignition. Consult federal, state, and/or local authorities for assistance on disposal.

Section VII. Handling and StorageHandling and Storage
Information

COMBUSTIBLE. Keep away from heat and sources of ignition. Mechanical exhaust required. When not in use, tightly seal the container and store in a dry, cool place. Avoid excessive heat and light. Do not breathe gas, fumes, vapor or spray. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Treat symptomatically and supportively. Avoid contact with skin and eyes. Always store away from incompatible compounds such as oxidizing agents.

Section VIII. Exposure Controls/Personal Protection

Engineering Controls

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash station and safety shower is proximal to the work-station location.

Personal Protection

Splash goggles. Lab coat. Vapor respirator. Boots. Gloves. A MSHA/NIOSH approved respirator must be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.



Exposure Limits

Not available.

Section IX. Physical and Chemical Properties

Physical state @ 20°C

Colorless liquid.

Solubility

Not available.

Specific Gravity

0.86

Molecular Weight

134.22

Partition Coefficient

Not available.

Boiling Point

183°C (361.4°F)

Vapor Pressure

Not available.

Melting Point

-88°C (-126.4°F)

Vapor Density

Not available.

Refractive Index

Not available.

Volatility

Not available.

Critical Temperature

Not available.

Odor

Not available.

Viscosity

Not available.

Taste

Not available.

Section X. Stability and Reactivity Data

Stability

This material is stable if stored under proper conditions. (See Section VII for instructions)

Conditions of Instability

Avoid excessive heat and light.

Incompatibilities

Reactive with oxidizing agents.

Section XI. Toxicological Information

RTECS Number

CY9070000

Routes of Exposure

Eye contact. Inhalation. Ingestion.

Toxicity Data

Rat LD₅₀ (oral) 10 ml/kg

Chronic Toxic Effects

CARCINOGENIC EFFECTS : Not available.
MUTAGENIC EFFECTS : Not available.
TERATOGENIC EFFECTS : Not available.
DEVELOPMENTAL TOXICITY : Not available.
There is no known effect from chronic exposure to this product. Repeated or prolonged exposure to this compound is not known to aggravate existing medical conditions.

Acute Toxic Effects

No specific information is available in our data base regarding the toxic effects of this material for humans. However, exposure to any chemical should be kept to a minimum. Skin and eye contact may result in irritation. May be harmful if inhaled or ingested. Always follow safe industrial hygiene practices and wear proper protective equipment when handling this compound.

Section XII. Ecological Information

Ecotoxicity Not available.

Environmental Fate Not available.

Section XIII. Disposal Considerations

Waste Disposal Recycle to process, if possible. Consult your local or regional authorities. You may be able to dissolve or mix material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber system. Observe all federal, state, and local regulations when disposing of this substance.

Section XIV. Transport Information

DOT Classification DOT CLASS 3: Flammable liquid.

PIN Number UN2709

Proper Shipping Name Butyl benzenes

Packing Group (PG) III

DOT Pictograms

**Section XV. Other Regulatory Information and Pictograms**TSCA Chemical Inventory (EPA) This product is **ON** the EPA Toxic Substance Control Act (TSCA) inventory.

WHMIS Classification (Canada) WHMIS CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).

EINECS Number (EEC) 203-209-7

EEC Risk Statements Not available.

Japanese Regulatory Data Not available.

Section XVI. Other Information**Version 1.0****Validated on 6/4/1997.****Printed 1/22/2005.****Notice to Reader**

TCI laboratory chemicals are for research purposes only and are NOT intended for use as drugs, food additives, households, or pesticides. The information herein is believed to be correct, but does not claim to be all inclusive and should be used only as a guide. Neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All chemical reagents must be handled with the recognition that their chemical, physiological, toxicological, and hazardous properties have not been fully investigated or determined. All chemical reagents should be handled only by individuals who are familiar with their potential hazards and who have been fully trained in proper safety, laboratory, and chemical handling procedures. Although certain hazards are described herein, we can not guarantee that these are the only hazards which exist. Our MSDS sheets are based only on data available at the time of shipping and are subject to change without notice as new information is obtained. Avoid long storage periods since the product is subject to degradation with age and may become more dangerous or hazardous. It is the responsibility of the user to request updated MSDS sheets for products that are stored for extended periods. Disposal of unused product must be undertaken by qualified personnel who are knowledgeable in all applicable regulations and follow all pertinent safety precautions including the use of appropriate protective equipment (e.g. protective goggles, protective clothing, breathing equipment, facial mask, fume hood). For proper handling and disposal, always comply with federal, state, and local regulations.



SAFETY DATA SHEET

Creation Date 26-Sep-2009

Revision Date 19-Jan-2015

Revision Number 1

1. Identification

Product Name Propylbenzene

Cat No. : AC418430000; AC418430250; AC418431000; AC418435000

Synonyms 1-Phenyl Propane.

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01
/ **Europe** call: +32 14 57 52 11
Emergency Number **US**:001-201-796-7100 /
Europe: +32 14 57 52 99
CHEMTREC Tel. No.**US**:001-800-424-9300 /
Europe:001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 3
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	
Aspiration Toxicity	Category 1

Label Elements

Signal Word
Danger

Hazard Statements

Flammable liquid and vapor
May be fatal if swallowed and enters airways
May cause respiratory irritation



Precautionary Statements**Prevention**

Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Wear protective gloves/protective clothing/eye protection/face protection
Keep cool

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell

Skin

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower

Ingestion

IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Do NOT induce vomiting

Fire

In case of fire: Use CO₂, dry chemical, or foam for extinction

Storage

Store locked up
Store in a well-ventilated place. Keep container tightly closed

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Toxic to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
Propyl benzene	103-65-1	98

4. First-aid measures

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.
Inhalation	Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Obtain medical attention.
Ingestion	Do not induce vomiting. Call a physician or Poison Control Center immediately.
Most important symptoms/effects	Breathing difficulties. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray. Carbon dioxide (CO ₂). Dry chemical. Use water spray to cool unopened containers. chemical foam.
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Unsuitable Extinguishing Media	No information available
Flash Point	47 °C / 116.6 °F
Method -	No information available
Autoignition Temperature	450 °C / 842 °F
Explosion Limits	
Upper	6.00%
Lower	.80%
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Flammable. Vapors may travel to source of ignition and flash back.

Hazardous Combustion Products

Carbon monoxide (CO) Carbon dioxide (CO₂)

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health
1

Flammability
3

Instability
0

Physical hazards
N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment. Remove all sources of ignition.
Environmental Precautions	See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.
Methods for Containment and Clean Up	Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling	Ensure adequate ventilation. Wear personal protective equipment. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Use explosion-proof equipment. Use only non-sparking tools. Wash hands before breaks and immediately after handling the product.
Storage	Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines	This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.
Engineering Measures	Ensure adequate ventilation, especially in confined areas.
Personal Protective Equipment	
Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection

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.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Light yellow
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-99 °C / -146.2 °F
Boiling Point/Range	158 °C / 316.4 °F @ 760 mmHg
Flash Point	47 °C / 116.6 °F
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	6.00%
Lower	.80%
Vapor Pressure	No information available
Vapor Density	4.1
Relative Density	0.860
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	450 °C / 842 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C9 H12
Molecular Weight	120.19

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Keep away from open flames, hot surfaces and sources of ignition. Incompatible products.
Incompatible Materials	Strong oxidizing agents
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO ₂)
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity
Product Information
Component Information

No acute toxicity information is available for this product

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Propyl benzene	6040 mg/kg (Rat)	Not listed	65000 ppm (Rat) 2 h

Toxicologically Synergistic
Products

No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure
Irritation

May cause eye, skin, and respiratory tract irritation

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Propyl benzene	103-65-1	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard Category 1

Symptoms / effects, both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains.

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility .

Component	log Pow
Propyl benzene	3.68

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN2364
 Proper Shipping Name N-PROPYL BENZENE
 Hazard Class 3
 Packing Group III

TDG

UN-No UN2364
 Proper Shipping Name N-PROPYL BENZENE
 Hazard Class 3
 Packing Group III

IATA

UN-No UN2364
 Proper Shipping Name n-PROPYLBENZENE
 Hazard Class 3
 Packing Group III

IMDG/IMO

UN-No	UN2364
Proper Shipping Name	PROPYLBENZENE
Hazard Class	3
Packing Group	III

15. Regulatory information**International Inventories**

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Propyl benzene	X	X	-	203-132-9	-		X	X	X	X	X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicableCERCLA
Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Propyl benzene	X	X	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security

This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada

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

WHMIS Hazard Class B2 Flammable liquid
D2B Toxic materials

**16. Other information**

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 26-Sep-2009
Revision Date 19-Jan-2015
Print Date 19-Jan-2015

Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.


End of SDS

Safety Data Sheets (SDS)

SECTION 1-IDENTIFICATION

Product name: Toluene
Other names:-
Proper shipping name: Toluene
Recommended use of the chemical and restrictions on use: The major use of toluene is as a mixture added to gasoline to improve octane ratings. Used as a solvent for paint, resins, lacquers inks & adhesives. Component of solvent blends and thinners. Used in the manufacture of chemicals, dyes, explosives, benzoic acid. Some grades of toluene may contain traces of xylene and benzene. The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation. WARNING: Intentional misuse by concentrating/inhaling contents may be lethal.
Manufacturer/Supplier Name: Taiwan SM Corp., Kaohsiung plant Address: NO.7, Industrial 1st Rd, Lin-Yuan Kaohsiung County 83203, Taiwan, R.O.C. Phone No.: 886-7-6414511
Emergency phone No./Fax No.: 886-7-6414511 Ext. 221 (on duty), 886-7-6414517 (off duty)/886-7-6423828

SECTION 2-HAZARDS IDENTIFICATION

GHS Classification:	Flammable Liquid Category 2 Acute Toxicity (Oral) Category 4 Skin Corrosion/ Irritation Category 2 Serious Eye Damage/ Eye Irritation Category 2 Specific Target Organ Toxicity Repeated Exposure Category 2 Hazardous To The Aquatic Environment (Acute) Category 3 Aspiration Hazard Category 1
GHS Label elements:	
Hazard symbols	
Signal word	Danger
Hazard statements	Highly flammable liquid and vapor Harmful if inhaled Causes skin irritation Causes serious eye irritation May cause damage to organs through prolonged or repeated exposure. May cause long lasting harmful effects to aquatic life. May be fatal if swallowed and enters airways.
Precautionary statements	Use only in well ventilated area. Control of exposure by mechanical ventilation in an unventilated or confined space. Avoid breathing vapors and contact with skin and eyes. Wear breathing apparatus/protective gloves/face protection. Store in well-ventilated place. Disposal must be in accordance with applicable federal, state, or local regulations.
Other hazards: —	

SECTION 3-COMPOSITION/INFORMATION ON INGREDIENTS

CAS No.	Chemical Name	wt% by weight	EINECS No.
00108-88-3	Toluene	97.0 min.	203-625-9
Synonyms	Methylbenzol; Methylbenzene; Toluol; Phenylmethane		

SECTION 4-FIRST AID MEASURES

Description of necessary first aid measures

Eye:

1. Flush immediately with warm water for at least 20 minutes.
2. Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
3. If pain persists or recurs seek medical attention.
4. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin:

1. Removing contaminated clothing, shoes, and leathery wearings, cleaning procedure is available before reused or waste treatment.
2. Washing affected area thoroughly with soap and water for at least 20 minutes.
3. Call a Physician if irritation develops or persists.

Ingestion:

1. If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomits.
2. If victim is conscious and alert, give 2~4 cupfuls of milk/water to dilute the substance in stomach.
3. Never give anything by mouth to an unconscious person.
4. Don't induce vomiting unless directed to do so by medical person.
5. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
6. Then seek for medical attention.

Inhalation:

1. Remove from further exposure and flush thoroughly with air.
2. Lay patient down. Keep warm and rested.
3. Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
4. If respiratory irritation, seek immediate medical assistance and call a physician.

Most important symptoms/effects, acute and delayed

Headache, fatigue, drowsiness, insomnia, anorexia and pain in limbs, nervousness, impairment of memory.

Indication of immediate medical attention and special treatment needed, if necessary

For acute or short term repeated exposures to toluene:

Inhalation:

1. Inhalation overexposure can produce toxic effects. Monitor for respiratory distress.
2. If cough or difficulty in breathing develops, evaluate for upper respiratory tract inflammation, bronchitis, and pneumonitis. Administer supplemental oxygen with assisted ventilation, as required.
3. This material (or a component) sensitizes the heart to the effects of sympathomimetic amines. Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in individuals exposed to this material.
4. Administration of sympathomimetic drugs should be avoided.

Ingestion:

1. If ingested, this material presents a significant aspiration and chemical pneumonitis hazard.
2. Induction of emesis is not recommended.
3. Consider activated charcoal and/or gastric lavage.
4. If patient is obtunded, protect the airway by cuffed endotracheal intubation or by placement of the body in a Trendelenburg and left lateral decubitus position.

SECTION 5-FIRE FIGHTING MEASURES

Extinguishing media

Foam 、CO₂ 、Dry chemical 、Water fog.

Specific hazards arising from the chemical

1. Liquid and vapor are highly flammable.
2. Severe fire hazard when exposed to heat, flame and/or oxidizers.
3. Vapor may travel a considerable distance to source of ignition.
4. Heating may cause expansion or decomposition leading to violent rupture of containers.
5. On combustion, may emit toxic fumes of carbon monoxide (CO).

Special protective equipment and precautions for fire-fighters

1. Firefighters must use full bunker gear including NIOSH-approved positive pressure self-contained breathing apparatus to protect against potential hazardous combustion or decomposition products and oxygen deficiencies.
2. Evacuate area and fight the fire from a maximum distance or use unmanned hose holders or monitor nozzles.
3. Cover pooling liquid with foam.
4. Containers can build pressure if exposed to radiant heat; cool adjacent containers with flooding quantities of water until well after the fire is out.
5. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines.
6. Be aware that burning liquid will float on water.
7. Notify appropriate authorities of potential fire and explosion hazard if liquid enter sewers or waterways

SECTION 6-ACCIDENTAL RELEASE MEASURES**Personal precautions, protective equipment and emergency procedure**

1. Personal protective equipment (specified in Section 8)
Eyes : Chemical safety goggles are recommended, and a face shield is added when needed.
Skin : Wear appropriate protective gloves to avoid skin contact.
Clothing: When direct contact is likely, use rubberized clothings, apron and boots.
Respiratory : When limits are exceeded, wear a respirator approved by NIOSH/MSHA for protection against organic dust, mists and vapors.
2. Remove all sources of ignition. No smoking, naked lights or ignition sources. Ventilate area of leak or spill.
3. Keep unnecessary and unprotected personnel from entering. Evacuate personnel from the danger area. Consult with an expert about the emergency procedures.

Environmental precautions

1. Prevent spillage from entering drains, surface, and groundwater.
2. Contain and recover liquid when possible. Use non-sparking tools and equipment.
3. Collect liquid in an appropriate container or absorb with an inert material (e.g. vermiculite, dry sand, earth), and place in a chemical waste container.
4. Report the accidental spill/release to Local/State government.

Methods and materials for containment and cleaning up**Minor spill:**

1. Remove all ignition sources.
2. Clean up all spills immediately.
3. Avoid breathing vapors and contact with skin and eyes.
4. Control personal contact by using protective equipment.
5. Contain and absorb small quantities with vermiculite or other absorbent material.
6. Wipe up.
7. Collect residues in a flammable waste container.

Major spill

1. Clear area of personnel and move upwind.
2. Alert emergency responders and tell them location and nature of hazard.
3. May be violently or explosively reactive.
4. Wear breathing apparatus plus protective gloves.
5. Prevent spillage from entering drains or water course.
6. No smoking, naked lights or ignition sources. Increase ventilation.
7. Stop leak if safe to do so.
8. Water spray or fog may be used to disperse/absorb vapor.
9. Contain spill with sand, earth or vermiculite.
10. Use only spark-free shovels and explosion proof equipment.
11. Collect recoverable product into labeled containers for recycling..
12. Absorb remaining product with sand, earth or vermiculite.
13. Collect solid residues and seal in labeled drums for disposal.
14. Wash area and prevent runoff into drains.
15. If contamination of drains or waterways occurs, advise emergency services.

SECTION 7-HANDLING AND STORAGE**Precautions for safe handling**

1. Wash thoroughly after handling.
2. Use only in well ventilated area.
3. Ground and bond containers when transferring.
4. Use spark-free tools and explosion proof equipment.
5. Empty containers retain product residue (liquid/vapor), and can be dangerous.
6. Do not pressurize, cut, weld, braze, solder, drill, or expose empty containers to heat, sparks or open flames.

Conditions for safe storage, including any incompatibilities

1. Store in original containers in approved flame-proof area.
2. No smoking, naked lights, heat or ignition sources.
3. DO NOT store in pits, depressions, basements or areas where vapors may be trapped.
4. Keep containers securely sealed.
5. Store away from incompatible materials in a cool, dry well ventilated area.
6. Protect containers against physical damage and check regularly for leaks.
7. Keep containers tightly closed and store in a cool, dry, well-ventilated place, plainly labeled, and out of closed vehicles.
8. Ground all equipment containing this material.
9. Observe manufacturer's storing and handling recommendations.
10. Containers should be able to withstand pressures expected from warming and cooling in storage. This flammable liquid should be stored in a separate safety cabinet or room. A refrigerated room is preferable for materials with a flash point temperature lower than 70°F (21°C).

SECTION 8-EXPOSURE CONTROLS, PERSONAL PROTECTION

OSHA - Final PELs : 200 ppm TWA.

OSHA Ceiling : 300ppm.

ACGIH : 50 ppm, skin -potential forcutaneous absorption.

NIOSH : 100 ppm TWA; 375 mg/m³ TWA; 500 ppm IDLH.

Taiwan TWA : 100 ppm (skin).

Taiwan STEL : 125 ppm (skin).

Taiwan Ceiling : -----.

Taiwan BEI : 1 mg/l (before on duty).

Engineering control

1. Process should be located at least 17 meter (50 feet) away from open flames and all high temperature operations likely to cause ignition of the styrene monomer vapor.
2. In venting styrene monomer vapors, consideration should be given to possible halogenation of the vapors by low concentrations of free chlorine and bromine with the resultant formation of lacrimations.
3. Process should be designed so that the operator is not exposed to direct contact with Toluene or the vapor. The technical problems of designing equipment, providing adequate ventilation and operating procedures which promise maximum security and economy, can best be handled by competent engineers.
4. It is essential for safety that equipment be used and maintained as recommended by the manufacturer.
5. Tanks used to store or process Toluene should be closed vessels vented to a safe point of discharge in the outside atmosphere away from operating stations, roadways, and at least 17 meter (50 feet) from possible sources of ignitions. All sparks, flames, heated surface, or other sources of ignition should be kept away from all vents. It is advisable, to provide suction on vessels when inspection or observation openings are made, to minimize or eliminate escape of vapors.

Personal protective equipment**Eye Protection:**

Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. Chemical goggles should be worn during transfer operations or when there is a likelihood of misting, splashing, or spraying of this material. A suitable emergency eye wash water and safety shower should be located near the work station.

Skin protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Clothing:

Avoid skin contact. Wear long-sleeved fire-retardant garments (e.g., Nomex®) while working with flammable and combustible liquids. Additional chemical-resistant protective gear may be required if splashing or spraying conditions exist. This may include an apron, boots and additional facial protection. If product comes in contact with clothing, immediately remove soaked clothing and shower. Promptly remove and discard contaminated leather goods.

Respirators:

For known vapor concentrations above the occupational exposure guidelines (see below), use a NIOSH-approved organic vapor respirator if adequate protection is provided. Protection factors vary depending upon the type of respirator used. Respirators should be used in accordance with OSHA requirements (29 CFR 1910.134). For airborne vapor concentrations that exceed the recommended protection factors for organic vapor respirators, use a full-face, positive-pressure, supplied air respirator. Due to fire and explosion hazards, do not enter atmospheres containing concentrations greater than 10% of the lower flammable limit of this product.

SECTION 9-PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Transparent liquid	Upper/lower explosive limits : 1.2% ~ 7.1%
Odour : pleasant aromatic petroleum odour	Vapor Pressure : 22 mmHg @20°C/68°F
Odour threshold : 0.16~37 ppm (detect) 1.9~69 ppm (recognition)	Vapor Density : 3.1 (air=1)
PH : Not available	Relative density : 0.86 (water=1)
Melting/Freezing Point : -95 °C	Solubility in water : 54~58 mg/100 ml
Initial boiling point/boiling range : 110.6 °C	Partition coefficient : 2.73 (n-octanol/water)
Flash point : 4.4 °C (closed cup)	Auto-ignition temperature : 480°C
Evaporation Rate : 2.24 (BuAc=1)	Decomposition temperature : Not available
Flammability (solid/gas) : Not available	Viscosity : 0.6 mPa.s max @20°C
Molecular Formula : C ₆ H ₅ CH ₃	Molecular Weight : 92.056

SECTION 10-STABILITY AND REACTIVITY

Reactivity Vapor is explosive when exposed to heat or flame
Chemical stability Stable at room temperature in closed containers under normal storage and handling conditions.
Possibility of hazardous reaction Has not been reported.
Condition to avoid Product is highly flammable – Keep away from sources of ignition. Avoid the higher temperatures. Keep away from open fire, heating elements and heat radiating surface and prevent from forming of the vapours mixtures with air in explosion limits.
Incompatible materials Heat, flame, strong oxidizers, nitric and sulfuric acids, chlorine, nitrogen tetroxide; will attack some forms of plastics, rubber, coatings.
Hazardous decomposition products Carbon monoxide, carbon dioxide, hydrocarbons.

SECTION 11-TOXICOLOGICAL INFORMATION

Routes of exposure Eye, Skin, inhalation, Ingestion.
Symptoms (treatments as indicated in Section 4) Eye: The liquid produces a high level of eye discomfort and is capable of causing pain and severe conjunctivitis. Corneal injury may develop, with possible permanent impairment of vision, if not promptly and adequately treated. There is evidence that material may produce eye irritation in some persons and produce eye damage 24 hours or more after instillation. Severe inflammation may be expected with pain. There may be damage to the cornea. Unless treatment is prompt and adequate there may be permanent loss of vision. Conjunctivitis can occur following repeated exposure. Skin: Contact with the material may damage the health of the individual; systemic effects may result following absorption. The material may cause moderate inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering. Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected. Ingestion: Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual. Swallowing of the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis; serious consequences may result. (ICSC13733). Considered an unlikely route of entry in commercial/industrial environments. The liquid may produce gastrointestinal discomfort and may be harmful if swallowed. Ingestion may result in nausea, pain and vomiting. Vomit entering the lungs by aspiration may cause potentially lethal chemical pneumonitis. Inhalation: Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual. There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by sleepiness, reduced alertness, loss of reflexes, lack of co-ordination, and vertigo. Inhalation of high concentrations of gas/vapour causes lung irritation with coughing and nausea, central nervous depression with headache and dizziness, slowing of reflexes, fatigue and inco-ordination. If exposure to highly concentrated solvent atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and possible death. The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation.

Chronic exposure: There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment. Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.
Toxicity LD50: <870 mg/kg (rat, oral) LC50: 6000 ppm/6h (rat, inhalation)
Chronic effect Carcinogenicity: ACGIH : A4-Not classifiable as a Human Carcinogen. OSHA : Possible select carcinogen. IARC : Group 3 carcinogen. Epide miology: Not available. Teratogenicity: Teratogenic effects have occurred in experimental animals. Reproductive Effects: Adverse reproductive effects have occurred in experimental animals. Neurotoxicity: Not available. Mutagenicity: Not available.





SECTION 12-ECOLOGICAL INFORMATION

Ecotoxicity LC ₅₀ (96 hr.) Fish: 7.3~22.8 mg/l EC ₅₀ (48 hr.) Water flea: — Biocencentration factor (BCF): 1.67~380
Persistence and degradability <ol style="list-style-type: none"> 1. The material are expected to form a slick on the surface of waters after release in calm sea conditions. This is expected to evaporate and enter the atmosphere where it will be degraded through reaction with hydroxyl radicals. 2. Some of the material will become associated with benthic sediments, and it is likely to be spread over a fairly wide area of sea floor. Marine sediments may be either aerobic or anaerobic. The material, in probability, is biodegradable, under aerobic conditions. Evidence also suggests that the hydrocarbons may be degradable under anaerobic conditions although such degradation in benthic sediments may be a relatively slow process. 3. Under aerobic conditions the material will degrade to water and carbon dioxide, while under aerobic processes it will produce water, methane, carbon dioxide and carbon dioxide. 4. Based on test results, as well as theoretical considerations, the potential for bioaccumulation may be high. Toxic effects are often observed in species such as blue mussel, daphnia, freshwater green algae, marine copepods and amphipods. Half-life (Air): 10~104 hr Half-life (Surface water): 96~528 hr Half-life (Ground water): 168~672 hr Half-life (Soil): 96~528 hr
Bioaccumulative potential This material is not expected to significantly bioaccumulate.
Mobility in soil: —
Other adverse effects: —

SECTION 13-DISPOSAL CONSIDERATIONS

Residues and spilled material are hazardous waste due to ignitability. Disposal must be in accordance with applicable federal, state, or local regulations. The container for this product can present explosion or fire hazards, even when emptied. To avoid risk of injury, do not cut, puncture, or weld on or near this container. Since the emptied containers retain product residue, follow label warnings even after container is emptied.

SECTION 14-TRANSPORTATION INFORMATION

US DOT	Shipping Name	Toluene	Hazard Labels	
	Hazard Class	3		
	UN Number	1294		
	Packing Group	II		
Sea(IMO/IMDG)	Shipping Name	Toluene	Hazard Labels	
	Hazard Class	3.2		
	UN Number	1294		
	Packing Group	II		
	IMDG Code Page	3285		
	MARPOL	Not a DOT "Marine Pollutant" per 49 CFR 171.8.		
Air(ICA0/IATA)	Shipping Name	Toluene	Hazard Labels	
	Hazard Class	3.2		
	Subsidiary Class	1294		
	Packing Group	II		
RID/ ADR	No information available.			
Canadian TDG	Shipping Name	Toluene	Hazard Labels	
	Hazard Class	3		
	UN Number	1294		
	Packing Group	II		
	Subsidiary Class	9.2		

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 Date: 10/4/82; Sunset Date: 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.

SARA**Section 302 (RQ)**

CAS# 108-88-3 : final RQ = 1000 pounds (454 kg)

Section 302 (TPQ)

None of the chemicals in this material have a TPQ.

SARA Codes

CAS# 108-88-3 : acute, flammable.

Section 313

This material contains Toluene (CAS# 108-88-3, 99% & 100%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.

Clean Air Act

CAS# 108-88-3 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depleters.

This material does not contain any Class 2 Ozone depleters.

<p>Clean Water Act</p> <p>CAS# 108-88-3 is listed as a Hazardous Substance under the CWA.</p> <p>CAS# 108-88-3 is listed as a Priority Pollutant under the Clean Water Act.</p> <p>CAS# 108-88-3 is listed as a Toxic Pollutant under the Clean Water Act.</p>
<p>OSHA</p> <p>None of the chemicals in this product are considered highly hazardous by OSHA.</p>
<p>STATE</p> <p>Toluene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.</p> <p>WARNING: This product contains Toluene, a chemical known to the state of California to cause birth defects or other reproductive harm.</p> <p>California No Significant Risk Level: None of the chemicals in this product are listed.</p>
<p>European/International Regulations</p>
<p>European Labeling in Accordance with EC Directives</p> <p>Hazard Symbols: XN F</p> <p>Risk Phrases : R 10 Flammable.</p> <p>R 20 Harmful by inhalation.</p> <p>Safety Phrases : S 9 Keep container in a well-ventilated place.</p> <p>S 16 Keep away from sources of ignition - No smoking.</p> <p>S 25 Avoid contact with eyes.</p> <p>S 29 Do not empty into drains.</p> <p>S 33 Take precautionary measures against static discharges.</p>
<p>WGK (Water Danger/Protection)</p> <p>CAS# 108-88-3: 2</p>
<p>United Kingdom Occupational Exposure Limits</p> <p>CAS# 108-88-3: OES-United Kingdom, TWA 50 ppm TWA; 191 mg/m3 TWA.</p> <p>CAS# 108-88-3: OES-United Kingdom, STEL 150 ppm STEL; 574 mg/m3 STEL.</p>
<p>CANADA</p> <p>CAS#100-42-5 is listed on Canada's DSL/NDSL list.</p> <p>This product has a WHMIS classification of B2, D2A (99%)/B3, D2A (100%).</p> <p>CAS# 105-05-5 is not listed on Canada's Ingredient Disclosure List.</p>
<p>Exposure Limits</p> <ul style="list-style-type: none"> ▪ CAS# 108-88-3: OEL-AUSTRALIA:TWA 100 ppm (375 mg/m3);STEL 150 ppm (560 mg/m3) ▪ OEL-BELGIUM:TWA 100 ppm (377 mg/m3);STEL 150 ppm (565 mg/m3) ▪ OEL-CZECHOSLOVAKIA:TWA 200 mg/m3;STEL 1000 mg/m3 ▪ OEL-DENMARK:TWA 50 ppm (190 mg/m3);Skin ▪ OEL-FINLAND:TWA 100 ppm (375 mg/m3);STEL 150 ppm; Skin ▪ OEL-FRANCE:TWA 100 ppm (375 mg/m3);STEL 150 ppm (560 mg/m3) ▪ OEL-GERMANY:TWA 100 ppm (380 mg/m3) ▪ OEL-HUNGARY:TWA 100 mg/m3;STEL 300 mg/m3;Skin ▪ OEL-JAPAN:TWA 100 ppm (380 mg/m3) ▪ OEL-THE NETHERLANDS:TWA 100 ppm (375 mg/m3);Skin ▪ OEL-THE PHILIPPINES:TWA 100 ppm (375 mg/m3) ▪ OEL-POLAND:TWA 100 mg/m3 ▪ OEL-RUSSIA:TWA 100 ppm; STEL 50 mg/m3 ▪ OEL-SWEDEN:TWA 50 ppm (200 mg/m3);STEL 100 ppm (400 mg/m3);Skin ▪ OEL-SWITZERLAND:TWA 100 ppm (380 mg/m3);STEL 500 ppm ▪ OEL-THAILAND:TWA 200 ppm; STEL 300 ppm ▪ OEL-TURKEY:TWA 200 ppm (750 mg/m3) ▪ OEL-UNITED KINGDOM:TWA 100 ppm (375 mg/m3);STEL 150 ppm; Skin OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

SECTION 16-OTHER INFORMATION

References and sources

1. CHEMINFO Data Bank, CCINFO CD, 2005-3
2. HAZARD TEXT Data Bank, TOMES PLUS CD, Vol.65, 2005
3. RETECS Data Bank, TOMES CPS CD, Vol.65, 2005
4. HSDB Data Bank, TOMES CPS CD, Vol.65, 2005
5. Hazardous Substance Data Bank, Environment Protection, Administration, Executive Yuan, ROC (Taiwan)
6. Chemwatch Data Bank, 2005-1
7. SDS, GHS in Taiwan, Council of Labor Affairs, Executive Yuan, ROC (Taiwan)

Version	Date	Remark
Version 1	06/01/1998	Original Version.
Version 2	04/20/2001	Updated 10 sections to 16 sections.
Version 3	08/01/2003	Updated "SECTION 9-PHYSICAL AND CHEMICAL PROPERTIES".
Version 4	01/01/2006	Updated "SECTION 14-TRANSPORTATION INFORMATION".
Version 5	08/05/2008	Updated each section by GHS SDS.
Prepared by	Safety & Environment Protection Section, Taiwan SM Corporation Kaohsiung Plant.	



SAFETY DATA SHEET

Xylene

SECTION 1: Identification of the substance/mixture and of the company/undertaking

Date issued 11.11.2013

1.1. Product identifier

Product name Xylene
Chemical name Xylene
Synonyms Xylol, dimethyl benzene, xylenol
REACH Reg No. 01-2119488216-32-0000
CAS no. 1330-20-7
EC no. 215-535-7
Index no. 601-022-00-9
Article no. 13000000

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/preparation For the preparation of paints and as a solvent. General purpose cleaner.

1.3. Details of the supplier of the safety data sheet

Manufacturer

Company name Fred Holmberg & Co AB
Office address Geijersgatan 8
Postal address Box 60056
Postcode S-216 10
City Limhamn
Country Sweden
Tel +46 (0)40 15 79 20
Fax +46 (0)40 16 22 95
E-mail info@holmberg.se
Website <http://www.holmberg.se/en/>

1.4. Emergency telephone number

Emergency telephone 112 (Europe)

SECTION 2: Hazards identification

2.1. Classification of substance or mixture

Classification according to Xi; R38
67/548/EEC or 1999/45/EC Xn; R20/21
R10
Classification according to Flam. Liq. 3; H226;
Regulation (EC) No 1272/2008 Acute tox. 4; H312;
[CLP/GHS] Skin Irrit. 2; H315;
Acute tox. 4; H332;

2.2. Label elements

Hazard Pictograms (CLP)



Signal word	Danger
Hazard statements	H226 Flammable liquid and vapour. H312 Harmful in contact with skin. H315 Causes skin irritation. H332 Harmful if inhaled.
Precautionary statements	P210 Keep away from heat/sparks/open flames/hot surfaces. – No smoking. P233 Keep container tightly closed. P243 Take precautionary measures against static discharge. P280 Wear protective gloves/protective clothing/eye protection/face protection. P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. P303 + P361 + P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. P331 Do NOT induce vomiting. P403 + P235 Store in a well-ventilated place. Keep cool.

2.3. Other hazards

Other hazards	Not known.
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SECTION 3: Composition/information on ingredients

3.2. Mixtures

Substance	Identification	Classification	Contents
Xylene	CAS no.: 1330-20-7 EC no.: 215-535-7 Index no.: 601-022-00-9	R10 Xn; R20/21 Xi; R38 Flam. Liq. 3; H226 Acute tox. 4; H332 Acute tox. 4; H312 Skin Irrit. 2; H315 Note : C	75 - 90 %
Ethylbenzene	CAS no.: 100-41-4 EC no.: 202-849-4 Index no.: 601-023-00-4 Synonyms: Ethylbenzene	F; R11 Xn; R20 Flam. Liq. 2; H225 Acute tox. 4; H332	10 - 25 %

Column headings	CAS no. = Chemical Abstracts Service; EU (Einecs or Elincs number) = European inventory of Existing Commercial Chemical Substances; Ingredient name = Name as specified in the substance list (substances that are not included in the substance list must be translated, if possible). Contents given in; %, %wt/wt, %vol/wt, %vol/vol, mg/m3, ppb, ppm, weight%, vol%
HH/HF/HE	T+ = Very toxic, T = Toxic, C = Corrosive, Xn = Harmful, Xi = Irritating, E = Explosive, O = Oxidizing, F+ = Extremely flammable, F = Very flammable, N = Environmental hazard

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation	Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.
Skin contact	Remove contaminated clothes and rinse skin thoroughly with water.
Eye contact	Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyes wide apart. Get medical attention if any discomfort continues.
Ingestion	NEVER MAKE AN UNCONSCIOUS PERSON VOMIT OR DRINK FLUIDS! Do not induce vomiting. Rinse mouth with water. Get medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Information for health personnel	Treat Symptomatically. Do not give victim anything to drink if he is
----------------------------------	--

unconscious.

4.3. Indication of any immediate medical attention and special treatment needed

Specific details on antidotes

No recommendation given.

SECTION 5: Firefighting measures**5.1. Extinguishing media**

Suitable extinguishing media

Extinguish with alcohol-resistant foam, carbon dioxide, dry powder or water fog.

5.2. Special hazards arising from the substance or mixture

Fire and explosion hazards

Solvent vapours may form explosive mixtures with air.

Hazardous combustion products

Fire creates: Carbon monoxide (CO). Carbon dioxide (CO₂).**5.3. Advice for firefighters**

Fire fighting procedures

No specific fire fighting procedure given.

SECTION 6: Accidental release measures**6.1. Personal precautions, protective equipment and emergency procedures**

Personal protection measures

Ensure suitable personal protection (including respiratory protection) during removal of spillages in a confined area. Ventilate well. Stop leak if possible without risk. Avoid contact with skin and eyes. Do not breathe vapour.

6.2. Environmental precautions

Environmental precautionary measures

Avoid discharge into drains, water courses or onto the ground.

6.3. Methods and material for containment and cleaning up

Cleaning method

Dam and absorb spillages with sand, earth or other non-combustible material.

6.4. Reference to other sections

Other instructions

No recommendation given.

SECTION 7: Handling and storage**7.1. Precautions for safe handling**

Handling

Keep away from heat, sparks and open flame. Take precautionary measures against static discharges. Mechanical ventilation may be required.

Protective Safety Measures

Advice on general occupational hygiene

Provide easy access to water supply and eye wash facilities.

7.2. Conditions for safe storage, including any incompatibilities

Storage

Keep away from heat, sparks and open flame. Ground container and transfer equipment to eliminate static electric sparks. Store in a cool and well-ventilated place.

7.3. Specific end use(s)

Specific use(s)

Not entered.

SECTION 8: Exposure controls/personal protection**8.1. Control parameters****DNEL / PNEC**

Method of testing

Contents

DNEL

Group: Industrial

Exposure route: Inhalation

Exposure frequency: Short term (acute)

Critical Component: Etylbenzen

Value: 289 mg/kg/dag

DNEL	Group: Industrial Exposure route: Inhalation Exposure frequency: Long term (repeated) Critical Component: Etylbenzen Type of effect: Systemic effect Value: 77 mg/kg/dag
DNEL	Group: Industrial Exposure route: Dermal Exposure frequency: Long term (repeated) Critical Component: Etylbenzen Type of effect: Systemic effect Value: 180 mg/kg/dag
DNEL	Group: Consumer Exposure route: Inhalation Exposure frequency: Long term (repeated) Critical Component: Etylbenzen Type of effect: Systemic effect Value: 14,8 mg/kg/dag
DNEL	Group: Consumer Exposure route: Dermal Exposure frequency: Long term (repeated) Critical Component: Etylbenzen Type of effect: Systemic effect Value: 108 mg/kg/dag
DNEL	Group: Consumer Exposure route: Oral Exposure frequency: Long term (repeated) Critical Component: Etylbenzen Type of effect: Systemic effect Value: 1,6 mg/kg/dag
DNEL	Group: Industrial Exposure route: Inhalation Exposure frequency: Short term (acute) Critical Component: xylen Value: 442 mg/kg/dag
DNEL	Group: Industrial Exposure route: Inhalation Exposure frequency: Long term (repeated) Critical Component: xylen Type of effect: Systemic effect Value: 221 mg/kg/dag
DNEL	Group: Industrial Exposure route: Dermal Exposure frequency: Long term (repeated) Critical Component: xylen Type of effect: Systemic effect Value: 3182 mg/kg/dag
DNEL	Group: Consumer Exposure route: Inhalation Exposure frequency: Short term (acute) Critical Component: xylen Value: 260 mg/kg/dag
DNEL	Group: Consumer Exposure route: Inhalation Exposure frequency: Long term (repeated) Critical Component: xylen Type of effect: Systemic effect

DNEL	Value: 65,3 mg/kg/dag Group: Consumer Exposure route: Dermal Exposure frequency: Long term (repeated) Critical Component: xylene Type of effect: Systemic effect
DNEL	Value: 1872 mg/kg/dag Group: Consumer Exposure route: Oral Exposure frequency: Long term (repeated) Critical Component: xylene Type of effect: Systemic effect
Exposure guidelines	Value: 12,5 mg/kg/dag Country of origin: Sverige Limit value type: NGV 200 mg/m ³ OEL Short Term Value: 450 mg/m ³ Source: Nationella hygieniska gränsvärden, AFS 2005:17 Ovanstående NGV resp. KTV gäller både xylene och etylbenzen
Other Information	

8.2. Exposure controls

Occupational exposure limits	Provide adequate ventilation. Observe Occupational Exposure Limits and minimise the risk of inhalation of vapours. Protective gloves and goggles are recommended. Provide eyewash, quick drench.
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Safety signs



Respiratory protection

Respiratory protection	Respiratory protection must be used if air contamination exceeds acceptable level. Use respiratory equipment with gas filter, type A2.
------------------------	--

Hand protection

Hand protection	Use protective gloves. Chemical resistant gloves required for prolonged or repeated contact. Gloves of nitrile rubber, PVA or Viton are recommended.
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Eye / face protection

Eye protection	Use safety goggles or face shield in case of splash risk.
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Skin protection

Skin protection (except hands)	Wear appropriate clothing to prevent any possibility of skin contact.
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Hygiene / Environmental

Specific hygiene measures	Wash hands after contact.
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SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	Fluid.
Colour	Colourless.
Odour	Aromatic.
Comments, pH (as supplied)	Not relevant.
Melting point/melting range	Value: < -48 °C
Boiling point / boiling range	Value: 136-145 °C
Flash point	Value: 27 °C
Evaporation rate	Value: 13,5
Explosion limit	Value: 1-7,1 %
Vapour pressure	Value: 1 kPa
	Test temperature: 20 °C

Vapour density	Value: 3,7
Specific gravity	Value: 0,870 kg/m ³ Test temperature: 20 °C
Solubility description	Soluble in: Organic solvents. Not soluble in water.
Partition coefficient: n-octanol/water	Value: 3,15
Spontaneous combustability	Value: > 432-530 °C
Viscosity	Value: < 0,90 mPas Method of testing: Kinematisk Test temperature: 25 °C

9.2. Other information

SECTION 10: Stability and reactivity

10.1. Reactivity

Reactivity	Heating may cause a fire.
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10.2. Chemical stability

Stability	Stable under the prescribed storage conditions.
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10.3. Possibility of hazardous reactions

Possibility of hazardous reactions	Not known.
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10.4. Conditions to avoid

Conditions to avoid	Avoid heat, flames and other sources of ignition.
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10.5. Incompatible materials

Materials to avoid	Avoid contact with oxidising agents (e.g. nitric acid, peroxides and chromates). Strong acids.
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10.6. Hazardous decomposition products

Hazardous decomposition products	Fire creates: Carbon monoxide (CO). Carbon dioxide (CO ₂).
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SECTION 11: Toxicological information

11.1. Information on toxicological effects

Toxicological Information:

Other toxicological data	Acute Toxicity (Oral LD50): mg/kg (oral rat) > 2000 Acute Toxicity (Inhalation LC50): mg/l (vapours) (4h) > 20 Acute Toxicity (Dermal LD50): mg/kg Rabbit > 2000
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Toxicological data for substances

Potential acute effects

Inhalation	In high concentrations, vapours are narcotic and may cause headache, fatigue, dizziness and nausea. Ikke klassificerad som aspirationstoxisk (Not classified as asp. tox.)
Skin contact	Prolonged or frequent contact may cause redness, itching, eczema and skin cracking. Defats the skin.
Eye contact	May irritate and cause redness and pain.
Ingestion	Ingestion of large amounts may cause unconsciousness. However, ingestion may cause nausea, headache, dizziness and intoxication. Ingestion may cause irritation of the gastrointestinal tract, vomiting and diarrhoea. May cause irritation to the mouth and throat.

Delayed effects / repeated exposure

Sensitisation	Not known.
Chronic effects	None known.

Carcinogenic, Mutagenic or Reprotoxic

Carcinogenicity	None.
Mutagenicity	Not known.
Teratogenic properties	Suspected of damaging the unborn child

Reproductive toxicity Not known.

SECTION 12: Ecological information

12.1. Toxicity

Acute aquatic, fish	Value: 2 mg/l Method of testing: LC50 Fish, species: <i>Roccus saxatilis</i> Duration: 96h
Acute aquatic, algae	Value: > 3,2 mg/l Method of testing: IC50 Algae, species: <i>Selenastrum Capricornum</i> Duration: 72h
Acute aquatic, Daphnia	Value: 8,5 mg/l Method of testing: EC50 Daphnia, species: <i>Daphnia magna</i> Duration: 48h

12.2. Persistence and degradability

Persistence and degradability description	Lättnedbrytbar av biologiska organismer.
Chemical oxygen demand (COD)	Value: 5 Method of testing: COD
Biological oxygen demand (BOD)	Value: 0,55 Method of testing: BOD

12.3. Bioaccumulative potential

Bioaccumulative potential	Will not bio-accumulate.
Bioconcentration factor (BCF)	Value: 22 Method of testing: BCF

12.4. Mobility in soil

Mobility	The product is insoluble in water and will spread on the water surface.
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12.5. Results of PBT and vPvB assessment

PBT assessment results	This substance is not classified as PBT or vPvB.
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12.6. Other adverse effects

Other adverse effects / Remarks	None known.
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SECTION 13: Disposal considerations

13.1. Waste treatment methods

Specify the appropriate methods of disposal	Confirm disposal procedures with environmental engineer and local regulations. Absorb in vermiculite or dry sand and dispose of at a licenced hazardous waste collection point. Liquid components can be disposed of by incineration.
Product classified as hazardous waste	Yes
Packaging classified as hazardous waste	Yes

SECTION 14: Transport information

14.1. UN number

ADR	1307
RID	1307
IMDG	1307
ICAO/IATA	1307

14.2. UN proper shipping name

ADR	XYLENES
-----	---------

RID	XYLENES
IMDG	XYLENES
ICAO/IATA	XYLENES

14.3. Transport hazard class(es)

ADR	3
Hazard no.	30
RID	3
ADN	33
IMDG	3
ICAO/IATA	3

14.4. Packing group

ADR	III
RID	III
IMDG	III
ICAO/IATA	III

14.5. Environmental hazards

Comment	Not relevant.
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14.6. Special precautions for user

EmS	F-E, S-D
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14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

SECTION 15: Regulatory information

EC no.	215-535-7
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15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Other Label Information	Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 with amendments.
Legislation and regulations	Dangerous Substance Directive 67/548/EEC. The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 (S.I. 2009 No. 716). The List of Wastes (England) (Amendment) Regulations 2005. (SI 2005 No. 895). Avfallsförordningen (2011:927).

15.2. Chemical safety assessment

SECTION 16: Other information

Hazard symbol



Irritant

R-phrases	R10 Flammable. R38 Irritating to skin. R20/22 Harmful by inhalation and if swallowed. R38 Irritating to skin.
S-phrases	S7 Keep container tightly closed. S16 Keep away from sources of ignition - No smoking.
Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]	Flam. Liq. 3; H226; Acute tox. 4; H312; Skin Irrit. 2; H315;

List of relevant R-phrases (under headings 2 and 3).	Acute tox. 4; H332; R38 Irritating to skin. R11 Highly flammable. R10 Flammable. R20/21 Harmful by inhalation and in contact with skin. R20 Harmful by inhalation.
List of relevant H-phrases (Section 2 and 3).	H332 Harmful if inhaled. H312 Harmful in contact with skin. H225 Highly flammable liquid and vapour. H226 Flammable liquid and vapour. H315 Causes skin irritation.
Responsible for safety data sheet	Fred Holmberg & Co AB

HEALTH & SAFETY PLAN

APPENDIX B

ONSITE SAFETY FORMS

FIELD LEVEL RISK ASSESSMENT (FIT FOR DUTY), 1 DAY – RMS 2

Project: 937 Genesee Street – Corrective Action Plan Project No: 190500868

Client: City of Rochester

Location: 937 Genesee Street

Start Date: _____

Work Description Provide a general description of the work to be conducted.

Documentation and Procedure Review

1. Risk Management Strategy (RMS1) form and/or Site Specific Health and Safety Plan signed and reviewed? ☐ Yes ☐ No*
2. Emergency Response Plan reviewed? ☐ Yes ☐ No* ☐ N/A
3. Tested two-way communications (cell phone, satellite phone) and security measures? ☐ Yes ☐ No*
4. Attended Client Site Health and Safety meeting? ☐ Yes ☐ No* ☐ N/A
5. Conducted Stantec site safety meeting with all workforces? ☐ Yes ☐ No* ☐ N/A
6. Are there any new or unexpected hazards not identified in the RMS1/HASP?
If yes, include in the Job Safety Analysis (JSA). ☐ Yes ☐ No
7. Working alone or remote work?
If yes, complete call in/out process – Safe Work form must be completed. ☐ Yes ☐ No

Notifications and Permits

8. Are work permits required for this site?
If yes, have they been completed and submitted as required? ☐ Yes ☐ No
☐ Yes ☐ No*
9. Are utility locates required for this site?
If yes, have they been completed and reviewed? ☐ Yes ☐ No
☐ Yes ☐ No*
10. Does the Client require any notification prior to starting the work?
If yes, has the notification been provided? ☐ Yes ☐ No
☐ Yes ☐ No*

***Contact your Project Manager immediately.**

Personal Protective Equipment

List specific PPE as needed. Verify type and inspect condition.

- | | | |
|--|--|---|
| <input type="checkbox"/> Head Protection Type: _____ | <input type="checkbox"/> Hearing Protection: _____ | <input type="checkbox"/> Gloves Type: _____ |
| <input type="checkbox"/> Foot Protection Type: _____ | <input type="checkbox"/> Respiratory Protection: _____ | <input type="checkbox"/> Water Safety Gear: _____ |
| <input type="checkbox"/> Eye Protection Type: _____ | <input type="checkbox"/> Fire Retardant Coveralls: _____ | <input type="checkbox"/> _____ |
| <input type="checkbox"/> High Visibility Vest: _____ | <input type="checkbox"/> Fall Protection: _____ | <input type="checkbox"/> _____ |

Tools and Equipment

List specific equipment to be used. Verify type and inspect condition.

- | | | |
|--------------------------------|--------------------------------|--------------------------------|
| <input type="checkbox"/> _____ | <input type="checkbox"/> _____ | <input type="checkbox"/> _____ |
| <input type="checkbox"/> _____ | <input type="checkbox"/> _____ | <input type="checkbox"/> _____ |

Daily Tailgate Discussions/Subcontractor Input

Start	Time:	Weather:
Mid-Day	Time:	Weather:
Post-Day	Time:	Weather:

I know the hazards:

By signing here, you are stating the following:

1. I have been involved in the Job Safety Analysis and understand the hazards and risk control actions associated with each task I am about to perform.
2. I understand the permit to work requirements applicable to the work I am about to perform (if it includes permitted activities).
3. I am aware that no jobs or work (that is not risk-assessed) is to be performed.
4. I am aware of my obligation to **"Stop Work"** (See *Stop Work Section*).

I arrived and departed fit for duty:

5. I am physically and mentally fit for duty.
6. I am not under the influence of any type of medication, drugs or alcohol that could affect my ability to work safely.
7. I am aware of my responsibility to bring any illness, injury (regardless of where or when it occurred) or fatigue issue I may have to the attention of the Crew Lead.
8. I signed out uninjured unless I have otherwise informed the Crew Lead.

Insert fitness level under corresponding time column: Fit for Duty = F Alternate Plan = AP Team Lead to contact Project Manager for any personnel identified as AP			
Individual Name/Company Name/Signature	Time:	Time:	Time:

I will STOP the job any time anyone is concerned or uncertain about safety.

I will STOP the job if anyone identifies a hazard or additional mitigation not recorded.

I will be alert to any changes in personnel or their fitness level (AP), conditions at the work site or hazards.

If it is necessary to **STOP THE JOB**, I will reassess the task, hazards and mitigations; and then proceed only when safe to do so.



Remember to

1. Stop and think
2. Look around
3. Assess risk
4. Control risks
5. Begin/resume work

Conclusion of day: I certify that the planned work activities are completed for the day and all injuries and first aids have been reported via RMS3.

Signature of Crew Lead: _____


Date: _____

FIELD LEVEL RISK ASSESSMENT (FIT FOR DUTY), 1 DAY – RMS 2

Job Safety Analysis (JSA) Must be completed for all field activities.

Basic Job Steps	Potential Hazards	Controls to Reduce or Eliminate Hazard	Person Responsible

Review the hazard categories below and check the mitigation measures applicable to the identified scope of work.

Environmental Hazards <ul style="list-style-type: none"> 1. Work area clean <input type="checkbox"/> 2. Material storage identified <input type="checkbox"/> 3. Dust/Mist/Fume <input type="checkbox"/> 4. Noise in area <input type="checkbox"/> 5. Extreme temperatures <input type="checkbox"/> 6. Spill potential <input type="checkbox"/> 7. Waste containers needed <input type="checkbox"/> 8. Waste properly disposed <input type="checkbox"/> 9. Waste plan identified <input type="checkbox"/> 10. Excavation permit required <input type="checkbox"/> 11. Other workers in area <input type="checkbox"/> 12. Weather conditions <input type="checkbox"/> 13. MSDS reviewed <input type="checkbox"/> 	Access/Egress Hazards <ul style="list-style-type: none"> 23. Aerial life/Man basket (inspected & tagged) <input type="checkbox"/> 24. Scaffold (inspected & tagged) <input type="checkbox"/> 25. Ladders (tied off) <input type="checkbox"/> 26. Slips & trips <input type="checkbox"/> 27. Hoisting (tools, equipment) <input type="checkbox"/> 28. Evacuation (alarms, routes, ph. #) <input type="checkbox"/> 29. Confined space entry permit required <input type="checkbox"/> 	Rigging & Hoisting Hazards <ul style="list-style-type: none"> 38. Lift study required <input type="checkbox"/> 39. Proper tools used <input type="checkbox"/> 40. Tools inspected <input type="checkbox"/> 41. Equipment inspected <input type="checkbox"/> 42. Slings inspected <input type="checkbox"/> 43. Others working overhead/below <input type="checkbox"/> 44. Critical lift permit <input type="checkbox"/>
Ergonomic Hazards <ul style="list-style-type: none"> 14. Awkward body position <input type="checkbox"/> 15. Over extension <input type="checkbox"/> 16. Prolonged twisting/bending motion <input type="checkbox"/> 17. Working in a tight area <input type="checkbox"/> 18. Lift too heavy/awkward to lift <input type="checkbox"/> 19. Parts of body in line of fire <input type="checkbox"/> 20. Repetitive motion <input type="checkbox"/> 21. Hands not in line of sight <input type="checkbox"/> 22. Working above your head <input type="checkbox"/> 	 <div style="display: inline-block; vertical-align: middle; margin-left: 10px;"> Remember to 1. Stop and think 2. Look around 3. Assess risk 4. Control risks 5. Begin/resume work </div>	
	Overhead Hazards <ul style="list-style-type: none"> 30. Barricades & signs in place <input type="checkbox"/> 31. Hole coverings identified <input type="checkbox"/> 32. Harness/lanyard inspected <input type="checkbox"/> 33. 100% Tie-off with harness <input type="checkbox"/> 34. Tie off points identified <input type="checkbox"/> 35. Falling items <input type="checkbox"/> 36. Foreign bodies in eyes <input type="checkbox"/> 37. Hoisting or moving loads overhead <input type="checkbox"/> 	Electrical Hazards <ul style="list-style-type: none"> 45. GFI test <input type="checkbox"/> 46. Lighting levels too low <input type="checkbox"/> 47. Working on/near energized equipment <input type="checkbox"/> 48. Electrical cords condition <input type="checkbox"/> 49. Electrical tools condition <input type="checkbox"/> 50. Fire extinguisher <input type="checkbox"/> 51. Hot work or electrical permit required <input type="checkbox"/>
	Personal Limitations/Hazards <ul style="list-style-type: none"> 52. Procedure not available for task <input type="checkbox"/> 53. Confusing instructions <input type="checkbox"/> 54. No training for task or tools to be used <input type="checkbox"/> 55. First time performing the task <input type="checkbox"/> 56. Micro break (stretching/flexing) <input type="checkbox"/> 57. Report all injuries to your supervisor <input type="checkbox"/> 	

**It is important that all relevant hazards have plans in place to reduce risk.
Be sure that all associated permits are closed off at the end of the job.**

Remember: Stop and Think

Reviewed by Name and Signature: _____

Fit for Duty

Safety is influenced by many factors, but the most important is the health and well-being of Stantec's employees and partners. Physical and mental health are just as important as good tools, good practices, and good job planning.

This card is designed to help you do a quick self-assessment of your physical and mental health. Any concerns resulting from your assessment regarding your ability to carry out your job responsibilities safely and in good health need to be discussed with your supervisor before starting work.

- Am I feeling good today and ready to work at my typical level of physical activity and responsibility?
- Do I have any sprains/strains, areas of weakness or soreness?
- Am I managing multiple sources of stress?
- Am I well hydrated?
- Any physically-demanding activities recently (chores, sports, hobbies)?
- Am I well-rested with a good energy level? When did I eat last?
- Am I taking any medications that can make me drowsy or adversely affect my safe performance?
- Any cuts/scrapes are clean and bandaged?
- Did I remember to bring with me my health maintenance medications (blood pressure, diabetes, cholesterol, heart, etc.)?

If your answers to any of the questions above indicate that you may not be ready to work, contact your supervisor immediately to discuss a plan of action.

LAST-MINUTE RISK ASSESSMENT (LMRA)

1. STOP and Think

2. Look around

Is the work area safe?
Will my work endanger others?
Will other people pose risk?

3. Assess risk

Do I clearly understand the task?
Will lifting or manual handling be required?
Potential for slips, trips, or falls?
Are there driving or vehicle concerns?
Have I considered all underground services?
Moving or pressurized equipment?
What could go wrong?

4. Control risk

What can I do to control hazards?
Do I have the right tools?
Is the SWP (Safe Work Practice) appropriate?
Do I have the appropriate PPE?
Are emergency plans in place?

5. Begin/Resume work

If you're unsure, talk to your supervisor.



Are you ready to work safely?

FIELD LEVEL RISK ASSESSMENT (FIT FOR DUTY), 5 DAY – RMS 2

Project: 937 Genesee Street – Corrective Action Plan Project No: 190500868

Client: City of Rochester

Location: 937 Genesee Street

Start Date: _____

Documentation and Procedure Review

1. Risk Management Strategy (RMS1) form and/or Site Specific Health and Safety Plan signed and reviewed? ☐ Yes ☐ No*
2. Emergency Response Plan reviewed? ☐ Yes ☐ No* ☐ N/A
3. Tested two-way communications (cell phone, satellite phone) and security measures? ☐ Yes ☐ No*
4. Attended Client Site Health and Safety meeting? ☐ Yes ☐ No* ☐ N/A
5. Conducted Stantec site safety meeting with all workforces? ☐ Yes ☐ No* ☐ N/A
6. Are there any new or unexpected hazards not identified in the RMS1/HASP?
If yes, include in the Job Safety Analysis (JSA). ☐ Yes ☐ No
7. Working alone or remote work?
If yes, complete call in/out process – Safe Work form must be completed. ☐ Yes ☐ No

Notifications and Permits

8. Are work permits required for this site?
If yes, have they been completed and submitted as required? ☐ Yes ☐ No
☐ Yes ☐ No*
9. Are utility locates required for this site?
If yes, have they been completed and reviewed? ☐ Yes ☐ No
☐ Yes ☐ No*
10. Does the Client require any notification prior to starting the work?
If yes, has the notification been provided? ☐ Yes ☐ No
☐ Yes ☐ No*

***Contact your Project Manager immediately.**

Work Description Provide a general description of the work to be conducted.

Personal Protective Equipment

List specific PPE as needed. Verify type and inspect condition.

- | | | |
|--|--|---|
| <input type="checkbox"/> Head Protection Type: _____ | <input type="checkbox"/> Hearing Protection: _____ | <input type="checkbox"/> Gloves Type: _____ |
| <input type="checkbox"/> Foot Protection Type: _____ | <input type="checkbox"/> Respiratory Protection: _____ | <input type="checkbox"/> Water Safety Gear: _____ |
| <input type="checkbox"/> Eye Protection Type: _____ | <input type="checkbox"/> Fire Retardant Coveralls: _____ | <input type="checkbox"/> _____ |
| <input type="checkbox"/> High Visibility Vest: _____ | <input type="checkbox"/> Fall Protection: _____ | <input type="checkbox"/> _____ |

Tools and Equipment

List specific equipment to be used. Verify type and inspect condition.

- | | | |
|--------------------------------|--------------------------------|--------------------------------|
| <input type="checkbox"/> _____ | <input type="checkbox"/> _____ | <input type="checkbox"/> _____ |
| <input type="checkbox"/> _____ | <input type="checkbox"/> _____ | <input type="checkbox"/> _____ |

Daily Tailgate Discussions/Subcontractor Input

Date:		Time:	Weather:
Start			
Mid-Day			
Post-Day			
Date:		Time:	Weather:
Start			
Mid-Day			
Post-Day			
Date:		Time:	Weather:
Start			
Mid-Day			
Post-Day			
Date:		Time:	Weather:
Start			
Mid-Day			
Post-Day			
Date:		Time:	Weather:
Start			
Mid-Day			
Post-Day			
Date:		Time:	Weather:
Start			
Mid-Day			
Post-Day			

FIELD LEVEL RISK ASSESSMENT (FIT FOR DUTY), 5 DAY – RMS 2

I know the hazards:

By signing here, you are stating the following:

1. I have been involved in the Job Safety Analysis (JSA) and understand the hazards and risk control actions associated with each task I am about to perform.
2. I understand the permit to work requirements applicable to the work I am about to perform (if it includes permitted activities).
3. I am aware that work that has not been risk-assessed must not be performed.
4. I am aware of my ability and obligation to **Stop Work** (*See below*).

I arrived and departed fit for duty (see Fit for Duty card for further information):

5. I am physically and mentally fit for duty.
6. I am not under the influence of any type of medication, drugs or alcohol that could affect my ability to work safely.
7. I am aware of my responsibility to bring any illness, injury (regardless of where or when it occurred), symptoms of soreness or discomfort, or fatigue issue I may have to the attention of the Crew Lead or Supervisor.
8. I sign out uninjured unless I have otherwise informed the Crew Lead or Supervisor.

Insert fitness level under corresponding time column: Fit for Duty = F Alternate Plan = AP Team Lead to contact Project Manager for any personnel identified as AP															
Individual Name/Company Name/Signature	Date:			Date:			Date:			Date:			Date:		
	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:

I will STOP WORK any time anyone is concerned or uncertain about safety. **I will STOP WORK** if anyone identifies a hazard or additional mitigation not recorded. **I will** be alert to any changes in personnel or their fitness level (AP), conditions at the work site or hazards. If it is necessary to **STOP WORK**, I will reassess the task, hazards and mitigations; and then proceed only when safe to do so.

Conclusion of day: I certify that the planned work activities are completed for the day and all injuries and first aids have been reported via RMS3.

Signature of Crew Lead:	_____	Date:	_____
Signature of Crew Lead:	_____	Date:	_____
Signature of Crew Lead:	_____	Date:	_____
Signature of Crew Lead:	_____	Date:	_____
Signature of Crew Lead:	_____	Date:	_____




FIELD LEVEL RISK ASSESSMENT (FIT FOR DUTY), 5 DAY – RMS 2

Job Safety Analysis (JSA) Must be completed for all field activities.

Basic Job Steps	Potential Hazards	Controls to Reduce or Eliminate Hazard	Person Responsible

Review the hazard categories below and check the mitigation measures applicable to the identified scope of work.

Environmental Hazards <ul style="list-style-type: none"> 1. Work area clean <input type="checkbox"/> 2. Material storage identified <input type="checkbox"/> 3. Dust/Mist/Fume <input type="checkbox"/> 4. Noise in area <input type="checkbox"/> 5. Extreme temperatures <input type="checkbox"/> 6. Spill potential <input type="checkbox"/> 7. Waste containers needed <input type="checkbox"/> 8. Waste properly disposed <input type="checkbox"/> 9. Waste plan identified <input type="checkbox"/> 10. Excavation permit required <input type="checkbox"/> 11. Other workers in area <input type="checkbox"/> 12. Weather conditions <input type="checkbox"/> 13. MSDS reviewed <input type="checkbox"/> 	Access/Egress Hazards <ul style="list-style-type: none"> 23. Aerial life/Man basket (inspected & tagged) <input type="checkbox"/> 24. Scaffold (inspected & tagged) <input type="checkbox"/> 25. Ladders (tied off) <input type="checkbox"/> 26. Slips & trips <input type="checkbox"/> 27. Hoisting (tools, equipment) <input type="checkbox"/> 28. Evacuation (alarms, routes, ph. #) <input type="checkbox"/> 29. Confined space entry permit required <input type="checkbox"/> 	Rigging & Hoisting Hazards <ul style="list-style-type: none"> 38. Lift study required <input type="checkbox"/> 39. Proper tools used <input type="checkbox"/> 40. Tools inspected <input type="checkbox"/> 41. Equipment inspected <input type="checkbox"/> 42. Slings inspected <input type="checkbox"/> 43. Others working overhead/below <input type="checkbox"/> 44. Critical lift permit <input type="checkbox"/>
Ergonomic Hazards <ul style="list-style-type: none"> 14. Awkward body position <input type="checkbox"/> 15. Over extension <input type="checkbox"/> 16. Prolonged twisting/bending motion <input type="checkbox"/> 17. Working in a tight area <input type="checkbox"/> 18. Lift too heavy/awkward to lift <input type="checkbox"/> 19. Parts of body in line of fire <input type="checkbox"/> 20. Repetitive motion <input type="checkbox"/> 21. Hands not in line of sight <input type="checkbox"/> 22. Working above your head <input type="checkbox"/> 		
	Overhead Hazards <ul style="list-style-type: none"> 30. Barricades & signs in place <input type="checkbox"/> 31. Hole coverings identified <input type="checkbox"/> 32. Harness/lanyard inspected <input type="checkbox"/> 33. 100% Tie-off with harness <input type="checkbox"/> 34. Tie off points identified <input type="checkbox"/> 35. Falling items <input type="checkbox"/> 36. Foreign bodies in eyes <input type="checkbox"/> 37. Hoisting or moving loads overhead <input type="checkbox"/> 	Electrical Hazards <ul style="list-style-type: none"> 45. GFI test <input type="checkbox"/> 46. Lighting levels too low <input type="checkbox"/> 47. Working on/near energized equipment <input type="checkbox"/> 48. Electrical cords condition <input type="checkbox"/> 49. Electrical tools condition <input type="checkbox"/> 50. Fire extinguisher <input type="checkbox"/> 51. Hot work or electrical permit required <input type="checkbox"/>
	Personal Limitations/Hazards <ul style="list-style-type: none"> 52. Procedure not available for task <input type="checkbox"/> 53. Confusing instructions <input type="checkbox"/> 54. No training for task or tools to be used <input type="checkbox"/> 55. First time performing the task <input type="checkbox"/> 56. Micro break (stretching/flexing) <input type="checkbox"/> 57. Report all injuries to your supervisor <input type="checkbox"/> 	

**It is important that all relevant hazards have plans in place to reduce risk.
Be sure that all associated permits are closed off at the end of the job.**

Remember: Stop and Think

Reviewed by Name and Signature: _____

HEALTH & SAFETY PLAN

APPENDIX C

JOB SAFETY ANALYSIS SHEETS

JOB SAFETY ANALYSIS		
PROJECT: Petroleum-Impacted Soil, 937 Genesee Street, Rochester, NY		
TASK: Geoprobe Drilling Activities		
Created by: C. Yarrington	Date: November 5, 2015	Revision Date:
Task Element	Hazard(s)	Controls
1. Pre-Clearance Activities & Utility Locates	a. Damage to utilities or injuries arising from struck utilities	a. Utility location surveys (including GPR & RD surveys) must be conducted by a subcontractor per NYSDEC requirements prior to any ground-intrusive work to prevent damage to existing infrastructure and to prevent injuries which may arise from striking a utility; if any part of the crew is unsure of the mark out, work must stop until the problem is resolved; the Project Manager should be consulted if pipes or other indications of underground infrastructure are encountered; remember that all workers have Stop Work Authority if proceeding with the work places themselves, others, and/or the environment at risk.
2. Mobilization	a. Slip/Trip/Fall b. Kickoff and Tailgate Meetings	a. Assess ground conditions when accessing the work area; take measure to eliminate objects; clear walking paths in areas of vegetative growth; wear boots with proper treads; remove ice on pavement, if possible, or use salt/sand for traction. b. Conduct initial safety meeting as kickoff to the field work and review HASP. Conduct daily tailgate meetings to review tasks for the day, identify hazards/changed conditions, and reiterate “Stop Work” authority for <u>all</u> workers.
3. Work Area Control	a. Injury to others in the vicinity of the work area	a. Mark work areas with orange cones or caution tape to prevent unwanted foot traffic in close proximity to drilling areas and operating machinery; be aware of surroundings and maintain communication with personnel in the vicinity of drilling activities.

JOB SAFETY ANALYSIS		
PROJECT: Petroleum-Impacted Soil, 937 Genesee Street, Rochester, NY		
TASK: Geoprobe Drilling Activities		
Created by: C. Yarrington	Date: November 5, 2015	Revision Date:
Task Element	Hazard(s)	Controls
4. Oversee Drilling Activities and Collect Soil Samples	a. Exposure to vapors b. Exposure to impacted soil/groundwater c. Struck by operating equipment/pinch points d. Noise e. Handling glass sample containers	a. Monitor breathing zone continuously with PID; be aware of action levels set forth in Section 6.2 of the HASP ; upgrade to Level C (full-face respirator with P-100 combo cartridges) if action levels of VOCs are exceeded and sustained. b. Wear nitrile gloves and safety glasses in case of dermal contact with soil boring and/or encountered groundwater; move slowly if standing water accumulates and presents splash potential; containerized water/liquids should be covered and placed on firm, solid ground. c. Maintain an observer's position where eye contact and open communication with the operator are possible; do not stand where the operator cannot see you; maintain adequate distance from the machinery when in use, particularly the moving parts; appropriate standing locations and communication should be discussed at the health and safety meeting prior to work start; be aware of other activities in the area and periodically confirm the work area is controlled. d. Use hearing protection as specified in Section 4.2.3 of the HASP . e. Use bubble wrap to cushion containers in cooler.
5. Decontamination (equipment)	a. Splash Potential	a. Perform decontamination in a controlled environment with proper containers and water supply; wear gloves and safety glasses; wear a face shield if necessary; containerize decontamination water.
6. Decontamination (personal)	a. Exposure to contaminated liquids (splash potential) and solids.	a. If necessary, perform dry decontamination on boots with stiff-bristled brush to remove soil, onto a poly-covered surface; wear gloves and safety glasses; wear a face shield if necessary; containerize wash and rinse fluids.

JOB SAFETY ANALYSIS		
PROJECT: Petroleum-Impacted Soil, 937 Genesee Street, Rochester, NY		
TASK: Geoprobe Drilling Activities		
<u>Created by:</u> C. Yarrington	<u>Date:</u> November 5, 2015	<u>Revision Date:</u>
Task Element	Hazard(s)	Controls
<u>Training Requirements:</u> HAZWOPER 40-hr and 8-Hr Refresher	<u>Personal Protective Equipment (PPE) Requirements:</u> Wear minimum PPE level appropriate for task. Steel toed, ankle-height boots; Hard hat; Safety vest; Hand protection (chemical resistant and/or impact resistant); Safety glasses required for ALL tasks.	
Remarks: note that although drilling is likely to involve a direct-push Geoprobe rig, the hazards and controls for given task elements are likely applicable to other drilling programs.		

JOB SAFETY ANALYSIS		
PROJECT: Petroleum-Impacted Soil, 937 Genesee Street, Rochester, NY		
TASK: Excavation Activities		
<u>Created by:</u> C. Yarrington	<u>Date:</u> November 5, 2015	<u>Revision Date:</u>
Task Element	Hazard(s)	Controls
1. Pre-Clearance Activities & Utility Locates	a. Damage to utilities or injuries arising from struck utilities	a. Utility location surveys (including GPR & RD surveys) must be conducted by a subcontractor per NYSDEC requirements prior to any ground-intrusive work to prevent damage to existing infrastructure and to prevent injuries which may arise from striking a utility; if any part of the crew is unsure of the mark out, work must stop until the problem is resolved; the Project Manager should be consulted if pipes or other indications of underground infrastructure are encountered; remember that all workers have Stop Work Authority if proceeding with the work places themselves, others, and/or the environment at risk.
2. Mobilization	a. Slip/Trip/Fall b. Kickoff and Tailgate Meetings	a. Assess ground conditions when accessing the work area; take measure to eliminate objects; clear walking paths in areas of vegetative growth; wear boots with proper treads; remove ice on pavement, if possible, or use salt/sand for traction. b. Conduct initial safety meeting as kickoff to the field work and review HASP. Conduct daily tailgate meetings to review tasks for the day, identify hazards/changed conditions, and reiterate “Stop Work” authority for <u>all</u> workers.
3. Work Area Control	a. Injury to others in the vicinity of the work area	a. Mark work area with orange cones or caution tape to prevent unwanted foot traffic in close proximity to excavation area and operating machinery; be aware of surroundings and maintain communication with personnel in the excavation vicinity.

JOB SAFETY ANALYSIS		
PROJECT: Petroleum-Impacted Soil, 937 Genesee Street, Rochester, NY		
TASK: Excavation Activities		
<u>Created by:</u> C. Yarrington	<u>Date:</u> November 5, 2015	<u>Revision Date:</u>
Task Element	Hazard(s)	Controls
4. Oversee excavation	a. Exposure to vapors b. Exposure to impacted soil/groundwater c. Struck by operating equipment d. Fall in excavation (slip/trip/fall) e. Handling glass sample containers (if collecting waste characterization samples)	a. Monitor breathing zone continuously with PID; be aware of action levels set forth in Section 6.2 of the HASP ; upgrade to Level C (full-face respirator with P-100 combo cartridges) if action levels of VOCs are exceeded and sustained. b. Wear nitrile gloves and safety glasses in case of dermal contact with excavated soil and/or encountered groundwater; move slowly if standing water accumulates and presents splash potential; containerized water/liquids should be covered and placed on firm, solid ground. c. Stand on opposite side of excavation across from the operating equipment; maintain eye contact and open communication with the operator; do not stand where the operator cannot see you; maintain adequate distance from the machinery when in use, particularly the moving parts; appropriate standing locations and communication should be discussed at the health and safety meeting prior to work start; be aware of other activities in the area and periodically confirm the work area is controlled. d. Maintain an adequate distance from walls of excavation; stay alert for signs of wall collapse (sliding, toppling, bulging); do not enter excavations greater than 4 feet deep; excavations deeper than 10 feet should have fall prevention systems in place. e. Use bubble wrap to cushion containers in cooler.
5. Decontamination (equipment)	a. Splash Potential	a. Perform decontamination in a controlled environment with proper containers and water supply; wear gloves and safety glasses; wear a face shield if necessary; containerize decontamination water.

JOB SAFETY ANALYSIS		
PROJECT: Petroleum-Impacted Soil, 937 Genesee Street, Rochester, NY		
TASK: Excavation Activities		
<u>Created by:</u> C. Yarrington	<u>Date:</u> November 5, 2015	<u>Revision Date:</u>
Task Element	Hazard(s)	Controls
6. Decontamination (personal)	a. Exposure to contaminated liquids (splash potential) and solids)	a. If necessary, perform dry decontamination on boots with stiff-bristled brush to remove soil, onto a poly-covered surface; wear gloves and safety glasses; wear a face shield if necessary; containerize wash and rinse fluids.
<u>Training Requirements:</u> HAZWOPER 40-hr and 8-Hr Refresher	<u>Personal Protective Equipment (PPE) Requirements:</u> Wear minimum PPE level appropriate for task. Steel toed, ankle-height boots; Hard hat; Safety vest; Hand protection (chemical resistant and/or impact resistant); Safety glasses required for ALL tasks.	
Remarks:		

JOB SAFETY ANALYSIS		
PROJECT: Petroleum-Impacted Soil, 937 Genesee Street, Rochester, NY		
TASK: Groundwater Monitoring Well Gauging and Sampling		
<u>Created by:</u> R. Mahoney	<u>Date:</u> Jan. 21, 2014	<u>Revision Date:</u>
Task Element	Hazard(s)	Controls
1. Mobilization	a. Lifting hazards b. Slip/Trip/Fall	a. Minimize weight of any single lift; use two people where necessary; lift with legs and not with back. b. Assess ground conditions at each well site; take measures to eliminate objects; Clear walking paths in areas of vegetative growth; Wear boots with proper treads; remove ice on pavement, if possible, or use salt/sand for traction.
2. Opening Well / Gauging	a. Struck by vehicle (if in traffic area) b. Pinch Point when opening well cover c. Exposure to vapors d. Splash potential for groundwater or NAPL	a. Wear reflective vest; Establish work area and mark with cones and flagging; position field vehicle to block work area. b. Be aware of pinch points associated with removal and replacement of the well lid/vault cover. Be aware of body position; wear sturdy leather or impact-resistant gloves. Use appropriate tool to remove well lid cover. This includes a handle appropriately designed for the type and weight of cover to be removed, and should allow lifting the cover from an upright position. c. Monitor breathing zone continuously with PID; be aware of action levels set forth in Section 6.2 of HASP . Upgrade to Level C (Full-face respirator with P-100 combo cartridges) if action levels of VOCs are exceeded and sustained. d. Wear latex gloves (minimum protection) and neoprene gloves (preferred). Use slow and controlled motion when inserting and removing well probe from well or decontamination bucket. Place decon bucket on firm, level surface.

JOB SAFETY ANALYSIS		
PROJECT: Petroleum-Impacted Soil, 937 Genesee Street, Rochester, NY		
TASK: Groundwater Monitoring Well Gauging and Sampling		
<u>Created by:</u> R. Mahoney	<u>Date:</u> Jan. 21, 2014	<u>Revision Date:</u>
Task Element	Hazard(s)	Controls
3. Opening Well / Sampling	a. Struck by vehicle (if in traffic area) b. Pinch Point when opening well cover c. Exposure to vapors d. Splash potential for groundwater or NAPL e. Handling glass sample containers	a. Wear reflective vest; Establish work area and mark with cones and flagging; position field vehicle to block work area. b. Be aware of pinch points associated with removal and replacement of the well lid/vault cover. Be aware of body position; wear sturdy leather or impact-resistant gloves. Use appropriate tool to remove well lid cover. This includes a handle appropriately designed for the type and weight of cover to be removed, and should allow lifting the cover from an upright position. c. Monitor breathing zone continuously with PID; Be aware of action levels set forth in Section 4.1 of HASP . Upgrade to Level C (Full-face respirator with P-100 combo cartridges) if action levels of VOCs are exceeded and sustained. d. Wear latex gloves (minimum protection) and neoprene gloves (preferred). Use slow and controlled motion when inserting and removing bailer from well and when pouring contents into measuring bucket or carbon bucket. Place all buckets on firm, level surface. e. Use bubble wrap to cushion containers in cooler.
4. Decontamination (equipment)	a. Splash Potential	a. Perform decon in a controlled environment with proper containers and potable water supply; Wear gloves and safety glasses; wear a Face Shield if necessary. Containerize decon water in covered buckets for transport to GCTS treatment bldg.

JOB SAFETY ANALYSIS		
PROJECT: Petroleum-Impacted Soil, 937 Genesee Street, Rochester, NY		
TASK: Groundwater Monitoring Well Gauging and Sampling		
Created by: R. Mahoney	Date: Jan. 21, 2014	Revision Date:
Task Element	Hazard(s)	Controls
5. Decontamination (personal)	a. Exposure to contaminated liquids (splash potential) and solids.	a. If necessary, perform dry decon on boots with stiff-bristled brush to remove soil, onto a poly-covered surface; Wear gloves and safety glasses; wear a Face Shield if necessary; Contain wash and rinse fluids in appropriate containers.
Training Requirements: HAZWOPER 40-hr and 8-Hr Refresher	Personal Protective Equipment (PPE) Requirements: Wear minimum PPE level appropriate for task. Steel toed, ankle-height boots; Hard hat; Safety glasses required for <u>ALL</u> tasks.	
Remarks: For wells located in areas of heavy brush or trees – visually inspect area for poison ivy before proceeding with work. If present, take measures to eliminate threat (remove, or cover with plastic sheeting, etc). For removal, wear Tyvek suit and gloves – cover all exposed skin.		

Appendix C

Community Air Monitoring Plan

New York State Department of Health Generic Community Air Monitoring Plan

Overview

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

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 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 DEC/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, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than $150 \text{ mcg}/\text{m}^3$ 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 $150 \text{ mcg}/\text{m}^3$ of the upwind level and in preventing visible dust migration.

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

December 2009

Fugitive Dust and Particulate Monitoring

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

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.
2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.
3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:
 - (a) Objects to be measured: Dust, mists or aerosols;
 - (b) Measurement Ranges: 0.001 to 400 mg/m³ (1 to 400,000 :ug/m³);
 - (c) Precision (2-sigma) at constant temperature: +/- 10 :g/m³ for one second averaging; and +/- 1.5 g/m³ for sixty second averaging;
 - (d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
 - (e) Resolution: 0.1% of reading or 1g/m³, whichever is larger;
 - (f) Particle Size Range of Maximum Response: 0.1-10;
 - (g) Total Number of Data Points in Memory: 10,000;
 - (h) Logged Data: Each data point with average concentration, time/date and data point number
 - (i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
 - (j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
 - (k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
 - (l) Operating Temperature: -10 to 50° C (14 to 122° F);
 - (m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.
4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.
5. The action level will be established at 150 ug/m³ (15 minutes average). While conservative,

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

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM₁₀ at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

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

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

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

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

Appendix D

Brownfield Site-Specific QAPP

Brownfields QAPP

Title and Approval Page

**Title: Corrective Action- Petroleum-Impacted Soils, 937 Genesee Street, Rochester, NY
Quality Assurance Project Plan (QAPP)**

Project Name/Property Name: Corrective Action – Petroleum Impacted Soils

Property/Site Location: 937 Genesee Street, Rochester, NY

Revision Number: Rev. 0

Revision Date: January 4, 2016

Brownfields Cooperative Agreement Number: BF-96290614-0

City of Rochester, New York

Brownfields Recipient

Robert Mahoney, Stantec Consulting Services Inc., 61 Commercial Street, Suite 100, Rochester, New York 14614, 585-413-5301, Bob.Mahoney@Stantec.com

Preparer's Name and Organizational Affiliation

Preparer's Address, Telephone Number, and E-mail Address

January 4, 2016

Preparation Date (Day/Month/Year)

Brownfields Recipient Program Manager:

Signature

Mark Gregor / City of Rochester Div. Environ. Quality – January 4, 2016

Printed Name/Organization/Date

Environmental Consultant Quality Assurance Officer:
(QAO)

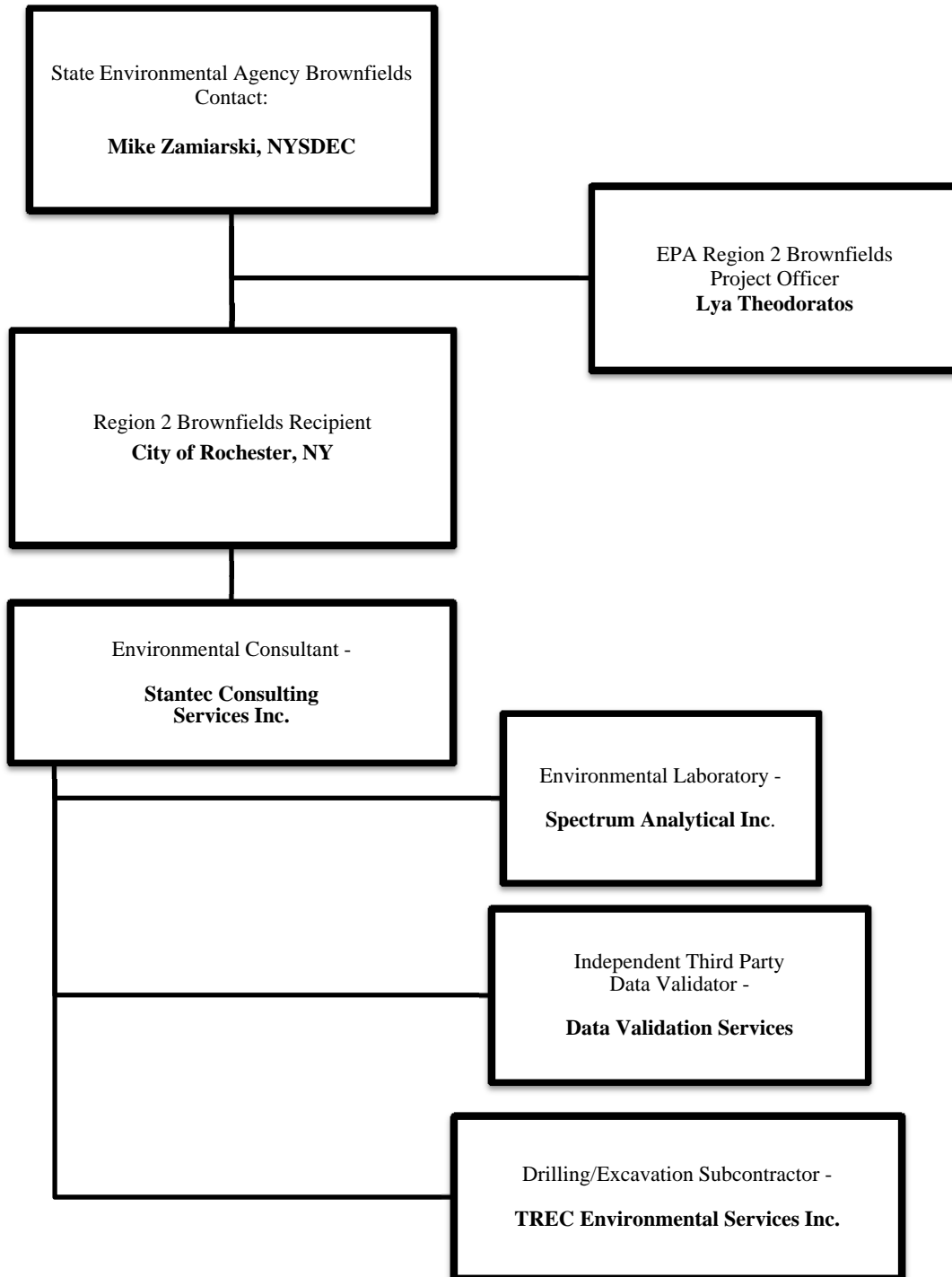
Signature

Peter Nielsen, Stantec Consulting Services – January 4, 2016

Printed Name/Organization/Date

Brownfields QAPP Template #2a

Project Organizational Chart



Brownfields QAPP Template #2b
Personnel Responsibilities

Name	Title	Telephone Number	Organizational Affiliation	Responsibilities¹
Mr. Michael Storonsky	Environmental Consultant Project Manager	585-413-5266	Stantec Consulting Services	Oversight of execution of all project elements and preparation of all project deliverables.
Mr. Robert Mahoney, P.G.	Sampling Assistance(s)	585-413-5301	Stantec Consulting Services	Management of field sampling program and subcontractors, data management and report preparation.
Mr. Mark Gregor	Brownfields Recipient Program Manager	585- 428-5978	City of Rochester, NY	Administration of Brownfield Grant Projects
Mr. Joe Biondolillo	Project Manager	585-428-6649	City of Rochester, NY	Overall management of Brownfield projects
Mr. Michael Zamiarski, P.E.	State Brownfields Contact	585-226-2466	New York State Department of Environmental Conservation	Oversight of environmental investigations and remediation under Petroleum Spill Program.
Ms. Lya Theodoratos	EPA Brownfields Project Officer (BPO)	212-637-3260	EPA Region 2	Transmission of information about the QA requirements and oversight of grants and/or contracts
Ms. Rebecca Merz	Environmental Laboratory Contact	413-789-9018	Eurofins Spectrum Analytical, Inc.	Analytical Laboratory services coordination and reporting.
Ms. Judy Harry	Third Party Data Validator ²	518-251-4429	Data Validation Services	All data validation-related services

¹ Include resumes as an appendix to the Site-Specific QAPP

² Data validation to be performed by third party – independent to project (can be within Environmental Consulting firm or subcontracted to a data validation firm).

Brownfields QAPP Template #3a

Problem Definition/Project Description

I. PROBLEM DEFINITION

This QAPP is appended to a Corrective Action Plan (CAP) that has been developed for proposed environmental remediation of petroleum-impacted soil and groundwater at the property located at 937-941 Genesee Street (“the Site”). Site environmental conditions were assessed through a previously-performed Phase II Environmental Site Assessment, which identified the presence of petroleum-impacted soils in two portions of the Site, and a surface layer of metals-impacted fill soils across much of the property.

The environmental remediation project is being performed as part of the City of Rochester’s (City’s) Brownfield Cleanup Grant (Agreement No. BF-96290614-0) from the United States Environmental Protection Agency (EPA). The work is being jointly funded by the EPA and the City.

The remedial activities are subject to the conditions in the EPA Brownfield Assessment Cooperative Agreement Administrative Conditions. In addition, the Site has been assigned Spill File No. 1206397 by the New York State Department of Environmental Conservation (NYSDEC) based on the presence of the petroleum impacts found. The City has entered into a Stipulation Agreement with the NYSDEC for cleanup at the Site.

The goal of the project is to remediate subsurface petroleum impacts sufficiently to facilitate closure of the NYSDEC Spill File for the Site, and to facilitate future sale and development of the property. This CAP provides details on a proposed cleanup program including demolition of remaining building remnants, impacted soil excavation and offsite disposal, groundwater management, excavation backfill, Site restoration and related activities.

II. PROJECT DESCRIPTION

A. Site Location and Description

The Site, which is owned by the City (Monroe County Tax ID No. 135.34-2-36) is located at 937-941 Genesee Street, Rochester, NY. The Site is located in a densely-developed area of mixed commercial and residential usage, and is zoned as part of the Brooks Landing Urban Renewal District/C1. The property is currently a vacant, rectangular and generally level parcel approximately 0.25 acres in size (see Figure 1).

A Phase I Environmental Site Assessment (ESA) revealed the following historical information:

- The 941 Genesee Street parcel was an auto repair garage during the time frame from approximately 1917 through 1942. Permit records indicated a 550-gallon gasoline tank and pump from 1938 through 1941; these were listed as being removed in 1943.
- 941 Genesee Street was also the site of a dry cleaner from 1947 through 2003, and dry cleaning site use appeared to continue until the 2009 demolition of the building on the Site by the City. Sanborn™ fire insurance rating maps from 1950 and 1971 showed a dry cleaning building with a pressing section, a cleaning section, and a boiler room. A City permit was maintained for a 250-gallon solvent tank at the Site from 1947 through 1961.

Due to tax delinquency and a fire that damaged the building on the 941 parcel, the City performed emergency demolition of the building in 2009. During the demolition of the building a 55-gallon drum, filled with stone and with no sealed bottom was found buried in the floor at the western end of the building that was. This feature was suspected to have been a dry well. The demolition included filling in the basement located beneath the front (east end) of the structure with imported fill soils to match existing grade. The building's floor slab and much of the wall footings were left in place.

Phase II ESA (2011) and Supplemental Phase II ESA (2012) investigations were performed to evaluate soil and groundwater conditions on the Site and further evaluate the potential for off-site impacts. The following is a combined summary of the primary findings of these investigations:

- 19 test borings were performed and 10 groundwater monitoring wells were installed (nine overburden wells and one bedrock well).
- An approximate three-foot diameter manhole was identified in the western portion of the foundation slab. The manhole was found to have a solid bottom and did not appear to have an outlet; however sampling of the contents of the manhole identified impacts above NYSDEC's Unrestricted Use Soil Cleanup Objectives (UUSCOs). Soil and groundwater sampling locations nearest the manhole and the former suspected drywell revealed the most significant impacts on the Site. This western area was identified as Remedial Area of Concern (RAOC) 1.
- A second area of impact was identified on the eastern side of the Site centered on boring/well B-14/MW-14. The contamination in this area may have resulted from releases associated with the sewer that serviced the Site, the former gasoline tank and pump, or the former 250-gallon solvent tank. This eastern area was identified as RAOC 2.
- The impacts identified in RAOCs 1 and 2 primarily involve petroleum constituents typical of diesel fuel, kerosene, lubricating oil, and/or mineral spirits or Stoddard solvent (a known dry-cleaning agent). No chlorinated VOCs were identified at the Site.

- Overburden groundwater depths have ranged from approximately 8 to 10 feet below ground surface. The hydraulic gradient of the water table is relatively low, and flow was generally toward the east-northeast. The investigations completed have not indicated that contamination is migrating offsite.
- A shallow, variable layer of fill soil containing apparent ash and cinder materials is present on the Site. This shallow fill material was identified in the Phase II ESA reports as RAOC 3. Analysis of this material indicates that SVOC and metal concentrations, although above NYSDEC's UUSCOs or Restricted Residential SCOs (RRSCOs) for Brownfield sites, were consistent with concentrations typically observed in urban fill.

B. Proposed Corrective Action and Sampling Considerations

A corrective action program will be implemented to remediate petroleum-impacted soil and groundwater. The CAP document to which this QAPP is appended provides a detailed description of the proposed remedial activities. The primary objectives of this remediation project are as follows:

- Implement corrective actions to address petroleum-impacted soil and groundwater in two primary remedial areas of concern, RAOC 1 and RAOC 2. The urban fill identified previously as RAOC 3 will be allowed to remain onsite and will be addressed as part of an Environmental Management Plan (EMP) that will provide guidance for management of such material if disturbed by future Site activities;
- Excavate source-area soils and other media that are impacted with petroleum-related contaminants in excess of applicable SCOs and/or soils which exhibit nuisance characteristics, and transport and dispose these materials offsite;
- Remove (if encountered), treat, and discharge to the combined sewer impacted groundwater from the excavations; and
- Perform *in-situ* bioremediation of groundwater by adding Oxygen Releasing Compound (ORC-A™) to the excavation prior to backfilling to further reduce contaminant concentrations to acceptable levels (as demonstrated through groundwater monitoring).

Successful implementation of these project elements will result in issuance by NYSDEC of spill file closure and a "No Further Action" letter.

Soil and groundwater samples will be submitted to a laboratory accredited through the New York State Department of Health Environmental Laboratory Accreditation Program (ELAP). Specific analyses to be used are listed in the sections below.

Sampling Considerations:**1. RAOC Excavations**

Both of the identified RAOC's will be excavated to remove impacted soil. Prior to performing the excavation a test boring will be performed in each RAOC to obtain a subsurface soil sample for waste disposal characterization analyses, which will facilitate live loading of excavated impacted soil into trucks for offsite disposal. During excavation, soil will be screened with a calibrated photoionization detector (PID). Confirmatory soil samples will be obtained from excavation sidewalls and bottoms and the samples will be submitted for laboratory analysis for:

- Total Petroleum Hydrocarbons (TPH), USEPA Method 8015D;
- Part 375 and NYSDEC CP-51 List volatile organic compounds (VOCs) plus Tentatively Identified Compounds (TICs), USEPA Method 8260C; and
- PART 375 and NYSDEC CP-51 List Semivolatile Organic Compounds (SVOCs) plus TICs, USEPA Method 8270D.

2. Monitoring Well Installation and Sampling

Two overburden wells will be installed to replace wells destroyed by the RAOC excavations. The replacement wells will be installed using a Geoprobe® rig after backfilling is complete. Each overburden well will consist of 1-in diameter PVC casing and approximately 10-ft of well screen. New flush-mounted surface completions will be installed for each new well. All new and existing well casings will be surveyed for accurate elevations. The wells will be developed upon completion. Each well will be developed after completion to reduce turbidity to the extent practicable. The wells will be allowed to equilibrate for a minimum of 48 hours before sampling is performed.

The sampling will be performed using bailers or low-flow methodology to facilitate accurate measurement of the field parameters dissolved oxygen (DO) and oxidation-reduction potential (ORP). Samples will be submitted to an ELAP-certified laboratory for the following analyses:

- Part 375 and CP-51 List VOCs plus TICs, USEPA Method 8260C;
- Part 375 and CP-51 List SVOCs plus TICs, USEPA Method 8270D; and
- TPH, USEPA Method 8015D.

A DUSR will only be generated for the final round of groundwater sampling.

3. Groundwater Elevation Measurement

After water levels have equilibrated, static water levels will be measured in each well with an electronic water level indicator to the nearest 0.01 ft. The potential presence of petroleum product will also be monitored with an interface probe.

4. Survey of Exploration and Sample Locations

Horizontal coordinates of excavations, test borings, monitoring wells and relevant Site features will be established with GPS equipment. The relative elevation of the top of each monitoring well casing will be established by a licensed surveyor using a temporary benchmark established on the Site.

5. Decontamination

Sampling methods and equipment have been chosen to minimize the need for decontamination. All non-dedicated or non-disposable equipment will be decontaminated prior to and following each use. Decontamination of soil sampling equipment (such as split spoons and hand-sampling tools) will consist of a wash with Alconox (or equivalent) solution and a potable water rinse. Following decontamination, direct contact between sampling equipment and the ground surface will not be permitted. Decontamination fluids will be managed as IDW (see discussion, next section).

C. Project Decision Statements

Future development of the Site is uncertain. The property is likely to remain zoned for mixed Residential and Commercial.

It is currently presumed that the cleanup criteria to be used to compare analytical results for soil samples will be soil cleanup objectives (SCOs) for Protection of Groundwater (POGW) contained in NYSDEC's 6NYCRR Part 375 regulations.

Project "If/Then" statements:

1. If confirmatory sample results indicate residual soil contamination is present at levels above applicable SCOs, then the excavation will be expanded to the extent practicable to remove the residual impacts.
2. If, after the prescribed time period for post-remedial groundwater monitoring, contaminant concentrations exceed the groundwater standards contained in NYSDEC's TOGS 1.1.1 Guidance Document, then it will be proposed to conduct groundwater monitoring until asymptotic conditions for VOCs are attained for a one-year period. At that time, it would also be proposed that the institutional and

engineering controls be used to provide conditions protective of public health and the environment for the intended and reasonably anticipated use of the Site.

Brownfields QAPP Template #3b

Project Quality Objectives/Systematic Planning Process Statements

Use this template to develop the project quality objectives (PQOs) that define the type, quantity and quality of data needed to answer specific environmental questions, and support proper environmental decisions. The questions below are examples only, and are neither inclusive nor appropriate for all projects.

Overall project objectives include:

The primary objectives of the soil and groundwater remediation are to:

- Excavate and dispose source-area soils and other media that are impacted with petroleum-related contaminants in excess of applicable SCOs and/or soils which exhibit nuisance characteristics;
- Remove (if encountered), treat, and discharge to the combined sewer impacted groundwater from the excavations; and
- Perform *in-situ* bioremediation of groundwater and achieve groundwater quality sufficient for regulatory closure of the site.

Soil and groundwater will be analyzed for

- TPH, USEPA Method 8015D;
- Part 375 and NYSDEC CP-51 List volatile organic compounds (VOCs) plus Tentatively Identified Compounds (TICs), USEPA Method 8260C; and
- PART 375 and NYSDEC CP-51 List Semivolatile Organic Compounds (SVOCs) plus TICs, USEPA Method 8270D.

Who will use the data?

The data will be used by The City of Rochester, which is the current owner and EPA Region 2 Brownfields Recipient, and the NYSDEC, which currently has an open Spill File for the site.

What will the data be used for?

The data will determine whether site soil and/or groundwater have been remediated sufficiently to allow Spill File closure by NYSDEC.

What types of data are needed?

- Laboratory Analytical Data for both soil and groundwater will include:
 - TPH, USEPA Method 8015D;

- Part 375 and NYSDEC CP-51 List volatile organic compounds (VOCs) plus Tentatively Identified Compounds (TICs), USEPA Method 8260C; and
- PART 375 and NYSDEC CP-51 List Semivolatile Organic Compounds (SVOCs) plus TICs, USEPA Method 8270D.
- Field Data include:
 - Geoprobe[®] direct-push drilling methods to obtain continuous soil samples in each boring with a macrocore sampler. The sampler uses dedicated plastic sleeves for each sample interval and the sampler will be decontaminated after each sample interval. During drilling, soil samples will be visually inspected for indications of staining, sheen, etc. The soil samples will be screened with a calibrated PID for the presence of volatile organic compounds.
 - Excavation limits (X,Y, Z coordinates).
 - Monitoring well construction details.
 - For groundwater sampling, each sample will be collected using either bailing methodology or the EPA low flow sampling SOP; Field parameters to be measured during purging would include pH, temperature, specific conductance, oxidation reduction potential and dissolved oxygen.
 - Groundwater levels will be measured in monitoring wells to the nearest 0.01 ft using an electronic water level indicator.

How much data are needed?

Including the QA/QC samples, it is currently estimated that up to approximately 17 total analyses will be performed for the three analyte classes listed above for soil and up to 6 analyses will be performed for the same analyte classes for groundwater samples.

Where, when, and how should the data be collected/generated?

- Soil waste pre-characterization samples will be obtained from a test boring performed in approximately the center of RAOC-1 and RAOC-2;
- Confirmation soil samples will be obtained from each excavation sidewall and each excavation bottom;
- Groundwater samples will be collected from each of three replacement monitoring wells that will remain after the remedial excavations are complete: two wells (MW-3 and MW-6) in RAOC-1 and one well (MW-14) in RAOC-2.

Figure 1 indicates the locations of the RAOCs and the existing wells.

Who will collect and generate the data?

Stantec Consulting Services Inc. will collect all samples, perform all field screening for soils using a calibrated PID, and measure field parameters while sampling groundwater during the

final round of sampling. Subsequent rounds of groundwater sampling may be performed by City personnel.

How will the data be reported?

- Field data will be recorded in a field book, on field diagrams, and on Groundwater Sampling Reports.
- Laboratory data will be reported by the laboratory in “Category B” deliverables. In addition, electronic data deliverables (EDDs) will be provided by the laboratory in a format compatible with NYSDEC’s requirements for EDDs. All laboratory-generated soil data will undergo independent review by an experienced data validator who will prepare Data Usability Summary Reports (DUSRs) for each sample delivery group. For groundwater, a DUSR will be generated only for the final groundwater monitoring sampling round.
- All data will be included, discussed and summarized in a Remedial Construction/Closure Report (RCCR).

How will the data be archived?

- As discussed above, all data will be included in a summary report to the City of Rochester and NYSDEC. The report will be provided in electronic format to both parties, and in hard copies, if requested.
- The laboratory analytical data will also be provided in electronic data deliverable format. The EDD file will be compatible with NYSDEC EDD requirements as detailed in its Electronic Data Deliverable Manual (April 2013). Once the RCCR report has been finalized the EDD file will be uploaded to NYSDEC’s Environmental Information Management System for permanent archiving.

Brownfields QAPP Template #4

Project Schedule/Timeline

List all project activities that will be performed during the course of the project. Include the anticipated start and completion dates.

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Estimated Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Preparation of QAPP	Stantec Consulting Services Inc.	10/1/15	12/3/15	QAPP	12/3/15
Review of QAPP	City of Rochester DEQ, Joseph Biondolillo	12/4/15	12/7/15	Written Approval by COR DEQ	12/9/15
	NYSDEC	12/9/15	12/23/15	Written Approval by NYSDEC	12/23/15
Preparation of Health and Safety Plan	Stantec Consulting	10/1/15	12/7/15	HASP	12/7/15
Procurement of Equipment	Stantec Consulting	1/4/15	1/8/15	N/A	
Laboratory Request	Stantec Consulting	1/11/15	1/15/15	N/A	
Field Reconnaissance/Access	Stantec Consulting	1/11/15	1/15/15	N/A	
Collection of Field Samples	Stantec Consulting	1/25/15	2/22/15	N/A	
Laboratory Package Received	Stantec Consulting	1/27/15	3/14/15	Unvalidated data package, Preliminary EDD ²	3/14/15
Validation of Laboratory Results	Data Validation Services ¹	3/15/15	4/5/15	Validated data Packages, Updated EDD	4/5/15
Data Evaluation/Preparation of Final Report	Stantec Consulting Services Inc.	1/17/15	4/31/15	Final Report	4/31/15

¹Data validation to be performed by third party – independent to project (can be within Environmental Consulting firm or subcontracted to data validation firm).

²EDD = Electronic Data Deliverable

Brownfields QAPP Template #5a

Sampling Methods and Locations

Matrix	Sampling Location(s)	Depth (ft)	Analytical Group¹	No. of Samples²	Sampling SOP Reference	Rationale for Sampling Location
Soil	Excavation sidewalls and bottoms		VOCs	14 + Field Dup + MS/MSD	<i>Corrective Action Plan, Petroleum-Impacted Soil and Groundwater, 937 Genesee Street, Rochester, New York, NYSDEC Spill No. 126397 by Stantec Consulting Services Inc., dated November 2015</i>	Actual number of samples and locations to be determined based on observations, excavation limits and field screening results.
Soil	Excavation sidewalls and bottoms		SVOCs	14+ Field Dup + MS/MSD		
Soil	Excavation sidewalls and bottoms		TPH	14 + Field Dup + MS/MSD		
Groundwater	Wells MW-3, MW-6, and MW-24. See Figure 1		VOCs	3 + Field Dup + MS/MSD + trip blank	Bailing method or EPA Low Flow Sampling SOP	In RAOCs and directly downgradient.
Groundwater	Wells MW-3, MW-6, and MW-24. See Figure 1		SVOCs	3 + Field Dup + MS/MSD+ trip blank	Bailing method or EPA Low Flow Sampling SOP	
Groundwater	Wells MW-3, MW-6, and MW-24. See Figure 1		TPH	3 + Field Dup + MS/MSD+ trip blank	Bailing method or EPA Low Flow Sampling SOP	

¹ Analytical Groups include: volatiles; semivolatiles; pesticides; PCBs, total metals; cyanide, etc.² The number of groundwater samples will vary depending on whether overburden or interface wells are installed³ PCBs and Metals to be analyzed in groundwater only if detected in soils.

Brownfields QAPP Template #5b

Analytical Methods and Requirements

Matrix	Analytical Group	Concentration Level	Analytical & Preparation Method/ SOP Reference	Sample Volume	Containers (number, size, type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Groundwater	VOCs	Low	SW-846 Method 8260	80 ml	(2) 40 ml VOA vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days
Groundwater	SVOCs	Low	SW-846 Method 8270	2000 ml	(2) 1000 ml glass bottles with w/Teflon lined cap	cool to 4°C	7 days to extraction, 40 days to analysis
Groundwater	exTPH	Low	SW-846 Method 8015	2000 ml	(2) 1000 ml glass bottles with w/Teflon lined cap	cool to 4°C	7 days to extraction, 40 days to analysis
Soil	VOCs	Low	SW-846 Method 8260	10 g	4oz glass jar with Teflon lined cap	cool to 4°C	14 days
Soil	SVOCs	Low	SW-846 Method 8270	30 g	8 oz glass jar w/Teflon lined cap	cool to 4°C	14 days until extraction, 40 days until analysis
Soil	PCBs	Low	SW-846 Method 8082	30 g	8 oz glass jar w/Teflon lined cap	cool to 4°C	14 days until extraction, 40 days until analysis
Soil	Metals & mercury	Low	SW-846 Method 6010/7471	5 g	4 oz glass jar w/Teflon lined cap	cool to 4°C	180 days (28 days for mercury)
Soil	exTPH	Low	SW-846 Method 8015	30 g	8 oz glass jar w/Teflon lined cap	cool to 4°C	14 days until extraction, 40 days until analysis

¹Concentration Level refers to Trace; Low; Medium; High of the sample.

Brownfields QAPP Template #5c

Reference Limits and Evaluation Table

GROUNDWATER

Matrix <i>Aqueous</i>				
Analytical Group <u>VOCs – SW-846 8260</u>				
Concentration Level <i>Low</i>				
Analyte	CAS Number	NYSDEC TOGS 1.1.1 Groundwater Standards (µg/L)	Achievable Lab Method Detection Limit (µg/L)	Achievable Lab Reporting Limit µg/L)
1,1,1-Trichloroethane	71-55-6	5	0.5	5
1,1,2,2-Tetrachloroethane	79-34-5	5	0.42	5
1,1,2-Trichloroethane	79-00-5	1	0.38	5
1,1-Dichloroethane	75-34-3	5	0.25	5
1,1-Dichloroethene	75-35-4	5	0.39	5
1,2,3-Trichlorobenzene	87-61-6	5	0.33	5
1,2,4-Trichlorobenzene	120-82-1	5	0.26	5
1,2-Dibromo-3-chloropropane	96-12-8	0.04	0.75	5
1,2-Dibromoethane	106-93-4	ns	0.5	5
1,2-Dichlorobenzene	95-50-1	3	0.33	5
1,2-Dichloroethane	107-06-2	0.6	0.41	5
1,2-Dichloropropane	78-87-5	1	0.61	5
1,3-Dichlorobenzene	541-73-1	3	0.29	5
1,4-Dichlorobenzene	106-46-7	3	0.4	5
2-Butanone	78-93-3	50	2.1	5
2-Hexanone	591-78-6	ns	1.7	5
4-Methyl-2-pentanone	108-10-1	ns	0.82	5
Acetone	67-64-1	50	2.2	5
Benzene	71-43-2	1	0.33	5
Bromochloromethane	74-97-5	ns	0.43	5
Bromodichloromethane	75-27-4	50	0.26	5
Bromoform	75-25-2	50	0.77	5
Bromomethane	74-83-9	5	0.8	5
Carbon disulfide	75-15-0	60	0.34	5
Carbon tetrachloride	56-23-5	5	0.54	5
Chlorobenzene	108-90-7	5	0.26	5
Chloroethane	75-00-3	5	0.48	5
Chloroform	67-66-3	7	0.33	5
Chloromethane	74-87-3	5	0.26	5
cis-1,2-Dichloroethene	156-59-2	5	0.48	5
cis-1,3-Dichloropropene	10061-01-5	0.4	0.45	5
Dibromochloromethane	124-48-1	50	0.57	5

Dichlorodifluoromethane	75-71-8	5	0.66	5
Ethylbenzene	100-41-4	5	0.35	5
Isopropylbenzene	98-82-8	5	0.38	5
m,p-Xylene	179601-23-1	5	0.77	5
Methyl tert-butyl ether	1634-04-4	10	0.24	5
Methylene chloride	75-09-2	5	0.41	5
o-Xylene	95-47-6	5	0.36	5
Styrene	100-42-5	5	0.5	5
Tetrachloroethene	127-18-4	5	0.65	5
Toluene	108-88-3	5	0.32	5
trans-1,2-Dichloroethene	156-60-5	5	0.65	5
trans-1,3-Dichloropropene	10061-02-6	0.4	0.48	5
Trichloroethene	79-01-6	5	0.36	5
Trichlorofluoromethane	75-69-4	5	0.54	5
Vinyl chloride	75-01-4	2	0.5	5
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	ns	0.82	5
1,4-Dioxane	123-91-1	ns	34	100
Cyclohexane	110-82-7	ns	0.71	5
Methyl acetate	79-20-9	ns	0.29	5
Methylcyclohexane	108-87-2	ns	0.76	5

Matrix <i>Aqueous</i>				
Analytical Group <i>SVOCs - SW-846 8270</i>				
Concentration Level <i>Low</i>				
Analyte	CAS Number	NYSDEC TOGS 1.1.1 Groundwater Standards (µg/L)	Achievable Lab Method Detection Limit (µg/L)	Achievable Lab Reporting Limit µg/L)
2,2'-oxybis(1-Chloropropane)	108-60-1	ns	0.78	10
2,4-Dichlorophenol	120-83-2	5	0.57	10
2,4-Dimethylphenol	105-67-9	50	1.8	10
2,4-Dinitrophenol	51-28-5	10	3.5	20
2,4-Dinitrotoluene	121-14-2	5	0.41	10
2,6-Dinitrotoluene	606-20-2	5	0.52	10
2-Chloronaphthalene	91-58-7	10	0.81	10
2-Chlorophenol	95-57-8	ns	0.61	10
2-Methylnaphthalene	91-57-6	ns	0.94	10
2-Methylphenol	95-48-7	ns	0.96	10
2-Nitroaniline	88-74-4	5	0.71	20
2-Nitrophenol	88-75-5	ns	0.6	10
3,3'-Dichlorobenzidine	91-94-1	5	1.7	10
3-Nitroaniline	99-09-2	5	0.97	20
4,6-Dinitro-2-methylphenol	534-52-1	ns	0.79	20
4-Bromophenyl-phenylether	101-55-3	ns	0.54	10
4-Chloro-3-methylphenol	59-50-7	ns	0.6	10
4-Chloroaniline	106-47-8	5	2	10
4-Chlorophenyl-phenylether	7005-72-3	ns	0.41	10
4-Methylphenol	106-44-5	ns	1.4	10

4-Nitroaniline	100-01-6	5	0.96	20
4-Nitrophenol	100-02-7	ns	0.53	20
Acenaphthene	83-32-9	20	0.65	10
Acenaphthylene	208-96-8	ns	0.42	10
Anthracene	120-12-7	50	0.48	10
Benzo(a)anthracene	56-55-3	0.002	0.4	10
Benzo(a)pyrene	50-32-8	ns	1.2	10
Benzo(b)fluoranthene	205-99-2	0.002	0.94	10
Benzo(g,h,i)perylene	191-24-2	ns	0.39	10
Benzo(k)fluoranthene	207-08-9	0.002	1.2	10
Bis(2-chloroethoxy)methane	111-91-1	5	1.1	10
Bis(2-chloroethyl)ether	111-44-4	1	0.75	10
Bis(2-ethylhexyl)phthalate	117-81-7	5	1.3	10
Butylbenzylphthalate	85-68-7	50	0.32	10
Carbazole	86-74-8	ns	0.64	10
Chrysene	218-01-9	0.002	0.42	10
Di-n-butylphthalate	84-74-2	50	0.48	10
Di-n-octylphthalate	117-84-0	ns	0.47	10
Dibenzo(a,h)anthracene	53-70-3	ns	0.44	10
Dibenzofuran	132-64-9	ns	0.52	10
Diethylphthalate	84-66-2	50	0.45	10
Dimethylphthalate	131-11-3	50	0.37	10
Fluoranthene	206-44-0	50	0.33	10
Fluorene	86-73-7	0.04	0.44	10
Hexachlorobenzene	118-74-1	0.04	0.44	10
Hexachlorobutadiene	87-68-3	0.5	0.75	10
Hexachlorocyclopentadiene	77-47-4	5	1	10
Hexachloroethane	67-72-1	5	0.55	10
Indeno(1,2,3-cd)pyrene	193-39-5	0.002	0.38	10
Isophorone	78-59-1	50	0.47	10
N-Nitroso-di-n-propylamine	621-64-7	ns	0.63	10
N-Nitrosodiphenylamine	86-30-6	50	1.1	10
Naphthalene	91-20-3	10	0.96	10
Nitrobenzene	98-95-3	0.4	1.6	10
Pentachlorophenol	87-86-5	1	1.7	20
Phenanthrene	85-01-8	50	0.45	10
Phenol	108-95-2	1	0.75	10
Pyrene	129-00-0	50	0.44	10
1,1'-Biphenyl	92-52-4	5	0.65	10
2,4,5-Trichlorophenol	95-95-4	ns	0.26	20
2,4,6-Trichlorophenol	88-06-2	ns	0.53	10
1,2,4,5-Tetrachlorobenzene	95-94-3	ns	0.92	10
2,3,4,6-Tetrachlorophenol	58-90-2	ns	0.65	25
Acetophenone	98-86-2	ns	0.51	10
Atrazine	1912-24-9	ns	1.3	10
Benzaldehyde	100-52-7	ns	0.51	10
Caprolactam	105-60-2	ns	1.1	10

Matrix <i>Aqueous</i>				
Analytical Group <i>exTPH</i>				
Concentration Level <i>Low</i>				
Analyte	CAS Number	NYSDEC TOGS 1.1.1 Groundwater Standards (µg/L)	Achievable Laboratory Method Detection Limit, mg/L	Achievable Laboratory Reporting Limit, mg/L
exTPH	EXTPH	NA	0.018	0.2

SOIL

Matrix Soil				
Analytical Group <i>VOCs – SW-846 8260</i>				
Concentration Level <i>Low</i>				
Analyte	CAS Number	NYSDEC Part 375 Soil Cleanup Objectives for Protection of Groundwater (µg/kg)	Achievable Lab Method Detection Limit (µg/kg)	Achievable Lab Reporting Limit (µg/kg)
1,1,1-Trichloroethane	71-55-6	680	0.53	5
1,1,2,2-Tetrachloroethane	79-34-5	1,000,000	0.68	5
1,1,2-Trichloroethane	79-00-5	1,000,000	0.48	5
1,1-Dichloroethane	75-34-3	270	0.67	5
1,1-Dichloroethene	75-35-4	330	0.95	5
1,2,3-Trichlorobenzene	87-61-6	ns	0.64	5
1,2,4-Trichlorobenzene	120-82-1	1,000,000	0.63	5
1,2-Dibromo-3-chloropropane	96-12-8	ns	1.3	5
1,2-Dibromoethane	106-93-4	ns	0.74	5
1,2-Dichlorobenzene	95-50-1	1,100	0.62	5
1,2-Dichloroethane	107-06-2	20	0.54	5
1,2-Dichloropropane	78-87-5	1,000,000	0.69	5
1,3-Dichlorobenzene	541-73-1	2,400	0.7	5
1,4-Dichlorobenzene	106-46-7	1,800	0.8	5
2-Butanone	78-93-3	120	2	5
2-Hexanone	591-78-6	1,000,000	0.83	5
4-Methyl-2-pentanone	108-10-1	ns	0.73	5
Acetone	67-64-1	50	1.6	5
Benzene	71-43-2	60	0.61	5
Bromochloromethane	74-97-5	ns	0.76	5
Bromodichloromethane	75-27-4	1,000,000	0.97	5
Bromoform	75-25-2	1,000,000	2	5
Bromomethane	74-83-9	1,000,000	1.1	5
Carbon disulfide	75-15-0	1,000,000	0.3	5
Carbon tetrachloride	56-23-5	760	0.33	5
Chlorobenzene	108-90-7	1,100	0.51	5
Chloroethane	75-00-3	1,000,000	1	5
Chloroform	67-66-3	370	0.64	5
Chloromethane	74-87-3	1,000,000	0.8	5
cis-1,2-Dichloroethene	156-59-2	250	0.75	5
cis-1,3-Dichloropropene	10061-01-5	1,000,000	0.67	5
Dibromochloromethane	124-48-1	1,000,000	0.65	5
Dichlorodifluoromethane	75-71-8	ns	0.98	5
Ethylbenzene	100-41-4	1,000	0.5	5
Isopropylbenzene	98-82-8	1,000,000	0.58	5
m,p-Xylene	179601-23-1	1,600	1.6	5
Methyl tert-butyl ether	1634-04-4	930	0.61	5
Methylene chloride	75-09-2	50	1.3	5
o-Xylene	95-47-6	1,600	0.47	5

Styrene	100-42-5	1,000,000	0.52	5
Tetrachloroethene	127-18-4	1,300	0.62	5
Toluene	108-88-3	700	0.47	5
trans-1,2-Dichloroethene	156-60-5	190	0.53	5
trans-1,3-Dichloropropene	10061-02-6	1,000,000	0.68	5
Trichloroethene	79-01-6	470	0.62	5
Trichlorofluoromethane	75-69-4	ns	0.42	5
Vinyl chloride	75-01-4	20	0.63	5
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	ns	3	5
1,4-Dioxane	123-91-1	100	61	100
Cyclohexane	110-82-7	ns	1.7	5
Methyl acetate	79-20-9	ns	1.4	5
Methylcyclohexane	108-87-2	ns	1.8	5

Matrix <i>Soil</i>				
Analytical Group <i>SVOCs – SW-846 8270</i>				
Concentration Level <i>Low</i>				
Analyte	CAS Number	NYSDEC Part 375 Soil Cleanup Objectives for Protection of Groundwater (µg/kg)	Achievable Lab Method Detection Limit (µg/kg)	Achievable Lab Reporting Limit (µg/kg)
2,2'-oxybis(1-Chloropropane)	108-60-1		51	330
2,4-Dichlorophenol	120-83-2	1,000,000	38	330
2,4-Dimethylphenol	105-67-9	1,000,000	36	330
2,4-Dinitrophenol	51-28-5	1,000,000	180	670
2,4-Dinitrotoluene	121-14-2	1,000,000	23	330
2,6-Dinitrotoluene	606-20-2	1,000,000	28	330
2-Chloronaphthalene	91-58-7	1,000,000	38	330
2-Chlorophenol	95-57-8	1,000,000	41	330
2-Methylnaphthalene	91-57-6	1,000,000	42	330
2-Methylphenol	95-48-7	1,000,000	38	330
2-Nitroaniline	88-74-4	1,000,000	21	670
2-Nitrophenol	88-75-5	1,000,000	36	330
3,3'-Dichlorobenzidine	91-94-1	1,000,000	35	330
3-Nitroaniline	99-09-2	1,000,000	24	670
4,6-Dinitro-2-methylphenol	534-52-1	ns	25	670
4-Bromophenyl-phenylether	101-55-3	ns	32	330
4-Chloro-3-methylphenol	59-50-7	1,000,000	26	330
4-Chloroaniline	106-47-8	1,000,000	24	330
4-Chlorophenyl-phenylether	7005-72-3	1,000,000	40	330
4-Methylphenol	106-44-5	ns	35	330
4-Nitroaniline	100-01-6	1,000,000	25	670
4-Nitrophenol	100-02-7	1,000,000	22	670
Acenaphthene	83-32-9	98,000	39	330
Acenaphthylene	208-96-8	107,000	37	330
Anthracene	120-12-7	1,000,000	27	330
Benzo(a)anthracene	56-55-3	1000	33	330

Benzo(a)pyrene	50-32-8	22,000	31	330
Benzo(b)fluoranthene	205-99-2	1,700	40	330
Benzo(g,h,i)perylene	191-24-2	100,000	38	330
Benzo(k)fluoranthene	207-08-9	1,700	43	330
Bis(2-chloroethoxy)methane	111-91-1	1,000,000	39	330
Bis(2-chloroethyl)ether	111-44-4	1,000,000	42	330
Bis(2-ethylhexyl)phthalate	117-81-7	1,000,000	29	330
Butylbenzylphthalate	85-68-7	1,000,000	26	330
Carbazole	86-74-8	1,000,000	28	330
Chrysene	218-01-9	1,000	29	330
Di-n-butylphthalate	84-74-2	1,000,000	28	330
Di-n-octylphthalate	117-84-0	1,000,000	28	330
Dibenzo(a,h)anthracene	53-70-3	1,000,000	35	330
Dibenzofuran	132-64-9	210,000	36	330
Diethylphthalate	84-66-2	1,000,000	24	330
Dimethylphthalate	131-11-3	1,000,000	30	330
Fluoranthene	206-44-0	1,000,000	29	330
Fluorene	86-73-7	386,000	33	330
Hexachlorobenzene	118-74-1	3,200	32	330
Hexachlorobutadiene	87-68-3	1,000,000	45	330
Hexachlorocyclopentadiene	77-47-4	1,000,000	96	330
Hexachloroethane	67-72-1	1,000,000	35	330
Indeno(1,2,3-cd)pyrene	193-39-5	8,200	37	330
Isophorone	78-59-1	1,000,000	34	330
N-Nitroso-di-n-propylamine	621-64-7	1,000,000	32	330
N-Nitrosodiphenylamine	86-30-6	1,000,000	29	330
Naphthalene	91-20-3	12,000	41	330
Nitrobenzene	98-95-3	1,000,000	38	330
Pentachlorophenol	87-86-5	800	140	670
Phenanthrene	85-01-8	1,000,000	26	330
Phenol	108-95-2	330	37	330
Pyrene	129-00-0	1,000,000	32	330
1,1'-Biphenyl	92-52-4	ns	42	330
2,4,5-Trichlorophenol	95-95-4	1,000,000	37	670
2,4,6-Trichlorophenol	88-06-2	1,000,000	39	330
1,2,4,5-Tetrachlorobenzene	95-94-3	ns	59	330
2,3,4,6-Tetrachlorophenol	58-90-2	ns	31	330
Acetophenone	98-86-2	ns	31	330
Atrazine	1912-24-9	ns	47	330
Benzaldehyde	100-52-7	ns	44	330
Caprolactam	105-60-2	ns	21	330

Matrix <i>Soil</i>				
Analytical Group <i>exTPH</i>				
Concentration Level <i>Low</i>				
Analyte	CAS Number	NYSDEC Part 375 Soil Cleanup Objectives for Protection of Groundwater (µg/kg)	Achievable Laboratory Method Detection Limit, mg/Kg	Achievable Laboratory Reporting Limit, mg/Kg
exTPH	EXTPH	NA	1.3	7

Brownfields QAPP Template #5d

Analytical Laboratory Sensitivity and Project Criteria

Matrix Aqueous				
Analytical Group VOCs				
Concentration Level Low				
Analytical Method/SOP	Data Quality Indicators¹	Performance Criteria (related to analytical method)	QC Sample such as Duplicate, Matrix Spike, Surrogates etc.) Used To Assess Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
8260 90.0012	Precision	RPD <20	Field Duplicate	S & A
	Accuracy / Representativeness	<=10 degrees C	Cooler Temperature	S
	Accuracy / Contamination	Analytes < = QL	Field Equipment Blank	S
	Accuracy / Contamination	Analytes < = QL, or less than 1/10 sample concentration, common lab contaminants <=2X QL	Method Blank	A
	Accuracy	Laboratory In-house Limits	Laboratory Control Sample	A
	Accuracy / Precision	Laboratory In-house Limits, 40% RPD	Matrix Spike / Matrix Spike Duplicate	A
	Accuracy	Factor of two (-50% to +100%) from most recent calibration	Internal Standards	A
	Accuracy	Laboratory In-house Limits	Surrogate Standards	A

¹Defined as Precision; Accuracy/Bias; Sensitivity/Quantitation Limits, Representativeness; Comparability, Completeness

Matrix Soil				
Analytical Group VOCs				
Concentration Level Low				
Analytical Method/SOP	Data Quality Indicators¹	Performance Criteria (related to analytical method)	QC Sample such as Duplicate, Matrix Spike, Surrogates etc.) Used To Assess Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
8260 90.0012	Precision	RPD <20	Field Duplicate	S & A
	Accuracy / Representativeness	<=10 degrees C	Cooler Temperature	S
	Accuracy / Contamination	Analytes < = QL	Field Equipment Blank	S
	Accuracy / Contamination	Analytes < = QL, or less than 1/10 sample concentration, common lab contaminants <=2X QL	Method Blank	A
	Accuracy	Laboratory In-house Limits	Laboratory Control Sample	A
	Accuracy / Precision	Laboratory In-house Limits, 40% RPD	Matrix Spike / Matrix Spike Duplicate	A
	Accuracy	Factor of two (-50% to +100%) from most recent calibration	Internal Standards	A
	Accuracy	Laboratory In-house Limits	Surrogate Standards	A

¹Defined as Precision; Accuracy/Bias; Sensitivity/Quantitation Limits, Representativeness; Comparability, Completeness

Matrix Aqueous				
Analytical Group SVOCs				
Concentration Level Low				
Analytical Method/SOP	Data Quality Indicators¹	Performance Criteria (related to analytical method)	QC Sample such as Duplicate, Matrix Spike, Surrogates etc.) Used To Assess Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
8270 70.0011	Precision	RPD <20	Field Duplicate	S & A
	Accuracy / Representativeness	<=10 degrees C	Cooler Temperature	S
	Accuracy / Contamination	Analytes < = QL	Field Equipment Blank	S
	Accuracy / Contamination	Analytes < = QL, or less than 1/10 sample concentration, Common lab contaminants <=5X QL	Method Blank	A
	Accuracy	Laboratory In-house Limits	Laboratory Control Sample	A
	Accuracy / Precision	Laboratory In-house Limits, RPD 40%	Matrix Spike / Matrix Spike Duplicate	A
	Accuracy	Factor of two (-50% to +100%) from most recent calibration	Internal Standards	A
	Accuracy	Laboratory In-house Limits	Surrogate Standards	A

¹Defined as Precision; Accuracy/Bias; Sensitivity/Quantitation Limits, Representativeness; Comparability, Completeness

Matrix Soil				
Analytical Group SVOCs				
Concentration Level Low				
Analytical Method/SOP	Data Quality Indicators¹	Performance Criteria (related to analytical method)	QC Sample such as Duplicate, Matrix Spike, Surrogates etc.) Used To Assess Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
8270 70.0011	Precision	RPD <20	Field Duplicate	S & A
	Accuracy / Representativeness	<=10 degrees C	Cooler Temperature	S
	Accuracy / Contamination	Analytes < = QL	Field Equipment Blank	S
	Accuracy / Contamination	Analytes < = QL, or less than 1/10 sample concentration, Common lab contaminants <=5X QL	Method Blank	A
	Accuracy	Laboratory In-house Limits	Laboratory Control Sample	A
	Accuracy / Precision	Laboratory In-house Limits, RPD 40%	Matrix Spike / Matrix Spike Duplicate	A
	Accuracy	Factor of two (-50% to +100%) from most recent calibration	Internal Standards	A
	Accuracy	Laboratory In-house Limits	Surrogate Standards	A

¹Defined as Precision; Accuracy/Bias; Sensitivity/Quantitation Limits, Representativeness; Comparability, Completeness

Matrix Aqueous				
Analytical Group exTPH				
Concentration Level Low				
Analytical Method/SOP 8015 60.0050	Data Quality Indicators	Performance Criteria (related to analytical method)	QC Sample such as Duplicate, Matrix Spike, Surrogates etc.) Used To Assess Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
	Precision	RPD <=40	Field Duplicate	S & A
	Accuracy / Representativeness	<=10 degree C	Cooler Temperature	S
	Accuracy / Contamination	Analytes < = QL	Field Equipment Blank	S
	Accuracy / Contamination	Analytes < = QL, or less than 1/10 sample concentration	Method Blank	A
	Accuracy	60% - 140%	Laboratory Control Sample	A
	Accuracy / Precision	50% - 150%, RPD 40%	Matrix Spike / Matrix Spike Duplicate	A
	Accuracy	Factor of two (-50% to +100%) from most recent calibration	Internal Standards	A
	Accuracy	Laboratory In-house Limits	Surrogate Standards	A

Matrix Soil				
Analytical Group exTPH				
Concentration Level Low				
Analytical Method/SOP 8015 60.0050	Data Quality Indicators	Performance Criteria (related to analytical method)	QC Sample such as Duplicate, Matrix Spike, Surrogates etc.) Used To Assess Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
	Precision	RPD <=40	Field Duplicate	S & A
	Accuracy / Representativeness	<=10 degree C	Cooler Temperature	S
	Accuracy / Contamination	Analytes < = QL	Field Equipment Blank	S

	Accuracy / Contamination	Analytes < = QL, or less than 1/10 sample concentration	Method Blank	A
	Accuracy	60% - 140%	Laboratory Control Sample	A
	Accuracy / Precision	50% - 150%, RPD 40%	Matrix Spike / Matrix Spike Duplicate	A
	Accuracy	Factor of two (-50% to +100%) from most recent calibration	Internal Standards	A
	Accuracy	Laboratory In-house Limits	Surrogate Standards	A

Brownfields QAPP Template #5e

Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)	How Data Will Be Used	Limitations on Data Use
Site Environmental History	Stantec Consulting – Phase I Environmental Site Assessment (ESA), 937 Genesee Street, Rochester, NY, September 2012	Stantec Consulting – Site historical environmental records, Sanborn maps, spill files, aerial photos, etc.; September 2012	Site information relative to features and locations that may be source areas of contamination.	No soil or groundwater sampling results.
Site-Specific Environmental Conditions	Stantec Consulting – Phase II ESA, 937 Genesee Street, City of Rochester, NY, July 8, 2012.	Stantec Consulting – Soil and Groundwater analytical data	Site information relative to features and locations that may be source areas of contamination.	
Site-Specific Environmental Conditions	Stantec Consulting – Supplemental Phase II ESA, 937 Genesee Street, City of Rochester, NY, October 3, 2012.	Stantec Consulting – Additional Soil and Groundwater analytical data	Site information relative to features and locations that may be source areas, and extent of contamination.	

Brownfields QAPP Template #6

**Project Specific Method and Standard Operating
Procedures (SOPs) Reference Table**

ANALYTICAL METHOD REFERENCE <i>(Include document title, method name/number, revision number, date)</i>
1a. SW846 Method 8260C GCMS Volatiles, August 2006
2a. SW846 Method 8270D GCMS Semivolatiles, August 2006
3a. SW846 Method 8015A, GC exTPH, November, 2000
ANALYTICAL LABORATORY SOPs <i>(Include document title, date, revision number, and originator=s name)</i>
1b. 90.0012, Revision 13, 9/7/12
2b. 70.0011, Revision 11, 7/18/12
3b. 60.0050, Revision 15, 5/27/15
FIELD SAMPLING SOPs¹ <i>(Include document title, date, revision number, and originator=s name)</i>
1c. USEPA Region II Low Flow Groundwater Sampling Procedure, March 16, 1998
2c. <i>Corrective Action Plan, Petroleum-Impacted Soil and Groundwater, 937 Genesee Street, Rochester, NY, NYSDEC Spill No. 126397, by Stantec Consulting Services Inc., dated November 2015</i>

¹ Project Sampling SOPs include sample collection, sample preservation, equipment decontamination, preventive maintenance, etc.

Brownfields QAPP Template #7

Field Equipment Calibration, Maintenance, Testing, and Inspection

Field Equipment	Calibration Activity	Maintenance Activity	Testing/ Inspection Activity	Frequency	Acceptance Criteria		Corrective Action	SOP Reference
YSI (or equivalent) flow-through cell	Calibrate with standard solutions	NA	NA	Prior to day's activities; end of day's activities; anytime anomaly suspected	pH Meter	+/- 0.1 units	Clean probe, replace battery, replace membrane, replace probe	EPA Region II Low Flow Ground-water Sampling Procedure, March 16, 1998
					Dissolved Oxygen	± 3%		
					Specific Conductivity	± 1%		
					Temperature	± 0.1 °C		
					Turbidity	± 2 NTU		
MiniRAE 2000 Photoionization Detector	Calibrate with isobutylene	Charge the monitor before use	NA	Prior to day's activities	0-2000 ppm: ± 2 ppm or 10% of reading 2000 ppm: ± 20% of reading		Charge or replace battery, clean sensor module or lamp housing, replace water trap filter	MiniRAE 2000 Operation and Maintenance Manual

Brownfields QAPP Template #8

Analytical Laboratory Instrument and Equipment Maintenance, Testing, and Inspection

Instrument/ Equipment	Maintenance Activity	Testing/Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	Analytical SOP Reference
GCMS- VOC, SVOC	Check for leaks, replace gas line filters, recondition or replace trap, replace column, clean injection port/liner and replace septum as needed, replace Electron Multitplier	Tune (BFB or DFTPP), Continuing Calibration Verification	Tune, CCV after every 12 hours of operation	Ion abundance within acceptance limits for tune, CCV %D ≤20%	As needed, replace connections, gas line filters, trap, or GC column. Clip column, replace injection port liner, clean injection port, clean source. Repeat tune, calibration or CCV and any affected samples. See Attachment in SOP for more details.	Eurofins Spectrum Department Supervisor	90.0012; 70.0011
GC/FID - exTPH	Check for leaks, replace gas line filters, clip end of column, recondition or replace column, clean injection port/liner, replace septum	Continuing Calibration Verification	Daily, after every 20 Samples	%D <20%	As needed, check GC conditions, check for leaks, clip column, clean/replace injection port/liner. Repeat calibration or CCV and affected samples. See Attachment 1 of SOP for more details.	Eurofins Spectrum Department Supervisor	60.0050

Analytical Laboratory Instrument Calibration

Instrument/ Equipment	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Responsible Person	Analytical SOP Reference
GC/MS – VOCs, SVOCs	ICAL - 5-point calibration	Instrument receipt, instrument change (new column, source cleaning, etc.), when CCV is out of criteria.	%RSD <20% with a maximum of 10% of the target analytes and/or surrogate compounds allowed %RSD <50%. Relative Retention Times must meet ± 0.06 RRT units for each compound and surrogate. Minimum RRFs are suggested in Table 4 of the method (and SOP).	Recalibrate and/or perform the necessary equipment maintenance. Check the calibration standards. Reanalyze data.	Eurofins Spectrum Department Supervisor	90.0012, 70.0011
GC/MS – VOCs, SVOCs	ICV (Second Source)	Once after each ICAL.	The %R must be within 70-130% for all target compounds.	Correct problem and verify second source standard. Rerun second source verification. If that fails, correct problem and repeat ICAL unless problem can be verified as due to ICV solution and not ICAL.	Eurofins Spectrum Department Supervisor	90.0012, 70.0011
GC/MS – VOCs, SVOCs	CCV	Analyze a standard at the beginning of each 12-hour shift after tune.	%D <20% with a maximum of 20% of the target analytes and/or surrogate compounds allowed %D < 50% D. Minimum RRFs are suggested in Table 4 of the method.	Correct problem, then rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since last acceptable CCV.	Eurofins Spectrum Department Supervisor	90.0012, 70.0011
GC/MS – VOCs, SVOCs	Instrument Tune (BVB for VOCs, DFTPP for SVOCs)	Prior to ICAL and every 12 hours.	Criteria listed in Section 8.2.2, of current revision of SOPs 90.0012 and 70.0011.	Retune and/or clean source.	Eurofins Spectrum Department Supervisor	90.0012, 70.0011

GC/FID – GRO, exTPH	ICAL - 5-point calibration	Instrument receipt, instrument change (new column, source cleaning, etc.), when CCV is out of criteria.	%RSD <20%, or linear regression with $r \geq 0.995$ or COD ≥ 0.99 Retention time windows per section 8.2.5.1 of GRO and TPH SOP.	Recalibrate and/or perform the necessary equipment maintenance. Check the calibration standards. Reanalyze data.	Eurofins Spectrum Department Supervisor	90.0038, 60.0050
GC/FID – GRO, exTPH	ICV (Second Source, typically a fuel product – gasoline or #2/diesel fuel standard)	Once after each ICAL.	The %R must be within 80-120%.	Correct problem and verify second source standard. Rerun second source verification. If that fails, correct problem and repeat ICAL unless problem can be verified as due to ICV solution and not ICAL.	Eurofins Spectrum Department Supervisor	90.0038, 60.0050
GC/FID – GRO, exTPH	CCV	Analyze a standard at the beginning of each 12-hour shift and after 20 field samples	%D <20% on at least one GC column. If %D causes a high bias, and samples are ND at QL, then reanalysis is not necessary	Correct problem, then rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since last acceptable CCV.	Eurofins Spectrum Department Supervisor	90.0038, 60.0050

Brownfields QAPP Template #9a

Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT	
Sample Collection (Personnel/Organization):	Stantec Field Geologist or Environmental Technician (TBD)
Sample Packaging (Personnel/Organization):	Stantec Field Geologist or Environmental Technician (TBD)
Coordination of Shipment (Personnel/Organization):	Stantec Field Geologist or Environmental Technician (TBD) and Robert Mahoney, Project Geologist
Type of Shipment/Carrier:	Fed Ex ground or Private Courier
SAMPLE RECEIPT AND ANALYSIS	
Sample Receipt (Personnel/Organization):	Sample receiving staff/Spectrum Analytical, RI Division
Sample Custody and Storage (Personnel/Organization):	Sample receiving staff/Eurofins Spectrum Analytical, RI Division
Sample Preparation (Personnel/Organization):	Sample Preparation Technicians (Organics, Inorganics)/Eurofins Spectrum Analytical, RI Division
Sample Determinative Analysis (Personnel/Organization):	Instrument Lab Staff (Organics, Inorganics)/Eurofins Spectrum Analytical, RI Division
SAMPLE ARCHIVING	
Field Sample Storage (No. of days from sample collection):	Samples to be shipped at the end of each sampling day, and arrive at laboratory within 48 hours (2 days) of sample shipment.
Sample Extract/Digestate Storage (No. of days from extraction/digestion):	Six months from delivery of final laboratory report.
SAMPLE DISPOSAL	
Personnel/Organization:	Sample receiving staff/Eurofins Spectrum Analytical, RI Division
Number of Days from Analysis:	30 days from delivery of final laboratory report.

Brownfields QAPP Template #9b

Sample Custody Requirements

Sample Identification Procedures:

Sample identification documents include field records, sample labels, custody seals, and chain-of-custody records. The sample labels are placed on the bottles so as not to obscure any QA/QC lot numbers on the bottles. Sample information is printed in a legible manner using waterproof ink. To minimize handling of sample containers, labels will be filled out prior to sample collection to the extent possible. The sample label will be firmly affixed to the sample containers and will include information of the name or initials of sampler, date (and time if possible) of collection, sample number, intended analysis, and preservation performed.

Each sample will have a unique ID number that will refer to the sample location, media type, and depth interval (if applicable).

Field Sample Custody/Tracking Procedures (sample collection, packaging, shipment, and delivery to laboratory):

Field quality control samples will be collected to verify reproducibility of the sampling and analytical methods. Field duplicates will be obtained at a rate of one per 20 original field samples. Trip blanks will be used to assess whether groundwater has been exposed to volatile constituents during sample storage and transport. The trip blanks will remain unopened throughout the sampling event and will only be analyzed for volatile organics. Sample bottles will be obtained pre-cleaned by the laboratory and shipped to the sampling personnel in charge of the field activities. Coolers or boxes containing cleaned bottles should be sealed with a custody tape seal during transport to the field or while in storage prior to use. Transportation and handling of samples must be accomplished in a manner that not only protects the integrity of the sample, but also prevents any detrimental effects due to the possible hazardous nature of samples.

Laboratory Sample Custody/Tracking Procedures (receipt of samples, archiving, and disposal):

Laboratory sample custody procedures (receipt of samples, archiving, and disposal) will be used according Eurofins Spectrum Analytical standard procedures. Coolers are received and checked for proper temperature. A sample cooler receipt form will be filled out to note conditions and any discrepancies. The chain-of-custody form will be checked against the sample containers for accuracy. Samples will be logged into the laboratory information management system and given a unique log number which can be tracked through processing. The laboratory project manager will notify the client verbally or via email immediately if any problems are identified. Discrepancies and resolutions will be documented on the sample receiving checklist. Samples will remain under custody until the completion of analysis, and following analysis until sample remnants are ultimately disposed. The Eurofins Spectrum Analytical laboratory facility is a secured, limited access facility.

Chain-of-Custody Procedures:

After collection, each sample will be maintained in the sampler's custody until formally transferred to another party (e.g., Fed Ex or Private Courier). For all samples collected, chain-of-custody forms will document the date and time of sample collection, the sampler's name, and the names of all others who subsequently held custody of the sample. Specifications for chemical analyses will also be documented on the chain-of-custody form. After collection, each sample will be maintained in the sampler's custody until formally transferred to another party (e.g., FedEx).

Brownfields QAPP Template #10
Field and Analytical Laboratory Quality Control Summary

Matrix		Groundwater				
Analytical Group		VOCs				
Concentration Level		Low/Medium - mg/kg (ppm)				
Sampling SOP(s)		EPA Region 2 Low Flow Groundwater Sampling Procedure				
Analytical Method/SOP Reference		EPA Method 8260 / 90.0012				
Sampler's Name		Stantec Field Geologist or Environmental Technician				
Field Sampling Organization		Stantec Consulting Services Inc.				
Analytical Organization		Eurofins Spectrum Analytical, Inc.				
No. of Sample Locations		3				
Quality Control (QC) Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate		RPD <20			Precision	RPD <20
Cooler Temperature	1 per shipping cooler	<=10 deg. C	Note in report		Accuracy / Representativeness	<=10 deg. C
Field Equipment Blank		Analytes <= QL			Accuracy / Contamination	Analytes <= QL
Method Blank	One per batch of <=20 samples	Analytes <= QL, or less than 1/10 sample concentration, common lab contaminants <=2X QL	If sufficient holding time remains, reanalyze batch. If insufficient holding time, flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy / Contamination	Analytes <= QL, or less than 1/10 sample concentration, common lab contaminants <=2X QL
Laboratory Control Sample	One per batch of <=20 samples	Laboratory In-house Limits	If sufficient holding time remains, reanalyze batch. If insufficient holding time, flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy	Laboratory In-house Limits

Matrix Spike / Matrix Spike Duplicate	One set per 20 samples, as determined by sampler	Laboratory In-house Limits, 40% RPD	flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy / Precision	Laboratory In-house Limits, 40% RPD
Internal Standards	Every sample, standard, QC sample	Factor of two (-50% to +100%) from most recent calibration	Reanalyze sample. If determined to be matrix interference, note in narrative.	Eurofins Spectrum Department Supervisor	Accuracy	Factor of two (-50% to +100%) from most recent calibration
Surrogate Standards	Every sample, standard, QC sample	Laboratory in-house limits. No exceedances for MB or LCS, one exceedance allowed for field samples	Flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy	Laboratory in-house limits. No exceedances for MB or LCS, one exceedance allowed for field samples

Matrix		Soil				
Analytical Group		VOCs				
Concentration Level		Low/Medium - mg/kg (ppm)				
Sampling SOP(s)		<i>Corrective Action Plan, Petroleum-Impacted Soil and Groundwater, 937 Genesee Street, Rochester, NY, NYSDEC Spill No. 126397, by Stantec Consulting Services Inc., dated November 2015</i>				
Analytical Method/SOP Reference		EPA Method 8260 / 90.0012				
Sampler's Name		Stantec Field Geologist or Environmental Technician				
Field Sampling Organization		Stantec Consulting Services Inc.				
Analytical Organization		Eurofins Spectrum Analytical, Inc. RI Division				
No. of Sample Locations		16				
Quality Control (QC) Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate		RPD <20			Precision	RPD <20
Cooler Temperature	1 per shipping cooler	<=10 deg. C	Note in report		Accuracy / Representativeness	<=10 deg. C
Field Equipment Blank		Analytes < = QL			Accuracy / Contamination	Analytes < = QL

Method Blank	One per batch of <=20 samples	Analytes < = QL, or less than 1/10 sample concentration, common lab contaminants <=2X QL	If sufficient holding time remains, reanalyze batch. If insufficient holding time, flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy / Contamination	Analytes < = QL, or less than 1/10 sample concentration, common lab contaminants <=2X QL
Laboratory Control Sample	One per batch of <=20 samples	Laboratory In-house Limits	If sufficient holding time remains, reanalyze batch. If insufficient holding time, flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy	Laboratory In-house Limits
Matrix Spike / Matrix Spike Duplicate	One set per 20 samples, as determined by sampler	Laboratory In-house Limits, 40% RPD	flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy / Precision	Laboratory In-house Limits, 40% RPD
Internal Standards	Every sample, standard, QC sample	Factor of two (-50% to +100%) from most recent calibration	Reanalyze sample. If determined to be matrix interference, note in narrative.	Eurofins Spectrum Department Supervisor	Accuracy	Factor of two (-50% to +100%) from most recent calibration
Surrogate Standards	Every sample, standard, QC sample	Laboratory in-house limits. No exceedances for MB or LCS, one exceedance allowed for field samples	Flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy	Laboratory in-house limits. No exceedances for MB or LCS, one exceedance allowed for field samples

Matrix		Groundwater				
Analytical Group		Semivolatile Organic Compounds				
Concentration Level		Low/Medium - mg/kg (ppm)				
Sampling SOP(s)		EPA Region 2 Low Flow Groundwater Sampling Procedure				
Analytical Method/SOP Reference		EPA Method 8270 / 70.0011				
Sampler's Name		Stantec Field Geologist or Environmental Technician				
Field Sampling Organization		Stantec Consulting Services Inc.				
Analytical Organization		Eurofins Spectrum Analytical, Inc.				
No. of Sample Locations		3				
Quality Control (QC) Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate		RPD <20			Precision	RPD <20
Cooler Temperature	1 per shipping cooler	<=10 deg. C	Note in report		Accuracy / Representativeness	<=10 deg. C
Field Equipment Blank		Analytes < = QL			Accuracy / Contamination	Analytes < = QL
Method Blank	One per preparation batch of <=20 samples	Analytes < = QL, or less than 1/10 sample concentration, common lab contaminants <=5X QL	If sufficient holding time remains, reprepare batch. If insufficient holding time, flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy / Contamination	Analytes < = QL, or less than 1/10 sample concentration, common lab contaminants <=5X QL
Laboratory Control Sample	One per preparation batch of <=20 samples	Laboratory In-house Limits	If sufficient holding time remains, reprepare batch. If insufficient holding time, flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy	Laboratory In-house Limits
Matrix Spike / Matrix Spike Duplicate	One set per 20 samples, as determined by sampler	Laboratory In-house Limits, 40% RPD	flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy / Precision	Laboratory In-house Limits, 40% RPD

Internal Standards	Every sample, standard, QC sample	Factor of two (-50% to +100%) from most recent calibration, unless obvious matrix interference	Reanalyze sample. If determined to be matrix interference, note in narrative.	Eurofins Spectrum Department Supervisor	Accuracy	Factor of two (-50% to +100%) from most recent calibration, unless obvious matrix interference
Surrogate Standards	Every sample, standard, QC sample	Laboratory in-house limits. No exceedances for MB or LCS, one acid and one base/neutral exceedance allowed for field samples, unless obvious matrix interference	Flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy	Laboratory in-house limits. No exceedances for MB or LCS, one acid and one base/neutral exceedance allowed for field samples, unless obvious matrix interference

Matrix		Soil				
Analytical Group		Semivolatile Organic Compounds				
Concentration Level		Low/Medium - mg/kg (ppm)				
Sampling SOP(s)		<i>Corrective Action Plan, Petroleum-Impacted Soil and Groundwater, 937 Genesee Street, Rochester, NY, NYSDEC Spill No. 126397, by Stantec Consulting Services Inc., dated November 2015</i>				
Analytical Method/SOP Reference		EPA Method 8270				
Sampler's Name		Stantec Field Geologist or Environmental Technician				
Field Sampling Organization		Stantec Consulting Services Inc.				
Analytical Organization		Eurofins Spectrum Analytical, Inc.				
No. of Sample Locations		16				
Quality Control (QC) Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate		RPD <20			Precision	RPD <20
Cooler Temperature	1 per shipping cooler	<=10 deg. C	Note in report		Accuracy / Representativeness	<=10 deg. C
Field Equipment Blank		Analytes <= QL			Accuracy / Contamination	Analytes <= QL

Method Blank	One per preparation batch of <=20 samples	Analytes < = QL, or less than 1/10 sample concentration, common lab contaminants <=5X QL	If sufficient holding time remains, reprepare batch. If insufficient holding time, flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy / Contamination	Analytes < = QL, or less than 1/10 sample concentration, common lab contaminants <=5X QL
Laboratory Control Sample	One per preparation batch of <=20 samples	Laboratory In-house Limits	If sufficient holding time remains, reprepare batch. If insufficient holding time, flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy	Laboratory In-house Limits
Matrix Spike / Matrix Spike Duplicate	One set per 20 samples, as determined by sampler	Laboratory In-house Limits, 40% RPD	flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy / Precision	Laboratory In-house Limits, 40% RPD
Internal Standards	Every sample, standard, QC sample	Factor of two (-50% to +100%) from most recent calibration, unless obvious matrix interference	Reanalyze sample. If determined to be matrix interference, note in narrative.	Eurofins Spectrum Department Supervisor	Accuracy	Factor of two (-50% to +100%) from most recent calibration, unless obvious matrix interference
Surrogate Standards	Every sample, standard, QC sample	Laboratory in-house limits. No exceedances for MB or LCS, one acid and one base/neutral exceedance allowed for field samples, unless obvious matrix interference	Flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy	Laboratory in-house limits. No exceedances for MB or LCS, one acid and one base/neutral exceedance allowed for field samples, unless obvious matrix interference

Matrix		Groundwater				
Analytical Group		exTPH				
Concentration Level		Low				
Sampling SOP(s)		<i>Corrective Action Plan, Petroleum-Impacted Soil and Groundwater, 937 Genesee Street, Rochester, NY, NYSDEC Spill No. 126397, by Stantec Consulting Services Inc., dated November 2015</i>				
Analytical Method/SOP Reference		60.0050				
Sampler's Name						
Field Sampling Organization		Stantec Consulting Services Inc.				
Analytical Organization		Eurofins Spectrum Analytical, RI Division				
No. of Sample Locations						
Quality Control (QC) Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate		RPD <20			Precision	RPD <20
Cooler Temperature	1 per shipping cooler	<=10 degree C	Note in report		Accuracy / Representativeness	<=10 degree C
Field Equipment Blank		Analytes < = QL			Accuracy / Contamination	Analytes < = QL
Method Blank	One per preparation batch of <=20 samples	Analytes < = QL, or less than 1/10 sample concentration	If sufficient holding time remains, reprepare batch. If insufficient holding time, flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy / Contamination	Analytes < = QL, or less than 1/10 sample concentration

Laboratory Control Sample	One per preparation batch of <=20 samples	60% - 140%	If sufficient holding time remains, reprepare batch. If insufficient holding time, flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy	Laboratory In-house Limits
Matrix Spike / Matrix Spike Duplicate	One set per 20 samples, as determined by sampler	50% - 150%, 40% RPD	flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy / Precision	Laboratory In-house Limits, 30% RPD
Surrogate Standards	Every sample, standard, QC sample	Laboratory in-house limits.	Flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy	Laboratory in-house limits. One surrogate must be within limits on at least one GC column for all field samples, otherwise reanalyze

Matrix	Soil
Analytical Group	exTPH
Concentration Level	Low
Sampling SOP(s)	<i>Corrective Action Plan, Petroleum-Impacted Soil and Groundwater, 937 Genesee Street, Rochester, NY, NYSDEC Spill No. 126397, by Stantec Consulting Services Inc., dated November 2015</i>
Analytical Method/SOP Reference	60.0050
Sampler's Name	
Field Sampling Organization	Stantec Consulting Services Inc.
Analytical Organization	Eurofins Spectrum Analytical, RI Division
No. of Sample Locations	

Quality Control (QC) Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate		RPD <20			Precision	RPD <20
Cooler Temperature	1 per shipping cooler	<=10 degree C	Note in report		Accuracy / Representativeness	<=10 degree C

Field Equipment Blank		Analytes < = QL			Accuracy / Contamination	Analytes < = QL
Method Blank	One per preparation batch of <=20 samples	Analytes < = QL, or less than 1/10 sample concentration	If sufficient holding time remains, reprepare batch. If insufficient holding time, flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy / Contamination	Analytes < = QL, or less than 1/10 sample concentration
Laboratory Control Sample	One per preparation batch of <=20 samples	60% - 140%	If sufficient holding time remains, reprepare batch. If insufficient holding time, flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy	Laboratory In-house Limits
Matrix Spike / Matrix Spike Duplicate	One set per 20 samples, as determined by sampler	50% - 150%, 40% RPD	flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy / Precision	Laboratory In-house Limits, 30% RPD
Surrogate Standards	Every sample, standard, QC sample	Laboratory in-house limits.	Flag result, note in narrative	Eurofins Spectrum Department Supervisor	Accuracy	Laboratory in-house limits. One surrogate must be within limits on at least one GC column for all field samples, otherwise reanalyze

Brownfields QAPP Template #11a

Data Management and Documentation

Field Sample Collection Documents and Records	Analytical Laboratory Documents and Records	Data Assessment Documents and Records	Project File
<ul style="list-style-type: none"> •Site and field logbooks •Boring logs •Well construction diagrams •Chain-of-Custody (COC) forms •Well Sampling Forms •Field Data Sheets •Photographs 	<ul style="list-style-type: none"> •Sample receipt logs •Internal and external COC forms •Equipment calibration logs •Sample preparation worksheets/logs •Sample analysis worksheets/run logs •Telephone/email logs •Corrective action documentation 	<ul style="list-style-type: none"> •Data Usability Summary Reports •Review forms for electronic entry of data into database •Documentation of internal technical review of report(s) •Corrective action documentation 	<ul style="list-style-type: none"> •The laboratory will maintain its project files for a minimum of 10 years •Stantec Consulting will maintain its project files for a minimum of 10 years •The City of Rochester will maintain its project files for a minimum of 10 years

Brownfields QAPP Template #11b

Project Reports

Type of Report	Frequency	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation	Report Recipient(s)
Status reports	Weekly	January - March 2015	Robert Mahoney – Sr. Environ. Geologist, Stantec Consulting	Joe Biondolillo – Sr. Environ. Specialist, City of Rochester DEQ
Data Usability Summary Report (DUSR)	One Time	April 5, 2015	Judy Harry- Data Validation Services	Joe Biondolillo – Sr. Environ. Specialist, City of Rochester DEQ; Lya Theodoratos - EPA Region 2 Brownfields Project Officer
Remedial Construction/ Closure Report	One Time	April 31, 2015	Robert Mahoney – Sr. Environ. Geologist, Stantec Consulting	Joe Biondolillo – Sr. Environ. Specialist, City of Rochester DEQ; Michael Zamiarski, .P.E. - Engineer, NYSDEC Lya Theodoratos - EPA Region 2 Brownfields Project Officer

Brownfields QAPP Template #12a

Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of Corrective Actions (Title and Organizational Affiliation)
<i>Due to the short time frame for project completion, these types of assessments are not applicable.</i>							

Brownfields QAPP Template #12b

Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
<i>Due to the short time frame for project completion, these types of assessments are not applicable.</i>						

Brownfields QAPP Template #13a

Project Data Verification Process (Step I)¹

Verification Input	Description	Internal/ External²	Responsible for Verification
Site/Field Logbooks	Field notes will be prepared daily by the Environmental Consultant Field Personnel and will be complete, appropriate, legible and pertinent. Upon completion of field work, logbooks will be placed in the project files.	I	Robert Mahoney - Stantec Consulting
Chains of custody	COC forms will be reviewed against the samples packed in the specific cooler prior to shipment. The reviewer will initial the form. An original COC will be sent with the samples to the laboratory, while copies are retained for (1) the Sampling Trip Report and (2) the project files.	I	Robert Mahoney- Stantec Consulting
Laboratory analytical data package	Data packages will be reviewed/verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal.	I	Spectrum Analytical Inc.
Laboratory analytical data package	Data packages will be reviewed as to content and sample information upon receipt by the Environmental Consultant Project Manager and the Third Party Data Validation Personnel.	I/E	Robert Mahoney - Stantec Consulting; Judy Harry - Data Validation Services ²
Remedial Construction/ Completion Report	The project data results will be compiled in a summary report for the project. Entries will be reviewed/verified against hardcopy information.	I	Robert Mahoney - Stantec Consulting

¹Step I – Completeness Check²Internal or External is in relation to the data generator.

Brownfields QAPP Template #13b

Project Data Validation Process (Steps IIa and IIb) ¹

Step IIa/IIb¹	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	SOPs	Ensure that the sampling methods/procedures outlined in QAPP were followed, and that any deviations were noted/approved.	Robert Mahoney - Stantec Consulting
IIb	SOPs	Determine potential impacts from noted/approved deviations, in regard to PQOs.	Robert Mahoney - Stantec Consulting
IIa	Chains of custody	Examine COC forms against QAPP and laboratory contract requirements (e.g., analytical methods, sample identification, etc.).	Judy Harry - Data Validation Services
IIa	Laboratory data package	Examine packages against QAPP and laboratory contract requirements, and against COC forms (e.g., holding times, sample handling, analytical methods, sample identification, data qualifiers, QC samples, etc.).	Judy Harry - Data Validation Services
IIb	Laboratory data package	Determine potential impacts from noted/approved deviations, in regard to PQOs. Examples include PQLs and QC sample limits (precision/accuracy).	Robert Mahoney - Stantec Consulting; Judy Harry - Data Validation Services
IIb	Field duplicates	Compare results of field duplicate (or replicate) analyses with RPD criteria	Robert Mahoney - Stantec Consulting; Judy Harry - Data Validation Services

¹Step IIa – Compliance with Methods, Procedures, and Contracts¹Step IIb – Comparison with Performance Criteria in QAPP

Brownfields QAPP Template #13c

Project Matrix and Analytical Validation (Steps IIa and IIb) ¹ Summary

Step IIa/IIb¹	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa / IIb	Soil/Sediment/ Aqueous	VOCs, SVOCs, TPH	Low and Medium	USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review (October 1999)	Judy Harry, Data Validation Services

¹Step IIa – Compliance with Methods, Procedures, and Contracts¹Step IIb – Comparison with Performance Criteria in QAPP

Brownfields QAPP Template #13d

Usability Assessment (Step III)¹

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:

Determine if any detectable amounts of contaminant(s) are present. If no detectable amounts are indicated and all data are acceptable for the verification and validation, then the data is usable.

If verification and validation are not acceptable then take corrective action (determine cause, data impact, evaluate the impact and document the rationale for resampling).

Describe the evaluative procedures used to assess overall measurement error associated with the project:

Determine if the quality control data is within the performance criteria (precision, accuracy, etc) through validation process IIb (Validation Activities).

Identify the personnel responsible for performing the usability assessment:

Project Management Team – Consisting of the Environmental Consultant Project Manager (Mike Storonsky); Data Validator (Judy Harry - DVS); Brownfields Recipient Project Manager (Joe Biondolillo – City of Rochester).

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

The Data Usability Summary Report (DUSR) will describe the rationale for the data and the presentation of any data limitations. For example, if the performance criteria are not usable to address the regulatory requirements or support the project-decision for the Brownfields Recipient, then the Phase II ESA Report will address how this problem will be resolved and discuss any alternative approaches.

¹Step III – Usability Assessment

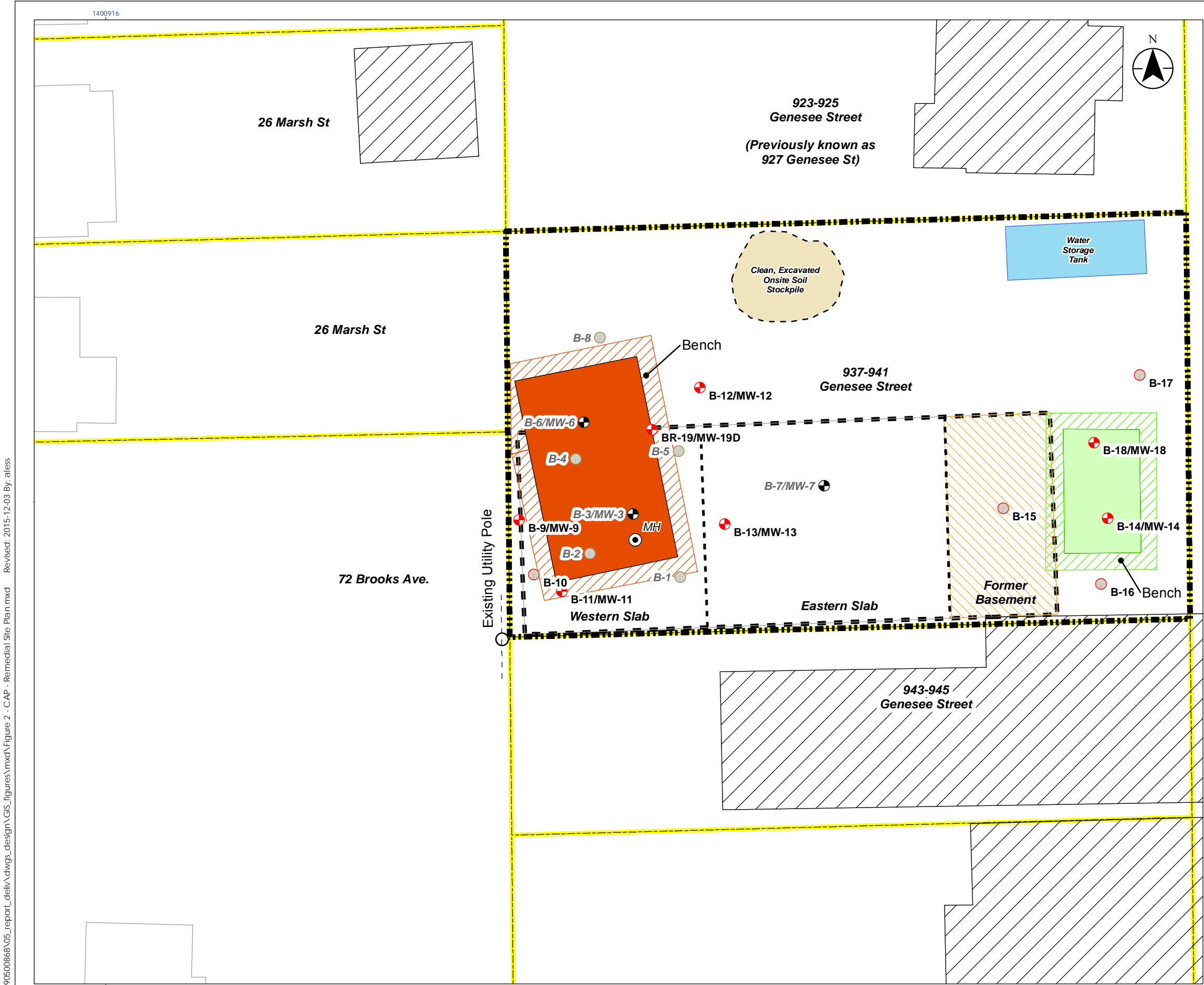
Table 13d-1**Data Elements for Data Review Process**

Item	Step I - Data Verification	Step IIa - Data Validation Compliance	Step IIb - Data Validation Comparison	Step III -Data Usability
Planning Documents				
Evidence of approval of QAPP	X			Use outputs from previous steps
Identification of personnel	X			
Laboratory name	X			
Methods (sampling & analytical)	X	X	X	
Performance requirements (including QC criteria)	X	X		
Project quality objectives	X		X	
Reporting forms	X	X		
Sampling plans – locations, maps grids, sample ID numbers	X	X		
Site identification	X			
SOPs (sampling & analytical)	X	X		
Staff training & certification	X			
List of project-specific analytes	X	X		
Analytical Data Package				
Case narrative	X	X	X	Use outputs from previous steps
Internal lab chain of custody	X	X		
Sample condition upon receipt, & storage records	X	X		
Sample chronology (time of receipt, extraction/digestion, analysis)	X	X		
Identification of QC samples (sampling /lab)	X	X		
Associated PE sample results	X	X	X	
Communication Logs	X	X		
Copies of lab notebook, records, prep sheets	X	X		
Corrective action reports	X	X		
Definition of laboratory qualifiers	X	X	X	
Documentation of corrective action results	X	X	X	
Documentation of individual QC results (e.g., spike, duplicate, LCS)	X	X	X	
Documentation of laboratory method deviations	X	X	X	
Electronic data deliverables	X	X		

Instrument calibration reports	X	X	X	
Laboratory name	X	X		
Laboratory sample identification no.	X	X		
QC sample raw data	X	X	X	
QC summary report	X	X	X	

Data Elements for Data Review Process				
Raw data	X	X	X	Use outputs from previous steps
Reporting forms, completed with actual results	X	X	X	
Signatures for laboratory sign-off (e.g., laboratory QA manager)	X	X		
Standards traceability records (to trace standard source form NIST, for example)	X	X	X	
Sampling Documents				
Chain of custody	X	X		Use outputs from previous steps
Communication logs	X	X		
Corrective action reports	X	X	X	
Documentation of corrective action results	X	X	X	
Documentation of deviation from methods	X	X	X	
Documentation of internal QA review	X	X	X	
Electronic data deliverables	X	X		
Identification of QC samples	X	X	X	
Meteorological data from field (e.g., wind, temperature)	X	X	X	
Sampling instrument decontamination records	X	X		
Sampling instrument calibration logs	X	X		
Sampling location and plan	X	X	X	
Sampling notes & drilling logs	X	X	X	
Sampling report (from field team leader to project manager describing sampling activities)	X	X	X	
External Reports				
External audit report	X	X	X	Use outputs from previous steps
External PT sample results	X	X		
Laboratory assessment	X	X		
Laboratory QA plan	X	X		
MDL study information	X	X	X	
NELAP accreditation	X	X		

FIGURE 1

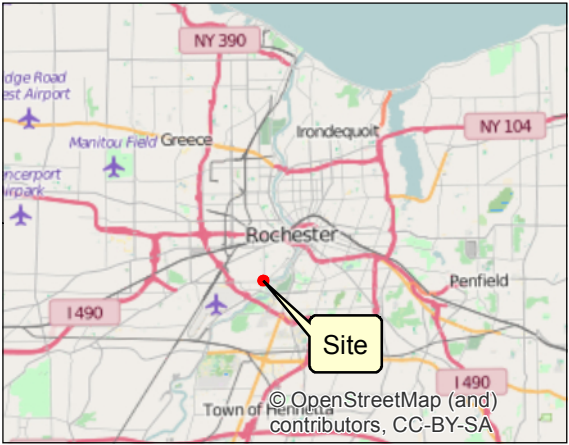
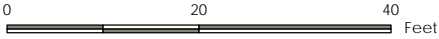


Legend

- Former Building Footprint
- Site Boundary
- Former Basement
- Parcel Boundary
- Existing Buildings

Notes

- Coordinate System:
NAD 1983 StatePlane New York West FIPS 3103 Feet
- RAOC = Remedial Area of Concern.
- Locations of remedial features approximate only and subject to change.



Project Location: 937-941 Genesee Street, Rochester, NY
Prepared by: APL on 2015-10-26
Technical Review by: BM on 2015-10-26
Independent Review by: MPS on 2015-10-26
190500868

Client/Project: City of Rochester
Corrective Action Plan
937-941 Genesee Street

Figure No.: 1
Title: Remedial Site Plan