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## **Remedial Action Work Plan**

RG&E West Station Plant Area Former Manufactured Gas Plant (MGP) Site Rochester, New York Site No. V00593-8 Index No. B-0535-98-07

Submitted to: Rochester Gas & Electric Rochester, New York

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#### **Abbreviations and Acronyms**

AA	Alternative Analysis
ASTs	Above Ground Storage Tanks
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAMP	Community Air Monitoring Plan
CCD-R	Center City District - Riverfront
COPCs	Constituents of Potential Concern
CTF	Central Water Treatment Facility
DD	Decision Document
DER	Division of Environmental Remediation
DNAPL	Dense Non-Aqueous Phase Liquid
DOOVC Plan	Dust, Odor, and Organic Vapor Control and Monitoring Plan
DUSR	Data Usability Summary Report
EDD	Electronic Data Deliverable
feet bgs	feet below ground surface
feet msl	feet above mean sea level
FER	Final Engineering Report
FWIA	Fish and Wildlife Impact Analysis
GEI	GEI Consultants, Inc., P.C.
GRAs	General Response Actions
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
ICs	Institutional Controls
LTTD	Landfill Thermal Treatment/Disposal
MGP	Manufactured Gas Plant
MNA	Monitored Natural Attenuation
NAPL	Non-Aqueous Phase Liquid
NTUs	Nephelometric Turbidity Units
NYCRR	Codes, Rules and Regulations of the State of New York
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OSHA	Occupational Safety and Health Administration
PAHs	Polycyclic Aromatic Hydrocarbons

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#### **Abbreviations and Acronyms**

PCBs	Polychlorinated Biphenyls
PDI	Pre-Design Investigation
PFU	Pneumatic Foam Unit
PID	Photoionization Detector
POTW	Publicly Owned Treatment Works
ppm	parts per million
QA/QC	Quality Assurance/Quality Control
RAOs	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RG&E	Rochester Gas and Electric
RI	Remedial Investigation
SCGs	Standards, Criteria, and Guidance
SCOs or RSCO	Soil Cleanup Objectives or Recommended Soil Cleanup Objectives
SMP	Site Management Plan
SVOCs	Semi-Volatile Organic Compounds
TAGM	Technical Administrative Guidance Memorandum
TAL	Target Analyte List
TCL	Target Compound List
TLM	Tar-Like Material
TOGS	Technical and Operational Guidance Series
µg/L	micrograms per liter
USEPA	United States Environmental Protection Agency
USFWS	United State Fish and Wildlife Service
VCA	Voluntary Cleanup Agreement
VOCs	Volatile Organic Compounds
WWTS	Waste Water Treatment System

## Certification

I Kelly R. McIntosh certify that I am currently a NYS registered professional engineer and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).



Kelly R. McIntosh, Ph.D., P.E. New York License Number 068079 GEI Consultants, Inc., P.C.

## **Executive Summary**

GEI Consultants, Inc., P.C. (GEI) was retained by Rochester Gas and Electric (RG&E) to prepare a Remedial Action Work Plan for the West Station Plant Area Former Manufactured Gas Plant (MGP) Site (Site No. V00593-8), located in Rochester, New York.

#### **Remedial Investigation (RI) Conclusions**

MGP residual materials were identified in soil at the site. Comparatively low concentrations of BTEX and PAHs were detected in on-site groundwater. The low concentrations indicate natural biological processes effectively attenuate dissolved phase constituents in groundwater. Municipal water is available at the site and no future uses of on-site groundwater are foreseen. While no complete human health exposure pathways exist under current conditions, some possible exposure scenarios were identified including a scenario where subsurface construction activities occur without a proper Site Management Plan (SMP). An environmental easement limiting site use is planned to be used to eliminate use exposure scenarios. Significant ecological resources do not reside on the Site and no threatened or endangered species of fish or benthic invertebrates were identified in the near-shore environment. Although the potential adverse impacts to the aquatic community as a whole were determined to be very low, the Fish and Wildlife Impact Analysis concluded that elevated concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) in soil adjacent to the Genesee River and in the near-shore river sediments may pose a potential threat to benthic populations adjacent to portions of the site. New York State Department of Environmental Conservation (NYSDEC) approved the RI Report by letter dated January 15, 2013.

#### **Alternatives Analysis Summary**

Remedial Action Objectives (RAOs) were developed for public health protection and environmental protection for groundwater, soil, river sediment, and soil vapors. To achieve RAOs, general response actions were developed with technology options and assembled into nine remedial alternatives. The remedial alternatives were analyzed using evaluation criteria defined by DER-10 which included: 1.Overall protection of human health and the environment; 2. Conformance with Standards, Criteria, and Guidance (SCGs); 3. Long-term effectiveness and permanence; 4. Reduction of toxicity, mobility, or volume of contamination through treatment; 5.Short-term impacts and effectiveness; 6. Implementability; 7. Cost effectiveness and 8. Land Use. Public acceptance is the ninth criteria and will be considered after public comment. Through comparative evaluation, Alternative 3 - Land Side Barrier Wall and Dense Non-Aqueous Phase Liquid (DNAPL) Recovery Wells, with River Side Soil and Sediment Removal was the recommended remedial alternative. The estimated cost to implement Alternative 3 is \$31 million. Alternative 3 is the recommended alternative and is comprised of the following components:

- Institutional controls (ICs) that include: Site access restrictions (maintain site fencing);
   SMP identifying soil management protocols; and groundwater and land use prohibitions (incorporated into an environmental easement as appropriate)
- Removal and off-site disposal of known and accessible underground process piping associated with the former MGP.
- River Side Excavation: Excavation of soil containing MGP residual material (DNAPL, Tar-Like Material {TLM} and/or purifier waste) that is identifiable visually as a distinct phase from the River Side of the Site (encompassing the soil between the river and the retaining wall and the river bank south of the retaining wall). River Side soil excavation will terminate in a northern lateral direction and at the depth where MGP residual material is not observed.
- Construction of near-shore water diversion structures (temporary sheet pile or other means) and excavation of visually impacted Genesee River Sediment (limits as determined by RI).
- Off-Site disposal of excavated visually impacted sediment at a permitted facility.
- Reconstruction with restoration as applicable of the river bank.
- Predesign Investigation for: extent of visual impacted soil on the River Side soil excavation area, assessment of existing retaining wall integrity and repair, assessment of soil properties along alignment of new Barrier Wall and data required to support design of nearshore water diversion structures.
- Extension of the existing site retaining wall approximately 360 feet to the south (southern terminus keyed into the intake/discharge barrier wall).
- Installation of passive DNAPL recovery wells along the upgradient (Land Side) of the retaining wall (existing and extended) to be evacuated regularly if DNAPL accumulates.
- A soil cap to include site re-grading to accommodate a 24-inch thickness of clean imported cover soils to allow for restricted residential use of the site with placement of a demarcation layer between the site soils and the cover soils. Pavement may be used in lieu of cover soils where appropriate (e.g., roadways, driveways and parking areas).
- Implementation of a monitored natural attenuation (MNA) or enhanced MNA program to monitor the quality of groundwater migrating from the Site and/or enhance natural attenuation.
- The estimated cost for implementation of recommended alternative is \$31.0 million.

The NYSDEC approved the AA Report in correspondence dated January 28, 2016.

#### **Remedy Design Process**

Following NYSDEC's approval of the RAWP summarizing RI findings, remedy selection, and remedial design process, RG&E will begin preparation of a Pre-Design Investigation (PDI) Work Plan. Implementation of the plan will collect information required for detailed design of the selected remedy. Detailed design will involve preparation of design documents including plans and specifications which will be used to support preparation of contractor bid documents for remedial action implementation. The following plans will be prepared:

- Remedial Facilities Plan
- Pre-Design Investigation Work Plan
- Site Health and Safety Plan with Community Air Monitoring Plan
- Dust, Odor, and Vapor Control Plan
- Erosion and Sediment Control Plan and River Turbidity Monitoring/Sheen Observance Plan
- Materials Management Plan
- Decontamination Plan
- Soil Hauling and Traffic Control Plan
- Citizen Participation Plan Updates
- Site Management Plan and Environmental Easement (Post Construction)

After completing the detailed remedial design, a remedial contractor will be selected for remedial construction. Engineering oversight by a NYS Licensed Professional Environmental Engineer will be conducted throughout remedial construction to assure compliance with the remedial design. A Final Engineering report (FER) with an SMP will be prepared to document implementation of the completed remedial program and will be certified by a New York State Professional Engineer. The timeframe to proceed from design (inclusive of regulatory approvals) through remedial construction completion is anticipated to require 5 to 6 years.

## 1. Introduction

This Remedial Action Work Plan (RAWP) has been prepared by GEI Consultants, Inc.,P.C. (GEI) on behalf of Rochester Gas and Electric Corporation (RG&E) for the West Station Plant Area Former Manufactured Gas Plant (MGP) Site (Site No. V00593-8), located in Rochester, New York (Figure 1). This RAWP identifies and describes the preferred remedial action to address impacts to soil, sediment and groundwater from historic Industrial site operations related to Manufactured Gas Plant Operations which occurred from the late 1890s through the late 1940s. These impacts are generally associated with the former MGP and the associated presence of coal tar constituents.

This RAWP has been prepared consistent with the requirements of Voluntary Cleanup Agreement (VCA) Index Number B-0535-98-07 between RG&E and the New York State Department of Environmental Conservation (NYSDEC), effective April 10, 2003 and Amended December 23, 2014. The Remedial Action is based on the findings of the Remedial Investigation of the West Station Former MGP Plant Area Site (December 2010), additional sampling programs conducted both on-site and off-site, and the Alternative Analysis (AA) Report (March 2013). NYSDEC approved the AA Report in correspondence dated January 28, 2016. In subsequent correspondence dated August 11, 2016, the NYSDEC requested that RG&E proceed with development of a Remedial Action Work Plan (RAWP).

## 1.1 RAWP Objective

The objective of the RAWP is to describe the proposed remedial actions for soil, sediment and groundwater that will: (1) adequately mitigate potential threats to human health and the environment arising from MGP related constituents; (2) are consistent with the remedial objectives for the site; and (3) are consistent with the future contemplated use of the site.

## 1.2 RAWP Outline

This report contains seven (7) sections.

- The remainder of Section 1.0 includes a description of the Site and its setting and briefly presents the findings of remedial investigations conducted on and off property.
- Section 2.0 presents a summary of the Alternatives Analysis which includes identification
  of constituents of potential concern, remedial action objectives, development and
  evaluation of remedial alternatives, and a description of the recommended remedy.
- Section 3.0 presents the recommended Remedial Action.

- Section 4.0 presents technical plans and describes materials management for the proposed remedy.
- Section 5.0 presents a description of Periodic Progress Reports and the Final Engineering Report.
- Section 6.0 presents the schedule.
- Section 7.0 lists the project references.

## 1.3 Background Information

#### 1.3.1 Site Description

The West Station Site is a former MGP located at 254 Mill Street in Rochester, Monroe County, New York (Figure 1). The Site is presently owned by RG&E and, as shown on Figure 2A, is bounded by RG&E Power Station No. 3 (decommissioned Beebe Station electric generation plant) situated on Mill Street and Falls Street to the west, the former City of Rochester trash incinerator plant to the north, the Genesee River to the east, and the Platt Street Bridge on the south. The area of the Site south of the Platt Street Bridge was called the "Park Area" of the West Station Site (which was remediated by RG&E in accordance with VCA Index No. D8-0001-95-10), while the remaining portion of the West Station Site was referred to as the "Plant Area". The former MGP processes were located on the Plant Area portion of the Site and encompass approximately 7 acres. The Site is relatively flat, with an average ground elevation of approximately 412 feet above mean sea level (feet msl). Several buildings and structures owned by RG&E remain on the property. These include two above ground "closed" diesel oil storage tanks (ASTs) with secondary containment structures, an inactive diesel oil-fired turbine, and several buildings used for RG&E equipment storage. The Site is transected in the south-central portion of the plant by an underground water intake/discharge structure associated with the adjacent Beebe Station. The intake/discharge structure is a concrete structure installed partially into bedrock. The existing site features on RG&E property are shown on Figure 2A. The location of the intake/discharge structure is shown on Figure 2B.

#### 1.3.2 Land Use

The RG&E property is zoned "CCD-R – Center City District – Riverfront". According to zoning regulations found in Chapter 120, Article IX, §120-67 of the City Code, the boundaries of the Riverfront District were chosen to include all properties that had a physical and/or visual connection to the River. The District is contiguous and unbroken along the River corridor in the CCD (Rochester City Code, 2002). The zoning also applies to surrounding properties and allows industrial, commercial, and residential property use. The RG&E property and other properties in its immediate vicinity, have long histories of industrial and commercial use. The site is currently

fenced on all sides and is accessible only to RG&E employees by an electronic entry system controlled gate. The former Beebe Station is in the process of being decommissioned.

## 1.4 Summary of Remedial Investigation

The RI was conducted by AMEC Environment & Infrastructure, Inc. (AMEC) in 2008-2010 (with supplemental work completed in 2012). The RI incorporated results of previous investigations at the Site (see Section 7.0 for reference listing). The RI included Site characterization activities, evaluation of the extent of impact and potential chemical migration pathways from the Site, Human Health Risk Assessment (HHRA) and Fish and Wildlife Impact Analysis (FWIA). NYSDEC approved the completed RI by letter dated January 15, 2013.

## 1.4.1 RI Investigation Activities

The RI included characterization of soil, groundwater, and sediments and porewater in the Genesee River. The investigations included the completion of:

- 91 soil borings
- 7 test pits
- 47 monitoring wells (23 overburden and 24 bedrock), and 2 piezometers

Samples collected and submitted for analysis during the RI included:

- Surface soil (9 locations & samples)
- Subsurface soil (131 samples)
- Overburden groundwater (30 MWs & 50 samples)
- Bedrock groundwater (23 MWs & 31 samples)
- Near-shore river sediments (21 samples from over 50 probing locations)
- River sediment porewater (8 locations)

Supplemental investigations were conducted on-site in the northeast corner of the property in the area referred to as the SB-35 area and within the footprint of a decommissioned electric substation situated near the center of the Site (decommissioned after completion of the 2010 RI). Results of supplemental investigation in the SB-35 area were documented in letter reports submitted to the NYSDEC dated August 17, 2012 and December 28, 2012. Investigation results for the decommissioned electric substation are documented in a letter report dated August 28, 2012. Supplemental investigation was also conducted in an area of visible water

seepage, off-site along the river's edge approximately 70 feet north of the West Station property. No site-related chemical constituents were identified during the off-site investigation. Results are documented in correspondence dated July 31, 2014. RI sample locations are shown on Figure 3. Samples were analyzed for Target Compound List (TCL) Volatile Organic Chemicals (VOCs), Semi-volatile Organic Chemicals (SVOCs), polychlorinated biphenyls (PCBs), Target Analyte List (TAL) metals and total cyanide. Additional samples were analyzed for forensic parameters to assess the potential origin of chemical impact observed in various sample media.

## 1.4.2 Site Topography

The Site is differentiated topographically into two areas: the "land side" area and the "river side" area. The land side area is characterized by generally flat topography, with ground surface elevations varying between 410 and 415 feet msl. The river side area is characterized by lower elevations ranging between 399 and 396 feet msl, and is separated from the land side area by a concrete retaining wall in the northern portion of the Site. In the central and southern portions of the Site, the land side and river side areas are separated by buildings and other infrastructure associated with the adjacent Beebe Station property. The topography slopes down abruptly from the elevated land side area to the edge of the Genesee River.

## 1.4.3 Geology/Hydrogeology

The Site is located within the Genesee River Gorge. The Site is situated on a bench consisting predominantly of fill material emplaced during Site construction. A thin, discontinuous layer of native alluvium exists between the fill material and bedrock, and is prevalent in undisturbed areas, and where former raceways existed prior to Site development. The uppermost bedrock unit encountered at the Site is the Rochester Shale, which also forms the floor and sidewalls of the gorge in the immediate vicinity of the Site.

Investigations of the Site identified fill material ranging between 9 and 38 feet in thickness (placed during the late 1800s and early 1900s west of the concrete retaining wall constructed parallel with the River shore line). Fill consists of a silty sand and gravel matrix with coal, cinders, and brick. The fill material was generally present above several feet of alluvium. The fill and alluvium, which comprise the overburden, is largely unsaturated. The depth to the water table is approximately 18 feet below ground surface across the majority of the site.

Depth to bedrock varies between 8.5 feet at the GMX-MW-16 monitoring well series to a maximum depth of 35.3 feet at soil boring SB-13. The bedrock beneath the property was investigated to a depth of 96 feet. The bedrock units cored and sampled (groundwater) are, sequentially:

- Rochester Shale (30 feet in thickness)
- Irondequoit Limestone (20 feet in thickness)

- Williamson Shale (5 feet in thickness)
- Sodus Shale (15 feet in thickness)
- Reynales Limestone (maximum thickness not determined during RI however it was cored 5 feet during the RI)

In the overburden, groundwater flow occurs generally to the east in the southern portion of the Site. In the northern portion of the site, the concrete retaining wall, which is keyed into bedrock, prevents the flow of overburden groundwater toward the River as shown by a nearly flat hydraulic gradient in the northeast corner of the site. The hydraulic gradient steepens in a southeasterly direction toward the south terminus of the wall.

Bedrock groundwater flow in the Rochester Shale beneath the Site is generally to the east. Flow in the deeper bedrock (Irondequoit Limestone and deeper formations) is toward the northeast.

#### 1.4.4 Groundwater Usage and Area Water Supply

Groundwater is not used as a source of drinking water at this Site or in the surrounding area.

The principal potable water sources for the City of Rochester are Hemlock Lake, which is owned by the State of New York, and Candice Lake. Water supplies for the City are supplemented by water from Lake Ontario, purchased from the Monroe County Water Authority (http://www.cityofrochester.gov/).

#### 1.4.5 Nature and Extent of MGP-Related Impacts

#### 1.4.5.1 MGP Residual Materials

Occasional observations of MGP residual material were identified during the RI in site media in primarily three forms: Tar-Like Material (TLM); Dense Non-Aqueous Phase Liquid (DNAPL); and, less frequently, suspected gas purifier material.

TLM is a solidified (non-flowable) material defined in the RI as a solid or semi-solid tar. Its consistency ranges from hard solid (resistant to deformation) to a softer taffy-like semi-solid. DNAPL is a flowable organic liquid material and has been observed as discontinuous blebs or globules in water-saturated soil.

The presence of TLM was identified primarily in overburden soils on the river side of the Site, and on the land side near Building 18 in the area of the former primary and secondary MGP cooler structures, and sporadically in the southern portion of the site. TLM was most often found in unsaturated fill material. TLM was not observed in bedrock below the overburden.

DNAPL present as discontinuous blebs and globules was observed in 23 soil borings Site-wide and in a test pit excavation used to facilitate the installation of SB-33 located on the river-side of the site approximately 20 feet north of the Brown's Race discharge pipe. The DNAPL was accompanied by a characteristic coal tar-like odor, and was predominantly present in the saturated zone of the overburden. Discontinuous blebs and globules of DNAPL were observed in the vicinity of former process areas such as the former Water Gas Plant, the former Tar Separator, and the former Pitch Hopper. Complete DNAPL saturation of soil (tar saturated soils) was not observed at any location on the Site.

In bedrock, traces of DNAPL in the form of a light film or discontinuous ganglia were observed in 3 of 21 borings. The observations were in limited areas on the surface of the bedrock fractures or shale partings in the upper bedrock (weathered zone).

Indications of DNAPL presence in groundwater were observed in two monitoring wells (RW-1 and GMX-MW-6S) during well development and sampling. The accumulated thicknesses were barely measurable (less than one-half inch). The DNAPL volume was insufficient for discrete sampling or mobility assessment. Pumping of the wells during purging and groundwater sampling did not result in additional DNAPL accumulation in either well. Pumping showed that, where NAPL was present in saturated soil, it has low mobility and pumping is not an effective means of removal.

A small area of suspected gas purifier material was observed on the ground surface on the river side of the Site in the vicinity of monitoring wells GMX-MW-17S/D. The material was composed of wood chips and fine sand and gravel, visibly blue in color with a musty odor. The suspected gas purifier material appears to be an isolated area. No other instances of suspected gas purifier materials were observed during the investigation.

#### 1.4.5.2 Surface and Subsurface Soil

Comparison criteria for surface and subsurface soil samples used in the RI are the 6NYCRR Subpart 375-6, Remedial Program Soil Cleanup Objectives (SCOs) for Restricted Use SCOs for Commercial Property and Industrial Property (December 14, 2006) and the NYSDEC Technical and Administrative Guidance Memorandum #4046 Determination of Soil Cleanup Objectives and Cleanup Levels (TAGM #4046) criteria. The TAGM #4046 criteria was included in the RI because DER-10 was not finalized until the year the RI was complete and submitted to the DEC.

Polyaromatic hydrocarbons (PAHs) were the primary potentially MGP-related chemicals detected in soil samples at concentrations above comparison criteria. Other organic chemicals, in particular benzene, toluene, ethylbenzene and xylene (BTEX) were detected far less frequently. Detections of BTEX above TAGM #4046 values were limited to fewer than 10% of samples and occurred in areas coincident with soils exhibiting MGP residual material or PAH concentrations above comparison criteria. None of the soil samples detected BTEX concentrations that exceeded Part 375 Restricted Use SCOs for commercial or industrial property.

A few metals were detected at concentrations above Part 375 Restricted Use SCOs for commercial properties, and to a lesser extent, industrial properties. Excluding supplemental samples collected in the SB-35 area and in the substation area, these included:

- 11 samples of 114 analyzed for arsenic
- 1 sample of 114 analyzed for lead
- 3 samples of 114 analyzed mercury above Part 375 Restricted Use SCOs for industrial property

Total cyanide was detected in soil at concentrations above Part 375 Restricted Use SCOs for commercial properties in just two samples collected from the central Plant area of the Site (GMX-MW18S and GMX-MW-3D) and one location east of the retaining wall on the river side area of the site (SB-39). Total cyanide was not detected above Part 375 Restricted Use SCOs for industrial property anywhere on-site.

Collectively, these results show that the most appropriate chemical indicators of MGP-related impacts in Site soils are the PAH compounds. However, since these compounds are nearly ubiquitous in an urban environment, the presence of PAH compounds in and of itself does not necessarily indicate an MGP-derived impact. Soil sampling results conclude that soils having PAH concentrations above unrestricted use SCOs that extends to the site boundaries. Over 90% of soil samples analyzed exceeded unrestricted use SCOs for one or more PAH. No particular pattern of distribution was identified for those soils that did or did not exceed SCOs. Given the low soil cleanup objectives for some PAH compounds, it is likely that a portion of the low-level exceedances are attributable to the placement of historic fill during site construction.

PAH concentrations exceeding Part 375 Restricted Use SCOs tracked more closely with visual impact and areas of the site where MGP-related activities occurred. The mapped extent of impact is further refined to soil samples containing total PAH concentrations above 500 ppm or suspected to contain concentrations above 500 ppm based on the identification of MGP residual material at that location. Observed locations of TLM and DNAPL are summarized on Figure 4.

In general, the areas of the Site exhibiting physical evidence of impact and/or concentrations of PAHs above Part 375 Restricted Use SCOs for industrial property extends to the following areas of the Site:

- The central portion of the Site between Building 18, the concrete retaining wall along the River, the diesel fuel ASTs, and the main access road to Beebe Station (western extent of former MGP operations);
- Three isolated areas in the southern portion of the site; and

• The River side of the site near the former pitch hopper and the area between the diesel oil ASTs and the north-central end of the site (east of Building 18) on the river side of the concrete retaining wall.

The vertical extent of impact at boring/well locations is generally limited and occurs in random horizons in the overburden soil varying in depth between less than one foot below ground surface to the bedrock surface (approximately 30 feet below ground surface). However, continuous impact through the soil profile from ground surface to top of bedrock was not identified at any of the boring/well locations. DNAPL, where observed, was visible as discontinuous blebs. DNAPL-saturated soils were not identified during any of the investigations conducted at the Site.

#### 1.4.5.3 Groundwater

Comparison criteria used in the RI to evaluate groundwater samples are the NYSDEC Ambient Water Quality Standards and Guidance in Technical and Operational Guidance Series (TOGS) 1.1.1 (June 1998) and 6 NYCRR Part 703: Surface Water and Groundwater Quality Standards and Effluent Limitations for Class GA groundwater.

Organic compounds were detected in groundwater at concentrations above New York State Class GA Groundwater Standards in overburden and bedrock groundwater monitoring wells near former MGP process areas. In the overburden:

- BTEX and PAHs were detected in overburden groundwater in the general area between Building 18 and the diesel oil ASTs (Plant area of the Site). The detected constituent concentrations are comparatively low – total BTEX and total PAH concentrations in groundwater were below 1 ppm in all overburden wells. The comparatively low concentrations of BTEX and PAHs in groundwater suggest biological processes naturally attenuate chemical constituents present in groundwater.
- BTEX and PAHs were detected in overburden groundwater on the river side of the Site, east of the concrete retaining wall. The RI concluded these concentrations are potentially associated with the presence of MGP residual materials (primarily TLM) observed in soils between the wall and the River and did not migrate through groundwater from source material located within the land side area of the Site. Based on footing elevations shown on retaining wall construction drawings, the concrete retaining wall is keyed into bedrock and serves as a barrier to the eastward movement of overburden groundwater which prevents such migration.
- Iron, manganese, and sodium concentrations were elevated compared to NYS Groundwater Standards in most overburden wells. It is not uncommon for these metals to be found at elevated concentrations in New York State groundwater which are considered to be representative of background concentrations in groundwater.

 Total cyanide was detected above the groundwater standard at two locations where either total cyanide was elevated in soil (GMX-MW-18S) or BTEX and PAHs were elevated in soil and groundwater (GMX-MW-8S).

In bedrock groundwater:

- BTEX and chloroform were the only VOCs detected above NYS Groundwater Standards in bedrock. Chloroform was not detected in soil or overburden groundwater and is not site related. Several PAH compounds were also detected in bedrock groundwater but below standards. The concentrations of BTEX and PAHs in bedrock groundwater in shallow bedrock are about an order of magnitude lower than those detected in the overburden groundwater above it.
- Well GMX-MW-6D is the exception to low constituent PAH concentrations in bedrock groundwater. Concentrations detected are likely related to the presence of DNAPL observed nearby in the overburden (corresponding to the area of the suspected foundation structure of the former primary and secondary coolers penetrated by monitoring well).
- The limit of the vertical extent of impact to bedrock groundwater from the site occurs in the Irondequoit Limestone which is immediately below the Rochester Shale. Naphthalene (17 µg/L) in well GMX-MW-6IRON is the only site-related constituent to exceed groundwater standards in the Irondequoit Formation. Site-related impacts in deeper Sodus Shale and Reynales Limestone were not identified.
- Other than metals considered to represent background concentrations, inorganic constituents, including total cyanide, were not detected in bedrock groundwater above NYS Groundwater Standards.

#### 1.4.5.4 River Sediment

A layer of cobbles and boulders (12 to 18-inches in thickness) blankets finer-grained near- shore river sediments, except in a localized area southeast of the CTF. Sheens on surface water were produced in four near shore areas after investigation tools penetrated the softer, finer-grained sediments existing along the entire length of the site. River sediment samples analyzed did not detect BTEX. PAHs were detected at concentrations above NYSDEC sediment criteria and total PAH concentrations were above NYSDEC Sediment Criteria in 13 of 18 samples analyzed during the RI. Figure 5 summarizes PAH sediment sample locations above sediment criteria. Laboratory forensic testing of sediment indicates that the PAHs detected are derived from both pyrogenic and petrogenic sources. Only one sediment sample was identified as being solely pyrogenic in origin. Where sheens are produced and PAHs are elevated, it is likely that those sediments are affected by MGP residuals from the site. The most frequently detected metals above sediment criteria were arsenic, copper, lead, nickel, and mercury. The concentration of metals detected in sediment samples correlate with PAH concentrations. Where PAH

concentrations were higher, metals concentrations were also elevated. Total cyanide was detected in three of 18 sediment samples. NYSDEC sediment criteria do not exist for total cyanide in sediment. Figure 5 shows the extent of sediments producing sheens with elevated PAH concentrations. The area shown is based on data collected during the West Station RI and investigation of Genesee River sediments between the upper and middle falls completed by GEI (March 2010).

The Genesee River flows through downtown Rochester and drains an area of urban development and industrial use (both contemporary and historical). Point and non-point storm water flow and industrial outfall discharges have likely contributed to the chemical presence identified in sediments.

#### 1.4.6 Human Health Exposure Assessment

Chemicals of Potential Concern (COPCs) were identified at the Site in soil, groundwater, and sediment. COPCs include certain VOCs (BTEX, chloroform, and styrene), certain SVOCs (biphenyl, phenols, and PAHs), metals, and total cyanide.

The current Site use and its restricted Site access limit viable exposure scenarios. The exposure assessment focused on exposure to COPCs by:

- Current Site workers
- Current and future trespassers
- Current and future subsurface construction workers
- Hypothetical future residential users
- Adjacent off-site properties

Groundwater is not used as a source of drinking water at this Site or in the surrounding area. As a result, there is no direct exposure to COPCs in groundwater. Current Site workers can be exposed to COPCs in surface soil via incidental ingestion, dermal contact, and inhalation of particles. However, the likelihood of exposure is very low as work activities are considered passive and intrusive work activities are prohibited, resulting in little potential to disturb the areas of exposed soil. Although a potential pathway for migration of COPCs volatilizing from soil and groundwater exists, the exposure to volatile COPCs from vapor intrusion would be low. This is because low concentrations of non-chlorinated VOCs were identified in soil and overburden groundwater and exposure durations would be short since on-site buildings are used primarily for storage of equipment and supplies and are not occupied by workers on a routine basis of for long durations. Trespassers may potentially be exposed to COPCs; however, the exposure duration by a trespasser would be short given that the property is an active RG&E Facility with highly restricted access. Current and future workers involved in subsurface soil excavation (i.e., utility repair or installation) may potentially be exposed to COPCs in surface and subsurface soil. Potential exposure routes include via incidental ingestion, dermal contact, and inhalation of volatiles or soil particulates within excavation air. If future property use

involved residential development (an unlikely scenario given Site surroundings but included based on current zoning which allows for residential development), exposure to COPCs was identified in surface and subsurface soil without some form of engineering and/or institutional controls. While current zoning does not prevent future residential use of the property RG&E intends to deed restrict property use to prevent potential future development of the property for future unrestricted residential use. The exposure potential of receptors on properties adjacent to the Site is extremely low since there is no potential for direct exposure (ingestion, dermal contact) or indirect exposure (inhalation of indoor air vapors) to COPCs in groundwater.

## 1.4.7 Fish and Wildlife Impact Analysis

The Site itself has poor resource value for wildlife as historic development of the property was for industrial use. The Genesee River is the habitat for a variety of different fish species. However, the River adjacent to the Site is not as ecologically important as it is downstream, beyond the Lower Falls, where it provides an important recreational fishery. The FWIA did not identify significant aquatic resources adjacent to the Site and analysis concluded potential adverse impacts to the aquatic community as a whole were determined to be very low. COPCs, primarily PAHs, and TLM were detected in the near shore environment in the River at some locations along the Site. The cobbles and boulders present above finer-grain sediment poses a barrier for fish species from contacting fine-grained river sediment near the site. The presence of elevated PAH concentrations and TLM in sediment may pose a localized potential impact to the aquatic benthic community population.

## 2. Alternatives Analysis Summary

This section summarizes the COPCs established for the site, identifies the remedial action objectives, and summarizes the analysis of remedial alternatives for the site with the identification of the preferred remedial alternative.

## 2.1 COPCs

The potentially site-derived MGP constituents of potential concern as identified in the RI are BTEX, PAHs, and cyanide. The potential MGP-derived PAHs include:

- acenaphthene
- acenaphthylene
- anthracene
- benzo(a)anthracene
- benzo(b)anthracene
- benzo(g,h,i)perylene
- benzo(k)fluoranthene
- benzo(a)pyrene
- chrysene

- dibenzo(a,h)anthracene
- dibenzofuran indeno (1,2,3-cd) pyrene
- fluoranthene
- naphthalene
- phenanthrene
- 2-methylnaphthalene
- pyrene

### 2.2 Remedial Action Objectives

Remedial Action Objectives (RAOs) are identified to maintain and/or achieve conditions that are protective of public health and the environment. The RAOs developed for the site are consistent with the remedy selection process described in 6 NYCRR Part 375 and guidance presented in DER-10.

The RAOs are based on considerations specific to the site (e.g., detected constituents, site use, and potential exposure pathways) with consideration of the Standards, Criteria, and Guidance (SCGs) in DER-10. The RAOs developed for the site pertain to chemical presence which is attributable to the former MGP (as identified in the RI) and are presented below.

Media	<b>RAOs for Public Health Protection</b>	RAOs for Environmental Protection
Groundwater	<ul> <li>Prevent ingestion of groundwater with site-derived MGP contaminant levels exceeding drinking water standards.</li> <li>Prevent contact with, or inhalation of volatiles from, groundwater containing site-derived MGP constituents.</li> </ul>	<ul> <li>Restore groundwater migrating from the Site to pre- disposal/pre-release/background conditions, to the extent practicable.</li> </ul>
Soil	<ul> <li>Prevent ingestion/direct contact with contaminated soil containing site-derived MGP constituents.</li> <li>Prevent inhalation of (or exposure from) site-derived MGP contaminants volatilizing from contaminants in soil.</li> </ul>	<ul> <li>Prevent off-Site migration of site-derived MGP contaminants in soils.</li> <li>Prevent impacts to biota from ingestion/direct contact with soil containing site-derived MGP</li> </ul>
Sediment	<ul> <li>Prevent direct contact with site-derived MGP contaminated sediments.</li> </ul>	<ul> <li>constituents causing toxicity.</li> <li>Prevent impacts to biota from ingestion/direct contact with site-derived MGP impacted sediments causing toxicity.</li> <li>Restore sediments to pre-release/background conditions for site-derived MGP constituents to the extent feasible.</li> </ul>
Soil Vapor	<ul> <li>Mitigate impacts to public health (via exposure to site-derived MGP constituents) results from existing, or the potential for, soil vapor intrusion into buildings.</li> </ul>	

## 2.3 Remedial Action Alternatives Analysis

The development of remedial alternatives for detailed comparative analysis were evaluated using criteria specified in 6 NYCRR Part 375-1.8(f) and DER-10 and with respect to the degree to which the site RAOs would be attained. As indicated in section 2.2, the RAOs pertain to constituents of concern potentially derived from the former MGP operations. These potentially site-derived MGP constituents are listed in Section 2.1.

As described in Section 2.2, the project RAOs fall into two broad categories, those intended to protect public health and those intended to protect the environment. The RAOs can generally be

achieved by preventing human or environmental exposure to contaminant concentrations which could present unacceptable risk. General Response Actions (GRAs) are therefore targeted to either eliminate the presence of contaminants above levels which would pose an environmental or human health risk or to implement a barrier (institutional or physical) to exposures. GRAs may include use of institutional controls, implementation of physical barriers to exposure (e.g., covers, caps, barrier walls and other containment techniques), removal of contaminated media for treatment and/or disposal, in-situ treatment, and in-situ stabilization (or any combination thereof).

In addition to the RAOs specifically targeting exposure and risk, the RAOs also set a goal of restoring groundwater and sediment to pre-disposal/pre-release/background conditions, to the extent practicable.

GRAs which could be employed to attain the RAOs (in whole or in part) are identified below. No action is considered a GRA for all media in accordance with DER-10.

GRAs for soil at the site include:

- No action
- Institutional controls to prevent exposure
- Physical barriers to migration (i.e., erosion) and/or exposure
- In-situ soil treatment
- Removal and ex-situ soil treatment and/or disposal

GRAs for groundwater include:

- No action
- Institutional controls to prevent exposure
- Barriers (physical or hydraulic) to groundwater flow and/or infiltration
- In-situ groundwater treatment
- Ex-situ groundwater treatment
- Removal or treatment of source(s) of groundwater contamination (MGP residual materials in soil and groundwater)

GRAs for sediment include:

- No action
- Institutional controls to prevent exposure
- Physical barriers to migration (i.e., erosion) and/or exposure
- In-situ sediment treatment
- Removal and ex-situ sediment treatment and/or disposal

GRAs for soil vapor at the site include:

- No action
- Institutional controls to prevent exposure
- Barriers or venting to prevent soil vapor exposure
- In-situ soil treatment of source(s) of contamination in soil vapor
- Removal and ex-situ soil treatment and/or disposal of source(s) of contamination in soil vapor

### 2.4 Remedial Alternatives Analyzed

The GRAs were assembled into technology options and combined into nine site-wide remedial alternatives as described below.

#### **Alternative 1- Institutional Controls**

Alternative 1 relies entirely on institutional controls to limit exposures to MGP-related constituents. Alternative 1 consists of the following institutional controls:

- Site access restrictions (maintain site fencing)
- Site management plan identifying soil management protocols
- Groundwater and land use prohibitions (incorporated into an environmental easement as appropriate)

The existing perimeter security fencing at the site would be augmented with appropriate signs regarding restrictions to soil excavation. The fencing and signs would be inspected annually and a Periodic Review Report would be prepared in accordance with DER-10.

## Alternative 2: Land Side Barrier Wall and DNAPL Recovery Wells, River Side Surficial Cleanup

Alternative 2 is comprised of the following components:

- Institutional controls as included in Alternative 1.
- Removal and off-site disposal of known underground process piping associated with the former MGP.
- River Side Surficial Cleanup: Solidified TLM residue exposed on the ground surface will be removed from the area between the river and the retaining wall and from the river bank

south of the retaining wall following clearing and grubbing of trees and vegetation. After the surficial cleanup, the riverbank will be covered with riprap.

- Extension of the existing site retaining wall approximately 360 feet to the south (southern terminus keyed into the screen house inlet structure. This is intended to provide a more complete barrier to migration of the small amounts of DNAPL residual which have been encountered on the Land Side of the site in deep soils (approximately 20 to 30 feet bgs). DNAPL was not observed on the Land Side of the site in the upper 15 feet of soil.
- Installation of passive DNAPL recovery wells along the upgradient (Land Side) of the retaining wall (existing and extended) to be evacuated regularly if DNAPL accumulates.
- Site re-grading to accommodate a 12 to 24-inch thickness of clean imported cover soils to allow for restricted residential use of the site with placement of a demarcation layer between the site soils and the cover soils. If the future use of the property is determined to be commercial, a 12-inch cover will be used. If residential use is contemplated, a 24-inch cover will be used. Pavement may be used in lieu of cover soils where appropriate (e.g., roadways, driveways and parking areas).
- Implementation of a monitored natural attenuation (MNA) or enhanced MNA program to monitor the quality of groundwater migrating from the Site and/or enhance natural attenuation.

## Alternative 3: Land Side Barrier Wall and DNAPL Recovery Wells, River Side Soil and Sediment Removal

Alternative 3 is comprised of the following components:

- Institutional controls as included in Alternative 1.
- Removal and off-site disposal of known underground process piping associated with the former MGP.
- River Side Excavation: Excavation of soil containing MGP residual material (DNAPL, TLM and/or purifier waste) that is visually identifiable as a distinct phase from the River Side of the Site (encompassing the soil between the river and the retaining wall and the river bank south of the retaining wall). River Side soil excavation will terminate at the depth where MGP residual material is not observed.

- Construction of near-shore water diversion structures (temporary sheet pile, coffer dam or other means) and excavation of visually impacted Genesee River Sediment (limits as determined by RI).
- Off-Site disposal of excavated visually impacted sediment at a permitted facility.
- Reconstruction with restoration as applicable of the river bank.
- Predesign Investigation of existing retaining wall and repair as appropriate
- Extension of the existing site retaining wall approximately 360 feet to the south (southern terminus keyed into the decommissioned screen house inlet structure).
- Installation of passive DNAPL recovery wells along the upgradient (Land Side) of the retaining wall (existing and extended) to be evacuated regularly if DNAPL accumulates.
- Site re-grading to accommodate a 12 to 24-inch thickness of clean imported cover soils with placement of a demarcation layer between the site soils and the cover soils. If the future use of the property is determined to be commercial, a 12-inch cover will be used. If residential use is contemplated, a 24-inch cover will be used. Pavement may be used in lieu of cover soils where appropriate (e.g., roadways, driveways and parking areas).
- Implementation of an MNA or enhanced MNA program to monitor the quality of groundwater migrating from the Site and/or enhance natural attenuation.

## Alternative 4: Land Side Limited DNAPL Removal and Barrier Wall, DNAPL Recovery Wells, River Side Soil and Sediment Removal

Alternative 4 is comprised of the following components:

- Institutional controls as included in Alternative 1.
- Removal and off-site disposal of known underground process piping associated with the former MGP.
- Land Side Excavation: Excavation of soil from a limited area of the central portion of the property underlying the former central water treatment facility and the former above ground oil storage tanks. Within this defined area, soil which contains DNAPL that is identifiable visually as a distinct phase where excavation can be performed without encroaching on the existing retaining wall and with a practical depth limitation of approximately 25 feet will be excavated. Purifier waste if encountered would also be removed. Soils exhibiting stains, solidified TLM, sheens or odors without visible DNAPL

would not be removed from the land side of the Site. Removal of DNAPL contaminated soil will require substantial excavation and on-site soil handling of soils not contaminated with DNAPL.

- River Side Excavation: Excavation of soil containing MGP residual material (DNAPL, TLM and/or purifier waste) that is identifiable visually as a distinct phase from the River Side of the Site (encompassing the soil between the river and the retaining wall and the river bank south of the retaining wall). River Side soil excavation will terminate at the depth where MGP residual material is not observed.
- Construction of near-shore water diversion structures (temporary sheet pile or other means) and excavation of visually impacted Genesee River Sediment (limits as determined by RI).
- Off-Site disposal of excavated visually impacted sediment at a permitted facility.
- Reconstruction with restoration as applicable of the river bank.
- Extension of the existing site retaining wall approximately 360 feet to the south (southern terminus keyed into the decommissioned screen house inlet structure).
- Installation of passive DNAPL recovery wells along the upgradient (Land Side) of the retaining wall (existing and extended) to be evacuated regularly if DNAPL accumulates.
- Site re-grading to accommodate a 12 to 24-inch thickness of clean imported cover soils with placement of a demarcation layer between the site soils and the cover soils. If the future use of the property is determined to be commercial, a 12-inch cover will be used. If residential use is contemplated, a 24-inch cover will be used. Pavement may be used in lieu of cover soils where appropriate (e.g., roadways, driveways and parking areas).
- Implementation of an MNA or enhanced MNA program to monitor the quality of groundwater migrating from the Site and/or enhance natural attenuation.

# Alternative 5: Land Side Depth-Limited Soil Excavation (Visually Impacted and Above 500 mg/kg Total PAH), Barrier Wall, DNAPL Recovery Wells, River Side Soil and Sediment Removal

Alternative 5 is comprised of the following components:

- Institutional controls as included in Alternative 2.
- Removal and off-site disposal of known underground process piping associated with the former MGP.

- Excavation of impacted soil from the Land Side of the Site with the following characteristics:
  - except within 25 feet of the existing retaining wall, soil containing MGP residual material that is identifiable visually as a distinct phase will be excavated to a (post grade) depth of 15 feet (this would not include soils which may exhibit stains, sheens or odors without visible MGP residual);
  - except within 25 feet of the existing retaining wall, soil containing total PAHs greater than 500 ppm will be removed to a (post grade) depth of 15 feet; and
  - within 25 feet of the existing retaining wall, the excavation depth will be limited to 10 feet so as not to undermine the tieback supports.
- Excavation of impacted soil from the River Side of the Site (encompassing the soil between the river and the retaining wall and the river bank south of the retaining wall) with the following characteristics:
  - soil containing MGP residual material that is identifiable visually as a distinct phase will be excavated to bedrock (this would not include soils which may exhibit stains, sheens or odors without visible MGP residual), and;
  - o soil containing total PAHs greater than 500 ppm will be removed.
- Construction of near-shore water diversion structures (temporary sheet pile or other means) and excavation of visually impacted Genesee River Sediment as determined in RI.
- Off-Site disposal of excavated materials meeting the removal criteria listed above at a permitted disposal facility.
- Backfill of the excavation with soils/fill materials from the Site which do not require removal based on the above requirements and clean imported soils.
- Extension of the existing site retaining wall approximately 360 feet to the south (southern terminus keyed into the decommissioned screen house inlet structure).
- Installation of passive DNAPL recovery wells along the upgradient (Land Side) of the existing retaining wall to be evacuated regularly if DNAPL accumulates.
- Reconstruction with restoration as applicable of the river bank.
- Site re-grading to accommodate a 12 to 24-inch thickness of clean imported cover soils with placement of a demarcation layer between the site soils and the cover soils. If the future use of the property is determined to be commercial, a 12-inch cover will be used. If

residential use is contemplated, a 24-inch cover will be used. Pavement may be used in lieu of cover soils where appropriate (e.g., roadways, driveways and parking areas).

• Implementation of an MNA or enhanced MNA program to monitor the quality of groundwater migrating from the Site and/or enhance natural attenuation.

#### Alternative 6: Land Side Depth-Limited Excavation of Soil Above Commercial SCOs, Barrier Wall, DNAPL Recovery Wells, River Side Soil and Sediment Removal

Alternative 6 is comprised of the following components:

- Institutional controls as included in Alternative 2
- Removal and off-site disposal of known underground process piping associated with the former MGP.
- Excavation of impacted soil from the Land Side of the Site with the following characteristics:
  - except within 25 feet of the existing retaining wall, soil containing MGP residual material that is identifiable visually as a distinct phase will be excavated to a (post grade) depth of 15 feet (this would not include soils which may exhibit stains, sheens or odors without visible MGP residual);
  - except within 25 feet of the existing retaining wall, soil containing concentrations of potentially MGP-derived constituents above 6 NYCRR Part 375 Commercial Use SCOs will be removed to a post grade depth of 15 feet; and
  - within 25 feet of the existing retaining wall, the excavation depth will be limited to 10 feet so as not to undermine the tieback supports.
- Excavation of impacted soil from the River Side of the Site (encompassing the soil between the river and the retaining wall and the river bank south of the retaining wall) with the following characteristics:
  - soil containing MGP residual material that is identifiable visually as a distinct phase will be excavated to bedrock (this would not include soils which may exhibit stains, sheens or odors without visible MGP residual), and;
  - soil containing concentrations of potentially MGP-derived constituents above 6 NYCRR Part 375 Commercial Use SCOs.

- Construction of near-shore water diversion structures (temporary sheet pile or other means) and excavation of visually impacted Genesee River Sediment as determined in RI.
- Off-Site disposal of excavated materials meeting the removal criteria listed above at a permitted disposal facility
- Backfill of the excavation with Site soils/fill materials which do not require removal based on the above requirements and clean imported soils.
- Extension of the existing site retaining wall approximately 360 feet to the south (southern terminus keyed into the decommissioned screen house inlet structure).
- Installation of passive DNAPL recovery wells along the upgradient (Land Side) of the existing retaining wall to be evacuated regularly if DNAPL accumulates.
- Reconstruction with restoration as applicable of the river bank.
- Implementation of an MNA or enhanced MNA program to monitor the quality of groundwater migrating from the Site and/or enhance natural attenuation.

#### Alternative 7: Land Side Depth-Limited Excavation of Soil Above Unrestricted Use SCOs, Barrier Wall, DNAPL Recovery Wells, River Side Soil and Sediment Removal

Alternative 7 is comprised of the following components:

- Institutional controls as included in Alternative 2
- Removal and off-site disposal of known underground process piping associated with the former MGP.
- Excavation of impacted soil from the Land Side of the Site with the following characteristics:
  - except within 25 feet of the existing retaining wall, soil containing MGP residual material that is identifiable visually as a distinct phase will be excavated to a (post grade) depth of 15 feet (this would not include soils which may exhibit stains, sheens or odors without visible MGP residual);
  - except within 25 feet of the existing retaining wall, soil containing concentrations of potentially MGP-derived constituents above 6 NYCRR Part 375 Unrestricted Use SCOs will be removed to a post grade depth of 15 feet; and

- within 25 feet of the existing retaining wall, the excavation depth will be limited to 10 feet so as not to undermine the tieback supports.
- Excavation of impacted soil from the River Side of the Site (encompassing the soil between the river and the retaining wall and the river bank south of the retaining wall) with the following characteristics:
  - soil containing MGP residual material that is identifiable visually as a distinct phase will be excavated to bedrock (this would not include soils which may exhibit stains, sheens or odors without visible MGP residual), and;
  - soil containing concentrations of potentially MGP-derived constituents above 6 NYCRR Part 375 Unrestricted Use SCOs will be removed.
- Construction of near-shore water diversion structures (temporary sheet pile or other means) and excavation of visually impacted Genesee River Sediment as determined in RI.
- Off-Site disposal of excavated materials meeting the removal criteria listed above at a permitted disposal facility
- Backfill of the excavation with Site soils/fill materials which do not require removal based on the above requirements and clean imported soils.
- Extension of the existing site retaining wall approximately 360 feet to the south (southern terminus keyed into the decommissioned screen house inlet structure).
- Installation of passive DNAPL recovery wells along the upgradient (Land Side) of the existing retaining wall to be evacuated regularly if DNAPL accumulates.
- Reconstruction with restoration as applicable of the river bank.
- Implementation of an MNA or enhanced MNA program to monitor the quality of groundwater migrating from the Site and/or enhance natural attenuation.

#### Alternative 8: Land Side Site-Wide Excavation of DNAPL/TLM to Bedrock and Depth-Limited excavation of Soil Above Unrestricted SCOs, River Side Soil and Sediment Removal

Alternative 8 is comprised of the following components:

• Institutional controls limited to groundwater use restrictions and provisions for future vapor intrusion evaluation/mitigation if/as appropriate

- Removal and off-site disposal of known underground process piping associated with the former MGP.
- Excavation of impacted soil from the Land Side of the Site with the following characteristics:
  - soil containing MGP residual material (DNAPL, TLM and/or purifier waste) that is identifiable visually as a distinct phase will be excavated to bedrock and;
  - soil containing concentrations of potentially MGP-derived constituents above 6 NYCRR Part 375 Unrestricted Use SCOs will be removed to a post grade depth of 15 feet.
- Excavation of impacted soil from the River Side of the Site (encompassing the soil between the river and the retaining wall and the river bank south of the retaining wall) with the following characteristics:
  - soil containing MGP residual material (DNAPL, TLM and/or purifier waste) that is identifiable visually as a distinct phase will be excavated, and;
  - soil containing concentrations of potentially MGP-derived constituents above 6 NYCRR Part 375 Unrestricted Use SCOs will be removed.

Soils exhibiting stains, sheens or odors without visible MGP residual would not be excavated unless one of the aforementioned criteria is met.

- This alternative requires demolition of the existing site retaining wall. Site restoration would either include reconstruction of the retaining wall, or changing the existing grade to accommodate a sloped riverbank.
- Construction of near-shore water diversion structures (temporary sheet pile or other means) and excavation of visually impacted Genesee River Sediment as determined in RI.
- Off-Site disposal of excavated soil meeting the removal criteria listed above at a permitted disposal facility.
- Backfill of the excavation with soil/fill materials which do not require removal based on the above requirements and clean imported soils.
- Reconstruction with restoration as applicable of the river bank.
- Implementation of an MNA or enhanced MNA program to monitor the quality of groundwater migrating from the Site and/or enhance natural attenuation.

#### Alternative 9: Land Side DNAPL Removal, River Side Soil and Sediment Removal

Alternative 9 is comprised of the following components Institutional controls as included in Alternative 1.

- Removal and off-site disposal of known and accessible underground process piping associated with the former MGP.
- Land Side Excavation: Excavation of soil on the Land Side of the site which contains DNAPL that is visually identifiable as a distinct phase. This will necessarily entail disposal and removal of the existing site retaining wall. Purifier waste if encountered would also be removed. Soils exhibiting stains, solidified TLM, sheens or odors without visible DNAPL would not be removed from the land side of the Site. Removal of DNAPL contaminated soil will require substantial excavation and on-site soil handling of soils not contaminated with DNAPL.
- This alternative requires demolition of the existing site retaining wall. Site restoration would either include reconstruction of the retaining wall, or changing the existing grade to accommodate a sloped riverbank.
- River Side Excavation: Excavation of soil containing MGP residual material (DNAPL, TLM and/or purifier waste) that is identifiable visually as a distinct phase from the River Side of the Site (encompassing the soil between the river and the retaining wall and the river bank south of the retaining wall). River Side soil excavation will terminate at the depth where MGP residual material is not observed.
- Construction of near-shore water diversion structures (temporary sheet pile or other means) and excavation of visually impacted Genesee River Sediment (limits as determined by RI).
- Off-Site disposal of excavated visually impacted sediment at a permitted facility.
- Reconstruction with restoration as applicable of the river bank.
- Site re-grading to accommodate a 12 to 24-inch thickness of clean imported cover soils with placement of a demarcation layer between the site soils and the cover soils. If the future use of the property is determined to be commercial, a 12-inch cover will be used. If residential use is contemplated, a 24-inch cover will be used. Pavement may be used in lieu of cover soils where appropriate (e.g., roadways, driveways and parking areas).
- Implementation of an MNA or enhanced MNA program to monitor the quality of groundwater migrating from the Site and/or enhance natural attenuation.

## 2.5 Alternatives Analysis Evaluation Criteria

The following evaluation criteria defined by DER-10 were utilized in the analysis of alternatives:

- 1. Overall protection of human health and the environment
- 2. Conformance with SCGs
- 3. Long-term effectiveness and permanence
- 4. Reduction of toxicity, mobility, or volume of contamination through treatment
- 5. Short-term impacts and effectiveness
- 6. Implementability
- 7. Cost effectiveness
- 8. Land Use

A ninth criterion, community acceptance, is considered after a decision document has been subject to public comment. This modifying criterion is evaluated after any public comments on the remedy have been received, prior to NYSDEC's final approval of the remedy.

In accordance with the NYSDEC guidance document DER-31 – Green Remediation, aspects of environmental sustainability were considered as part of the detailed analysis of alternatives. These aspects were included in the considerations of the short-term impacts for each alternative.

### 2.6 Alternative Analysis and Recommended Alternative

The comparative evaluation rankings are summarized in Table 1. Alternatives 1 and 2 do not meet the RAOs for environmental protection and were dropped from further consideration. The remaining six alternatives attain the project RAOs.

The deep excavations for Alternatives 4, 8 and 9 present implementability concerns and Alternatives 8 and 9 (complete DNAPL removal) may not be technically feasible. The potential community disruption associated with odors and high volume truck traffic to and from the site for an extended period of time also limit the feasibility of the Alternatives 4 and 8.

Compared to Alternative 3, Alternatives 5, 6 and 7 offer little added benefit with respect to attaining the project RAOs at much higher cost, greater community disruption, and with comparatively high resource utilization during construction.

Alternative 3 achieves RAOs at comparatively lower cost while being more implementable with less community disruption and short term risks than any of the other alternatives. The NYSDEC approved the AA Report in correspondence dated January 28, 2016.

Alternative 3 is the recommended alternative and is comprised of the following components:

- Institutional controls (ICs) that include: Site access restrictions (maintain site fencing); site management plan (SMP) identifying soil management protocols; and groundwater and land use prohibitions (incorporated into an environmental easement as appropriate)
- Removal and off-site disposal of known and reasonably accessible underground process piping associated with the former MGP.
- River Side Excavation: Excavation of soil containing MGP residual material (DNAPL, TLM and/or purifier waste) that is identifiable visually as a distinct phase from the River Side of the Site (encompassing the soil between the river and the retaining wall and the river bank south of the retaining wall). River Side soil excavation will terminate in a northern lateral direction and at the depth where MGP residual material is not observed.
- Construction of near-shore water diversion structures (temporary sheet pile or other means) and excavation of visually impacted Genesee River Sediment (limits as determined by RI).
- Off-Site disposal of excavated visually impacted sediment at a permitted facility.
- Reconstruction with restoration as applicable of the river bank.
- Predesign Investigation for: extent of visual impacted soil on the River Side soil excavation area, assessment of existing retaining wall integrity and repair, and data required to support design of near-shore water diversion structures.
- Extension of the existing site retaining wall approximately 360 feet to the south (southern terminus keyed into the intake/discharge barrier wall).
- Installation of passive DNAPL recovery wells along the upgradient (Land Side) of the retaining wall (existing and extended) to be evacuated regularly if DNAPL accumulates.
- Soil Cap, inclusive of site re-grading to accommodate a 24-inch thickness of clean imported cover soils to allow for restricted residential use of the site with placement of a demarcation layer between the site soils and the cover soils. Pavement may be used in lieu of cover soils where appropriate (e.g., roadways, driveways and parking areas).
- Implementation of an MNA or enhanced MNA program to monitor the quality of groundwater migrating from the Site and/or enhance natural attenuation.
- The estimated cost for implementation of Alternative 3 is \$31.0 million.
# 3. Recommended Remedial Action

The following are elements of the recommended remedial action for the West Station Former MGP described in Section 2.6.

#### Predesign Investigation:

*Existing Retaining Wall Integrity:* Since the proposed remedial action (Alternative 3) entails excavation of soils adjacent to the existing retaining wall, the condition of the existing retaining wall barrier will be verified in a pre-design investigation. The purpose of the pre-design investigation will be to evaluate precautionary or stabilization measures to be taken during excavation (to avoid damaging the structure) and to identify repairs which may be necessary (if any) prior to backfilling with clean soil. Alternative 3 will include excavation of soils on the River side of the retaining wall. The predesign investigation would expose the bedrock surface along the river side of the wall near locations where DNAPL has been observed (near wells GMX-MW-19S and GMX-MW-25S) in order to inspect the base of the wall and the bedrock surface for signs of DNAPL seepage. The construction of the base of the wall and the bedrock/wall interface will be visually inspected.

*New Barrier Wall Characterization:* Soil borings will be completed along the alignment of the new barrier wall between the southern terminus of the Existing Barrier Wall and the former Beebe Station concrete intake structure. Characterization data will be used to determine soil and upper bedrock conditions along the new wall alignment.

*North Area River Side Soil Characterization:* Test pits will be excavated on the on the River Side of the site between the northern site boundary and the northern extent of soil excavation proposed in the AA. The test pits will be used to visually inspect soils in the area of the site for DNAPL/TLM presence and to facilitate the collection of soil samples. Findings will support detail design which will define the extent of River Side soil excavation at the north end of the site.

*Near Shore River Sediment Characterization:* Surface water diversion during near shore sediment removal will require construction of a cofferdam or placement pre-cast concrete retaining block into the Genesee River. Testing will be performed to determine the extent of boulder and cobble-size materials in the river, thickness, and the depth to bedrock. This activity will be coordinated with RG&E's Hydro Group, NYS Canal Corporation, and other involved agencies.

#### **Existing Retaining Wall Repair:**

As indicated above, the RI concluded that the existing retaining wall is an effective barrier to DNAPL migration. However, as a precautionary measure, all alternatives utilizing the existing retaining wall as a permanent component of the remedy have been assumed to include some provision for mitigation of DNAPL seepage in the unlikely event it is observed. If the predesign investigation encounters seepage at the base of the retaining wall which could result in DNAPL migration to the River Side soils and/or Genesee River, measures would be taken to reduce the effective permeability of the wall in areas prone to seepage of DNAPL. If the seepage to be controlled occurs at the junction between the base of the wall and the bedrock on which it sits, it may be appropriate to seal the base by constructing a steel reinforced concrete "curb" along the base of the River Side of the wall. The curb would be formed in place such that it seals both the base of the wall and adjacent bedrock surface.

If seepage to be controlled occurs within the upper few feet of fractured rock beneath the retaining wall (which could be manifested as seepage up through the River Side bedrock surface when it is exposed in a test excavation), a concrete curb may not be an effective repair. This seepage would likely be better controlled through targeted injection grouting at the base of the overburden and upper few feet of bedrock beneath the wall. Whether the grout holes are drilled on the Land Side of the River Side of the wall would be determined in the predesign and design phases.

Remediation cost estimates presented in AA assumed the retaining wall would be sealed by constructing the reinforced concrete curb at its base. The need for and method used to seal the retaining wall would be determined during the predesign and detailed design project phases. The sequencing of the wall repair (if any) relative to the timing of the soil and sediment excavations will also be determined in the design phase.

#### **River Side Soil and Genesee River Sediment Excavation:**

The River Side soil excavations would be performed concurrently with the Genesee River sediment excavations. Excavation of River Side soils would be targeted to remove soils containing DNAPL and solidified TLM. Sediments requiring remediation were identified in the RI. Figure 6 shows the excavation areas for River Side soils and Genesee River sediments.

A river water diversion structure (i.e., coffer dam, pre-cast concrete large block retaining wall) could be constructed along the perimeter of the sediment excavation area to allow dewatering and provide a safe working environment for the excavation activities. One of the challenges to implementation of River Side soils and river sediment excavations is the limited work space available and the necessity of building the soil/sediment staging area on the Land Side of the site some 25 feet higher in elevation. The AA assumed that a single coffer dam would be constructed rather than a series of smaller dams (which would allow excavation to occur in

cells). For this project it has been deemed more feasible to dewater the entire area to allow enough space to work safely (e.g., to move excavation equipment along temporary roadways). Access to the River Side of the site for excavating equipment is limited and available only south of the existing retaining wall. The entire excavation area will need to be kept dewatered to allow access and egress and transport of excavated materials to the soil handling/staging area on the Land Side of the site.

It is likely that the River Side excavations in the vicinity of the existing retaining wall will need to be conducted with smaller equipment due to the confined area and limited access and egress. This will increase the cost of the excavation relative to excavation with conventional excavation equipment.

Water will be generated from dewatering the excavation areas constantly for the duration of the River Side soil and sediment excavations. A water treatment or pretreatment facility will be constructed on site to treat this water. The treated water would either be discharged to the Genesee River under a temporary discharge permit or to the City of Rochester Publicly Owned Treatment Works (POTW). Water treatment will consist of influent equalization, NAPL separation, filtration and carbon absorption. It will be designed to be capable of treating at least 500 gpm with provisions in the detailed design for capacity expansion if needed.

There is no specific depth limit for the River Side soils excavation – DNAPL and TLM will be excavated to bedrock (if present and required). The River Side soils are steeply sloped from the retaining wall (where present) or top of the river bank (south of the retaining wall) toward the river's edge. Depth to bedrock ranges from about 6 feet to more than 15 feet in the excavation area.

Estimated excavation depths are shown on Figure 6. The AA assumed that soil excavated from the River Side soils and sediment excavated from the Genesee River will be disposed off-site. It may not be practical to segregate soil and sediment on the River Side of the site. A determination on the feasibility of using unimpacted River Side soils as on-site backfill would be made during detailed remedial design. River Side soils and sediment excavated will be transported to a Land Side temporary enclosure (likely fabric with steel supports) which will be set up for soil handling. Saturated soils and sediments will be mixed with appropriate amendments for stabilization as necessary prior to off-site transportation and disposal.

Following sediment excavation, a riprap layer will be placed in the sediment excavation areas to allow for natural re-deposition of finer grained sediments. After completion of the River Side soil excavations, the remaining soil will be re-graded as appropriate and the stream bank will be reconstructed using riprap with restoration as applicable.

#### **Underground MGP Process Piping Removal:**

Prior to land side excavation, known underground process piping associated with the former MGP will be identified, removed, appropriately decontaminated, and properly disposed off-site.

#### **Excavation and Disposal Quantities:**

Excavated soil containing visible DNAPL or solidified TLM would be transported off-site for disposal at a permitted facility. Excavated soils and sediments that are observed to contain only small amounts of solid TLM and/or traces of DNAPL will be transported off-site to a Subtitle D Landfill for disposal. Excavated soils observed to be heavily impacted by solid TLM and/or DNAPL would be transported off-site for thermal treatment and disposal. The procedures and specific criteria used to segregate soils based on disposal method will be addressed in detailed design. The AA made certain assumptions concerning the split between landfill disposal and thermal treatment/disposal (LTTD) based on general RI data. Soils excavated from horizons where DNAPL was observed was assumed to require LTTD disposal. Estimated excavation and disposal volumes are summarized as follows:

Excavation Area	Total Excavated	Total Disposed	Disposal Option (cy)		
	( <i>cy</i> )	( <i>cy</i> )	Landfill	LTTD	
River Sediment	8,000	8,000	8000	0	
River Side Soils	11,300	11,300	8500	2800	
Land Side Soils <sup>(1)</sup>	5,000	1,500	1000	500	
TOTAL	24,300	20,800	17,500	3,300	

(1) Excavation necessary to accommodate new barrier wall

#### Existing Retaining Wall/New Barrier Wall:

The existing retaining wall extends from the north perimeter of the property parallel to the river for approximately 500 feet to its terminus in the central portion of the east perimeter of the property (Figure 6). Where present, the existing wall marks the boundary between the River Side of the site and the Land Side of the site. South of the existing wall, the top of the river bank marks the boundary between the River Side and Land Side.

The existing retaining wall was built in 1913. According to available construction drawings and photographs, the existing retaining wall is constructed of steel-reinforced concrete keyed into (or sitting on) bedrock with formed-in-place concrete tiebacks extending perpendicular some 20 feet into the Land Side soils. The tops of the tiebacks occur at approximately 15 feet below grade.

Based on RI findings, the existing retaining wall presents a barrier to overburden groundwater (and DNAPL) flow.

The new barrier wall would be keyed into the top of bedrock and extend from the south terminus of the existing wall to the former intake and discharge structures for the adjacent Beebe Station. The former intake was filled during decommissioning of Beebe Station; the discharge structure is located on top of the intake and will remain open as the emergency sewer overflow for the City of Rochester. The intake/discharge concrete structure keys into bedrock to provide a continuous barrier in the lower overburden and upper bedrock and traverses the West Station property as shown on Figure 6. Appendix A contains a drawing of the former intake and discharge structures in plan and cross-sectional view. They are constructed of concrete, with the discharge overlying the intake. The intake is constructed entirely within the upper bedrock. Near the river the intake is present in the top 7 feet of bedrock and near the north end of the property it is present approximately 6 to 13 feet below top of bedrock. The discharge directly overlies the intake and extends above bedrock into the overburden approximately 10 feet near the river and approximately 4.5 feet near the west side of the Plant Area.

The design of the intake/discharge structure creates an impermeable vertical barrier in the upper bedrock and lower overburden. DNAPL was not observed during prior investigations at any location south of the intake/discharge traverse.

The new barrier wall will be approximately 360 feet in length and 30 feet high. During predesign investigation, studies will be performed to determine soil and upper bedrock conditions along the new wall alignment. The AA assumed reinforced concrete construction would be used for construction material as the barrier wall will also function as a retaining wall. The new barrier wall will be joined to the closed intake/discharge structure at the location shown approximately on Figure 6. At the junction, the "intake/discharge structure barrier wall" will extend approximately 10 feet above bedrock. The layout of the three barrier walls (existing retaining wall, new barrier wall and intake/discharge structure barrier wall) is shown on Figure 6.

#### **DNAPL Recovery:**

Although DNAPL has not yet been observed to accumulate in the monitoring wells installed during the RI, passive DNAPL recovery wells are included are included as a precaution in the event mobility conditions change. A total of 11 passive DNAPL recovery wells would be constructed specifically to facilitate DNAPL recovery. If DNAPL does not accumulate in the well, then the NAPL is not sufficiently mobile or present in sufficient quantities to move into a recovery well. As shown in Figure 6, the passive DNAPL recovery wells would be installed on the interior (Land Side) of the barrier walls. The passive recovery wells would be periodically checked in accordance with the SMP and any accumulated DNAPL would be recovered either by periodic hand bailing of wells, or by an automated system to recover passively collected DNAPL, depending on the rates of recovery observed. The recovered DNAPL would be

temporarily stored on site and then transported off site for treatment and disposal at a permitted facility. Monitoring (and potential recovery) from the DNAPL recovery wells would continue for the duration of the site Groundwater MNA Program (described below).

#### **Groundwater MNA Program:**

Groundwater monitoring wells to be used in the MNA program will be located to monitor overburden and bedrock groundwater at the site perimeter in potentially downgradient locations. The groundwater monitoring program (including well locations) would be described in detail in the SMP. The program will require annual sampling of approximately 10 monitoring wells for analysis of PAHs and BTEX with additional parameters to assess natural attenuation processes and that it will be a long term program (30 years).

#### Soil Cover:

Surface soils at the Land Side of the site will be covered with a 24-inch layer of clean imported soil (vegetated) to allow for restricted residential use of the site placed above a demarcation barrier, or pavement/existing buildings. For cost estimation, it was assumed the soil cover would be placed over the entirety of the Land Side of the site, except for Buildings 16, 17 and 18 (approximately 250,000 square feet).

#### Institutional Controls with Site Management Plan:

Institutional controls will include: Site access restrictions (maintain site fencing); and implementation of a SMP identifying soil management protocols for post-remediation development (including soil cover maintenance), DNAPL accumulation checks and removal (if any), groundwater sampling to support MNA, and groundwater and land use prohibitions (incorporated into an environmental easement as appropriate). The perimeter site security site fencing existing at the site would be augmented with appropriate signs regarding restrictions to excavation at the site. The fencing and signs would be inspected annually and a Periodic Review Report would be prepared in accordance with DER-10.

# 4. Technical Plans for Proposed Remedy

## 4.1 General

RG&E will select a remedial engineer(s) to develop the Pre-Design Work Plan, Implement Pre-Design work activity, prepare detailed design documents including plans and specifications for remedial construction, obtain necessary permits, and oversee remedy implementation by a remedial contractor. The remedial engineer will prepare periodic reports and the Final Engineering Report (FER) as described in Section 6. The remainder of this section describes various plans that will be prepared during the remedial design process to implement the remedy described in Section 3 and discusses the management of materials generated during site remediation.

## 4.2 Remedial Facilities Plan

The Remedial Facilities Plan will require the following. The site perimeter fence will be inspected and upgraded/repaired, if needed, to control site access and maintain a secure work area during remedy implementation. Underground utilities at the Plant Area will be marked prior to remedy implementation. The plan will identify contractor equipment and haul truck staging areas, soil handling and management areas, excavation and near-shore dewatering operation handling and waste water treatment areas, and facilities for contractor decontamination and restroom use. An updated site base map with site survey and topographic information will be prepared using AutoCAD Civil 3-D.

## 4.3 Pre-Design Investigation Work Plan

A Pre-Design Investigation (PDI) Work Plan will be prepared after selection of the final remedy and will describe studies, field and testing methods, and investigation activity that will provide information required for detailed design. The PDI work plan will detail work scope and include a sampling and analysis plan and will reference the Site Health and Safety Plan and Community Air Monitoring Plan (CAMP) (see below). The PDI Work Plan will address data needs described in Section 3 and, at a minimum, include the following:

- Excavation of test pits using a mini-excavator on the River side of the existing retaining wall to inspect signs of DNAPL seepage and assess the integrity of the footer.
- Soil borings to be completed along the alignment of the new barrier wall between the southern terminus of the existing barrier wall and the former Beebe Station concrete intake structure. Characterization data will be used to determine soil and upper bedrock conditions along the new wall alignment.

- Test pits to be excavated on the on the River Side of the site between the northern site boundary and the northern extent of soil excavation proposed in the AA. The test pits will be used to visually inspect soils for DNAPL/TLM presence and to facilitate the collection of soil samples. Findings will be used to define the extent of River Side soil excavation at the north end of the site.
- Surface water diversion during near shore sediment removal will require construction of a cofferdam or placement pre-cast concrete retaining block into the Genesee River. Testing will be performed of the near-shore sediments to assess boulder and cobble size materials and thickness.

## 4.4 Site Health and Safety Plan with Community Air Monitoring

A Site-specific Health and Safety Plan (HASP) is included in Appendix B. The HASP will apply to PDI and remedial construction-related work on-site. The HASP provides a mechanism for establishing on-site safe working conditions, project safety organization, procedures, and personal protective equipment requirements. The HASP meets the requirements of 29 CFR 1910 and 29 CFR 1926 (which includes 29 CFR 1910.120 and 29 CFR 1926.65). Appendix D of the HASP includes a Community Air Monitoring Plan (CAMP) for protection of the public during intrusive construction activity. The CAMP was prepared in accordance with the guidelines provided in the New York State Department of Health (NYSDOH) Generic CAMP and Occupational Safety and Health Administration (OSHA) standards for construction (29 CFR 1926). Continuous monitoring on the perimeter of the work zones for odor, VOCs, and dust will be required for ground intrusive and soil handling activities. Air monitoring stations will be established to monitor upwind and downwind Site perimeters. It is likely that an additional air monitoring station will be established on the Pont De Rennes pedestrian walkway located directly above RG&E property between the Park Area and Plant Area if public access is not restricted during remedial construction. Each station will include a photoionization detector (PID) and a DustTrak aerosol monitor or equivalent. A portable PID will be used to monitor the work zone and for periodic monitoring for VOCs during activities such as soil sampling. Action levels for the protection of the community and visitors are set forth in the CAMP. Action levels for site worker respiratory use will also be set forth in the HASP.

## 4.5 Dust, Odor, and Vapor Control Plan

A Dust, Odor, and Organic Vapor Control and Monitoring Plan (DOOVC Plan) will be developed for on-site remedial construction work activity that will meet CAMP requirements and OSHA standards for construction (29 CFR 1926) after selection of the final remedy. The DOOVC Plan will specifically address work practices to minimize dust, odors and vapors during all remediation construction activities.

Generally, the residuals encountered at former MGP sites are well defined and principally contain VOCs, polycyclic aromatic hydrocarbons (PAHs), and a number of inorganic constituents, including metal-complexed cyanide compounds, and metals. Constituents of MGP tar or petroleum products can produce odor emissions during investigation activities when they are unearthed during excavation. When this occurs, VOCs and light-end semi-volatile organic compounds (SVOCs) can volatilize into the ambient air. Some MGP residuals can cause distinctive odors that are similar to mothballs, roofing tar, or asphalt driveway sealer. It is important to note that the CAMP in Appendix D provides for continual monitoring of VOCs and particulates during the field work to monitor for any potential release of constituents which may exceed the exposure limits for downwind receptors.

To minimize the potential for dust, odor, and vapor generation, the impacted soil and sediment will be transported to a Land Side soil staging area inside a temporary enclosure (likely fabric with steel supports) which will be set up for soil handling as an engineering control to mitigate dust and odor generation. Several general excavation procedure site controls that will be implemented include:

- If encountered, every effort will be made to minimize the amount of time that impacted material is exposed to ambient air at the site.
- Loading of excavated soil for transport to the soil staging area will be completed quickly and efforts will be made to keep the soil covered at all times.
- Meteorological conditions are also a factor in the generation and migration of odors. Some site activities may be limited to times when specific meteorological conditions prevail, such as when winds are blowing away from a specific receptor.

If substantial VOCs or odors remain elevated in the work area, secondary controls will be enacted. The site manager will work through the applicable list of secondary controls until the perimeter odor issues are resolved. The site manager will work closely with RG&E and NYSDEC during this task. Final selection of controls will be dependent on field conditions encountered. Secondary controls include the following:

- For soil that may need to be stockpiled, the soil will be placed beneath temporary tarps or polyethylene covers which will be used to control odors, VOCs, and dust.
- Water may be sprayed onto dry soils to minimize the generation of dust.
- Two agents that can be sprayed over impacted soil have been determined to be effective in controlling emissions. They include odor suppressant solution (BioSolve<sup>TM</sup>), hydro mulch, and odor suppressant foam. These agents may be used where tarps cannot be

effectively deployed over the source material, or where tarps are ineffective in controlling odors:

- ✓ BioSolve<sup>™</sup> can provide immediate, localized control of odor emissions.
- ✓ Hydromulch Although it is unlikely that it will be necessary, modified hydromulch slurry may be used to cover inactive sources for extended periods of time (up to several days). The hydromulch, typically cellulose fibers (HydroSeal®), is modified by mixing a tackifier (glue) with the mulch and water to form a slurry. It is applied using a standard hydroseed applicator to a thickness of ¼ inch. The material forms a sticky, cohesive, and somewhat flexible cover. Reapplication may be necessary if the applied layer becomes desiccated or begins to crack.
- ✓ Odor Suppressant Foam Odor suppressant foam can provide immediate, localized control of odor emissions. The foam is made by the injection of air into a foam concentrate/water mixture using a Pneumatic Foam Unit (PFU). The foam is applied via a hose to cover source areas to a depth of 3 to 6 inches. Short-term foam (such as Rusmar AC-645) is recommended to control VOC and odor emissions from active excavations and stockpiles. It is shipped as a concentrate and diluted with water at the site. Under normal conditions, this foam can last between 12 to 17 hours. However, it has been observed to degrade quickly in direct sunlight, so frequent and liberal application to areas that require odor control is advisable. For longer-term odor suppression needs, such as over weekends, long-term foam (such as Rusmar AC-904, which lasts between 15 to 30 days) should be used.

Performance monitoring will be verified by action level compliance with perimeter air monitoring for VOCs and dust through implementation of the HASP and the CAMP. Action levels for site worker respiratory use are provided in the HASP.

## 4.6 Erosion and Sediment Control Plan and River Turbidity Monitoring/Sheen Response Plan

A soil erosion and sediment control plan will be prepared with the detailed design documents to describe practical and effective practices to control erosion and prevent sediment from leaving the site during soil excavation and during soil handling and management in and around the soil staging area. The control plan will include design plans and specifications for achieving a performance standard of best management practices to control and minimize soil erosion and transport during construction activity per "New York State Standards and Specifications for Erosion and Sediment Control" (July 2016).

During construction activity in the River, river turbidity monitoring and visual sheen observations will be performed. Turbidity meters equipped with an optical backscatter sensor will be used to quantify suspended sediment in surface water at upstream and downstream locations. Water quality guidelines for in-water work activities at the site will be established as a less than 50 Nephelometric Turbidity Units (NTUs) increase in downstream monitoring measurements compared to upstream monitoring measurements (above any baseline increase documented before construction). Mitigation can include activities such as slowing the rate of material placement, inspection and repair of the turbidity curtains, deployment of an additional row of turbidity curtain, or other mitigation measures deemed appropriate for the project. A surface water boom system will be deployed in conjunction with the turbidity curtain to protect the water column outside the river work zone. Inspection for visible sheen beyond the turbidity curtain and boom system will occur each day when in-water work is being performed.

Sheen observation and turbidity monitoring details, locations, frequency of monitoring, and mitigation controls will be provided in the detailed design.

## 4.7 Materials Management Plan

Certain impacted soil and water (materials) generated during remedy implementation will require off-site disposal or on-site treatment prior to disposal. A Materials Management Plan will be prepared as part of the detailed design to describe methods for screening, handling, and disposing of these materials. During the excavation activities described above, visual, olfactory and instrument-based screening will be performed by a qualified environmental professional. The impacted soil and sediment will be transported to a Land Side soil staging area inside a temporary enclosure (likely fabric with steel supports) which will be set up for soil handling as an engineering control to mitigate dust and odor generation. Saturated soils and sediments will be mixed with appropriate amendments for stabilization as necessary prior to off-site transportation and disposal.

In total, approximately 24,300 cubic yards of soil and sediment is anticipated to be excavated during the project. It is estimated that 3,500 cubic yards of Land Side excavated soil during the installation of the new barrier wall will not be grossly contaminated and can be placed under the soil cover. The remaining soil and sediment will be examined and sorted during removal activities to segregate grossly impacted soil (containing DNAPL and TLM) from other River side soils and sediments. Grossly impacted soil (estimated to be approximately 15% of soil) will be removed from the site and treated prior to disposal using off-site LTTD. Other soils will be disposed off-site at a permitted landfill.

Waste characterization samples will be collected from all remediation-derived waste as required to meet disposal facility requirements. Samples will be collected to be representative of the material to be disposed at a frequency consistent with disposal facility requirements. contaminated excavated materials will be transported to and disposed of at licensed, permitted disposal facilities. Transportation to these facilities will be via legally permitted (such as permits required in NYCRR Part 364 and NYCRR Part 360) and NYSDEC-acceptable methods. Water collected from dewatering operations will be treated on-site by a temporary waste water treatment system (WWTS). The WWTS will be designed to remove suspended solids, oil and grease, insoluble metals, VOCs, and semi-volatile organic compounds (SVOCs). The WWTS will treat water generated during excavations. WWTS effluent will be sampled and analyzed for compliance with discharge effluent limitations specified in a temporary water discharge permit and discharged back to the River.

Imported soil used as backfill in the area of the new barrier wall and used to construct the soil cover will meet requirements of 6 NYCRR 375-6.7(d) and comply with the RAOs and SCGs identified in Section 2.2.

# 4.8 Decontamination

Soil excavation and transportation equipment (haul trucks, etc.) will be decontaminated as necessary prior to exiting the Site and before handling of clean backfill material. Decontamination will consist of physically removing residual contaminated soil from the equipment using steam cleaning/pressure washing methods. A temporary decontamination pad will be constructed according to final design specifications at a location to be identified in the Remedial Facilities Plan (Section 4.2). Decontamination fluids will be collected and treated at the waste water treatment area which is to be assembled during remediation equipment mobilization. Equipment decontamination protocols will be described in the detailed design.

# 4.9 Soil Hauling and Traffic Control Plan

Remedial activities will require the off-site transport of soil in covered haul trucks (estimated to be 1700 to 1800 loads) and on-site delivery of clean soil and backfill (estimated to be 700 to 800) loads. All loading and transportation activities will be conducted in accordance with applicable federal, state, and local regulations, including but not limited to United States Department of Transportation and United States Environmental Protection Agency (USEPA) regulations 40 CFR 172-179 and New York 6NYCRR Part 364 regulations. The detailed design will include the name and location of the disposal facilities to be used. Loading activities will be managed to minimize the formation of dust, odors and vapors in accordance with the DOOVC Plan. Contaminated soil and debris transport containers shall be covered to prevent release of dust and particulates and exposure of the contaminated soil and debris to precipitation. A traffic control plan with prescribed haul routes will be prepared with the detailed design following the identification and selection of soil disposal facilities.

# 4.10 Citizen Participation Plan

The RAWP, along with a Fact Sheet approved by NYSDEC that provides a summary of the proposed remedy, will be placed in the document repository for the West Station Former MGP Site. The Fact Sheet will also be mailed to all of the entities on the Site Contact List presented in

the Citizen Participation Plan. These notifications will precede a 45-day public comment period on the proposed remedy. Subsequent to the public comment period and after addressing public comments, the NYSDEC will issue a Decision Document (DD) specifying the selected remedy for the site. RG&E will initiate design phase activities of the project within 14 days of DD issuance.

## 4.11 Site Management Plan and Environmental Easement

The Site Management Plan (SMP) will be developed near the completion of the proposed remedy, coinciding with the submission of the FER (see Section 5). The SMP will be designed to maintain the institutional and engineering controls and to provide inspection and evaluation frequencies to verify performance of the remedy. The SMP will include:

- Introduction with purpose, summary of remediation, and site conditions;
- Identification of institutional control which will be in the form of an environmental easement;
- Identification of engineering controls including: DNAPL recovery monitoring plan that includes annual inspection and review requirements, post-remediation groundwater monitoring plan, and cover soil maintenance requirements;
- Identification of the site boundaries and include by reference the SMP.

# 5. Periodic Progress Reports and Final Engineering Report

Remedial action periodic progress reports and a Final Engineering Report (FER) will be required. Based on the expected project duration (see Section 6), the periodic progress reports will be prepared monthly. The monthly progress reports will discuss significant activities during the reporting period, status of any requisite permits, and reasons for delays or problems with implementation of the remedial action. The reports will also include a discussion of pending or planned significant project activities scheduled to occur over the following two months. The progress reports will be provided by electronic media to NYSDEC's project manager.

The FER will be submitted to the NYSDEC Project Manager after completion of the remedial action. The FER will be prepared to document implementation of the complete remedial program and will be certified by a New York State Professional Engineer. The FER will summarize data and information describing the final remedial action implemented. The FER will include:

- Summary of remedial actions completed;
- Description of problems encountered and their resolutions including deviations from the final design;
- Description of changes to the design documents and rationale;
- Listing of waste streams, quantity of materials disposed, and where disposed;
- Description of source and quality of imported fill;
- Analytical data generated from environmental media sampling during the remedial activities;
- List of the remediation standards applied to the remedial actions;
- List of applicable local, regional, and national governmental permits, certificates, or other approvals obtained for the remedial work;
- As-built drawings including remediation areas and permanent structures;
- Air quality and dust monitoring data and map;
- Copies of the submitted monthly reports; and
- Copies of manifests for off-site transport of waste material.

Documents and reports submitted to the NYSDEC will be in both hard copy and in digital format on CD. These digital documents shall be in PDF form and, where appropriate, supplemented by photos. Laboratory analytical data will be submitted in an electronic data deliverable (EDD) format that complies with the NYSDEC's electronic data warehouse standards.

# 6. Schedule

A preliminary schedule for the remedial design process and remedy implementation is provided below. The schedule is presented in terms of duration to complete project phases after public acceptance of the RAWP and NYSDEC remedy selection. A final detailed schedule will be developed and included with the 50% design submittal identified below.

<b>DURATION*</b> (Months)				
Remedial Design Project Phase:				
3				
7				
12				
6				
6				
1				
Remedy Implementation Project Phase:				
24 to 30				
		9		

\* Duration includes typical regulatory agency review timeframes

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Remedial Action Work Plan RG&E West Station Plant Area Former Manufactured Gas Plant (MGP) Site Rochester, New York November 2016, Revised June 2017



#### Table 1 Comparative Ranking of Alternatives RG&E West Station MGP

		Threshold Criteria		Balancing Criteria						
Alternative	Description	Overall Protection of Human Health and the Environment	Compliance with SCGs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, & Volume Through Treatment	Short-Term Effectiveness	Implementability	Estimated Total Cost (AA accuracy +50% / -30%)	Cost Effectiveness	Land Use
1	Institutional Controls, Site Access Restriction, Site Management Plan (ICs)	9 <sup>th</sup>	9 <sup>th</sup>	9 <sup>th</sup>	9 <sup>th</sup>	1 <sup>st</sup>	1 <sup>st</sup>	\$125,700	1 <sup>st</sup>	9 <sup>th</sup>
2	ICs, Extend Existing Barrier Wall, DNAPL Recovery, Soil Cover	8 <sup>th</sup>	8 <sup>th</sup>	8 <sup>th</sup>	8 <sup>th</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	\$14,951,000	5 <sup>th</sup>	4 <sup>th</sup>
3	ICs, Extend Existing Barrier Wall, DNAPL Recovery, Soil Cover, River Side Excavation of Soil Containing DNAPL and Solid TLM, Sediment Removal from Area Defined in the RI	6 <sup>th</sup>	6 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>	3 <sup>rd</sup>	3 <sup>rd</sup>	\$30,976,000	2 <sup>nd</sup>	4 <sup>th</sup>
4	ICs, Extend Existing Barrier Wall, DNAPL Recovery, Land Side Excavation of DNAPL-Containing Soils (Limited Area), Soil Cover, River Side Excavation of Soil Containing DNAPL and Solid TLM, Sediment Removal from Area Defined in the RI	3 <sup>rd</sup>	3 <sup>rd</sup>	3 <sup>rd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	7 <sup>th</sup>	\$39,456,000	3 <sup>rd</sup>	4 <sup>th</sup>
5	ICs, Extend Existing Barrier Wall, DNAPL Recovery, Excavation of Soils on Land Side to 500 ppm TPAH with a Maximum Depth of 15 feet, Soil Cover, Excavation of Soil on River Side to 500 ppm TPH, Sediment Removal from Area Defined in the RI	6 <sup>th</sup>	6 <sup>th</sup>	6 <sup>th</sup>	6 <sup>th</sup>	5 <sup>th</sup>	3 <sup>rd</sup>	\$44,686,000	6 <sup>th</sup>	4 <sup>th</sup>
6	ICs, Extend Existing Barrier Wall, DNAPL Recovery, Excavation of Soils on Land Side to Commerical SCOs with a Maximum Depth of 15 feet, Excavation of Soil on River Side to Commerical SCOs, Sediment Removal from Area Defined in the RI	5 <sup>th</sup>	4 <sup>th</sup>	4 <sup>th</sup>	5 <sup>th</sup>	7 <sup>th</sup>	3 <sup>rd</sup>	\$52,366,000	7 <sup>th</sup>	2 <sup>nd</sup>
7	ICs, Extend Existing Barrier Wall, DNAPL Recovery, Excavation of Soils on Land Side to Unrestricted SCOs with a Maximum Depth of 15 feet, Excavation of Soil on River Side to Unrestricted SCOs, Sediment Removal from Area Defined in the RI	4 <sup>th</sup>	4 <sup>th</sup>	4 <sup>th</sup>	4 <sup>th</sup>	8 <sup>th</sup>	3 <sup>rd</sup>	\$58,346,000	9 <sup>th</sup>	1 <sup>st</sup>
8	ICs, Excavation of Soils on Land Side to Unrestricted SCOs with a Maximum Depth of 15 feet, Site Wide Excavation of DNAPL to Top of Bedrock, Excavation of Soil on River Side to Unrestricted SCOs, Sediment Removal from Area Defined in the RI	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	9 <sup>th</sup>	9 <sup>th</sup>	\$58,345,000	8 <sup>th</sup>	3 <sup>rd</sup>
9	ICs, Land Side Site-Wide Excavation of DNAPL-Containing Soils, Soil Cover, River Side Excavation of Soil Containing DNAPL and Solid TLM, Sediment Removal from Area Defined in the RI	2 <sup>nd</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	6 <sup>th</sup>	8 <sup>th</sup>	\$41,875,000	4 <sup>th</sup>	4 <sup>th</sup>

#### Comparative Ranking:

Shaded Alternative achieved highest score from analysis of alternatives -

1st - Ranked First, Best Duplicate ranks indicate equivalent ranking.



Remedial Action Work Plan RG&E West Station Plant Area Former Manufactured Gas Plant (MGP) Site Rochester, New York November 2016, Revised June 2017











![](_page_56_Figure_4.jpeg)

![](_page_57_Figure_0.jpeg)

![](_page_58_Picture_0.jpeg)

![](_page_59_Figure_0.jpeg)

on\_GDS

![](_page_60_Picture_1.jpeg)

![](_page_61_Figure_0.jpeg)

# Appendix A

Former River Water Intake/Beebe Station Discharge Tunnel Drawing

![](_page_63_Figure_0.jpeg)

Rock.Elev.Found		
General Layout d		
Details of New		
Sectional Elev. Co		

# Appendix B

Health and Safety Plan with Community Air Monitoring Plan

![](_page_65_Picture_0.jpeg)

![](_page_65_Picture_1.jpeg)

Geotechnical Environmental Water Resources Ecological

# Health and Safety Plan and Community Air Monitoring

RG&E West Station Plant Area Rochester, New York Site No. V00593-8 Index No. B-0535-98-07

#### Prepared For:

Rochester Gas and Electric Rochester, New York

Submitted by: GEI Consultants, Inc., P.C. 90B John Muir Drive Suite 104 Amherst, New York 14228

November 2016

Project No. 128480

![](_page_65_Picture_10.jpeg)

Rilligge

Richard H. Frappa, P.G. Project Manager

zh.

Steven Hawkins, CSP Regional Health and Safety Officer

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- A Map to Hospital and Occupational Health Clinic
- B Safety Data Sheets
- C Heat and Cold Stress Guidelines
- D Community Air Monitoring Plan

# 1. Emergency Contact Information

Important Pho	one Numbers	Directions to Hospital
Local Police:	911	To Hospital and Occupational Health
Fire Department:	911	Clinic:
Ambulance:	911	See Attached Mans and Directions in
State Police or County Sheriff:	911	Appendix A
Strong Memorial Hospital 601 Elmwood Ave Rochester, NY 14642 OnSite Occupational Health Services 400 Air Park Dr. #90	(585) 275-9555 (585) 235-3890	Strong Memorial Hospital(3.6 mi – about 13 min.)Start at foot of Falls Street1. Head south on Falls St. TowardBrown St. (440 ft)2. Take For St. and Mot Hope Ave toCrittenden Blvd (3.3 mi)
Project Manager: TBD Corporate Health and Safety	# cell # cell	3. Continue on Crittenden Blvd to destination     End at 601 Elmwood Ave Rochester, NY 14642
Officer : TBD		OnSite Occupational Health Services: (6.8 mi – about 10 min.)
Client Contact: Christopher Keipper	(585) 771-4560 office (585) 363-3204 cell	<ol> <li>Start at foot of Falls Street</li> <li>Head south on Falls St. Toward Brown St. (440 ft)</li> <li>Turn right on Brown Street and Merge onto I-490 West (0.7 mi)</li> <li>Continue on I-490 West to I-390 S (5.4 mi)</li> <li>Take Exit 17 and merge onto NY- 383 South/ Scottsville Rd. (0.2 mi).</li> <li>Continue on NY-383 South/ Scottsville Rd. (0.5 mi.)</li> <li>Turn left on Airpark Dr. (440 ft). Destination will be on the left.</li> <li>End at 400 Air Park Dr. #90 Rochester, NY 14624</li> </ol>

# Table 1. Emergency Information

Health and Safety Plan and Community Air Monitoring RG&E West Station Plant Area Rochester, New York Site No. V00593-8 November 2016

# 2. Background Information

## 2.1 General

Engineer TBD

Project NameRG&E West Station Plant AreaRochester, New York

This Health and Safety Plan (HASP) establishes policies and procedures to protect personnel from the potential hazards posed by the activities at the RG&E West Station Plant Area (Site). Reading of the HASP is required of on-site personnel and will be reviewed by subcontractors. Subcontractors will prepare their own Site-specific HASP and may use this as a guide. The plan identifies measures to minimize accidents and injuries, which may result from project activities or during adverse weather conditions. A copy of this HASP will be maintained on site for the duration of the work.

Included in Section 1 and Appendix A is a route to the nearest medical facility from the Site with directions and contact information. Safety data sheets (formerly known as Material Safety Data Sheets [MSDS]), specific to chemicals that may be encountered while working at the Site, are in Appendix B. Appendix C details the signs, symptoms, care and procedures to both heat and cold stress. Appendix D specifies Community Air Monitoring requirements.

## 2.2 Site Description

The West Station Site is a former MGP located at 254 Mill Street in Rochester, Monroe County, New York (Figure 1). The Site is presently owned by RG&E and is bounded by RG&E Power Station No. 3 (Beebe Station electric generation plant) situated on Mill Street and Falls Street to the west, the former City of Rochester trash incinerator plant to the north, the Genesee River to the east, and the Platt Street Bridge on the south. The area of the Site south of the Platt Street Bridge was called the "Park Area" of the West Station Site (which was remediated by RG&E in accordance with VCA Index No. D8-0001-95-10), while the remaining portion of the West Station Site was referred to as the "Plant Area". The former MGP processes were located on the Plant Area portion of the Site and encompass approximately 7 acres. For the purposes of defining areas of the Site targeted for characterization and remediation, the Plant Area is discussed in terms of "land side" and "river side" which are separated by a concrete barrier wall in the northern portions of the property and by buildings/structures and a stone wall at the southern end of the property.

The Site is relatively flat, with an average ground elevation of approximately 412 feet above mean sea level (feet msl). Several buildings and structures owned by RG&E remain on the property.

# 2.3 Project Description

The Remedial Action (RA) for the West Station Plant Area will initially consist of a predesign effort, which will include:

- characterization of soil and sediments on the Genesee River side of the Site;
- limited excavation of soils adjacent to the existing concrete retaining wall to assess its integrity, and;
- exploratory soil borings completed along the alignment of a new concrete barrier wall to be constructed during the implementation of the remedy.

Information derived from pre-design information will be used to guide the implementation of the remedy which will include;

- excavation, stabilization/dewatering and disposal of Genesee River sediments and river-side soils;
- Removal of former processing piping associated with the former MGP;
- Excavation and disposal of land-side soils;
- Construction of a new concrete barrier wall which will tie into the existing concrete barrier wall;
- Installation of DNAPL recovery wells, and;
- Placement of a 12-24" thick cover soil across the Site.
# 3. Statement of Safety and Health Policy

Safety policy and procedure on any one project cannot be administered, implemented, monitored, and enforced by any one individual. The total objective of a safe, accident free work environment can only be accomplished by a dedicated, concerted effort by every individual involved with the project from management down to all employees.

Each employee must understand their value to the company; the costs of accidents, both monetary, physical, and emotional; the objective of the safety policy and procedures; the safety rules that apply to the safety policy and procedures; and what their individual role is in administering, implementing, monitoring, and compliance of their safety policy and procedures. This allows for a more personal approach to compliance through planning, training, understanding, and cooperative effort, rather than by strict enforcement. If for any reason an unsafe act persists, strict enforcement will be implemented.

Health and Safety Plan and Community Air Monitoring RG&E West Station Plant Area Rochester, New York Site No. V00593-8 November 2016

# 4. Hazard/Risk Analysis

Physical hazards associated with drilling, excavation, and construction may be present. These activities would require the use of heavy equipment by subcontractors such as drill rigs and excavators during excavation and characterization activities. Potential hazards include, but are not limited to, the following:

- bodily injuries
- slipping, tripping or falling
- falling into water (drowning)
- heavy lifting
- being struck by machinery or falling objects

The Contractor should verify that electric, gas, water, steam, sewer, and other service lines are shut off, capped, or otherwise controlled, at or outside the building before remedial action work is started. In each case, any utility company that is involved should be notified in advance by the Remediation Contractor, and its approval or services, if necessary, will be obtained.

Smoking is prohibited at the facility per RG&E requirements.

### 4.1 Personal Safety

Field activities have the potential to take employees into areas which may pose a risk to personal safety. The following website (source) has been researched to identify potential crime activity in the area of the project:

• <u>www.cityrating.com/crimestatistics.asp</u>: Crime in Rochester, NY is significantly above both the New York State and National averages

To protect yourself, take the following precautions:

- If deemed necessary by the PM, use the buddy system (teams of a minimum of two persons present);
- Let the Site Safety Officer (SSO) know when you begin work in these areas and when you leave;
- Call in regularly;
- Pay attention to what is going on around you; and

• If you arrive in an area and it does not look safe to get out of your vehicle, lock the doors and drive off quickly but safely.

Employees must not knowingly enter into a situation where there is the potential for physical and violent behaviors to occur. If employees encounter hostile individuals or a confrontation develops in the work area, suspend work activities, immediately leave the area of concern, and contact local 911 for assistance. Notify the SSO and Corporate Health and Safety Officer (CHSO) of any incidents once you are out of potential danger.

In the event of an emergency, prompt communications with local emergency responders is essential. At least one charged and otherwise functioning cell phone to facilitate emergency communications will be on-site. Confirmation of cellular phone operation will be confirmed at the start of each working day.

## 4.2 Activity Hazard Analysis

The potential hazards for this project associated with site conditions and activity hazards associated with on-site activities have been identified in Table 2. General hazards and control measures that are applicable to all site activities are identified in the General Hazards section. The site-specific tasks, potential hazards, and control measures established to reduce the risk of injury or illness are identified in the Activity Hazard section of Table 2. Health and Safety SOPs for routine hazards and common site conditions are referenced in the table below.

#### Table 2. Activity Hazard Analysis

General Hazards These Hazards Apply to All Site Activities	Control Measure
<b>Chemical / Contaminant Exposure –</b> Skin and eye injury/irritation	<ul> <li>Wear protective coveralls (e.g. Tyvek <sup>®</sup>) with shoe covers, safety glasses, face shield, Nitrile gloves.</li> <li>Dispose of gloves after use and wash hands.</li> <li>Avoid contact with pooled liquids and limit contact with contaminated soils/groundwater.</li> </ul>

General Hazards These Hazards Apply to All Site Activities	Control Measure
<b>Cold Stress –</b> Нуроthermia, Frostbite	<ul> <li>Take breaks in heated shelters when working in extremely cold temperatures.</li> <li>Drink warm liquids to reduce the susceptibility to cold stress.</li> <li>Wear protective clothing (recommended three layers: an outside layer to break the wind, a middle layer to provide insulation, and an inner layer of cotton of synthetic weave to allow ventilation).</li> <li>Wear a hat and insulated boots.</li> <li>Keep a change of dry clothing available in case clothes become wet.</li> <li>Do heavy work during the warmer parts of the day and take breaks from the cold.</li> <li>If possible shield work areas from drafts of wind and use insulating material on equipment handles when temperatures are below 30°F</li> <li>Watch for symptoms of cold stress. (see Appendix C in HASP)</li> </ul>
Driving	<ul> <li>Employees must wear their safety belt while in a moving vehicle.</li> <li>Vehicle accidents will be reported.</li> <li>Vehicles will be properly maintained and safely operated.</li> <li>Employees will follow safe driving behaviors, which include limiting distractions such as manipulating radios or other equipment that may cause a distraction. Employees should not exceed the posted speed limit and should maintain a safe distance between other vehicles.</li> <li>Use defensive driving techniques.</li> <li>Driving distance and time after a 12-hour shift should not exceed 30 miles or 30 minutes (whichever is greater).</li> <li>See SOP HS-004</li> </ul>
Dusty Conditions –	Avoid travel at extreme times
Eye and respiratory irritation	Wear protective gear – dust masks, safety glasses

General Hazards These Hazards Apply to All Site Activities	Control Measure
<b>Heat stress –</b> Fainting, Fatigue, Heat Stroke	<ul> <li>Increase water intake while working.</li> <li>Increase number of rest breaks and/or rotate workers in shorter work shifts. Rest in cool, dry areas.</li> <li>Watch for signs and symptoms of heat exhaustion and fatigue.</li> <li>Plan work for early morning or evening during hot months.</li> <li>Use ice vests when necessary.</li> <li>In the event of heat stroke, bring the victim to a cool environment and initiate first aid procedures.</li> </ul>
Inclement Weather	<ul> <li>Listen to local forecasts for warnings about specific weather hazards such as tornados, thunder storms, and flash floods.</li> <li>If the storms produce thunder and/or lightning, leave the work area immediately and move to a safe area.</li> <li>Discuss an action plan prior to the severe weather.</li> <li>Wear appropriate PPE for the type of weather that could be encountered.</li> <li>Stop work until conditions are suitable. Take cover in vehicles or shelter as appropriate.</li> <li>See SOP HS-010</li> </ul>
<b>Insects –</b> Bites, Stings, Allergic Reactions	<ul> <li>Apply insect repellent prior to performing field work and as often as needed throughout the work shift</li> <li>Wear proper protective clothing (work boots, socks and light colored clothing)</li> <li>Wear shoes, long pants with bottoms tucked into boots or socks, and a long-sleeved shirt when outdoors for long periods of time, or when many insects are most active (between dawn and dusk).</li> <li>When walking in wooded areas, avoid contact with bushes, tall grass, or brush as much as possible</li> <li>Field personnel who may have insect allergies should have bee sting allergy medication on site and should provide this information to the SSO and the CHSO prior to commencing work.</li> <li>Field personnel should perform a self-check at the end of the day for ticks.</li> <li>See SOP HS-001</li> </ul>
Noise	<ul> <li>See SOP HS-001</li> <li>Maintain distance from the source of the noise.</li> <li>Wear appropriate hearing protection when working in load environments.</li> </ul>

General Hazards These Hazards Apply to All Site Activities	Control Measure		
<b>Physical Injury –</b> Slips, Trips and Falls	<ul> <li>Wear PPE that properly fits, is in good condition and appropriate for the activities and hazards.</li> <li>Maintain good visibility of the work area.</li> <li>Avoid walking on uneven, steeply sloped or debris ridden ground surfaces.</li> <li>Plan tasks prior to preforming them including an activity hazard analysis.</li> <li>Keep trafficked areas free from slip/trip/fall hazards.</li> <li>Maintain weed growth in sampling areas, especially on slopes.</li> <li>Wear shoes with traction.</li> <li>Avoid traversing steep areas in slippery conditions.</li> <li>Do not carry heavy objects to sampling areas, on steeply sloped areas, or where steep areas must be traversed to arrive at sample points.</li> </ul>		
Repetitive Motion Injury -	Take regular breaks and do not work in unusual		
Standing, Squatting, and Bending Over	<ul><li>positions for long periods of time.</li><li>Walk and stretch between tasks.</li></ul>		
Unsecured or High Crime Areas	<ul> <li>Be aware of your surroundings.</li> <li>Use the buddy system. Do not remain on site alone. Accompany or be accompanied by others to vehicles.</li> <li>Request police detail when appropriate.</li> <li>Let the Site Safety Officer (SSO) know when you begin work in these areas and when you leave.</li> <li>Call in regularly.</li> <li>If you arrive in an area and it does not look safe to get out of your vehicle, lock the doors and drive off quickly but safely.</li> </ul>		

General Hazards These Hazards Apply to All Site Activities	Control Measure
<b>Utilities –</b> Shock, Electrocution, Fire, Explosion	<ul> <li>A thorough underground utility survey must be conducted prior to intrusive activities. Coordination with utility locating services, property owner(s) or utility companies must be conducted.</li> <li>Utilities are to be considered live or active until documented otherwise.</li> <li>For overhead utilities within 50 feet, determine with the utility company the appropriate distance. Minimum distance for clearance is based on voltage of the line.</li> <li>If exposing a utility, proper support and protection must be provided so that the utility will not be damaged.</li> <li>If a gas line is contacted, the contractor must notify police, fire, and emergency personnel, and evacuate employees according to the site evacuation procedures. No attempt should be made to tamper with or correct the damaged utility.</li> <li>See SOP HS-014</li> </ul>
<b>Vehicular Traffic –</b> Struck by injury, crushing	<ul> <li>Increase visibility of the work area to others by using cones, flags, barricades, proper lighting and caution tape to define work area.</li> <li>Use a "spotter" to locate oncoming vehicles.</li> <li>Use vehicle to block work area.</li> <li>Engage police detail for all work conducted in appropriate areas.</li> <li>Wear high-visibility, reflective vest at all times.</li> <li>Maintain minimum DOT defined distances to other traffic lanes.</li> <li>See SOP HS-016.</li> </ul>

Activity	Potential Hazard	Control Measures
Boating/Barge/ Near Shore Work	Drowning, fall hazards, pinch points, hypothermia	<ul> <li>Use caution when boarding the boat/barge.</li> <li>Establish a safe area for boarding and de-boarding.</li> <li>Do not stand in the boat. Avoid sudden movements.</li> <li>Stay away from the edge of the boat/barge.</li> <li>Wear a PDF at all times when on the water.</li> <li>Have an extra set of clothing in case of drenching/soaking to prevent hypothermia.</li> <li>See SOP HS-017</li> </ul>

Activity	Potential Hazard	Control Measures					
Construction Site Entry	Struck-by, caught-in- between equipment, crushing, pinch points	<ul> <li>Wear hardhat; high visibility reflective safety vest; steel-toed, steel-shank boots or (electrical hazard) EH-rated safety boots with composite toe and shank; safety glasses; nitrile/neoprene gloves; and earplugs.</li> <li>Identify yourself and your work location to heavy equipment operators, so they may incorporate you into their operations.</li> <li>Coordinate hand signals with operators.</li> <li>Stay Alert! Pay attention to equipment backup alarms and swing radii.</li> <li>Wear a high-visibility, reflective vest when working near equipment or motor vehicle traffic.</li> <li>Position yourself in a safe location when filling out logs talking with the contractor.</li> <li>Notify the contractor immediately if any problems arise.</li> <li>Do not stand or sit under suspended loads or near any pressurized equipment lines.</li> <li>Do not operate cellular telephones in the vicinity of heavy equipment operation.</li> </ul>					
Dense Non- Aqueous Phase Liquid (DNAPL) Gauging and Recovery	Contaminant Exposure, Repetition, Slips/Trips/Falls	<ul> <li>Wear proper PPE during sampling including Tyvek or Tyvek apron with sleeves, Nitrile gloves, and face shield/safety glasses.</li> <li>Take regular breaks and do not work in unusual positions for long periods of time.</li> <li>Keep trafficked areas free from slip/trip/fall hazards.</li> </ul>					
Drilling Oversight/ Sampling	Contaminant Exposure, Noise, Contact with Utilities, Cuts/Scrapes, Heavy Lifting, Repetition, Slips/Trips/Falls	<ul> <li>Wear hardhat; high visibility reflective safety vest; steel-toed, steel-shank boots or composite toe and shank; safety glasses; Nitrile/neoprene gloves; and earplugs.</li> <li>Confirm utility locate has been completed.</li> <li>Confirm adequate clearance from overhead utilities.</li> <li>Dispose of gloves after use and wash hands.</li> <li>Take regular breaks and do not work in unusual positions for long periods of time.</li> <li>Keep trafficked areas free from slip/trip/fall hazards.</li> </ul>					
Drum Handling	Contaminant Contact • Cuts or Abrasions Heavy Lifting , Slips/Trips/Falls	<ul> <li>Wear proper PPE during sampling including nitrile gloves and safety glasses and face shield as appropriate.</li> <li>Use proper dollies or drum moving tools.</li> <li>Use applicable tools to open/close drum lids.</li> <li>Do not handle drums with bulging sides.</li> <li>Dispose of gloves after use and wash hands.</li> <li>Wear work gloves over nitrile gloves.</li> <li>Use proper lifting techniques.</li> <li>Ask fellow worker for help.</li> <li>Keep trafficked areas free from slip/trip/fall hazards.</li> </ul>					

Activity	Potential Hazard Control Measures				
Excavation and Trenching Oversight	Crushing, entrapment, falls	<ul> <li>Prior to excavating, determine utility locations and have locations marked by utility companies and the property owner.</li> <li>Utilities shall be properly supported and barriers should be erected around excavations in remote areas.</li> <li>Backfill temporary excavations when work is completed.</li> <li>Personnel must remain 2 feet from the face of the excavation.</li> <li>Sides, slopes, and faces shall meet OSHA requirements.</li> <li>Excavation entry will be allowed only with proper sloping or shoring.</li> <li>See SOP HS-006</li> </ul>			
Groundwater/ DNAPL Sampling	Contaminant Exposure, Heavy Lifting, Repetition, Slips/Trips/Falls	<ul> <li>Wear hardhat; high visibility reflective safety vest; steel-toed, steel-shank boots or composite toe and shank; safety glasses and Nitrile/neoprene gloves.</li> <li>Dispose of gloves after use and wash hands.</li> <li>User proper lifting techniques.</li> <li>Take regular breaks and do not work in unusual positions for long periods of time.</li> <li>Keep trafficked areas free from slip/trip/fall hazards.</li> </ul>			
Heavy Lifting	Back injury, knee injury	<ul> <li>Use proper lifting techniques.</li> <li>Ask fellow worker for help.</li> <li>Use a mechanical lifting device or a lifting aid where appropriate.</li> <li>If you must lift, plan the lift before doing it.</li> <li>Check your route for clearance.</li> <li>Bend at the knees and use leg muscles when lifting.</li> <li>Use the buddy system when lifting heavy or awkward objects.</li> <li>Do not twist your body while lifting.</li> </ul>			
Heavy Equipment – Working Near	Struck-by, caught-in- between equipment, crushing, pinch points	<ul> <li>Wear hardhat; high visibility reflective safety vest; steel-toed, steel-shank boots or (electrical hazard) EH-rated safety boots with composite toe and shank; safety glasses; nitrile/neoprene gloves; and earplugs.</li> <li>Identify yourself and your work location to heavy equipment operators, so they may incorporate you into their operations.</li> <li>Coordinate hand signals with operators.</li> <li>Stay Alert! Pay attention to equipment backup alarms and swing radii.</li> <li>Wear a high-visibility, reflective vest when working near equipment or motor vehicle traffic.</li> <li>Position yourself in a safe location when filling out logs talking with the contractor.</li> <li>Notify the contractor immediately if any problems arise.</li> <li>Do not stand or sit under suspended loads or near any pressurized equipment lines.</li> <li>Do not operate cellular telephones in the vicinity of heavy equipment operation.</li> </ul>			

Activity	Potential Hazard	Control Measures				
Mobile Equipment Use	Falls, crushing	<ul> <li>Inspect equipment prior to use.</li> <li>Use equipment in accordance with manufacturer's specifications and instructions.</li> <li>Wear appropriate PPE including: hard hat, gloves, steel toed/shank safety boots, safety glasses and high visibility reflective clothing.</li> <li>Unauthorized personnel will not be permitted to ride on equipment unless it is equipped to accommodate passengers safely.</li> <li>The operator will make sure the warning signal is operating when the equipment is backing up.</li> <li>Wear seat belts and adjust them for a proper fit.</li> <li>See SOP HS-021</li> </ul>				
Soil Sampling/Soil Vapor Sampling	<ul> <li>Contaminant Exposure, Cuts/Scrapes, Heavy Lifting, Repetition, Slips/Trips/Falls</li> <li>Wear hardhat; high visibility reflective safety vest; steel-toed, st shank boots or composite toe and shank; safety glasses; Nitrile/neoprene gloves; and earplugs as necessary.</li> <li>Dispose of gloves after use and wash hands.</li> <li>Wear work gloves over nitrile gloves.</li> <li>Excavation entry will be allowed only with proper sloping or sh Take regular breaks and do not work in unusual positions for loperiods of time.</li> </ul>					
Waste Characterization	Contaminant Contact Cuts or Abrasions, Slips/Trips/Falls	<ul> <li>Wear proper PPE during sampling including nitrile gloves and safety glasses.</li> <li>Dispose of gloves after use and wash hands.</li> <li>Wear work gloves over nitrile gloves.</li> <li>Keep trafficked areas free from slip/trip/fall hazards.</li> </ul>				
Working near Water	<ul> <li>While working near water stay inside guard rails and or barriers.</li> <li>While working out of out of safety zones a personal flotation device (PFD) must be worn at all times and an approved 30-inch ring buoys will be readily available for emergency rescue operations.</li> <li>Use appropriate fall protection.</li> <li>Buddy system shall be in use.</li> <li>See SOP HS-017</li> </ul>					

Personal Protective Equipment (PPE) is the initial level of protection based on the activity hazards and Site conditions which have been identified. Upgrades to respiratory protection may be required based on the designated Action Levels found in Section 9. General on-site provisions will include: extra nitrile, leather, and/or Kevlar gloves, extra protective coveralls (e.g. Tyvek®) with boot covers, drinking water and electrolyte fluids, reflective vest, first aid kit, fire extinguisher, hearing protection, and washing facilities.

If Site conditions suggest the existence of a situation more hazardous than anticipated, the Site personnel will evacuate the immediate area. The hazard, the level of precautions, and the PPE will then be reevaluated with the assistance and approval of the CHSO and the Project Manager.

### 4.2.1 Handling Drums and Containers

Regulations for handling drums and containers are specified by Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.120(j). Potential hazards associated with handling drums include vapor generation, fire, explosions, and possible physical injury. Handling of drums/containers during the Site investigation and remediation activities may be necessary. If drum/container handling is necessary, it will be performed in accordance with applicable regulations.

#### 4.2.2 Electrical Hazards

#### 4.2.2.1 Utilities

The Site may have shallow, buried utilities and also overhead utilities in certain areas. It will be necessary for parties disturbing the existing ground surface and conducting operations with heavy equipment having high clearances to exercise caution in performing projectrelated work with respect to the presence of utilities. Utility companies with active, buried lines in the Site area will be asked by the Contractor performing intrusive activities to mark their facilities. Employees will use these data to choose work locations.

#### 4.2.2.2 Underground Utilities

No excavating, drilling, boring, or other intrusive activities will be performed until an underground utility survey, conducted by knowledgeable persons or agencies, has been made. This survey will identify underground and in-workplace utilities such as the following:

- Electrical lines and appliances;
- Telephone lines;
- Cable television lines;
- Gas lines;
- Pipelines;
- Steam lines;
- Water lines;
- Sewer lines; and/or
- Pressurized air lines.

The location of utilities will be discussed with employees and subcontractors during a Site Safety Briefing. Identified utilities should be marked or access otherwise restricted to avoid chance of accidental contact.

Even when a utility search has been completed, drilling, boring, and excavation should commence with caution until advanced beyond the depth at which such utilities are usually located. Utilities will be considered "live" or active until reliable sources demonstrate otherwise.

#### 4.2.2.3 Overhead Utilities

Overhead transmission and distribution lines will be carried on towers and poles which provide adequate safety clearance over roadways and structures. Clearances will be adequate for the safe movement of vehicles and for the operation of construction equipment.

Overhead or above-ground electric lines should be considered active until a reliable source has documented them to be otherwise. Elevated work platforms, ladders, scaffolding, manlifts, and drill or vehicle superstructures will be erected a minimum of 20 feet (the actual distance is dependent upon the voltage of the line) from overhead electrical lines until the line is de-energized, grounded, or shielded so arcing cannot occur between the work location or superstructure.

#### 4.2.3 Excavations and Trenches

The safety requirements for excavations and trenches must be determined by a competent person who is capable of identifying existing and predictable hazards and work conditions that are unsanitary, hazardous, or dangerous to staff. The competent person must also have the authorization to take prompt corrective measures to eliminate unsatisfactory conditions.

The following are general requirements for work activities in and around excavations:

- Prior to initiation of excavation activity (or ground intrusive activity, such as drilling), the location of underground installations will be determined. The <One-Call/Dig-Safe> center will be contacted by the Contractor/Subcontractor a minimum of 72 hours prior to excavation activities. It may also be necessary to temporarily support underground utilities during excavation. When excavations approach the estimated location of underground installations, the exact location of the underground installations will be determined by means that are safe for field staff, i.e., hand dig, test pits, etc.
- Excavations should be inspected daily by the excavating company's competent person prior to commencement of work activities. Evidence of cave-ins, slides, sloughing, or surface cracks or excavations will be cause for work to cease until necessary precautions are taken to safeguard employees.

- Excavated and other materials or equipment that could fall or roll into the excavation, and vehicular traffic and heavy equipment will be placed at least 5 feet from the edge of the excavation.
- Excavation operations will cease immediately during hazardous weather conditions such as high winds, heavy rain, lightning, and heavy snow.

Employees will refer to the Excavation Safety SOP for further information.

## 4.2.4 Fire and Explosion

The use of a boat engine, drill rig, and tools that are gasoline powered presents the possibility of fire and explosion hazards. Underground/underwater utility lines also present fire and explosion hazards. Prior to the start of any work, all underground utilities and piping that may pose a potential hazard will be identified and located. The One Call center (Dig Safely,NY) will be called and underground utilities will be located and marked in OU-1, OU-3 and along the shoreline, and their orientation under the river will be determined. In the event a pipe or line is struck, work will stop and the emergency response plan will be implemented.

When conducting excavating activities, the opportunity for encountering fire and explosion hazards exists from contamination in soil and the possibility of free product in underground structures and pipelines. Additionally, the use of diesel-powered excavating equipment could present the possibility of encountering fire and explosion hazards.

### 4.2.5 Heat Stress

Employees may be exposed to the hazards associated with heat stress when ambient temperatures exceed 70°F. Employees should increase water intake while working in conditions of high heat. Enough water should be available so that each employee can consume 1 quart of water per hour. In addition, they should increase number of rest breaks and/or rotate employees in shorter work shifts. Employees should rest in cool, dry, shaded areas for at least 5 minutes. Employees should not wait until they feel sick to cool down. Watch for signs and symptoms of heat exhaustion and fatigue. In the event of heat stroke, bring the victim to a cool environment, call for help, and initiate first aid procedures

The procedures to be followed regarding avoiding heat stress are provided in Appendix C – Heat Stress Guidelines.

### 4.2.6 Cold Stress

Employees may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia,

as well as slippery surfaces, brittle equipment, and poor judgment. The procedures to be followed regarding avoiding cold stress are provided in Appendix C – Cold Stress Guidelines.

## 4.2.7 Noise

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps, and generators. Employees who will perform suspected or established high noise tasks and operations will wear hearing protection. If deemed necessary by the SSO, the CHSO will be consulted on the need for additional hearing protection and the need to monitor sound levels for Site activities. Other employees who do not need to be in proximity of the noise should distance themselves from the equipment generating the noise.

### 4.2.8 Hand and Power Tools

In order to complete the various tasks for the project, personnel may use hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Work gloves, safety glasses, and hard hats will be worn by the operating personnel when using hand and power tools and Ground Fault Circuit Interrupter (GFCI)-equipped circuits will be used for power tools.

### 4.2.9 Slips, Trips, and Falls

Working in and around the Site may pose slip, trip, and fall hazards due to slippery and uneven surfaces. Excavation at the Site may cause uneven footing in trenches and around the soil piles. Steep slope and uneven terrain conditions at the Site are also a primary concern. Field employees will wear proper foot gear and will employ good work practice and housekeeping procedures to minimize the potential for slips, trips, and falls.

# 4.2.10 Manual Lifting

Manual lifting of objects and equipment may be required. Failure to follow proper lifting technique can result in back injuries and strains. Employees should use a buddy system and/or power equipment to lift heavy loads whenever possible and should evaluate loads before trying to lift them (i.e., they should be able to easily tip the load and then return it to its original position). Carrying heavy loads with a buddy and proper lifting techniques include: 1) make sure footing is solid; 2) make back straight with no curving or slouching; 3) center body over feet; 4) grasp the object firmly and as close to your body as possible; 5) lift with legs; and 6) turn with your feet, don't twist.

### 4.2.11 Projectile Objects and Overhead Dangers

Overhead dangers, including but not limited to falling debris and equipment, can occur while operating drill rigs and demolition equipment. Field employees will maintain a minimum distance from large overhead operations and to maintain proper communication with heavy equipment operators and their handlers, should work necessitate their presence beyond the minimum safety distance. Proper PPE will be worn during these types of activities including steel-toed/shank boots, safety vests, and hard hats.

## 4.2.12 Cuts and Lacerations

The core sampling program may require employees to use powered cutting tools (circular saw or shears) or a hooked knife to cut open the sample liner. Safety box cutters will be utilized for routine operations such as opening boxes of supplies or cutting rope or string. When using cutting tools, follow the safety precautions listed below:

- Keep free hand out of the way.
- Secure work if cutting through thick material.
- Use only sharp blades; dull blades require more force that results in less knife control.
- Pull the knife through the object and away from your body; pulling motions are easier to manage.
- Do not put the knife in your pocket.
- Wear leather or Kevlar® gloves when using knives or blades, or when removing sharp objects caught or dangling in sampling gear.

### 4.2.13 Working with Ladders and on Scaffolding

Field staff may be required to use ladders or scaffolding to access equipment of work areas. SOPs for working with ladders (SOP No. HS-011) and scaffolding (SOP No. HS-019) should be followed. The SOPs should be reviewed in the project planning stage and at the project execution stage.

For each project/task the proper ladder needs to be selected. Prior to each use, a ladder needs to be inspected and used in accordance with 29 CFR 1926.1053, as applicable. Copies of the standards will be kept on file.

If work on scaffolding is required, it will be performed in accordance with 29 CFR 1926.451, as applicable. Copies of the standards will be kept in the project file. Work on scaffolds will not be performed without first notifying and receiving approval from the CHSO. A competent person should supervise the erection, modification, and disassembly of scaffolds.

#### 4.2.14 Working Near Water

The buddy system will be used when working near water, in which two persons operate as a single unit in order to monitor and assist each other in performing tasks. Personnel must be attired in a United States Coast Guard (USCG)-approved Type III or Type V work vest. The vest must be properly sized for the individual and must be secured. A throwable rescue device (Type IV personal flotation device [PFD] flotation aid) along with whatever equipment (i.e., ladders, lifting gear, or rescue boat) necessary will be immediately available to recover an individual from the water.

Waders may not be worn when working along, over, or in moving waters; or in waters influenced by tides or acted upon by waves when water depths exceed knee height unless specifically approved by the CHSO. Waders may be worn in still waters and in water depths up to the waist, if bottom conditions are firm and well understood. Waders should never be worn aboard a watercraft.

Take special care on slippery rocks along shorelines, lakeshores, riverbanks, and creeks. Always look ahead at the ground when walking around the water's edge and avoid stepping on stones that have algal growth, especially those in intertidal areas, as these are extremely slippery. Employees should limit access to areas where these slip/fall hazards exists, especially in locations containing tidal water flow.

#### 4.2.15 Boating Safety

#### 4.2.15.1 Person Overboard

If someone falls overboard, the remaining personnel on the vessel will:

- Immediately throw anything that floats overboard to mark the position of the person.
- Throw a life ring (Type IV PFD) overboard as close to the person as possible.
- Notify the captain "Man Overboard" and on which side of the vessel.
- Post a lookout to keep the person in sight. This person should try to make their way to the captain to assist him in bringing the vessel to the person in the water.
- Maneuver the vessel to pick up the person in the water. When the captain has the person in sight, he will release the deckhand to rig the rescue ladder.
- Have the life ring with line attached ready to throw near the person so they may be pulled to the boat.
- Notify boats in the area by radio on that you have a person in the water.

- Have a crew member attach a safety line to themselves and stand by to go in the water (ONLY IF NECESSARY).
- If the person is not located immediately, radio the USCG and other vessels in the area.
- Continue search until relieved by the USCG.

#### 4.2.15.2 Severe Weather

If severe weather is approaching, the decision to return to a pier or secure location at the shore of the creek will be made in a manner as to allow adequate time for the boat to return and personnel to evacuate. The location where the boat will dock is to be determined by its location in the body of water and the severity of the weather. The person in command of the vessel will make the final decision regarding movement of the boat. Equipment will be lashed securely to the deck of the boat and personnel will evacuate the boat to a place of safety. The vessel captain will make the final decision for actions taken due to changing weather conditions.

The captain is responsible for:

- Closing watertight and weather-tight doors, hatches and windows to prevent taking on water.
- Keeping bilges dry to prevent loss of stability.
- Keeping passengers seated and evenly distributed.
- Clearing deck drains and securing lines from washing overboard.

#### 4.2.15.3 Abandon Ship

The captain and SSO:

- NEVER abandon ship unless actually forced to do so.
- In the event the vessel has to be abandoned the captain and SSO will insure that nearby boats and the USCG have been contacted with the locations.
- Crew members will assist passengers and instruct them in what to do with respect to donning life jackets.
- Life jackets are distributed throughout the vessel in plain view.
- Life rings are on the side of the pilot house of the steel boat.
- If near or after dark, attach water lights to rafts and life rings.

# 4.3 Chemical Hazards

The characteristics of compounds at the Site are discussed below for information purposes. Adherence to the safety and health guidelines in this HASP should reduce the potential for exposure to the compounds discussed below.

## 4.3.1 Volatile Organic Compounds (VOC)

Volatile organic chemicals (VOCs), such as benzene, toluene, ethyl benzene, and xylene (BTEX) are present as soil and groundwater contaminants, and in some cases chemical components in non-aqueous phase liquids (NAPL) such as oil or tar within soils and abandoned pipelines. These compounds are at environmental concentrations and are not expected to be at concentrations that exposure symptoms would occur. These compounds generally have a depressant effect on the Central Nervous System (CNS), may cause chronic liver and kidney damage, and some are suspected human carcinogens. Benzene is a known human carcinogen. Acute exposure may include headache, dizziness, nausea, and skin and eye irritation. The primary route of exposure to VOCs is through inhalation and therefore respiratory protection is the primary control against exposure to VOCs.

## 4.3.2 Semi-Volatile Organic Compounds (SVOC)

Semi-volatile organic compounds (SVOCs) usually consist of a mixture of acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluorethene, benz(a)pyrene, benzo(e)pyrene, benzo(g,h,i)peryline, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3cd)pyrene, 2-methyl naphthalene, naphththalene, phenonls, and pyrene.

These SVOCs are present at the Site within impacted soil and groundwater and as a dense non-aqueous phase liquid (DNAPL) by-product of gas production within soils, former manufactured gas plant (MGP) structures, and abandoned pipelines.

These compounds are at environmental concentrations and are not expected to be at concentrations that exposure symptoms would occur. SVOCs such as those listed above may cause contact dermatitis. Direct contact can be irritating to the skin and produce itching, burning, swelling, and redness. Direct contact or exposure to the vapors may be irritating to the eyes. Conjunctivitis may result from prolonged exposure. Many SVOCs are considered to be very toxic, if ingested. High levels of exposure to SVOCs, though not anticipated during work activities conducted during this project, may increase the risk of cancer including lung, kidney, and skin cancer. Naphthalene is also an eye and skin irritant and can cause nausea, headache, fever, anemia, liver damage, vomiting, convulsions, and coma. Poisoning may occur by ingestion of large doses, inhalation, or skin absorption. The major route of entry for the work activities to be conducted at this Site is through direct contact. Exposure is most likely when handling soil and water samples. Inhalation may

occur when the soil is disturbed causing respirable and nuisance dust particles to become airborne.

# 4.3.3 Coal Tar and Coal Tar Products

Coal tar products, which are semi-volatile organic compounds (SVOCs) consist of a mixture of acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benz(a)pyrene, benzo(e)pyrene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3cd)pyrene, 2-methyl naphthalene, naphthalene, phenols, pyrene.

Coal tar products and other SVOCs are present at the Site within impacted soil and groundwater and as a dense non-aqueous phase liquid (DNAPL) by-product of gas production within soils, former manufactured gas plant (MGP) structures, and abandoned pipelines.

Coal tar products such as those listed above may cause contact dermatitis. Direct contact can be irritating to the skin and produce itching, burning, swelling, and redness. Direct contact or exposure to the vapors may be irritating to the eyes. Conjunctivitis may result from prolonged exposure. Coal tar is considered to be very toxic, if ingested. High levels of exposure to coal tar, though not anticipated during work activities conducted during this project, may increase the risk of cancer including lung, kidney, and skin cancer. Naphthalene is also an eye and skin irritant and can cause nausea, headache, fever, anemia, liver damage, vomiting, convulsions, and coma. Poisoning may occur by ingestion of large doses, inhalation, or skin absorption.

The major route of entry for the work activities to be conducted at this Site is through direct contact. Exposure is most likely when handling soil and water samples. Inhalation may occur when the soil is disturbed causing respirable and nuisance dust particles to become airborne.

# 4.3.4 Heavy Metals

The Site may contain elevated levels of metals including arsenic, copper, iron, manganese, mercury, selenium, and zinc.

Exposure to high concentrations of arsenic can cause dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, and hyper pigmentation of skin. Chronic exposure to arsenic has resulted in lung cancer in humans.

Exposure to high concentrations of copper through inhalation can cause irritation of the eyes, nose, pharynx, nasal septum. Ingestion may cause a metallic taste. Skin irritation may result from direct contact with skin. Damage to the liver and kidneys may occur.

No adverse health effects are associated with environmental exposure to iron. Target organs for iron via ingestion of iron (most often in supplement form) are the liver, cardiovascular system, and kidneys. Exposure to high concentrations of iron through ingestion can cause salivation nausea, vomiting, diarrhea, and abdominal pain.

Exposure to high concentrations of manganese can cause manganism, metal fume fever, flulike fever, and kidney damage.

Exposure to high concentrations of selenium can cause mucous membrane irritation, coughing, sneezing, shortness of breath, chills, headaches, hypotension, and CNS depression. Chronic exposure to selenium could cause bronchial irritation, gastrointestinal distress, excessive fatigue, and skin discoloration.

Exposure to high concentrations of zinc through ingestion can cause abdominal pain, nausea, vomiting, and diarrhea. Chronic exposure can lead to low blood pressure, jaundice, and seizures.

These metals are at environmental concentrations and are not expected to be at concentrations that exposure symptoms would occur. As with VOCs, the primary route of exposure is through inhalation of dust particles when soil is disturbed and becomes airborne.

### 4.3.5 Cyanide

Cyanide compounds are common by-products of manufactured gas production. Hydrogen cyanide is toxic because it is a chemical asphyxiate. It replaces the oxygen in the blood and cyanide ion is bound too tightly to the iron and cannot therefore replace the oxygen. It takes a great amount of heat and/or acid to release cyanide gas from the ferro cyanide molecule; therefore, hydrogen cyanide is not a concern at this Site.

### 4.3.6 Hydrogen Sulfide

Hydrogen sulfide is another common by-product of manufactured gas production. Exposure to lower concentrations can result in eye irritation, a sore throat and cough, shortness of breath, and fluid in the lungs. These symptoms usually go away in a few weeks. Long-term, low-level exposure may result in fatigue, loss of appetite, headaches, irritability, poor memory, and dizziness. Breathing very high levels (> 800 parts per million [ppm]) of hydrogen sulfide can cause death within just a few breaths. The primary route of exposure is

through inhalation and therefore respiratory protection is the primary control against exposure to hydrogen sulfide.

## 4.3.7 Evaluation of Organic Vapor Exposure

Air monitoring reduces the risk of overexposure by indicating when action levels have been exceeded and when PPE must be upgraded or changed. Action Levels for VOCs and associated contingency plans for the work zone are discussed within Section 9 of this HASP. A Community Air Monitoring Plan (CAMP) which describes air quality monitoring for receptors at the Site perimeter (outside the work zone) is provided as Appendix D.

Exposure to organic vapors will be evaluated and/or controlled by:

- Monitoring air concentrations for organic vapors in the breathing zone with a photoionization detector (PID) or a flame ionization detector (FID).
- When possible, engineering control measures will be utilized to suppress the volatile organic vapors. Engineering methods can include utilizing a fan to promote air circulation, utilizing volatile suppressant foam, providing artificial ground cover, or covering up the impacted material with a tarp to mitigate volatile odors.
- When volatile suppression engineering controls are not effective and organic vapor meters indicate concentrations above the action levels, then appropriate respiratory protection (i.e., air purifying respirator with organic vapor cartridge) will be employed.

### 4.3.8 Evaluation of Skin Contact and Absorption

Skin contact by contaminants may be controlled by use of proper hygiene practices, PPE, and good housekeeping procedures. The proper PPE (e.g., Tyvek<sup>®</sup>, gloves, safety glasses) as described in Section 5 will be worn for activities where contact with potential contaminated media or materials are expected.

SDSs for decontamination chemicals and laboratory reagents that may be used on Site are included in Appendix B. Specific chemical hazards information from the occupational health sources are summarized in Table 3.

Compound	CAS #	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
Arsenic	7440-38-2	0.01 mg/m <sup>3</sup>	0.01 mg/m <sup>3</sup> A.L. 005mg/m <sup>3</sup>	Inhalation Skin Absorption Ingestion Skin Contact	Ulceration of nasal septum, dermatitis, GI disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, potential carcinogen	Liver, kidneys, skin, lungs, lymphatic system	Metal: Silver-gray or tin- white, brittle, odorless solid FP: NA IP: NA LEL: NA UEL: NA VP: 0 mm
Benzene	71-43-2	0.5 ppm (Skin)	1 ppm TWA 5 ppm STEL	Inhalation Skin Absorption Ingestion Skin Contact	Irritation of eyes, skin, nose, respiratory system, giddiness, headache, nausea; staggering gait, fatigue, anorexia, weakness, dermatitis, bone marrow depression, potential carcinogen	Eyes, skin, CNS, bone marrow, blood	FP: 12° F IP: 9.24 eve LEL: 1.2% UEL:7.8% VP: 75 mm
Ethylbenzene	100-41-4	100 ppm	100 ppm	Inhalation Ingestion Skin Contact	Eye, skin, mucous membrane irritation; headache; dermatitis, narcosis; coma	Eyes, skin, respiratory system, CNS	FP: 55° F IP: 8.76 eV LEL: 0.8% UEL:6.7% VP: 7 mm
Hydrogen sulfide	7783-06-4	10 ppm TWA, 15 ppm STEL	20 ppm C, 50 ppm [10- min. Maximum peak]	Inhalation Skin/Eye Contact	Irritation eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation; dizziness, headache, fatigue, irritability, insomnia; gastrointestinal disturbance; liquid: frostbite	Eyes, respiratory system, CNS	Colorless gas with a strong odor of rotten eggs. VP: 17.6 atm IP: 10.46 eV
Iron	1309-37-1	Iron oxide dust and fume: (Fe <sub>2</sub> O <sub>3</sub> ) as FE: 5mg/m <sup>3</sup> (TWA)	Iron oxide dust and fume: 10mg/m <sup>3</sup>	Inhalation, ingestion, eye contact	Respiratory tract irritation, coughing, shortness of breath, overdose of iron may cause vomiting, abdominal pain, bloody diarrhea, vomiting blood, lethargy, and shock; acidity in the blood, bluish skin discoloration, fever, liver damage, and possibly death; eye and cornea irritation and discoloration.	Eyes, respiratory system, GI tract, liver	Reddish brown solid FP; NA LEL: NA UEL: NA VP: 0 mmHg

Compound	CAS #	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
Lead	7439-92-1	0.050 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup> A.L. 0.03 mg/m <sup>3</sup>	Inhalation Ingestion Skin Contact	Weakness, insomnia; facial pallor; pal eye, anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis of wrist and ankles; irritates eyes, hypo tension	Eyes, GI tract, CNS, kidneys, blood, gingival tissue	A heavy, ductile, soft, gray solid. FP: NA IP: NA LEL: NA UEL: NA VP: 0 mm
Manganese	7439-96-5	TWA 1 mg/m ST 3 mg/m <sup>3</sup>	C 5 mg/m <sup>3</sup>	Inhalation, ingestion	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; lowback pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage	Respiratory system, central nervous system, blood, kidneys	A lustrous, brittle, silvery solid. FP: NA LEL: NA UEL: Na VP: 0 mmHg
Naphthalene	91-20-3	10 ppm (52 mg/m <sup>3</sup> ) TWA, 15 ppm (79 mg/m <sup>3</sup> ) STEL	10 ppm (50 mg/m <sup>3</sup> ) TWA	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	FP: 174 F IP: 8.12 eV, LEL: 0.8% UEL:6.7%, VP: 0.08 mm
Toluene	108-88-3	50 ppm	200 ppm	Inhalation Skin Absorption Ingestion Skin Contact	Eye, nose irritation; fatigue, weakness, confusion, euphoria, dizziness, headache; dilated pupils, tearing of eyes; nervousness, muscle fatigue, insomnia, tingling in limbs; dermatitis	Eyes, skin, respiratory system, CNS, liver, kidneys	FP: 40° F IP: 8.82 eV LEL: 1.1% UEL:7.1% VP: 21 mm

Compound	CAS #	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
Xylene	1330-20-7	100 ppm	100 ppm	Inhalation Skin Absorption Ingestion, Skin Contact	Eye, skin, nose, throat irritation; dizziness, excitement, drowsiness; incoordination, staggering gait; corneal damage; appetite loss, nausea, vomiting, abdominal pain; dermatitis	Eyes, skin, respiratory system, Central Nervous System, GI tract, blood, liver, kidneys	FP: 90° F LEL: 0.9% UEL: 6.7% VP: 9 mm
Zinc	1314-13-2	5 mg/m <sup>3</sup> (TWA), 10 mg/m <sup>3</sup> (STEL) for zinc oxide fume	10 mg/m <sup>3</sup> (TWA), for zinc oxide fume	Inhalation	Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function	Respiratory system	Colorless liquid FP: NA? IP: 11 eV LEL: 7.5% UEL: 12.5% VP: 100 mmHg
Abbreviations: °F = degrees Fahre ACGIH = Americar A.L. = Action Level	enheit n Conference of I	Industrial Hyg	ienists		IP = Ionization Potential LEL = Lower explosive limit mg/m <sup>3</sup> = micrograms per cubic meter		

°F = degrees Fahrenheit	IP = Ionization Potential
ACGIH = American Conference of Industrial Hygienists	LEL = Lower explosive limit
A.L. = Action Level	mg/m <sup>3</sup> = micrograms per cubic meter
atm = atmosphere	min = minute
C = ceiling limit, not to be exceeded	mm = millimeter
CAS # = chemical abstract services number	mmHg = millimeters of mercury
CNS = Central Nervous System	N/A = not applicable
CTPV = Coal Tar Pitch Volatiles	OSHA = Occupational Safety and Health Administration
CVS = Cardiovascular System	PAH = Polycyclic Aromatic Hydrocarbons
eV = electron volt	PCB = Polychlorinated Biphenyls
f/cc = fibers per cubic centimeter	PEL = Permissible exposure limit
FP = Flash point	ppm = parts per million
GI = Gastro-intestinal	Skin = significant route of exposure

Compound	CAS #	ACGIH TLV	OSHA PEL	Route of Exposure	Symptoms of Exposure	Target Organs	Physical Data
H2S = Hydrogen Sulfide STEL = Short-term exposure limit (15 minutes)							
HCN = Hydrogen 0	N = Hydrogen CyanideTWA = Time-weighted average (8 hours)						
hr = hour		VP = vapor pressure approximately 68°F in mm Hg					

# 4.4 Biological Hazards

Areas of the Site may be wooded, surrounded with brush, or landscaped. Therefore, employees working on this project should be aware of the potential biological hazards at this Site. Each is discussed in detail below:

# 4.4.1 Poisonous Plants

Persons working on the Site should be aware of the possible presence of poisonous plants and insects. Poison ivy is a climbing plant with leaves that consist of three glossy, greenish leaflets. Poison ivy has conspicuous red foliage in the fall. Small yellowish-white flowers appear in May through July at the lower leaf axils of the plant. White berries appear from August through November. Poison ivy is typically found east of the Rockies. Poison oak is similar to poison ivy but its leaves are oak-like in form. Poison oak occurs mainly in the south and southwest. Poison sumac typically occurs as a small tree or shrub and may be 6 to 20 feet in height. The bark is smooth, dark and speckled with darker spots. Poison sumac is typically found in swampy areas and east of the Mississippi. The leaves have 7 to 13 smooth-edged leaflets and drooping clusters of ivory-white berries that appear in August and last through spring.



The leaves, roots, stems and fruit of these poisonous plants contain urushiol. Contact with the irritating oil causes an intensely itching skin rash and characteristic, blister-like lesions.

The oil can be transmitted on soot particles when burned and may be carried on the fur of animals, equipment, and apparel.

Proper identification of these plants is the key to preventing contact and subsequent dermatitis. Wear long sleeves and pants when working in wooded areas. In areas of known infestation, wear Tyvek<sup>®</sup> coveralls and gloves. Oils are easily transferred from one surface to another. If you come in contact with these poisonous plants, wash exposed areas immediately with cool water to remove the oils. Some commercial products such as Tecnu's Poison Oak-n-Ivy Cleanser claim to further help with the removal of oils.

### 4.4.2 Ticks

#### 4.4.2.1 Lyme Disease

Ticks are bloodsuckers, attaching themselves to warm-blooded vertebrates to feed. Deer ticks are associated with the transmission the bacteria that causes Lyme disease. Female deer ticks are about <sup>1</sup>/<sub>4</sub>-inch in length and are black and brick red in color. Males are smaller and all black. If a tick is not removed, or if the tick is allowed to remain for days feeding on human blood, a condition known as tick paralysis can develop. This is due to a neurotoxin, which the tick apparently injects while engorging. This neurotoxin acts upon the spinal cord causing incoordination, weakness, and paralysis.

The early stages of Lyme disease, which can develop within a week to a few weeks of the tick bite, are usually marked by one or more of these signs and symptoms:

- Tiredness
- Chills and fever
- Headache
- Muscle and/or join pain
- Swollen lymph glands
- Characteristic skin rash (i.e. bullseye rash)

#### 4.4.2.2 Rocky Mountain Spotted Fever

Rocky Mountain spotted fever is spread by the American dog tick, the lone-star tick, and the wood tick, all of which like to live in wooded areas and tall, grassy fields. The disease is most common in the spring and summer when these ticks are active, but it can occur anytime during the year when the weather is warm.

Initial signs and symptoms of the disease include sudden onset of fever, headache, and muscle pain, followed by development of a rash. Initial symptoms may include fever, nausea, vomiting, severe headache, muscle pain, and/or lack of appetite.

The rash first appears 2 to 5 days after the onset of fever and is often not present or may be very subtle. Most often it begins as small, flat, pink, non-itchy spots on the wrists, forearms, and ankles. These spots turn pale when pressure is applied and eventually become raised on the skin. Later signs and symptoms include rash, abdominal pain, joint pain, and/or diarrhea.

The characteristic red, spotted rash of Rocky Mountain spotted fever is usually not seen until the  $6^{th}$  day or later after onset of symptoms, and this type of rash occurs in only 35% to 60% of patients with Rocky Mountain spotted fever. The rash involves the palms or soles in as many as 50% to 80% of patients; however, this distribution may not occur until later in the course of the disease.

#### 4.4.2.3 Prevention

Tick season lasts from April through October; peak season is May through July. You can reduce your risk by taking these precautions:

- During outside activities, wear long sleeves and long pants tucked into socks. Wear a hat, and tie hair back.
- Use insecticides to repel or kill ticks. Repellents containing the compound n,ndiethyl-meta-toluamide (DEET) can be used on exposed skin except for the face, but they do not kill ticks and are not 100% effective in discouraging ticks from biting. Products containing permethrin kill ticks, but they cannot be used on the skin -- only on clothing. When using any of these chemicals, follow label directions carefully.
- After outdoor activities, perform a tick check. Check body areas where ticks are commonly found: behind the knees, between the fingers and toes, under the arms, in and behind the ears, and on the neck, hairline, and top of the head. Check places where clothing presses on the skin.
- Remove attached ticks promptly. Removing a tick before it has been attached for more than 24 hours greatly reduces the risk of infection. Use tweezers, and grab as closely to the skin as possible. Do not try to remove ticks by squeezing them, coating them with petroleum jelly, or burning them with a match. Keep ticks in a zip-lock baggie in case testing needs to be performed.
- Report any of the above symptoms and all tick bites to the PM and CHSO for evaluation.

### 4.4.3 Mosquito- Borne Disease – West Nile Virus

West Nile encephalitis is an infection of the brain caused by the West Nile virus, which is transmitted by infected mosquitoes. Following transmission from an infected mosquito, West Nile virus multiplies in the person's blood system and crosses the blood-brain barrier to reach the brain. The virus interferes with normal CNS functioning and causes inflammation of the brain tissue. However, most infections are mild and symptoms include fever, headache, and body aches. More severe infections may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and rarely, death. Persons over the age of 50 have the highest risk of severe disease.

Prevention centers on public health action to control mosquitoes and on individual action to avoid mosquito bites. To avoid being bitten by the mosquitoes that cause the disease, use the following control measures:

If possible, stay inside between dusk and dark. This is when mosquitoes are most active. When outside (between dusk and dark), wear long pants and long-sleeved shirts. Spray exposed skin with an insect repellent, preferably containing DEET.

# 4.4.4 Wasps and Bees

Wasps (hornets and yellow-jackets) and bees (honeybees and bumblebees) are common insects that may pose a potential hazard to the field team if work is performed during spring, summer, or fall. Bees normally build their nests in the soil. However, they use other natural holes such as abandoned rodent nests or tree hollows. Wasps make a football-shaped, paperlike nest either below or above the ground. Yellow-jackets tend to build their nests in the ground but hornets tend to build their nests in trees and shrubbery. Bees are generally more mild-mannered than wasps and are less likely to sting. Bees can only sting once while wasps sting multiple times because their stinger is barbless. Wasps sting when they feel threatened. By remaining calm and not annoying wasps by swatting, you lessen the chance of being stung.

Wasps and bees inject a venomous fluid under the skin when they sting. The venom causes a painful swelling that may last for several days. If the stinger is still present, carefully remove it with tweezers. Some people may develop an allergic reaction (i.e. anaphylactic shock) to a wasp or bee sting. If such a reaction develops, seek medical attention at once. If an employee is allergic to bees or wasps notify the SSO and if, needed, the location of the epi pen.

## 4.4.5 Sun Exposure

Employees are encouraged to liberally apply sunscreen, with a minimum sun protection factor (SPF) of 15, when working outdoors to avoid sunburn and potential skin cancer, which is associated with excessive sun exposure to unprotected skin. Additionally, employees should wear safety glasses that offer protection from ultraviolet A and B (UVA/UVB) rays.

# 5. Personal Protective Equipment

The PPE specified in Table 4 represents PPE selection required by 29 CFR 1910.132, and is based on the Activity Hazard Analysis of Section 4 (Table 2).

The PPE program addresses elements, such as PPE selection based on Site hazards, use and limitations, donning and doffing procedures, maintenance and storage, decontamination and disposal, training and proper fitting, inspection procedures prior to / during / and after use, evaluation of the effectiveness of the PPE program, and limitations during temperature extremes, heat stress, and other appropriate medical considerations. A summary of PPE for each level of protection is in Table 4.

Task	PPE Level	Site-Specific Requirements	Respirator		
Mobilization/Demobilization					
Mobilization/Demobilization of Equipment and Supplies	D	Hard hat, safety glasses, steel toe/shank safety boot, reflective vest, leather work gloves, hearing protection as needed	D – None		
Establishment of Site Security, Work Zones, and Staging Area	D	Hard hat, safety glasses, steel toe/shank safety boot, reflective vest, leather work gloves, hearing protection as needed	D - None		
Remedial Investigation/Construction					
Drilling, Well Installation, Excavation, Digging Test Pits, Backfilling, Grading, Construction, Observation, Sampling	D	Hard hat, safety glasses, steel toe/shank safety boot with overboot as needed, reflective vest, leather work gloves as needed, nitrile gloves, hearing protection as needed, Tyvek as needed	Level D initially, Level C-If action levels exceeded (see Section 9 of HASP)		
Remediation Observation/Documentation					
Observe Contractor Activities	D	Hard hat, safety glasses, steel toe/shank safety boot with overboot as needed, reflective vest, leather work gloves as needed, nitrile gloves, hearing protection as needed, Tyvek as needed	D - None		

# Table 4. Site-Specific PPE

Use of Level A or Level B PPE is not anticipated. If conditions indicating the need for Level A or Level B PPE are encountered, personnel will leave the Site and this HASP will be revised with oversight of the CHSO.

For most work conducted at the site, Level D PPE will include long pants, hard hats, safety glasses with side shields, and steel toe/shank or EH-rated safety boots. When work is conducted in areas where non-aqueous phase liquid (NAPL) or tar-saturated soil is

anticipated, employees will wear, at a minimum, modified Level D PPE, which can include Tyvek® coveralls and safety boots with overboots.

# 5.1 OSHA Requirements for PPE

Personal protective equipment used during the course of this field investigation must meet the following OSHA standards:

Type of Protection	Regulation	Source		
Eye and Face	29 CFR 1910.133	ANSI Z87.1 1968		
Respiratory	29 CFR 1910.134	ANSI Z88.1 1980		
Head	29 CFR 1910.135	ANSI Z89.1 1969		
Foot	29 CFR 1910.136	ANSI Z41.1 1999 or ASTM F-2412-2005, and ASTM F-2413-2005		
CRF = Code of Federal Regulations				

Table 5. OSHA Standards for PPE

ANSI = American National Standards Institute

ASTM = American Society For Testing and Materials

On-site personnel who have the potential to don a respirator must have a valid fit test certification and documentation of medical clearance. The CHSO will maintain such information on file for on-site personnel. The PM will obtain such information from the subcontractor's site supervisor prior to the initiation of such work. Both the respirator and cartridges specified for use in Level C protection must be fit-tested prior to use in accordance with OSHA regulations (29 CFR 1910.134). Air purifying respirators cannot be worn under the following conditions:

- Oxygen deficiency (less than 20.7%).
- Imminent Danger to Life and Health (IDLH) concentrations.
- If contaminant levels exceed designated use concentrations.

# 6. Key Project Personnel/Responsibilities and Lines of Authority

# 6.1 Project Personnel

The implementation of health and safety at this project location will be the shared responsibility of the PM, the CHSO, the SSO, other field staff implementing the proposed scope of work.

# 6.1.1 Project Manager

The PM is responsible for confirming that the requirements of this HASP are implemented. Some of the PM's specific responsibilities include:

- Conducting and documenting the Project Safety Briefing;
- Verifying that the staff selected to work on this program are sufficiently trained for Site activities;
- Assuring that personnel to whom this HASP applies, including subcontractor personnel, have received a copy of it;
- Providing the CHSO with updated information regarding conditions at the Site and the scope of Site work;
- Providing adequate authority and resources to the on-site SSO to allow for the successful implementation of necessary safety procedures;
- Supporting the decisions made by the SSO and CHSO;
- Maintaining regular communications with the SSO and, if necessary, the CHSO;
- Verifying that the subcontractors selected to work on this program have completed environmental, health and safety requirements and has been deemed acceptable for the proposed scope of work; and
- Coordinating the activities of subcontractors and confirming that they are aware of the pertinent health and safety requirements for this project.

# 6.1.2 Corporate Health and Safety Officer

The CHSO, is the individual responsible for the review, interpretation, and modification of this HASP. Modifications to this HASP which may result in less stringent precautions

cannot be undertaken by the PM or the SSO without the approval of the CHSO. Specific duties of the CHSO include:

- Writing, approving, and amending the HASP for this project;
- Advising the PM and SSO on matters relating to health and safety on this Site;
- Recommending appropriate PPE and safety equipment to protect personnel from potential Site hazards;
- Conducting accident investigations; and
- Maintaining regular contact with the PM and SSO to evaluate Site conditions and new information which might require modifications to the HASP.

#### 6.1.3 Site Safety Officer

Field staff are responsible for implementing the safety requirements specified in this HASP. However, one person will serve as the SSO. The SSO will be on-site during all activities covered by this HASP. The SSO is responsible for enforcing the requirements of this HASP once work begins. The SSO has the authority to immediately correct situations where noncompliance with this HASP is noted and to immediately stop work in cases where an immediate danger is perceived. Some of the SSO's specific responsibilities include:

- Conducting/attending the Project Safety Briefing prior to beginning work, and subsequent safety meetings as necessary;
- Conduct daily Safety Tailgate meeting in accordance with RG &E requirements (can be combined with "pre-entry") briefing for Site-related work;
- Verifying that personnel to whom this HASP applies have attended and participated in the Project Safety Briefing and subsequent safety meetings that are conducted during the implementation of the program;
- Maintaining a high level of health and safety consciousness among employees implementing the proposed activities;
- Procuring the air monitoring instrumentation required and performing air monitoring for investigative activities;
- Procuring and distributing the PPE and safety equipment needed for this project for field staff;
- Verifying that PPE and health and safety equipment is in good working order;
- Verifying that the selected contractors are prepared with the correct PPE and safety equipment and supplies;

- Notifying the PM of noncompliance situations and stopping work in the event that an immediate danger situation is perceived;
- Monitoring and controlling the safety performance of personnel within the established restricted areas to confirm that required safety and health procedures are being followed;
- Stopping work in the event that an immediate danger situation is perceived; and
- Reporting accident/incident and preparing accident/incident reports, if necessary.

### 6.1.4 Field Personnel

Field personnel covered by this HASP are responsible for following the health and safety procedures specified in this HASP and for performing their work in a safe and responsible manner. Some of the specific responsibilities of the field personnel are as follows:

- Reading and signing the HASP in its entirety prior to the start of on-site work;
- Attending and actively participating in the required Project Safety Briefing prior to beginning on-site work and any subsequent safety meetings that are conducted during the implementation of the program;
- Stopping work in the event that an immediate danger situation is perceived;
- Bringing forth any questions or concerns regarding the content of the HASP to the PM or the SSO, prior to the start of work;
- Reporting accidents, injuries, and illnesses, regardless of their severity, to the SSO, CHSO, and HR; and
- Complying with the requirements of this HASP and the requests of the SSO.

# 6.2 Engineers, Contractors, and Subcontractors

Engineers, contractors, and subcontractors for this project will be required to develop their own HASP for protection of their employees, but, at a minimum, must adhere to applicable requirements set forth in this HASP.

# 7. Training Program

# 7.1 HAZWOPER Training

In accordance with OSHA Standard 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" (HAZWOPER) responders will, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations. At a minimum, the training will have consisted of instruction in the topics outlined in the standard. Personnel who have not met the requirements for initial training will not be allowed to work in any Site activities in which they may be exposed to hazards (chemical or physical). Proof of training will be submitted to the PM or his/her representative prior to the start of field activities.

# 7.2 Annual 8-Hour Refresher Training

Annual 8-hour refresher training will be required of hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The training will cover a review of 29 CFR 1910.120 requirements and related company programs and procedures. Proof of current 8-hour refresher training will be submitted to the PM or his/her representative prior to the start of field activities.

# 7.3 Supervisor Training

Personnel acting in a supervisory capacity will have received 8 hours of instruction in addition to the initial 40-hour training. In addition supervisors will have 1 year of field experience and training specific to work activities (i.e., sampling, construction observation, etc.)

# 7.4 Site-Specific Training

Prior to commencement of field activities, the PM or the SSO will verify field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the Site operations. Personnel that have not received project-specific training will not be allowed on-site.

# 7.5 On-Site Safety Briefings

On-site personnel will be given health and safety briefings daily by the remediation contractor SSO or field representative to assist personnel in safely conducting work activities. The briefing will include and subcontractors. The briefings can include
information on new operations to be conducted, changes in work practices, or changes in the Site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity to periodically update the employees on monitoring results.

# 7.6 First Aid and CPR

The PM will verify that field staff has current certifications in first aid and Cardiopulmonary Resuscitation (CPR), so that emergency medical treatment is available during field activities. The training will be consistent with the requirements of the American Red Cross Association. employees also attend annual Bloodborne Pathogens training in compliance with OSHA regulations.

# 8. Medical Surveillance Program

A continuous, corporate, medical surveillance program that includes a plan designed specifically for field personnel engaged in work at sites where hazardous or toxic materials may be present must be developed prior to working at the site. The CHSO and is responsible for the administration and coordination of medical evaluations. Comprehensive examinations are given tofield personnel on an annual or biennial basis (as determined to be appropriate by the CHSO) participating in hazardous waste operations. The medical results of the examinations aid in determining the overall fitness of employees participating in field activities.

Subcontractor personnel that will enter any active waste handling or other active non-"clean" area must certify that they are participating in a medical surveillance program that complies with OSHA regulations for hazardous waste operations (i.e., 29 CFR 1910.120 and 29 CFR 1926.65). Proof of medical clearance will be submitted to the PM or SSO prior to the start of field activities.

# 9. Monitoring

# 9.1 Air Monitoring

Air monitoring will be performed to identify and quantify airborne levels of hazardous substances and safety and health hazards in order to determine the appropriate level of worker protection needed on-site in the event that intrusive work is conducted. Community air monitoring for the Site and Site perimeter is addressed in the Community Air Monitoring Plan supplied as an appendix to this HASP. Work requiring air monitoring includes the installation and/or abandonment of monitoring wells, DNAPL recovery wells and the excavation or manipulation of Site soil and/or sediment.

Activities requiring air monitoring will be conducted in accordance with a pre-approved work plan. If Action Levels are exceeded, the SSO will immediately implement Site action(s) according to Table 6 below and notify the PM and CHSO.

At a minimum, the following equipment is required for health and safety monitoring of onsite personnel:

- PID with 10.6 eV lamp or equivalent;
- 5-gas meter with sensors to monitor for  $O^2$ ,  $H_2S$ , HCN, LEL, and CO;
- Dust Meter;

Air monitoring equipment will be calibrated and maintained in accordance with manufacturer's requirements. Calibrations will be recorded in the project notes daily or on a daily calibration form.

Organic vapor concentrations will be measured using a PID during intrusive activities. During intrusive operations, organic vapor concentrations will be measured continuously. Organic vapor concentrations will be measured upwind of the work site(s) to determine background concentrations at least twice a day, (once in the morning and once in the afternoon). The SSO will interpret monitoring results using professional judgment and according to the alert and Action Limits set forth in the associated Site Work Plan.

Dust meters will be used to measure airborne particulate matter in the work zone during intrusive activities. Monitoring will be continuous and readings will be averaged over a 15-minute period for comparison with the Action Levels. Monitoring personnel will make a best effort to collect dust monitoring data from downwind of the intrusive activity. If off-site

sources are considered to be the source of the measured dust, upwind readings will also be collected.

The perimeter and work zone air monitoring will be conducted during all intrusive activities. Table 6 provides a summary of real time air monitoring Action Levels and contingency plans for work zone activities. The below Action Levels are determined by halving the Permissible Exposure Limits (PELs) or Threshold Limit Values (TLVs) as set forth by OSHA and the American Conference of Government Industrial Hygienists (ACGIH). O<sub>2</sub> values are based on the maximum use limits of a full face respirator if oxygen were being displaced by a chemical.

Air Monitoring Instrument	Monitoring Location	Action Level (above background)	Site Action	
PID	Work Zone	1.0 ppm	Use detector tube for benzene or zNose <sup>®</sup> to verify if concentration is benzene. No respiratory protection is required if benzene is not present.	
PID	Work Zone	10 ppm	Use Sensidyne detector tube for naphthalene or zNose <sup>®</sup> to verify if concentration is naphthalene. No respiratory protection is required if naphthalene is not present.	
		10 – 50 ppm	No respiratory protection is required if benzene or naphthalene is not present.	
		50 – 100 ppm	Stop work, withdrawal from work area, institute engineering controls, if levels persist, upgrade to Level C.	
		> 100 ppm	Stop work, withdraw from work area, notify PM and CHSO.	
O <sub>2</sub> Meter	Work Zone	< 20.7%	Stop work, withdraw from work area, ventilate area, notify PM and CHSO.	
		> 21.1%	Stop work, withdraw from work area, notify PM and CHSO.	
H <sub>2</sub> S Meter	Work Zone	< 5.0 ppm	No respiratory protection is required.	
		> 5.0 ppm	Stop work, cover excavation, withdraw from work area, institute engineering controls, notify PM and CHSO.	
HCN Meter	Word Zone	< 1.0 ppm	Run CMS Drager tube. Continue monitoring with real-time meter, and continue work if CMS Drager tube reading is less than 2.0 ppm.	
		<ul><li>&gt; 1.0 ppm HCN</li><li>Concentrations</li><li>&lt; 2.0 ppm</li></ul>	Run CMS Drager tube and confirm concentration is less than 2.0 ppm, notify PM and CHSO. Run CMS tube for sulfur dioxide, hydrogen sulfide, and phosphine chip potential interferences. Continue to monitor with real-time meter.	
		> 2.0 ppm	Stop work, and move (with continuous HCN monitoring meter) at lease 25 ppm upwind of the excavation until continuous meter reads less than 1 ppm, notify PM and CHSO. Run CMS Drager hydrogen cyanide chip and re-evaluate activity, continue monitoring with a real-time meter, resume	

# Table 6. Real-Time Work Zone Air Monitoring Action Levels

Health and Safety Plan and Community Air Monitoring RG&E West Station Plant Area Rochester, New York Site No. V00593-8 November 2016

			work if concentrations read less than 1.0 ppm.	
CGI	Work Zone	< 10% LEL	Investigate possible causes, allow excavation to ventilate, us caution during procedures.	
		> 10% LEL	Stop work, allow excavation/borehole to ventilate to < 10% LEL, if ventilation does not result in a decrease to < 10% LEL, withdraw from work area, notify PM and CHSO.	
Particulate Meter	Work Zone	150 μg/m <sup>3</sup>	Implement work practices to reduce/minimize airborne dust generation, e.g., spray/misting of soil with water.	

# **10. Site Control Measures**

# 10.1 Site Zones

Site zones are intended to control the potential spread of contamination and to assure that only authorized individuals are permitted into potentially hazardous areas. A three-zone approach will be utilized. It will include an Exclusion Zone (EZ), Contamination Reduction Zone (CRZ) and a Support Zone (SZ). Specific zones will be established on the work site by the Contractor when operations begin for each task requiring such delineation. Maps depicting the zones will be available at the Site.

This project is being conducted under the requirements of 29 CFR 1910.120, and any personnel working in an area where the potential for exposure to Site contaminants exists, will only be allowed access after proper training and medical documentation.

The following will be used for guidance in revising these preliminary zone designations, if necessary.

*Support Zone* – The SZ is an uncontaminated area that will be the field support area for most operations. The SZ provides for field team communications and staging for medical emergency. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone.

*Contamination Reduction Zone* – The CRZ is established between the EZ and the SZ. The CRZ contains the contamination reduction corridor and provides an area for decontamination of personnel and portable hand-held equipment, tools and heavy equipment. A personnel decontamination area will be prepared at each exclusion zone. The CRZ will be used for EZ entry and egress in addition to access for heavy equipment and emergency support services.

*Exclusion Zone* – Activities which may involve exposure to Site contaminants, hazardous materials, and/or conditions should be considered an EZ. This zone will be clearly delineated by cones, tapes, or other means. The Contractor may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ will be determined by the Contractor allowing adequate space for the activity to be completed, field members, and emergency equipment.

The Contractor is responsible for constructing, maintaining, and enforcing the zones.

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# 10.2 Buddy System

Personnel should be in line-of-site or communication contact with another on-site person. The other on-site person should be aware of his or her role as a "buddy" and be able to provide assistance in the event of an emergency. A copy of this plan will be given to any person acting as a "buddy" for informational purposes.

# **10.3 Sanitation for Temporary Work Sites**

Temporary sanitary facilities including toilets will be available on-site.

# 10.4 Illumination

Illumination requirements identified by OSHA are directed to work efforts inside buildings and/or during non-daylight hours. Activities planned for the Site are anticipated to occur outside during daylight hours. However, if work areas are used after dark, they will be equipped with illumination that meets or exceeds requirements specified in OSHA Standard 29 CFR 1926.56 "Illumination." Employees will not work on sites that are not properly lighted.

# **11. Accident Reporting**

Incidents involving personnel or subcontractor personnel, such as: lost time injuries, injuries requiring medical attention, near miss incidents, fires, fatalities, accidents involving the public, chemical spills and property damage must be reported. The report will be made to the PM verbally as soon as possible, but no later than 2 hours of the incident. The PM will immediately inform the CHSO, the Director of Human Resources, and a Project-Specific RG&E Representative any accident, incident, injury or near miss. An Accident Report form will be submitted within 12 hours of the incident. Staff must be aware that addressing accidents and injuries takes precedence over completing field work. If a staff member requires medical attention, or an incident/accident has occurred that call this into question, work must stop and the situation must be addressed.

# **12. Decontamination Procedures**

A decontamination pad will be established for personnel decontamination and equipment decontamination.

# **12.1 Personnel Decontamination Station**

A personnel decontamination station where employees can drop equipment and remove PPE will be set up at the decontamination pad by the Contractor. It will be equipped with basins for water and detergent, and trash bag(s), or cans for containing disposable PPE and discarded materials. Once personnel have decontaminated at this station and taken off their PPE, they will proceed to a sink where they will wash themselves wherever they have potentially been exposed to any contaminants (e.g., hands, face, etc.)

The following specific decontamination procedure will be used as necessary by personnel or subcontractor personnel wearing PPE from Level D through Level C.

- *Step 1* Equipment drop (respirator, tools, monitoring equipment, etc.) Decontaminate as appropriate.
- *Step 2* Boot wash/rinse (wash with non-foaming detergent, rinse with fresh water spray). Remove boots. If inner and outer gloves are worn, wash outer gloves, remove and save for later use, or remove and discard outer gloves and place in trash bag/can provided in the decontamination area.
- *Step 3* Hard hat removal; wash if visibly contaminated (use same wash as in Step 2).
- *Step 4* If Tyvek<sup>®</sup> (or equivalent) suit was worn and is visibly contaminated, remove and place in trash bag/can provided in the decontamination area or decontaminate (wash) and store for reuse. Contaminated washable coveralls should be removed and bagged for washing.
- *Step 5* Respirator and/or eye protection removal (as applicable). Wash (per Step 2) to remove visible contamination.
- *Step 6* Remove outer gloves.
- *Step 7* Wash potentially exposed skin (use water and soap at indoor sink).
- *Step 8* Disinfect respirator per manufacturer's recommendations.

Contaminated PPE (gloves, suits, etc.) will be decontaminated and stored for reuse or placed in plastic bags (or other appropriate containers) and disposed of in an approved facility.

Decontamination wastewater and used cleaning fluids will be collected and disposed of in accordance with applicable state and federal regulations.

# 12.2 Heavy Equipment Decontamination

Heavy equipment decontamination will be performed by the Contractor within the limits of the on-site decontamination pad in accordance with the contract specifications. A steam generator and brushes will be used to clean demolition equipment and other tools. No heavy equipment will be permitted to leave the Site unless it has been thoroughly decontaminated.

Wastewater from the heavy equipment and personnel decontamination areas will be collected and disposed of in accordance with applicable state and federal regulations. The Contractor will be responsible for ultimate disposal of investigation-derived wastes.

# **12.3 Decontamination Equipment Requirements**

The following equipment, if required, should be in sufficient supply to implement decontamination procedures for equipment.

- Buckets
- Alconox<sup>TM</sup> detergent concentrate
- Hand pump sprayers
- Long handled soft bristle brushes
- Large sponges
- Cleaning wipes for respirators
- Bench or stool(s)
- Methanol and/or Nitric Acid
- Liquid detergent and paper towels
- Plastic trash bags

The Contractor performing decontamination procedures is responsible for verifying that the above materials, as required for their operation, are in sufficient supply.

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# **13. Supplemental Contingency Plan Procedures**

# 13.1 Hazard Communication Plan

Personnel have received hazard communication training as part of their annual health and safety training and new employee health and safety orientation training. Hazardous materials used on the Site will be properly labeled, stored, and handled. SDS will be available to potentially exposed employees.

# 13.2 Fire

In the event of a fire personnel will evacuate the area. The owner's representative will contact the local fire department with jurisdiction and report the fire. Notification of evacuation will be made to the PM and the CHSO. The field representative will account for personnel and subcontractor personnel and report their status to the PM.

# 13.3 Medical Support

In case of minor injuries, on-site care will be administered with the Site first aid kit. For serious injuries, call 911 and request emergency medical assistance. Seriously injured persons should not be moved, unless they are in immediate danger. Notify the PM and the CHSO of the emergency.

Section 1 and Table 1 of this HASP contain detailed emergency information, including directions to the nearest hospital, and a list of emergency services and their telephone numbers. In addition, Appendix A includes maps to the hospital and/or occupational health clinic. Field personnel will carry a cellular telephone.

# 13.4 Severe Weather

The contingency plan for severe weather includes reviewing the expected weather to determine if severe weather is in the forecast. Severe weather includes high winds over 30 miles per hour (mph), heavy rains or snow squalls, thunderstorms, tornados, and lightning storms. If severe weather is approaching, the decision to evacuate personnel and subcontractor personnel from the Site will be the responsibility of the engineer. Notification of evacuation will be made to the PM and the CHSO. The field representative will account for engineer personnel and subcontractor personnel and report their status to the PM. If safe, work can resume 30 minutes after the last clap of thunder or flash of lightening.

# 13.5 Spills or Material Release

If a hazardous waste spill or material release occurs, if safe, the SSO or their representative will immediately assess the magnitude and potential seriousness of the spill or release based on the following:

- SDS for the material spilled or released;
- Source of the release or spillage of hazardous material;
- An estimate of the quantity released and the rate at which it is being released;
- The direction in which the spill or air release is moving;
- Personnel who may be or may have been in contact with the material, or air release, and possible injury or sickness as a result;
- Potential for fire and/or explosion resulting from the situation; and
- Estimates of area under influence of release.

If the spill or release is determined to be within the on-site emergency response capabilities, the SSO will verify implementation of the necessary remedial action. If the release is beyond the capabilities of the Site personnel, personnel will be evacuated from the immediate area and the local fire department will be contacted. The SSO will notify the PM and the CHSO.

# 13.6 Alcohol and Drug Abuse Prevention

Alcohol and drugs will not be allowed on the work Site. Project personnel under the influence of alcohol or drugs will not be allowed to enter the Site.

# 14. RG&E-Specific Required Protocols

RG&E requires that contractors performing work on construction-type projects on RG&E premises to conform to specific policies and requirements outlined in the document entitled "Contractor Safety Requirements". The document outlines general rules and procedures specific to RG&E Site operations which may not otherwise be covered by this HASP. RG&E-specific protocols will be included with final design documents.

# 15. Health and Safety Plan Sign-Off

Field personnel conducting site activities will be familiar with the information in this HASP. After reviewing this plan, please sign the copy in the project files, and bring a copy of the plan with you to the Site.

Site Name: RG&E West Station Plant Area

**Investigation:** Remedial Activities

Project No: TBD

Print Name	Signature
Project Manager:	

GEI Consultants, Inc., P.C.

# Appendix A

Map to Hospital and Occupational Health Clinic

Health and Safety Plan and Community Air Monitoring RG&E West Station Plant Area Rochester, New York Site No. V00593-8

#### Directions from West Station to Strong Memorial Hospital ER.

(3.6 mi – about 13 min.)

Start at foot of Falls Street

- 1. Head south on Falls St. Toward Brown St. (440 ft)
- 2. Take For St. and Mot Hope Ave to Crittenden Blvd (3.3 mi)
- 3. Continue on Crittenden Blvd to destination

End at 601 Elmwood Ave Rochester, NY 14642



Health and Safety Plan and Community Air Monitoring RG&E West Station Plant Area Rochester, New York Site No. V00593-8

#### Directions from West Station to OnSite Occupational Health Center:

(6.8 mi – about 10 min.)

Start at foot of Falls Street

- 7. Head south on Falls St. Toward Brown St. (440 ft)
- 8. Turn right on Brown Street and Merge onto I-490 West (0.7 mi)
- 9. Continue on I-490 West to I-390 S (5.4 mi)
- 10. Take Exit 17 and merge onto NY-383 South/ Scottsville Rd. (0.2 mi).
- 11. Continue on NY-383 South/ Scottsville Rd. (0.5 mi.)
- 12. Turn left on Airpark Dr. (440 ft). Destination will be on the left.

End at 400 Air Park Dr. #90 Rochester, NY 14624



Health and Safety Plan and Community Air Monitoring RG&E West Station Plant Area Rochester, New York Site No. V00593-8

# Appendix B

**Safety Data Sheets** 





Health	2
Fire	3
Reactivity	0
Personal Protection	Н

# Material Safety Data Sheet Benzene MSDS

Section 1: Chemical Product and Company Identification		
Product Name: Benzene Contact Information:		
Catalog Codes: SLB1564, SLB3055, SLB2881	<b>Sciencelab.com, Inc.</b> 14025 Smith Rd.	
<b>CAS#:</b> 71-43-2	Houston, Texas 77396	
RTECS: CY1400000	US Sales: <b>1-800-901-7247</b> International Sales: <b>1-281-441-4400</b>	
TSCA: TSCA 8(b) inventory: Benzene	Order Online: ScienceLab.com	
Cl#: Not available.	CHEMTREC (24HR Emergency Telephone), call:	
Synonym: Benzol; Benzine	1-800-424-9300	
Chemical Name: Benzene	International CHEMTREC, call: 1-703-527-3887	
Chemical Formula: C6-H6	For non-emergency assistance, call: 1-281-441-4400	

# Section 2: Composition and Information on Ingredients

Composition:		
Name	CAS #	% by Weight
Benzene	71-43-2	100

**Toxicological Data on Ingredients:** Benzene: ORAL (LD50): Acute: 930 mg/kg [Rat]. 4700 mg/kg [Mouse]. DERMAL (LD50): Acute: >9400 mg/kg [Rabbit]. VAPOR (LC50): Acute: 10000 ppm 7 hours [Rat].

# **Section 3: Hazards Identification**

#### **Potential Acute Health Effects:**

Very hazardous in case of eye contact (irritant), of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion. Inflammation of the eye is characterized by redness, watering, and itching.

#### **Potential Chronic Health Effects:**

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. The substance is toxic to blood, bone marrow, central nervous system (CNS).

The substance may be toxic to liver, Urinary System.

Repeated or prolonged exposure to the substance can produce target organs damage.

## **Section 4: First Aid Measures**

#### Eye Contact:

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

#### Skin Contact:

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

#### Serious Skin Contact:

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

#### Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

#### Serious Inhalation:

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

#### Ingestion:

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

Serious Ingestion: Not available.

### **Section 5: Fire and Explosion Data**

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 497.78°C (928°F)

Flash Points: CLOSED CUP: -11.1°C (12°F). (Setaflash)

Flammable Limits: LOWER: 1.2% UPPER: 7.8%

Products of Combustion: These products are carbon oxides (CO, CO2).

#### Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat. Slightly flammable to flammable in presence of oxidizing materials. Non-flammable in presence of shocks.

**Explosion Hazards in Presence of Various Substances:** Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Explosive in presence of oxidizing materials, of acids.

#### Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

#### Special Remarks on Fire Hazards:

Extremely flammable liquid and vapor. Vapor may cause flash fire. Reacts on contact with iodine heptafluoride gas.

Dioxygenyl tetrafluoroborate is as very powferful oxidant. The addition of a small particle to small samples of benzene, at ambient temperature, causes ignition.

Contact with sodium peroxide with benzene causes ignition.

Benzene ignites in contact with powdered chromic anhydride.

Virgorous or incandescent reaction with hydrogen + Raney nickel (above 210 C) and bromine trifluoride.

#### Special Remarks on Explosion Hazards:

Benzene vapors + chlorine and light causes explosion.

Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate.

Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in

trichlorotrifluoroethane causes explosion.

Interaction of nitryl perchlorate with benzene gave a slight explosion and flash.

The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene.

Peroxodisulfuric acid is a very powferful oxidant. Uncontrolled contact with benzene may cause explosion.

Mixtures of peroxomonsulfuric acid with benzene explodes.

### **Section 6: Accidental Release Measures**

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

#### Large Spill:

Flammable liquid.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

### Section 7: Handling and Storage

#### **Precautions:**

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

#### Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

### **Section 8: Exposure Controls/Personal Protection**

#### Engineering Controls:

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

#### **Personal Protection:**

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

#### Personal Protection in Case of a Large Spill:

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

#### Exposure Limits:

TWA: 0.5 STEL: 2.5 (ppm) from ACGIH (TLV) [United States]
TWA: 1.6 STEL: 8 (mg/m3) from ACGIH (TLV) [United States]
TWA: 0.1 STEL: 1 from NIOSH
TWA: 1 STEL: 5 (ppm) from OSHA (PEL) [United States]
TWA: 10 (ppm) from OSHA (PEL) [United States]
TWA: 3 (ppm) [United Kingdom (UK)]
TWA: 1.6 (mg/m3) [United Kingdom (UK)]
TWA: 1 (ppm) [Canada]
TWA: 3.2 (mg/m3) [Canada]
TWA: 0.5 (ppm) [Canada]Consult local authorities for acceptable exposure limits.

# **Section 9: Physical and Chemical Properties**

Physical state and appearance: Liquid.

Odor:

Aromatic. Gasoline-like, rather pleasant. (Strong.)

Taste: Not available.

Molecular Weight: 78.11 g/mole

Color: Clear Colorless. Colorless to light yellow.

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

Boiling Point: 80.1 (176.2°F)

Melting Point: 5.5°C (41.9°F)

Critical Temperature: 288.9°C (552°F)

Specific Gravity: 0.8787 @ 15 C (Water = 1)

Vapor Pressure: 10 kPa (@ 20°C)

Vapor Density: 2.8 (Air = 1)

Volatility: Not available.

Odor Threshold: 4.68 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Miscible in alcohol, chloroform, carbon disulfide oils, carbon tetrachloride, glacial acetic acid, diethyl ether,

acetone. Very slightly soluble in cold water.

# Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

**Conditions of Instability:** Heat, ignition sources, incompatibles.

Incompatibility with various substances: Highly reactive with oxidizing agents, acids.

**Corrosivity:** Non-corrosive in presence of glass.

#### Special Remarks on Reactivity:

Benzene vapors + chlorine and light causes explosion.

Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate.

Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in

trichlorotrifluoroethane causes explosion.

Interaction of nitryl perchlorate with benzene gave a slight explosion and flash.

The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene.

Peroxodisulfuric acid is a very powferful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

# Section 11: Toxicological Information

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

#### **Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 930 mg/kg [Rat]. Acute dermal toxicity (LD50): >9400 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 10000 7 hours [Rat].

### **Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.

DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. Causes damage to the following organs: blood, bone marrow, central nervous system (CNS). May cause damage to the following organs: liver, Urinary System.

### Other Toxic Effects on Humans:

Very hazardous in case of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects (female fertility, Embryotoxic and/or foetotoxic in animal) and birth defects.

May affect genetic material (mutagenic).

May cause cancer (tumorigenic, leukemia))

Human: passes the placental barrier, detected in maternal milk.

#### Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects:

Skin: Causes skin irritation. It can be absorbed through intact skin and affect the liver, blood, metabolism, and urinary system.

Eyes: Causes eye irritation.

Inhalation: Causes respiratory tract and mucous membrane irritation. Can be absorbed through the lungs. May affect behavior/Central and Peripheral nervous systems (somnolence, muscle weakness, general anesthetic, and

other symptoms similar to ingestion), gastrointestinal tract (nausea), blood metabolism, urinary system. Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation including vomiting. May affect behavior/Central and Peripheral nervous systems (convulsions, seizures, tremor, irritability, initial CNS stimulation followed by depression, loss of coordination, dizziness, headache, weakness, pallor, flushing), respiration (breathlessness and chest constriction), cardiovascular system, (shallow/rapid pulse), and blood.

# Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

#### Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

# Section 13: Disposal Considerations

#### Waste Disposal:

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

# **Section 14: Transport Information**

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Benzene UNNA: 1114 PG: II

Special Provisions for Transport: Not available.

### Section 15: Other Regulatory Information

#### Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer. birth defects or other reproductive harm, which would require a warning under the statute: Benzene California prop. 65 (no significant risk level): Benzene: 0.007 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Benzene Connecticut carcinogen reporting list .: Benzene Connecticut hazardous material survey .: Benzene Illinois toxic substances disclosure to employee act: Benzene Illinois chemical safety act: Benzene New York release reporting list: Benzene Rhode Island RTK hazardous substances: Benzene Pennsylvania RTK: Benzene Minnesota: Benzene Michigan critical material: Benzene Massachusetts RTK: Benzene Massachusetts spill list: Benzene New Jersey: Benzene New Jersev spill list: Benzene Louisiana spill reporting: Benzene California Director's list of Hazardous Substances: Benzene

TSCA 8(b) inventory: Benzene SARA 313 toxic chemical notification and release reporting: Benzene CERCLA: Hazardous substances.: Benzene: 10 lbs. (4.536 kg)

#### **Other Regulations:**

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

#### Other Classifications:

#### WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

#### DSCL (EEC):

R11- Highly flammable.
R22- Harmful if swallowed.
R38- Irritating to skin.
R41- Risk of serious damage to eyes.
R45- May cause cancer.
R62- Possible risk of impaired fertility.
S2- Keep out of the reach of children.
S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S39- Wear eye/face protection.
S46- If swallowed, seek medical advice immediately and show this container or label.
S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

#### Protective Equipment: Gloves. Lab coat.

Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles. References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:35 PM

Last Updated: 11/06/2008 12:00 PM

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Health	2
Fire	2
Reactivity	0
Personal Protection	Ε

# Material Safety Data Sheet Naphthalene MSDS

Section 1: Chemical Product and Company Identification		
Product Name: Naphthalene	Contact Information:	
Catalog Codes: SLN1789, SLN2401	<b>Sciencelab.com, Inc.</b> 14025 Smith Rd.	
CAS#: 91-20-3	Houston, Texas 77396	
RTECS: QJ0525000	US Sales: <b>1-800-901-7247</b> International Sales: <b>1-281-441-4400</b>	
TSCA: TSCA 8(b) inventory: Naphthalene	Order Online: ScienceLab.com	
CI#: Not available.	CHEMTREC (24HR Emergency Telephone), call:	
Synonym:	1-800-424-9300	
Chemical Name: Not available.	International CHEMTREC, call: 1-703-527-3887	
Chemical Formula: C10H8	For non-emergency assistance, call: 1-281-441-4400	

# Section 2: Composition and Information on Ingredients

Com	position:	

Name	CAS #	% by Weight
Naphthalene	91-20-3	100

**Toxicological Data on Ingredients:** Naphthalene: ORAL (LD50): Acute: 490 mg/kg [Rat]. 533 mg/kg [Mouse]. 1200 mg/kg [Guinea pig]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit]. VAPOR (LC50): Acute: 170 ppm 4 hour(s) [Rat].

# **Section 3: Hazards Identification**

#### **Potential Acute Health Effects:**

Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant, permeator). Severe over-exposure can result in death.

#### **Potential Chronic Health Effects:**

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE].

The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

## **Section 4: First Aid Measures**

#### Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

#### Skin Contact:

After contact with skin, wash immediately with plenty of water. 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. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

#### Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

#### Serious Inhalation:

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

#### Ingestion:

Do not induce vomiting. 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. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

## **Section 5: Fire and Explosion Data**

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 567°C (1052.6°F)

Flash Points: CLOSED CUP: 88°C (190.4°F). OPEN CUP: 79°C (174.2°F).

Flammable Limits: LOWER: 0.9% UPPER: 5.9%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Not available.

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

#### Fire Fighting Media and Instructions:

Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

### **Section 6: Accidental Release Measures**

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

#### Large Spill:

#### Flammable solid.

Stop leak if without risk. 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 ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

### Section 7: Handling and Storage

#### **Precautions:**

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

#### Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

# **Section 8: Exposure Controls/Personal Protection**

#### **Engineering Controls:**

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

#### **Personal Protection:**

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

#### Personal Protection in Case of a Large Spill:

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

#### **Exposure Limits:**

Israel: TWA: 10 (ppm) TWA: 10 STEL: 15 (ppm) from ACGIH (TLV) [1995] TWA: 52 STEL: 79 (mg/m3) from ACGIH [1995] Australia: STEL: 15 (ppm) Consult local authorities for acceptable exposure limits.

# **Section 9: Physical and Chemical Properties**

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

Odor: Aromatic.

Taste: Not available.

Molecular Weight: 128.19 g/mole

Color: White.

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

**Boiling Point:** 218°C (424.4°F)

Melting Point: 80.2°C (176.4°F)

Critical Temperature: Not available.

**Specific Gravity:** 1.162 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 4.4 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.038 ppm

Water/Oil Dist. Coeff.: Not available.

lonicity (in Water): Not available.

#### **Dispersion Properties:**

Partially dispersed in hot water, methanol, n-octanol. Very slightly dispersed in cold water. See solubility in methanol, n-octanol.

#### Solubility:

Partially soluble in methanol, n-octanol. Very slightly soluble in cold water, hot water.

# Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Highly reactive with oxidizing agents.

**Corrosivity:** Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: May attack some forms of rubber and plastic

Polymerization: No.

### **Section 11: Toxicological Information**

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

**Toxicity to Animals:** 

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 490 mg/kg [Rat]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 170 ppm 4 hour(s) [Rat].

### **Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.

DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

#### Other Toxic Effects on Humans:

Very hazardous in case of ingestion. Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

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

# Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 305.2 ppm 96 hour(s) [Trout].

BOD5 and COD: Not available.

#### Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

## Section 13: Disposal Considerations

Waste Disposal:

# Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Naphthalene, refined : UN1334 PG: III

Special Provisions for Transport: Marine Pollutant

# **Section 15: Other Regulatory Information**

Federal and State Regulations: Rhode Island RTK hazardous substances: Naphthalene Pennsylvania RTK: Naphthalene Florida: Naphthalene Minnesota: Naphthalene Massachusetts RTK: Naphthalene TSCA 8(b) inventory: Naphthalene TSCA 8(a) PAIR: Naphthalene TSCA 8(d) H and S data reporting: Naphthalene: 06/01/87 SARA 313 toxic chemical notification and release reporting: Naphthalene: 1% CERCLA: Hazardous substances.: Naphthalene: 100 lbs. (45.36 kg)

#### Other Regulations:

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

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

#### **Other Classifications:**

#### WHMIS (Canada):

CLASS B-4: Flammable solid. CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

#### DSCL (EEC):

R36- Irritating to eyes. R40- Possible risks of irreversible effects. R48/22- Harmful: danger of serious damage to health by prolonged exposure if swallowed. R48/23- Toxic: danger of serious damage to health by prolonged exposure through inhalation. R63- Possible risk of harm to the unborn child.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: E

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

Health: 2

Flammability: 2

Reactivity: 0

Specific hazard:

#### **Protective Equipment:**

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

## **Section 16: Other Information**

References: Not available.

Other Special Considerations: Not available.

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Health	2
Fire	3
Reactivity	0
Personal Protection	Н

# Material Safety Data Sheet Toluene MSDS

## **Section 1: Chemical Product and Company Identification**

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

Cl#: Not available.

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

Chemical Name: Toluene

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

Contact Information:

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

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

Order Online: ScienceLab.com

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

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

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

### Section 2: Composition and Information on Ingredients

Composition:

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

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

### Section 3: Hazards Identification

#### Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

#### **Potential Chronic Health Effects:**

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

#### Eye Contact:

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

#### Skin Contact:

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

#### Serious Skin Contact:

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

#### Inhalation:

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

#### **Serious Inhalation:**

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

#### Ingestion:

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

Serious Ingestion: Not available.

# **Section 5: Fire and Explosion Data**

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

### Fire Hazards in Presence of Various Substances:

Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

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

#### Fire Fighting Media and Instructions:

Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

#### Special Remarks on Explosion Hazards:

Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide;

concentrated nitric acid, sulfuric acid + nitric acid; N2O4; AgCIO4; BrF3; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

#### **Section 6: Accidental Release Measures**

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

#### Large Spill:

Toxic flammable liquid, insoluble or very slightly soluble in water.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

### Section 7: Handling and Storage

#### **Precautions:**

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

#### Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

### **Section 8: Exposure Controls/Personal Protection**

#### **Engineering Controls:**

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

#### **Personal Protection:**

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

#### Personal Protection in Case of a Large Spill:

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

#### **Exposure Limits:**

TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m3) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

#### Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

#### Taste: Not available.
Molecular Weight: 92.14 g/mole

Color: Colorless.

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

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

## Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

## **Section 11: Toxicological Information**

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

#### Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

#### **Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC.

May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

#### Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

#### Special Remarks on Toxicity to Animals:

Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

#### Special Remarks on Chronic Effects on Humans:

Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

#### Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects:

Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin.

Eyes: Cauess mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abraisons. This usually resolves in 2 days.

Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia, ), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite.

Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects:

Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophostatemia), severe, muscle weakness and Rhabdomyolysis.

Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

## Section 12: Ecological Information

#### Ecotoxicity:

Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

#### BOD5 and COD: Not available.

#### Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may

arise.

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

Special Remarks on the Products of Biodegradation: Not available.

## Section 13: Disposal Considerations

Waste Disposal:

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

## Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

## **Section 15: Other Regulatory Information**

#### Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey .: Toluene Illinois toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

#### **Other Regulations:**

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

#### Other Classifications:

#### WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

## DSCL (EEC):

R11- Highly flammable.
R20- Harmful by inhalation.
S16- Keep away from sources of ignition - No smoking.
S25- Avoid contact with eyes.
S29- Do not empty into drains.
S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

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

## **Section 16: Other Information**

References: Not available.

Other Special Considerations: Not available.

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# Occupational Health Guideline for Coal Tar Pitch Volatiles

### INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

#### SUBSTANCE IDENTIFICATION

#### Anthracene

- Formula: C14H10
- Synonyms: None

• Appearance and odor: Pale green solid with a faint aromatic odor.

#### Phenanthrene

Formula: C14H10 Synonyms: None

<sup>4</sup> Appearance and odor: Colorless solid with a faint aromatic odor.

#### Pyrene

- Formula: C16H10
- Synonyms: None
- Appearance: Bright yellow solid

#### Carbazole

- Formula: C12H<sub>9</sub>N
- Synonyms: None

• Appearance and odor: Colorless solid with a faint aromatic odor.

#### Benzo(a)pyrene

Formula: C<sub>20</sub>H<sub>13</sub>

• Synonyms: BaP, 3,4-benzopyrene

• Appearance and odor: Colorless solid with a faint aromatic odor.

#### PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for coal tar pitch volatiles is 0.2 milligram of coal tar pitch volatiles per cubic meter of air (mg/m<sup>a</sup>) averaged over an eight-hour work shift. NIOSH has recommended that the permissible exposure limit for coal tar products be reduced to 0.1 mg/m<sup>a</sup> (cyclohexane-extractable fraction) averaged over a work shift of up to 10 hours per day, 40 hours per week, and that coal tar products be regulated as occupational carcinogens. The NIOSH Criteria Document for Coal Tar Products and NIOSH Criteria Document for Coke Oven Emissions should be consulted for more detailed information.

#### **HEALTH HAZARD INFORMATION**

#### • Routes of exposure

Coal tar pitch volatiles can affect the body if they are inhaled or if they come in contact with the eyes or skin.

#### Effects of overexposure

Repeated exposure to coal tar pitch volatiles has been associated with an increased risk of developing bronchitis and cancer of the lungs, skin, bladder, and kidneys. Pregnant women may be especially susceptible to exposure effects associated with coal tar pitch volatiles. Repeated exposure to these materials may also cause sunlight to have a more severe effect on a person's skin. In addition, this type of exposure may cause an allergic skin rash.

#### Reporting signs and symptoms

A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to coal tar pitch volatiles.

#### • Recommended medical surveillance

The following medical procedures should be made available to each employee who is exposed to coal tar pitch volatiles at potentially hazardous levels:

These recommendations reflect good industrial hygiene and medical surveillance practices and their implementation will assist in achieving an effective occupational health program. However, they may not be sufficient to achieve compliance with all requirements of OSHA regulations.

I.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES Public Health Service Centers for Disease Control National Institute for Occupational Safety and Health

#### U.S. DEPARTMENT OF LABOR

Occupational Safety and Health Administration

#### 1. Initial Medical Examination:

-A complete history and physical examination: The purpose is to detect pre-existing conditions that might place the exposed employee at increased risk, and to

tablish a baseline for future health monitoring. Examition of the oral cavity, respiratory tract, bladder, and kidneys should be stressed. The skin should be examined for evidence of chronic disorders, for premalignant and malignant lesions, and evidence of hyperpigmentation or photosensitivity.

-Urinalysis: Coal tar pitch volatiles are associated with an excess of kidney and bladder cancer. A urinalysis should be obtained to include at a minimum specific gravity, albumin, glucose, and a microscopic on centrifuged sediment, as well as a test for red blood cells.

-Urinary cytology: Coal tar pitch volatiles are associated with an excess of kidney and bladder cancer. Employees having 5 or more years of exposure or who are 45 years of age or older should have a urinary cytology examination.

—Sputum cytology: Coal tar pitch volatiles are associated with an excess of lung cancer. Employees having 10 or more years of exposure or who are 45 years of age or older should have a sputum cytology examination.

-14" x 17" chest roentgenogram: Coal tar pitch volatiles are associated with an excess of lung cancer. Surveillance of the lungs is indicated.

-FVC and FEV (1 sec): Coal tar pitch volatiles are reported to cause an excess of bronchitis. Periodic surveillance is indicated.

---A complete blood count: Due to the possibility of inzene exposure associated with coal tar pitch vola-...ies, a complete blood count is considered necessary to search for leukemia and aplastic anemia.

---Skin disease: Coal tar pitch volatiles are defatting agents and can cause dermatitis on prolonged exposure. Persons with pre-existing skin disorders may be more susceptible to the effects of these agents.

2. Periodic Medical Examination: The aforementioned medical examinations should be repeated on an annual basis, and semi-annually for employees 45 years of age or older or with 10 or more years' exposure to coal tar pitch volatiles.

Summary of toxicology

Coal tar pitch volatiles (CTPV) are products of the destructive distillation of bituminous coal and contain polynuclear aromatic hydrocarbons (PNA's). These hydrocarbons sublime readily, thereby increasing the amounts of carcinogenic compounds in working areas. Epidemiologic evidence suggests that workers intimately exposed to the products of combustion or distillation of bituminous coal are at increased risk of cancer at many sites. These include cancer of the respiratory tract, kidney, bladder, and skin. In a study of coke oven workers, the level of exposure to CTPV and the length of time exposed were related to the development of cancer. Coke oven workers with the highest risk of `ancer were those employed exclusively at topside jobs

r 5 or more years, for whom the increased risk of

dying from lung cancer was 10-fold; all coke oven workers had a 7-1/3-fold increase in risk of dying from kidney cancer. Although the causative agent or agents of the cancer in coke oven workers is unidentified, it is suspected that several PNA's in the CTPV generated during the coking process are involved. Certain industrial populations exposed to coal tar products have a demonstrated risk of skin cancer. Substances containing PNA's which may produce skin cancer also produce contact dermatitis; examples are coal tar, pitch, and cutting oils. Although allergic dermatitis is readily induced by PNA's in guinea pigs, it is only rarely reported in humans from occupational contact with PNA's; these have resulted largely from the therapeutic use of coal tar preparations. Components of pitch and coal tar produce cutaneous photosensitization; skin eruptions are usually limited to areas exposed to the sun or ultraviolet light. Most of the phototoxic agents will induce hypermelanosis of the skin; if chronic photodermatitis is severe and prolonged, leukoderma may occur. Some oils containing PNA's have been associated with changes of follicular and sebaceous glands which commonly take the form of acne. There is evidence that exposures to emissions at coke ovens and gas retorts may be associated with an increased occurrence of chronic bronchitis. Coal tar pitch volatiles may be associated with benzene, an agent suspected of causing leukemia and known to cause aplastic anemia.

#### CHEMICAL AND PHYSICAL PROPERTIES

• Physical data—Anthracene

1. Molecular weight: 178.2

2. Boiling point (760 mm Hg): 340 C (644 F)

3. Specific gravity (water = 1): 1.24

4. Vapor density (air = 1 at boiling point of anthracene): 6.15

5. Melting point: 217 C (423 F)

6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg

7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble

8. Evaporation rate (butyl acetate = 1): Not applicable

Physical data—Phenanthrene

1. Molecular weight: 178.2

2. Boiling point (760 mm Hg): 340 C (644 F)

3. Specific gravity (water = 1): 1.18

4. Vapor density (air = 1 at boiling point of phenanthrene): 6.15

5. Melting point: 100.5 C (213 F)

6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F):

Insoluble

8. Evaporation rate (butyl acctate = 1): Not applicable

• Physical data—Pyrene

1. Molecular weight: 202.3

2. Boiling point (760 mm Hg): Greater than 360 C (greater than 680 F)

3. Specific gravity (water = 1): 1.28

4. Vapor density (air = 1 at boiling point of pyrene): 6.9

5. Melting point: 150.4 C (303 F)

6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg 7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble

8. Evaporation rate (butyl acetate = 1): Not applicable

Physical data—Carbazole

Molecular weight: 167.2

2. Boiling point (760 mm Hg): 355 C (671 F)

3. Specific gravity (water = 1): Greater than 1 4. Vapor density (air = 1 at boiling point of carba-

zole): 5.8

5. Melting point: 246 C (475 F)

6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg

7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble

8. Evaporation rate (butyl acetate = 1): Not applicable

Physical data—Benzo(a)pyrene

1. Molecular weight: 252.3

2. Boiling point (760 mm Hg): Greater than 360 C (greater than 680 F)

3. Specific gravity (water = 1): Greater than 1 4. Vapor density (air = 1 at boiling point of benzo(a)pyrene): 8.7

5. Melting point: 179 C (354 F)

6. Vapor pressure at 20 C (68 F): Less than 1 mm Hg

7. Solubility in water, g/100 g water at 20 C (68 F): insoluble

8. Evaporation rate (butyl acetate = 1): Not applicable

#### Reactivity

1. Conditions contributing to instability: None hazardous

2. Incompatibilities: Contact with strong oxidizers may cause fires and explosions.

3. Hazardous decomposition products: None

4. Special precautions: None

Flammability

1. Flash point: Anthracene: 121 C (250 F) (closed cup); Others: Data not available

2. Autoignition temperature: Anthracene: 540 C (1004 F); Others: Data not available

3. Flammable limits in air, % by volume: Anthracene: Lower: 0.6; Others: Data not available

4. Extinguishant: Foam, dry chemical, and carbon dioxide

Warning properties

Grant states that "coal tar and its various crude fractions appear principally to cause reddening and squamous eczema of the lid margins, with only small erosions of the corneal epithelium and superficial changes in the stroma, which disappear in a month following

uposure. Chronic exposure of workmen to tar fumes ad dust has been reported to cause conjunctivitis and discoloration of the cornea in the palpebral fissure. either near the limbus or, in extreme cases, across the whole cornea. Occasionally, epithelioma of the lid margin has been attributed to contact with coal tar."

#### MONITORING AND MEASUREMENT PROCEDURES

#### • General

Measurements to determine employee exposure are best taken so that the average eight-hour exposure is based on a single eight-hour sample or on two four-hour samples. Several short-time interval samples (up to 30 minutes) may also be used to determine the average exposure level. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee).

• Method

Coal tar products may be sampled by collection on a glass fiber filter with subsequent ultrasonic extraction and weighing. An analytical method for coal tar pitch volatiles is in the NIOSH Manual of Analytical Methods, 2nd Ed., Vol. 1, 1977, available from the Government Printing Office, Washington, D.C. 20402 (GPO No. 017-033-00267-3).

#### RESPIRATORS

· Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.

• In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

#### PERSONAL PROTECTIVE EQUIPMENT

Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent skin contact with condensed coal tar pitch volatiles, where skin contact may occur.
If employees' clothing may have become contaminated with coal tar pitch volatiles, employees should change into uncontaminated clothing before leaving the work premises.

• Clothing contaminated with coal tar pitch volatiles

should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of coal tar pitch volatiles from the clothing. If the clothing is to be laundered or otherwise cleaned to

move the coal tar pitch volatiles, the person performing the operation should be informed of coal tar pitch volatiles's hazardous properties.

• Employees should be provided with and required to use splash-proof safety goggles where condensed coal tar pitch volatiles may contact the eyes.

#### SANITATION

Case

• Workers subject to akin contact with coal tar pitch volatiles should wash with soap or mild detergent and water any areas of the body which may have contacted coal tar pitch volatiles at the end of each work day.

• Employees who handle coal tar pitch volatiles should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities.

• Areas in which exposure to coal tar pitch volatiles may occur should be identified by signs or other appropriate means, and access to these areas should be limited to authorized persons.

## COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in hich exposure to coal tar pitch volatiles may occur and control methods which may be effective in each

Operation	
Liberation from extraction and packaging from coal tar fraction of coking	Proce local ventil dilutic perso equip
Use as a binding agent in manufacture of coal briquettes used for fuel; use as a dielectric in the manufacture of battery electrodes, electric-arc furnace electrodes, and electrodes for alumina reduction	Proce local ventili dilutio perso equip
Use in manufacture of	Proce

Use in manufacture of roofing felts and papers and roofing

Controls rocess enclosure;

local exhaust ventilation; general dilution ventilation; personal protective equipment

Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment

Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment

#### Operation

Use for protective coatings for pipes for underground conduits and drainage; use as a coating on concrete as waterproofing and corrosion-resistant material; use in road paving and sealing

Use in manufacture and repair of refractory brick; use in production of foundry cores; use in manufacture of carbon ceramic items

#### Controls

Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment

Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment

### **EMERGENCY FIRST AID PROCEDURES**

In the event of an emergency, institute first aid procedures and send for first aid or medical assistance. • Eye Exposure

If condensed coal tar pitch volatiles get into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. If irritation is present after washing, get medical attention. Contact lenses should not be worn when working with these chemicals.

Skin Exposure

If condensed coal tar pitch volatiles get on the akin, wash the contaminated skin using soap or mild detergent and water. Be sure to wash the hands before eating or smoking and to wash thoroughly at the close of work.

#### • Breathing

If a person breathes in large amounts of coal tar pitch volatiles, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

#### • Rescue

Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty. Understand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

#### SPILL AND DISPOSAL PROCEDURES

• Persons not wearing protective equipment and clothing should be restricted from areas of releases until cleanup has been completed.

• If coal tar pitch volatiles are released in hazardous concentrations, the following steps should be taken: 1. Ventilate area of spill. 2. Collect released material in the most convenient and safe manner for reclamation or for disposal in sealed containers in a secured sanitary landfill.

• Waste disposal method:

Coal tar pitch volatiles may be disposed of in sealed containers in a secured sanitary landfill.

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## **RESPIRATORY PROTECTION FOR COAL TAR PITCH VOLATILES**

Condition	Minimum Respiratory Protection* Required Above 0.2 mg/m <sup>3</sup>
Particulate and Vapor Concentration	
2 mg/m <sup>3</sup> or less	A chemical cartridge respirator with an organic vapor cartridge(s) and with a fume or high-efficiency filter.
	Any supplied-air respirator.
	Any self-contained breathing apparatus.
10 mg/m³ or less	A chemical cartridge respirator with a full facepiece and an organic vapor cartridge(s) and with a fume or high-efficiency filter.
	A gas mask with a chin-style or a front- or back-mounted organic vapor canister and with a full facepiece and a fume or high-efficiency filter.
	Any supplied-air respirator with a full facepiece, helmet, or hood.
	Any self-contained breathing apparatus with a full facepiece.
200 mg/m² or less	A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
	A powered air-purifying respirator with an organic vapor cartridge and a high- efficiency particulate filter.
400 mg/mª or less	A Type C supplied-air respirator with a full facepiece operated in pressure- demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode.
Greater than 400 mg/m <sup>a</sup> or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure- demand or other positive pressure mode.
	A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continu- ous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
Fire Fighting	Self-contained breathing apparatus with a full facepiece operated in pressure- demand or other positive pressure mode.
Escape	Any gas mask providing protection against organic vapors and particulates, including pesticide respirators which meet the requirements of this class.
	Any escape self-contained breathing apparatus.

\*Only NIOSH-approved or MSHA-approved equipment should be used.

**M** 

MATERIAL SAFETY DATA SHEET

## **PRODUCT NAME: ISOBUTYLENE**

## 1. Chemical Product and Company Identification

BOC Gases, Division of The BOC Group, Inc. 575 Mountain Avenue Murray Hill, NJ 07974

**TELEPHONE NUMBER:** (908) 464-8100 24-HOUR EMERGENCY TELEPHONE NUMBER: CHEMTREC (800) 424-9300 BOC Gases Division of BOC Canada Limited 5975 Falbourne Street, Unit 2 Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (905) 501-1700 24-HOUR EMERGENCY TELEPHONE NUMBER: (905) 501-0802 EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: ISOBUTYLENE CHEMICAL NAME: Isobutylene COMMON NAMES/SYNONYMS: 2-Methylpropene, Isobutene TDG (Canada) CLASSIFICATION: 2.1 WHMIS CLASSIFICATION: A, B1, D2B

PREPARED BY: Loss Control (908)464-8100/(905)501-1700 PREPARATION DATE: 6/1/95 REVIEW DATES: 6/7/96

## 2. Composition, Information on Ingredients

INGREDIENT	% VOLUME	PEL-OSHA <sup>1</sup>	TLV-ACGIH <sup>2</sup>	LD <sub>50</sub> or LC <sub>50</sub> Route/Species
Isobutylene FORMULA: C4H8 CAS: 115-11-7 RTECS #: UD0890000	99.0 to 99.8	Simple Asphyxiant	Simple Asphyxiant	LC <sub>50</sub> 620 mg/m <sup>3</sup> /3H (rat)

As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

<sup>2</sup> As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

### 3. Hazards Identification

<u>EMERGENCY OVERVIEW</u> This product does not contain oxygen and may cause asphyxia if released in a confined area. Simple hydrocarbons can cause irritation and central nervous system depression at high concentrations. flammable.

#### **ROUTE OF ENTRY:**

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	No

#### HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization
No	Yes	No
Teratogen	Reproductive Hazard	Mutagen
No	No	No
Synergistic Effects None Reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

#### EYE EFFECTS:

Irritation may occur.

#### **SKIN EFFECTS:**

None anticipated as product is a gas at room temperature.

#### **INGESTION EFFECTS:**

Ingestion is unlikely.

#### **INHALATION EFFECTS:**

Product is relatively nontoxic. Simple hydrocarbons can irritate the eyes, mucous membranes and respiratory system at high concentrations.

Inhalation of high concentrations may cause dizziness, disorientation, incoordination, narcosis, nausea or narcotic effects.

This product may displace oxygen if released in a confined space. Maintain oxygen levels above 19.5% at sea level to prevent asphyxiation.

Effects of oxygen deficiency resulting from simple asphyxiants may include: rapid breathing, diminished mental alertness, impaired muscular coordination, faulty judgement, depression of all sensations, emotional instability, and fatigue. As asphyxiation progresses, nausea, vomiting, prostration, and loss of consciousness may result, eventually leading to convulsions, coma, and death.

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

#### NFPA HAZARD CODES

Health:1Flammability:4Reactivity:0

HMIS HAZARD CODES

Health: 1 Flammability: 4 Reactivity: 0

#### **RATINGS SYSTEM**

0 = No Hazard 1 = Slight Hazard 2 = Moderate Hazard 3 = Serious Hazard 4 = Severe Hazard

#### 4. First Aid Measures

EYES:

Never introduce oil or ointment into the eyes without medical advice! If pain is present, refer the victim to an ophthalmologist for further treatment and follow up.

SKIN:

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Remove contaminated clothing and wash affected area with soap and water. If irritation persists, seek medical attention.

#### INGESTION:

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Not normally required. Seek immediate medical attention.

#### INHALATION:

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO PRODUCT. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given assisted (artificial) respiration and supplemental oxygen. Further treatment should be symptomatic and supportive.

## 5. Fire Fighting Measures

Conditions of Flammability: Flammable liquid and vapor				
Flash point:	Method:	· · · · · · · · · · · · · · · · · · ·	Autoignition	
-105 °F (-76 °C)	Closed Cup		Temperature:	869 °F (465 °C)
LEL(%): 1.8		UEL(%): 9,6	**	
Hazardous combustion products: Carbon monoxide, Carbon dioxide				
Sensitivity to mechanical shock: None				
Sensitivity to static discharge: Not Available				

#### FIRE AND EXPLOSION HAZARDS:

Isobutylene is heavier than air and may travel a considerable distance to an ignition source. Isobutylene is a flammable gas! Keep away from open flame and other sources of ignition. Do not allow smoking in storage areas or when handling.

#### **EXTINGUISHING MEDIA:**

Water, carbon dioxide, dry chemical.

#### FIRE FIGHTING INSTRUCTIONS:

If possible, stop the flow of gas with a remote valve. Use water spray to cool fire exposed containers. If fire is extinguished and flow of gas is continued, increase ventilation to prevent a build up of a flammable/ explosive atmosphere. Extinguish sources of ignition.

Be cautious of a Boiling Liquid Evaporating Vapor Explosion, BLEVE, if flame is impinging on surrounding containers. Direct 500 GPM water stream onto containers above the liquid level with remote monitors. Limit the number of personnel in proximity to the fire. Evacuate surrounding areas to at least 3000 feet in all directions.

### 6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. Increase ventilation to prevent build up of a flammable/explosive atmosphere. Extinguish all sources of ignition! If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location

### 7. Handling and Storage

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Earth bond and ground all lines and equipment associated with the product system. Electrical equipment should be non-sparking and explosion proof.

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure regulator when connecting cylinder to lower pressure (<250 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130°F (54°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

Post "No Smoking" signs in storage or use areas.

For additional recommendations consult Compressed Gas Association Pamphlet P-1.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

# 8. Exposure Controls, Personal Protection

#### EXPOSURE LIMITS<sup>1</sup>;

INGREDIENT	% VOLUME	PEL-OSHA <sup>2</sup>	TLV-ACGIH <sup>3</sup>	LD <sub>50</sub> or LC <sub>50</sub> Route/Species
FORMULA: C4H8 CAS: 115-11-7 RTECS #: UD0890000	99.0 to 99.8	Simple Asphyxiant	Simple Asphyxiant	LC <sub>50</sub> 620 mg/m <sup>3</sup> /3H (rat)

<sup>1</sup> Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.

<sup>2</sup> As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

<sup>3</sup> As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

#### ENGINEERING CONTROLS:

Use local exhaust to prevent accumulation. Use general ventilation to prevent build up of flammable concentrations. May use hood with forced ventilation when handling small quantities. If product is handled routinely where the potential for leaks exists, all electrical equipment must be rated for use in potentially flammable atmospheres. Consult the National Electrical Code for details.

### EYE/FACE PROTECTION:

Safety goggles or glasses.

#### SKIN PROTECTION:

Protective gloves made of plastic or rubber.

#### **RESPIRATORY PROTECTION:**

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Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

## **OTHER/GENERAL PROTECTION:**

Safety shoes, safety shower, eyewash.

# 9. Physical and Chemical Properties

PARAMETER	VALUE	INTES	
Physical state (gas, liquid, solid)	: Gas		,
Vapor pressure at 70°F	: 39	nsia	
Vapor density at STP (Air = 1)	: 1.98	. Pare	
Evaporation point	: Not Available		
Boiling point	: 19.5	۴	
	: -6.9	°C	
Freezing point	: -220.6	°F	
pH Specific gravity Oil/water partition coefficient Solubility (H2O) Odor threshold Odor and appearance	: -140.3 : Not Available : Not Available : Not Available : Insoluble : Not Available : A colorless gas withat of burning out	°C th an unpleasant odor simil	lar to

## 10. Stability and Reactivity

STABILITY: Stable

CONDITIONS TO AVOID (STABILITY): None

INCOMPATIBLE MATERIALS: Oxidizers

# HAZARDOUS DECOMPOSITION PRODUCTS:

Carbon monoxide

## 11. Toxicological Information

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

No chronic effects data given in the Registry of Toxic Effects of Chemical Substances (RTECS) or Sax, Dangerous Properties of Industrial Materials, 7th ed.

## 12. Ecological Information

No data given.

## 13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

## 14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Isobutylene	Isobutylene
HAZARD CLASS:	2.1	2.1
IDENTIFICATION NUMBER:	UN 1055	UN 1055
SHIPPING LABEL:	FLAMMABLE GAS	FLAMMABLE GAS

### 15. Regulatory Information

Isoutylene is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

## SARA TITLE III NOTIFICATIONS AND INFORMATION

SARA TITLE III - HAZARD CLASSES: Acute Health Hazard Fire Hazard Sudden Release of Pressure Hazard

## 16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

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#### DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

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Material Safety Data	Sheet: Simple Green <sup>®</sup> All-Purpose Cleane	er		
	Simple Green <sup>®</sup> Scrubbing Pad			
Version No. 130050	Date of Issue: January 2009			ANSI-Z400.1-2003 Format
Section 1: PRC	DUCT & COMPANY IDENTIFICATIO	Ν		
Product Name:	Simple Green <sup>®</sup> All-Purpose Cleaner Simple Green <sup>®</sup> Scrubbing Pad			
Additional Name:	Simple Green <sup>®</sup> Concentrated Cleaner/Degrease	r/Deodo	rizer	
Manufacturer's Prod	uct Code Numbers: *Please refer to page 4			
Company:	Sunshine Makers, Inc. 15922 Pacific Coast Highway			
	Huntington Harbour, CA 92649 USA			
Telephone:	800-228-0709 • 562-795-6000	Fax:	562-592-3830	
Emergency Phone:	Chem-Tel 24-Hour Emergency Service: 800-255-3924			
Use of Product:	An all purpose cleaner and degreaser used diluted in water for direct, spray and dip tank procedures. Scrubbing pad is used with water for manual scrubbing applications. Both are for cleaning water-safe			d dip tank procedures. for cleaning water-safe

### Section 2: HAZARDS IDENTIFICATION

surfaces.

## Emergency Overview: CAUTION. Mild eye irritant. Simple Green<sup>®</sup> is a dark green liquid with a sassafras odor. Scrubbing Pad is a green fibrous rectangle.



 $\begin{array}{l} \underline{HMIS \ Rating:} \\ Health = 1 = slight \\ Fire = 0 \\ Reactivity, and Special = 0 = minimal \end{array}$ 

- **Eye Contact:** Mild Eye Irritant.
- **Skin Contact:** No adverse effects expected under typical use conditions. Prolonged exposure may cause dryness. Under this condition, use of gloves or skin moisturizer after washing may be indicated.
- **Ingestion:** May cause stomach or intestinal upset if swallowed (due to detersive properties.)
- **Inhalation:** No adverse effects expected under typical use conditions. Adequate ventilation should be present when using Simple Green<sup>®</sup> over a prolonged period of time. Open windows or ventilate via fan or other airmoving equipment if necessary.
- Carcinogens: No ingredients are listed by OSHA, IARC, or NTP as known or suspected carcinogens.
- **Medical Conditions:** No medical conditions are known to be aggravated by exposure to Simple Green<sup>®</sup>. Dermal-sensitive users may experience mild but reversible reactions.

UN Number: Not Required

Dangerous Goods Class: Non-hazardous

## Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

The only ingredient of Simple Green<sup>®</sup> with established exposure limits is undiluted 2-butoxyethanol (<4%) (Butyl Cellosolve; CAS No. 111-76-2) [*1% for Scrubbing Pad*]: the ACGIH TLV-TWA is 20 ppm (97 mg/m<sup>3</sup>). Based upon chemical analysis, Simple Green<sup>®</sup> contains no known EPA priority pollutants, heavy metals or chemicals listed under RCRA, CERCLA, or CWA. Analysis by TCLP (Toxicity Characteristic Leaching Procedure) according to RCRA revealed no toxic organic or inorganic constituents.

All components of Simple Green<sup>®</sup> are listed on the TSCA Chemical Substance Inventory. This product does not contain any ingredients covered by the provisions of 29 CFR 1910.1200.

Material Safety Da	ata Sheet:	Simple Green <sup>®</sup> All-Purpose Cleaner Simple Green <sup>®</sup> Scrubbing Pad	
Version No. 13005	509A	Date of Issue: January 2009	ANSI-Z400.1-2003 Format
Section 4:	FIRST AI	D MEASURES	
Eye Contact:	Reddening a minutes or u and lower li	nay develop. Immediately rinse the eye with large quantities intil the material has been removed; be sure to remove contac ds during rinsing. Get medical attention if irritation persists.	of cool water; continue 10-15 et lenses, if present, and to lift upper
Skin Contact:	Minimal effects, if any; rinse skin with water, rinse shoes and launder clothing before reuse. Reversible reddening may occur in some dermal-sensitive users; thoroughly rinse area and get medical attention if reaction persists.		othing before reuse. Reversible ea and get medical attention if
Swallowing;	Essentially non-toxic. Give several glasses of water to dilute; do not induce vomiting. If stomach upset occurs, consult physician.		ce vomiting. If stomach upset
Inhalation:	Non-toxic. Exposure to concentrate may cause mild irritation of nasal passages or throat; remove to fresh air. Get medical attention if irritation persists.		ssages or throat; remove to fresh

#### Section 5: FIRE FIGHTING MEASURES

### Simple Green<sup>®</sup> is stable, not flammable, and will not burn. No special procedures required.

Flash Point/Auto-Ignition: Not flammable.	Extinguishing Media: Not flammable/non-explosive.
Flammability Limits: Not flammable.	Special Fire Fighting Procedures: None required.

## Section 6: ACCIDENTAL RELEASE MEASURES

**Personal Precautions:** Avoid contact with eyes. Do not rub eyes with hands during cleanup. No special precautions for dermal contact are needed. Wash hands thoroughly after cleaning up spill or leak.

**Method for cleaning up:** Recover usable material by convenient method, residual may be removed by wipe or wet mop. If necessary, unrecoverable material may be washed to drain with large quantities of water.

### Section 7: HANDLING AND STORAGE

No Special precautions are required. This product is non-hazardous for storage and transport according to the U.S. **Department of Transportation Regulations.** Simple Green<sup>®</sup> requires no special labeling or placarding to meet U.S. Department of Transportation requirements.

UN Number:	Not Required	Dangerous Goods Class:	Non-hazardous

## Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits:	The Simple Green <sup>®</sup> formulation presents no health hazards to the user when used according to label directions for its intended purposes. Mild skin and eye irritation is possible (please see Eye contact and Skin contact in section IV.) No special precautionary measures required under normal use conditions.
Ventilation:	No special ventilation, precautions or respiratory protection is required during normal use. Large- scale use indoors should provide an increased rate of air exchange.
Human Health Effects or Risks From Exposure:	Adverse effects on human health are not expected from Simple Green <sup>®</sup> , based on 20 years of use of Simple Green <sup>®</sup> without reported adverse health incidence in diverse population groups, including extensive use by inmates of U.S. Federal prisons in cleaning operations.
Eye protection:	Simple Green <sup>®</sup> is a mild eye irritant; mucous membranes may become irritated by concentrate. Eye protection not generally required. Wash hands after using wipes.
Skin protection:	Simple Green <sup>®</sup> is not likely to irritate the skin in the majority of users. Repeated daily application to the skin without rinsing, or continuous contact on the skin may lead to temporary, but reversible, irritation. Rinse completely from skin after contact.

Material Safety Data Sheet:	Simple Green <sup>®</sup> All-Purpose Cleaner	
	Simple Green <sup>®</sup> Scrubbing Pad	
Version No. 1300509A	Date of Issue: January 2009	ANSI-Z400.1-2003 Format
Section 8: EXPOSURE	CONTROLS/PERSONAL PROTECTION – continued –	

General hygiene<br/>conditions:There are no known hazards associated with this material when used as recommended.<br/>The following general hygiene considerations are recognized as common good industrial hygiene<br/>practices:

- Avoid breathing vapor or mist.
- Avoid contact with eyes.
- Wash thoroughly after handling and before eating, drinking, or smoking.

### Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: Cleaner is a dark green liquid, pad is a fibrous green matrix; both exhibit a sassafras odor.					
Specific Gravity:	$1.010\pm0.010$	Vapor Pressure:	18 mm Hg @ 20°C; 23.5 mmHg @ 26°C		
Evaporation:	>1 (butyl acetate = 1)	Vapor Density:	1.3 (air = 1)		
Water Solubility:	100%	Density:	8.5 lbs/gallon		
<b>Boiling Point:</b>	100.6°C (212°F)	pH:	9.5 ± 0.3		
Ash Content:	At 600°F: 1.86% by weight	Nutrient Content:			
<b>Freezing Point:</b> Approx -9 °C (16 °F) If product freezes, it will reconstitute without loss of efficacy when brought back to room temperature and agitated.		Phosphorus: 0.3% Nitrogen <1.0% by Sulfur: 0.6% by we	by formula weight (fusion and qualitative test for ammonia) eight (barium chloride precipitation method)		
VOC Composite Partial Pressure: 0.006 mmHg @ 20°C					
<b>Volatile Organic Compounds (VOCs):</b> Cleaner meets CARB & BAAQMD regulations. Cleaner must be diluted 1:1					
CARB Method 310	3.8% with water	to Meet SCAQMD Rule	e 1171 & Rule 1122 VOC requirements for		
SCAQMD Method 313 2.8% solvent clear		aning operations. [Scrub	ober VOCs = 3.3% prior to dilution w/water]		

### Section 10: STABILITY AND REACTIVITY

Stability:	Stable
Materials to Avoid:	None known
Hazardous Decomposition Products:	None expected

## Section 11: TOXICOLOGICAL INFORMATION

Toxicology information is based on chemical profile of ingredients and extrapolation of data from similar formulas.

Acute Toxicity:	Oral LD <sub>50</sub> (rat) Dermal LD <sub>50</sub> (rabbit)	>5 g/kg body weight* >2 g/kg body weight	*Calculation from OECD series on testing and assessment number 33, Chapter 3.2
Eye Irritation:	Moderate/Mild reversib potential is reduced by i	le eye irritation may occur based on a mmediate rinsing of eyes in case of e	celevant laboratory studies. This eye contact.
Dermal Irritation:	Mild, reversible skin irritation may occur based on relevant laboratory studies. A 6-hour exposure to human skin under a patch did not produce irritation		
Repeat Exposure Via Skin Contact:	Based on relevant laboratory studies, no toxic effects are expected to be associated with daily s exposures (with up to 2 g/kg/day tested for 13 weeks on rabbits). Skin irritation may, however, occur with repeated or prolonged exposures.		ected to be associated with daily skin bits). Skin irritation may, however,
Reproductive Effects Assessment:	Based on relevant labora breeding), no adverse ef	atory studies (CD-1 mouse 18-week : fects on reproduction, fertility, or he	fertility assessment continuous alth of offspring are expected.

## Section 12: ECOLOGICAL INFORMATION

Hazard to wild animals & aquatic organisms: Low, based on toxicological profile.

**Biodegradability:** Readily biodegradable based on biodegradation profile, PRO/FT CBT-AC 014-7 "Ready Biodegradability: Closed Bottle Test" OECD, and OECD 302B laboratory tests

**Environmental Toxicity Information**: It is important not to allow the runoff from cleaning into closed systems such as decorative ponds. Always protect closed systems with tarps or dikes if necessary.

#### Section 13: DISPOSAL CONSIDERATIONS

Dispose of in accordance with all applicable local, state and federal laws. Dispose of used or unused product, and empty containers in accordance with the local, State, Provincial, and Federal regulations for your location. Never dispose of used degreasing rinsates into lakes, streams, and open bodies of water or storm drains.

### Section 14: TRANSPORT INFORMATION

This product is non-hazardous for transport according to the U.S. Department of Transportation Services UN Number: Not required Dangerous Goods Class: Non-hazardous

## Section 15: REGULATORY INFORMATION

*Reportable components: All components are listed on:	EINECS and TSCA Inventory		
No components listed under:	Clean Air Act Section 112		
SARA:	This material contains 2-Butoxyetha requirements of Section 313 of SAR	nol, < 4%, (CAS# 111-76-2) which i A Title III and 49 CFR Part 373.	s subject to the reporting
RCRA Status:	Not a hazardous waste.	CERCLA Status:	No components listed
TSCA TRI Reporting:	Not required / Not listed	CA PROP. 65 Status:	No components listed

### Section 16: OTHER INFORMATION

Questions about the information found on this MSDS should be directed to: SUNSHINE MAKERS, INC. – TECHNICAL DEPARTMENT 15922 Pacific Coast Hwy. Huntington Harbour, CA 92649

Phone: 800/228-0709 [8am-5pm Pacific time, Mon-Fri]

Fax: 562/592-3830

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Email: infoweb@simplegreen.com
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#### CAGE CODE 1Z575 GSA/FSS - CONTRACT NO. GS-07F-0065J National Stock Numbers & Industrial Part Numbers:

Simple Green	Part Number	NSN	Size		
	13012	7930-01-342-5315	24 oz spray (12/case)		
	13005	7930-01-306-8369	1 Gallon (6/case)		
	13006	7930-01-342-5316	5 Gallon		
	13016	7930-01-342-5317	15 Gallon		
	13008	7930-01-342-4145	55 Gallon		
Scrubbing Pad	Part Number	NSN	Size		
	10224	7930-01-346-9148	Each (24/case)		

**Retail Numbers:** 

Part Number	Size
13002	16 oz Trigger (12/case)
13005	1 Gallon (6/case)
13013	24 oz Trigger (12/case)
13014	67 oz / 2 L (6/case)
13033	32 oz Trigger (12/case)

\* part number is for both industrial and retail

**DISCLAIMER**: The information provided with this MSDS is furnished in good faith and without warranty of any kind. Personnel handling this material must make independent determinations of the suitability and completeness of information from all sources to assure proper use and disposal of this material and the safety and health of employees and customers. Sunshine Makers, Inc. assumes no additional liability or responsibility resulting from the use of, or reliance on this information.

<sup>\*\*</sup>International Part Numbers May Differ.

# Appendix C

## Heat Stress and Cold Stress Guidelines

Form	Signs & Symptoms	Care	Prevention <sup>3</sup>
Heat Rash	Tiny red vesicles in affected skin area. If the area is extensive, sweating can be impaired.	Apply mild lotions and cleanse the affected area.	Cool resting and sleeping areas to permit skin to dry between heat exposures.
Heat Cramps	Spasm, muscular pain (cramps) in stomach area and extremities (arms and legs).	Provide replacement fluids with minerals (salt) such as Gatorade.	Adequate salt intake with meals <sup>1</sup> . ACCLIMATIZATION <sup>2</sup>
Heat Exhaustion	Profuse sweating, cool (clammy) moist skin, dizziness, confusion, pale skin color, faint, rapid shallow breathing, headache, weakness, and/or muscle cramps.	Remove from heat, sit or lie down, rest, replace lost water with electrolyte replacement fluids (water, Gatorade) take frequent sips of liquids in amounts greater than required to satisfy thirst.	ACCLIMATIZATION <sup>2</sup> Adequate salt intake with meals <sup>1</sup> , only during early part of heat season. Ample water intake, frequently during the day.
Heat Stroke	HOT <u>Dry</u> Skin. Sweating has stopped. Mental confusion, dizziness, nausea, chills, severe headache, collapse, delirium, and/or coma.	<ul> <li>HEAT STROKE IS A MEDICAL EMERGENCY</li> <li>Remove from heat.</li> <li>COOL THE BODY AS RAPIDLY AS POSSIBLE by immersing in cold (or cool) water, or splash with water and fan.</li> <li>Call for Emergency Assistance.</li> <li>Observe for signs of shock.</li> </ul>	ACCLIMATIZATION <sup>2</sup> Initially moderate workload in heat (8 to 14 days). Monitor worker's activities.

# **Heat Stress Guidelines**

#### Footnotes:

- 1.) American diets are normally high in salt, sufficient to aid acclimatization. However, during the early part of the heat season, (May, June), one extra shake of salt during one to two meals per day may help, so long as this is permitted by your physician. Check with your personal physician.
- 2.) ACCLIMATIZATION The process of adapting to heat is indicated by worker's ability to perform hot jobs less fluid loss, lower concentrations of salt loss in sweat, and a reduced core (body) temperature and heart rate.
- 3.) Method to Achieve Acclimatization Moderate work or exercise in hot temperatures during early part of heat season. Adequate salt (mineral) and water intake. Gradually increasing work time in hot temperatures. Avoid alcohol. Normally takes 8 to 14 days to achieve acclimatization. Lost rapidly, if removed from strenuous work (or exercise) in hot temperature for more than approximately 5 days.

Health and Safety Plan and Community Air Monitoring RG&E West Station Plant Area Rochester, New York Site No. V00593-8

# Appendix D

# **Community Air Monitoring Plan**





Consulting Engineers and Scientists

# Health and Safety Plan

# Appendix D - Community Air Monitoring Plan (CAMP)

RG&E West Station Plant Area Rochester, New York Site No. V00593-8 Index No. B-0535-98-07

Prepared For: Rochester Gas and Electric Rochester, New York

Submitted by: GEI Consultants, Inc., P.C. 90B John Muir Drive Suite 104 Amherst, New York 14228 November 2016



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Richard H. Frappa, P.G. Senior Consultant

Kelly R. McIntosh, P.E., Ph.D. Senior Consultant

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Community Air Monitoring Plan (CAMP) RG&E West Station Plant Area Rochester, New York Site No. V00593-8 October 2016

## Abbreviations and Acronyms

CAMP	Community Air Monitoring Plan
COC	Compounds of Concern
GEI	GEI Consultants, Inc., P.C.
HASP	Health and Safety Plan
MGP	Manufactured Gas Plant
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
РАН	Polycyclic Aromatic Hydrocarbon
PID	Photo-ionization Detector
ppm	Parts per Million
RAWP	Remdial Action Work Plan
SVOC	Semi-Volatile Organic Compound
VOC	Volatile Organic Compound
$\mu g/m^3$	Micrograms per cubic meter

# 1. Introduction

This document presents the Community Air Monitoring Plan (CAMP) that will be implemented during the Remedial Action at the RG&E West Station Former MGP Plant Area Site located on Falls Street in Rochester, New York. A CAMP is required by the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) at sites where ground-intrusive activities may result in airborne release of compounds of concern (COCs). This CAMP has been developed to monitor for total volatile organic compound (VOC) vapors, and for particulates (dust) which are the principal COCs resulting from intrusive activities performed during implementation of the Remedial Action Work Plan (RAWP) prepared for the Site.

The Remedial Action (RA) for the West Station Plant Area will initially consist of a predesign effort, which will include:

- characterization of soil and sediments on the Genesee River side of the Site;
- limited excavation of soils adjacent to the existing concrete retaining wall to assess its integrity, and;
- exploratory soil borings completed along the alignment of a new concrete barrier wall to be constructed during the implementation of the remedy.

Information derived from pre-design information will be used to guide the implementation of the remedy which will include;

- excavation, stabilization/dewatering and disposal of Genesee River sediments and river-side soils;
- Removal of former processing piping associated with the former MGP;
- Excavation and disposal of land-side soils;
- Construction of a new concrete barrier wall which will tie into the existing concrete barrier wall;
- Installation of DNAPL recovery wells, and;
- Placement of a 12-24" thick cover soil across the Site.

The objectives of this CAMP are to:

• Ensure that the airborne concentrations of COC are minimized to protect the community.

- Provide an early warning system so that potential emissions can be controlled on site at the source.
- Measure and document the concentrations of airborne COC to confirm compliance with the specified limits.

This CAMP is a companion document to GEI's site-specific Health and Safety Plan (HASP) which is directed primarily toward protection of on-site workers within the designated work zones.

# 2. Air Monitoring Equipment, Methods, and Action Levels

This section provides instructions for conducting the CAMP. Discussed are the COCs to be monitored, the equipment to be used, and the action limits. Community air monitoring will be performed for total VOCs and particulates (dust) during the excavation and backfilling activities performed at the Site.

In addition to the community air monitoring, work/exclusion zone monitoring will be performed during work activities where impacted soil may be encountered. The exclusion zone air monitoring requirements, equipment, and action levels are described in the sitespecific HASP for this project. Note, however, that the work zone air monitoring and the community air monitoring are conducted as part of the overall site control program. When work zone VOC or particulate readings are found to exceed the downwind CAMP limits, the field staff will check the upwind and downwind air monitoring instruments to assess whether control measures will be required.

# 2.1 Monitoring Locations

Air monitoring locations will be established at the start of each workday. A minimum of one station located upwind of the work area, and one located downwind of the work area/exclusion zone will be placed at the Site perimeter as determined by the prevailing wind direction at the start of the day. The purpose of the upwind station will be to determine the background concentration of VOCs and particulates at the worksite. The downwind monitoring station will be used to assess compliance with the NYSDEC/NYSDOH specified action limits for VOCs and particulates. The upwind VOC and dust measurements will be subtracted from the downwind measurements in order to compare the downwind instrument readings to the CAMP action levels. Additionally, a station will be placed on the Pont de Rennes pedestrian bridge at the south end of the Site to monitor air quality near potential receptors at the upper rim of the Genesee River Gorge.

The location of the each monitoring station will be noted on a Community Air Monitoring Daily Data Sheet. The locations of the instruments may be changed during the day to adapt to changing wind directions. Each location will be noted on the Daily Data Sheet, along with the start and stop time at each location. Field personnel will be prepared to move the equipment to multiple locations in the event that there is little wind, if the wind direction changes frequently, or if there is a change to the location of the most sensitive downwind receptor location. It is not anticipated that any work area will be within 20' of any occupied structure during implementation of the RAWP. However, if any work area is less than 20 feet from the nearest occupied building, a downwind air monitoring station will be positioned at the air intake for the building or at the most sensitive exposure point for the downwind receptors. Background measurements inside the building will be made prior to the start of work. If exceedances of the action levels are measured at the outside wall of the building, additional measurements will be made inside the building using portable meters.

If necessary, precautions to minimize the release of VOCs and particulates will be taken at the work zone, and engineering or work controls used to protect the downwind receptor. These controls for minimizing releases from the work zone are discussed in Section 3.

# 2.2 Air Monitoring Equipment

The monitoring instruments will be calibrated at the start of each workday, and again during the day if the performance of an instrument is in question. The time and method of calibration will be noted on the Daily Data Sheet. Both the photo-ionization detectors (PIDs) and particulate meters will be mounted on a tripod in a vented protective case, and programmed to record 15-minute averages. A monitoring technician will check the instrumentation at each of these locations regularly during the workday to ensure that they are operating properly.

## 2.2.1 VOC Monitoring Equipment

VOC monitoring will be performed using PIDs (RAE Systems MiniRAE<sup>™</sup> or equivalent) equipped with a 10.2 or 10.6 eV bulb. The instruments will be set to record 15-minute running average concentrations. The PIDs will be equipped with an audible alarm to indicate an exceedance of the action level of 5 ppm total VOCs.

## 2.2.2 Particulate (Dust) Monitoring Equipment

Particulate monitoring will be performed using meters set to measure 10 micron and finer particulates (PM-10). Particulates will be monitored using an MIE DataRAM DR-2000l, TSI DustTrak<sup>TM</sup>, or equivalent, which is capable of measuring PM-10. The equipment used will be set to record 15-minute running average concentrations, for comparison to the action levels.

In addition to the instrument readings, fugitive dust migration will be visually assessed during all work activities, and the observations recorded. Per NYSDEC requirements, visible dust migration will not be allowed. If visible dust is observed to be migrating from the work zone, the work will be stopped and dust control measures implemented.

# 2.3 Monitoring Action Levels and Responses

The action levels and responses for VOCs and particulates are presented in Table 1.

## Table 1. Air Monitoring Response Levels and Actions

VOCs				
Response Level	Actions			
>1 ppm at the wall of an • occupied structure or at an air intake	Check the indoor air concentration and compare with background measurements taken previously			
>5 ppm above	Temporarily halt work activities			
background for 15- minute average	Continue monitoring, especially inside of occupied structures Perform work during cold weather			
•	If VOC levels decrease (per instantaneous readings) below 5 ppm over background, work activities can resume			
Persistent levels >5	Halt work activities			
ppm over background •	Identify source of vapors			
but <25 ppm	Corrective action to abate emissions			
•	Continue monitoring			
•	Resume work activities if VOC levels 200 feet downwind of the property boundary or half the distance to the nearest potential receptor is <5 ppm for a 15-minute average			
>25 ppm at the perimeter of the work area	Shut down work			
Particulates				
Response Level	Actions			
>100 µg/m <sup>3</sup> above	Apply dust suppression			
background for 15-	Continue monitoring			
minute average or	Continue work if downwind PM-10 particulate levels are <150 µg/m <sup>3</sup> above upwind			

minute average or visual dust observed leaving the site	<ul> <li>Continue work if downwind PM-10 particulate levels are &lt;150 µg/m<sup>3</sup> above upwind levels and no visual dust leaving site</li> </ul>
>150 µg/m³ above	Stop work
background for 15-	<ul> <li>Re-evaluate activities</li> </ul>
minute average	Continue monitoring
	<ul> <li>Continue work if downwind PM-10 particulate levels are &lt;150 µg/m<sup>3</sup> above upwind levels and no visual dust leaving site</li> </ul>

Sources:

- NYSDOH Generic Community Air Monitoring Plan, December 2009, as published in NYSDEC DER-10, Appendix 1A, 2010.
- Fugitive Dust and Particulate Monitoring, NYSDEC DER-10, Appendix 1B, 2010.
- Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures, NYSDOH.

All data will be downloaded to a computer on a daily basis and saved for review. The data will be provided to the NYSDEC and/or the NYSDOH upon request at any stage of the project.

If VOC or particulate action levels are observed to be exceeded during the workday, the event, the source, and corrective actions taken will be recorded on the Daily Data Sheet and reported to the on-site NYSDEC representative, if present. If an on-site representative is not present, exceedances will be noted in the daily report to the NYSDEC project manager within one business day.

Fire, Police, Ambulance		911
NYSDEC Contact	Keith Gronwald, P.E. – Project Manager	(office)
RG&E Contact	Christopher Keipper – Project Manager	(585) 771-4560 office (585) 363-3204 cell
RG&E	Outage Central	1-800-743-1701
Emergency	Natural Gas Emergency	1-800-743-1702

## Table 2. Emergency Contacts and Telephone Numbers

# 2.4 Odor Monitoring

The field personnel will record observations of odors generated during the implementation of the Remedial Action Work Plan (RAWP). Odors will be recorded as weak, moderate, or strong, based on olfactory responses. When odors attributable to the exposing of impacted media are generated in the work area during excavation, observations will also be made at the downwind limit of the Site. The observations will be made to assess the potential for significant odors reaching on-site receptors or being transmitted off site. The downwind odor monitoring will be performed in conjunction with the PID and dust monitoring program described in this CAMP.

Upon detection of strong odors at the site perimeter, site controls, starting in the work area, will be implemented. The site controls described in Section 3 will be used to assist with odor mitigation. Note that the goal of the Odor Management Plan is to minimize and to prevent, where practicable, the off-site migration of odors. Due to the short distances between some work areas at the site and the property lines of on-site receptors, site controls may be implemented proactively when odors are detected in the breathing zone in some work areas.

There are no action levels specified for odors. In the event that odors persist at the downwind receptors or property line after control measures are carried-out, the odor conditions will be discussed with the RG&E and NYSDEC project managers.

# 3. Control Procedures

A dust, odor, and organic vapor control and monitoring plan (DOOVC Plan) will be developed for on-site remedial construction work activity that will meet CAMP requirements and OSHA standards for construction (29 CFR 1926) after selection of the final remedy. The DOOVC Plan will specifically address work practices to minimize dust, odors and vapors during all remediation construction activities.

# 4. Documentation and Reporting

A Daily Data Sheet will be filled-out each day to record all of the details of the CAMP work. The form will be used to record the following information:

- Date and weather, with significant changes noted which may affect the positioning of the meters or recording of the data.
- Calibration results for the instruments.
- Locations of the upwind and downwind monitoring stations, and any changes made to the locations during the day to adjust for changing work locations or wind directions.
- Any significant readings made during the day, such as exceedances which occur and their causes.

Additional information will be noted in the project fieldbook(s), as necessary.

The electronic measurements from the PIDs and dust meters will be downloaded each day, reviewed, and archived. Exceedances of the action levels, if any, and the actions to be taken to mitigate the situations, will be discussed immediately with the on-site representatives, or reported within one business day to the NYSDEC project manager (if on-site NYSDEC oversight is not provided). The results of the daily CAMP monitoring will also be discussed in the daily written report to the NYSDEC project manager. Summaries of all air monitoring data will be provided to the NYSDEC or the NYSDOH upon request.

CAMP odor monitoring results will be recorded in the field log book and/or the Daily Data Sheet, and will also be available for review by the state agencies.